UNDERSTANDING INNOVATION IN HYBRID TEAMS: THE MODERATING ROLE OF PSYCHOLOGICAL SAFETY ON LEADERSHIP STYLES

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Thesis Abstract

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Work as we know it has changed. Numerous studies have previously explored the role of leadership and its impact on innovation in conventional team settings. Studies have also explored how psychological safety can have various positive impacts at a team and individual level, however there is not much in the literature exploring the intersection of these topics in less conventional contexts (e.g. virtual and/or hybrid teams). The proposed research studied leader style and its' ability to foster innovation in today's largely virtual or hybrid working environment through the moderating effect of psychological safety.

A survey methodology was employed to investigate the relationship between different leadership styles, Psychological Safety (PS), and Innovative Work Behaviours (IWB) in hybrid or virtual teams. Targeting individuals who were part of virtual teams across the capital projects and technology organisation within a top (Fortune 100) multinational energy firm, data were collected from 149 team members on 31 teams to capture their perceptions across these variables of interest. It was hypothesized that leaders who exhibit higher levels of Transformational Leadership behaviours will experience more IWB from team members, which was confirmed via HLM analysis. Additional hypotheses exploring the inverse relationship between Transactional Leadership and IWB, and the moderating role of PS, were also substantiated. Implications, limitations, and areas of future study are also discussed.

KEYWORDS: LEADERSHIP, PSYCHOLOGICAL SAFETY, INNOVATION, HYBRID TEAMS, VIRTUAL TEAMS, TRANSFORMATIONAL AND TRANSACTIONAL LEADERSHIP, INNOVATIVE WORK BEHAVIOURS, GLOBAL TEAMS

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CHAPTER 1

Introduction

This doctoral thesis seeks to explore the interplay between leadership style and innovation in the context of virtual/hybrid teaming, which is an area that over time has surged in significance in contemporary research. The aim of this study is to deepen the understanding of leadership in the complex and ever-changing digital working world which has substantial implications for leaders, HR practitioners, and researchers alike. Despite its importance, the topic remains underexplored and not well understood, particularly in the constituent context of multinational industry and the energy sector. In the following text, we will explore how this research aims to fill this gap by employing a quantitative cross-sectional design to examine leader style influence on innovative work behaviours in geographically dispersed teams through the moderating influence of psychological safety. Through this work, I aspire to contribute meaningful insights to the field of organisational leadership and behaviour, providing valuable implications for both theory and practice alike. This introduction covers a brief background and context, explores the research objectives and questions, as well as the theoretical and practical significance of the study.

Background and Context

In today's interconnected world, virtual teams have become a popular way for organisations to complete complex projects that require specialized skills and diverse knowledge. These teams consist of individuals who work together from separate locations and communicate and collaborate through technology. While virtual teams offer benefits such as increased flexibility, reduced costs, and access to a larger talent pool, they also face unique challenges, including communication barriers, lack of trust, and social isolation (Bell and Kozlowski, 2002; David & Bryant, 2003; Agrawal, 2012). Therefore, organizations must understand the factors that can contribute to the success of virtual teams.

One critical factor found to impact virtual teams' success is leadership (Admovic, 2018; Ale Ebrahim et al., 2011; Davis & Bryant, 2003; Bell & Kozlowski, 2002).

In a virtual context, leadership involves the ability to influence and inspire team members who are dispersed geographically and may have diverse cultural backgrounds and time zones. Leadership styles used in a virtual context can significantly impact team outcomes and team climate, including innovation and psychological safety (Yin et al., 2020; Förster, 2019; Jha, 2019; Javed et al., 2019; Scheepers et. al., 2018). Innovation refers to the team's ability to create new and valuable ideas, products, or services. (Alrowwad & Abualoush, 2020; Andriopoulos & Lewis, 2009; Baregheh et. al., 2009; Agbor, 2008) Psychological safety refers to the belief that it is safe to take interpersonal risks within a team without fear of negative consequences. (Chandrasekaran & Mishra, 2012; Carmeli et al., 2010; Blumenfeld et al., 2000; Edmondson, 1999).

Despite significant attention to the impact of leadership on virtual teams (Wang & Kim, 2020; Huang et al., 2018; Liao, 2017; Agrawal, 2012; David & Bryant, 2003), there is still a lack of research examining the relationship between leader style, psychological safety, and innovation in a virtual and hybrid context. Specifically, it is unclear how different leadership styles may positively (or negatively) impact innovation in virtual or hybrid teams and the potential implications of that impact for leaders who manage these types of teams.

In today's working world, technology has become indispensable, fundamentally transforming how businesses operate and how employees perform their roles. It has enhanced efficiency, facilitated remote collaboration, and served as an enabler of innovation, proving critical for competitive advantage in a rapidly evolving global marketplace. As technology continues to evolve ways of working, so do globalization, changing environmental, social, and corporate governance expectations, and undulous consumer attitudes that continue to change in ways that were unimaginable decades ago. As such, the pace of change is hastening. The workforce that will deliver new and innovative technologies will be part of the growing "knowledge economy" and will need to work differently to unlock innovations and improvements for generations to come. Thomas Malone predicted in his book *The Future of Work* (2004) that organizations and industries would evolve from centralized management to decentralized decision-making. These changes call for employees to be both energized and empowered to deliver results, bring improvements, and innovate for future challenges. These changes have not only come to fruition, but have also been exacerbated by technology, societal and

economic drivers that have shifted, and a knowledge economy that calls on employees to bring their value through their voices and ideas. Some contend that, particularly in westernized environments, the paradigm has already shifted from the "knowledge economy" to the "creativity economy," wherein the ability to succeed and develop in the future hinges on the creative prowess of your staff. (Nussbaum, 2005).

The complex backdrop of the energy transition for large multi-national companies presents a fertile ground for research, in particular, it can provide a compelling examination of how varying leadership styles influence the innovative capabilities of teams during this critical period of ecological and economic transformation. Creating a sustainable energy future is now a primary focus of the global energy economy, playing a crucial role in the research and development efforts and operational activities of energy firms and industries across the board. This transition from legacy carbon-heavy products towards low to no carbon products and services will take innovation, as well as fostering customer sentiments and behaviors to adopt these new sustainable technologies (Sovacool, 2016). It is well understood that “what got you here, won’t get you there” as popularized by the oft-quoted executive coach, Marshall Goldsmith. The same is true for energy firms pivoting during this energy transition. This transition means that society must move away from our current global energy system and towards a system that is more sustainable with lower to zero emissions. As for how long it will take, it has been widely debated but can be defined as a period of at least 40 years (Sovacool, 2016). A period in which energy companies, and most major industries in general, need to develop and implement effective strategies to decarbonize their operations, products, and supply chain to meet the overall demands of the Paris Climate agreement, circa 2015, and subsequent evolving energy policy updates and legislative rulings. With increasing environmental stewardship and a sense of urgency to ensure that the environmental sustainability goals of industries are achievable, measurable, and progressive, the veritable ‘burning platform’ and the case for change are obvious. The personnel tasked with implementing these novel and inventive technologies to facilitate the shift towards sustainable energy will be integral to the expanding knowledge economy and will be required to operate differently to realize the needed changes to help us decarbonize society. Considering the growing imperative to address current and future energy

challenges in a creative, innovative, and sustainable manner, knowledge workers have never been more required to devise sustainable energy solutions by generating and assessing novel concepts, formulating implementation strategies, and communicating concepts to teams while soliciting feedback in order to improve existing solutions. To facilitate these innovative outcomes, and minimize personal risk to employees, teams will need to form bonds, feel safe, and engender trust towards one another to meet their full potential (Gibson and Gibbs, 2006). An outcome that is potentially even more difficult to achieve when many are working remotely and may not have even met their colleagues in person.

Companies are no longer bound by the proximity of their employees to an office location to deliver strategic outcomes. Traditional teams, which work collocated and interact primarily face-to-face may not fully leverage the broad and diverse resources and skills available in different areas of a multinational company (Bell and Kozlowski, 2002). This has led to an increasing number of functioning teams that are geographically dispersed, digitally enabled, and are referred to as virtual, dispersed, and/or hybrid teams. Effective leadership is critical for virtual and hybrid teams tasked with generating the innovative outcomes required for this unprecedented transition, as it fosters communication, collaboration, and creativity across digital channels, overcoming geographical and physical barriers to innovate and execute strategically (Ale Ebrahim et al., 2011; Govindarajan et al., 2010; Agrawal, 2012). As such, being a leader has become even more challenging, as managing organisations and teams now requires adaptive leadership styles and effectively using technology to oversee and inspire teams which are geographically dispersed (Hertel & Orlikowski, 2015). Furthermore, as recent events have showcased, the boundaries between work and life continue to shift and shrink, with external events and world news impacting the working cultures of companies in every industry; white-collar employees are being incentivized to bring more of themselves and their ideas to the workplace. To capitalize on the collective genius of their workforce, modern enterprises are looking deeply at their cultures and ways of working to reinforce behaviors that bolster creativity, innovation, and decision-making deeper down in the company hierarchy (Naqvi et al., 2019). It should be of little surprise, therefore, that leadership style can and should impact both culture, ways of working and innovation within organisations (Fransen et. al., 2020; Yin et. al, 2019; Carmeli

et al., 2010), and becomes even more worthy of exploration in the context of dispersed, hybrid, or virtual teams.

This section has aimed to outline the nuanced background and context and the pronounced criticality of leadership in fostering innovation, further contextual evidence was given for the complexity inherent within multinational, dispersed teams of organisations navigating the complexities of the global Energy Transition.

Problem Statement

The COVID-19 pandemic has dramatically increased the reliance of organisations on dispersed, virtual teams, making it imperative for leaders to understand how to create an environment that fosters psychological safety and innovation in a virtual context. However, research in this area is limited, leaving a significant gap in the knowledge base. This study aims to fill this gap by examining the relationship between different leadership styles, psychological safety, and innovation in virtual and/or hybrid teams.

Research Objectives

Specifically, this study aims to:

- Examine the relationship between leadership styles and innovative behaviours in virtual or hybrid teams, or in other words, does leadership style have an impact on innovative work behaviours?
- Investigate the moderating influence of psychological safety in the same context, for instance, does leadership style impact innovative work behaviours more significantly when psychological safety is higher?

Significance of the Study

This study has significant implications for organisations that use virtual or hybrid teams to complete complex innovative projects and deploy geographically distributed teams to achieve business outcomes. By understanding how different leadership styles may impact innovation in this context, leaders can create an environment that fosters creativity and collaboration, ultimately leading to increased team performance, company profitability, and long-term economic

success. The additional lens of psychological safety as a moderating element of the relationship between leaders' style and innovation may help to further unlock pertinent insights for managers who are leading in this new digital age. The study's findings may also inform the development of training programs for virtual team leaders, aimed at improving their ability to manage teams in a virtual context. Finally, the study will contribute to the literature on hybrid/virtual teams, leadership style, psychological safety, and innovation.

Defining Key Terms

Leadership Style: refers to the broad study of leader-follower relationships. For this study, the Full Range of Leadership model is used, which presents leadership across a continuum of transformational leadership and transactional leadership. This important model was first explored from the premise that people can be fundamentally changed by the leader-follower relationship (Burns, 1978) and was further evolved into a leadership continuum by Bass, Avolio, and other scholars to include transactional leadership. (Bass & Avolio, 1995).

Innovative Work Behaviours: the development and initiation of novel and useful ideas along with the implementation of those ideas into new or improved products, services, or ways of working within an organisation (Asfar at al., 2014; Baer, 2012; Baregheh et al., 2009; Janssen, 2000).

Psychological Safety: the belief that it is safe to take interpersonal risks within a team without fear of negative consequences. (Chandrasekaran & Mishra, 2012; Carmeli et al., 2010; Blumenfeld et al., 2000; Edmondson, 1999).

Hybrid, virtual, dispersed teams: teams which are formed via virtual means to construct and implement significant global strategies, solve challenges, and sustain the organization (Trautrims et al., 2016), often geographically dispersed and digitally enabled. For the purposes of this study, virtual, dispersed, and/or hybrid teams will be referred to as hybrid teams.

Thesis Layout

This thesis is structured into five chapters, each serving a distinct purpose in exploring the chosen research topic. Chapter 1 has set the stage for the present research by outlining the research problem, objectives, and the significance of the

investigation, along with key terms. It has provided a comprehensive background that contextualizes the study within its broader academic and professional milieus, delineating the scope and the specific questions the research aims to answer.

Chapter 2 presents the Critical Literature Review, which delves into a robust examination of existing research related to the study's focus. This chapter synthesizes and critiques the body of literature on the subject topics, identifying gaps that the current study seeks to fill. It sets the theoretical framework that underpins the research, grounding the study in established knowledge while highlighting its contribution to the field.

Chapter 3 outlines the Methods, which details the research design and methodology employed to address the research questions. This includes the description of the research setting, participants, data collection techniques, and the methods used for data analysis. This chapter ensures the study's replicability and transparency, providing a clear roadmap of the procedures followed.

Chapter 4 presents the Results where the findings of the research are explored in a structured manner. It reports on the data analysis outcomes, providing a factual basis for the study's conclusions.

Chapter 5 includes the Discussion where interpretations of the results are presented in the context of the research questions and the theoretical framework established in earlier chapters. It discusses the implications of the findings for both theory and practice, addressing the research's contribution to knowledge and suggesting areas for future investigation. This final chapter also reflects on the study's limitations, offering a critical appraisal of the research process and outcomes.

Chapter 6 includes the Conclusion and includes areas of future research. It also includes some reflections and acknowledgements from the researcher.

Together, these chapters form a coherent thesis that advances a specific area of knowledge, contributing to academic canon and offering implications for practical application.

Chapter 2

Critical Literature Review

This chapter presents a Critical Literature Review, offering a thorough investigation of the existing research pertinent to the study's focus. The scope of this study relates to leadership style, innovation, and psychological safety within the context of hybrid teams, thus this work contributes to these specific literature streams. This chapter also establishes the theoretical framework that underpins the research study, situating it within the broader context of established knowledge and delineating its' contributions to the field, as well as offering a synthesized critique of the literature spanning the subjects of interest, pinpointing gaps that this study aims to address.

Theoretical underpinnings

First, we take a look at the extant knowledge covering hybrid teams. The rise of virtual teaming has radically changed the workplace by enhancing flexibility and boosting productivity, thereby reshaping modern work dynamics and setting new standards for how global businesses operate. Dispersed teams are formed via virtual means to construct and implement significant global strategies, solve challenges, and sustain the organization (Trautrims et al., 2016). A hybrid team is also formed largely via virtual means, but with some members potentially sitting collocated to an office location creating a sometimes in-office and sometimes at-home dynamic within a dispersed team.

The significance of leadership in a virtual context has been discussed through a variety of lenses, and it is widely understood that the challenges of leading virtual teams and the impact of the leader's style can have significant outcomes on a virtual team's success or failure. (Kayworth and Leidner, 2002; Davis and Bryant, 2003; Liao, 2017; Zhu and Lee, 2017; and Nordbäck, 2018). For the sake of this study, hybrid, dispersed, and virtual teams will all be referred to as hybrid teams.

Changes, partly catalysed by the global COVID-19 pandemic, have availed previously inaccessible opportunities in innovation and productivity through wider accessibility and transferability of skills across a dispersed organisation. As we have moved from pandemic to endemic, the ability to work remotely through telecommuting has become significantly more important not just from a productivity standpoint, but also from an employee attraction and retention perspective, and remains an integral facet of the way organizations will continue to operate. More than a year after the pandemic began, roughly 70% of full-time office employees in the U.S. were still working remotely (State of Remote Work, Owl Labs, 2021). Furthermore, 97% of American office workers cited working from home more than 1 day a week had become the norm, (88% globally) (Global Work-from-Home Experience Survey, Global Workplace Analytics, 2020). Even now, more than four years on from the start of the COVID-19 pandemic, evidence suggests that telecommuting is still 3-4x as prevalent than pre-2019 (Smart, 2024).

There are also other dynamics at play as companies shift towards hybrid teams. For one, companies have become more participative and democratic, which has resulted in a change in not only management structures (becoming more flat), but also in how employees are engaged and how they deliver within a complex matrixed corporate environment. Communicating across geographical boundaries, spanning time zones, with team members having varying experience levels, skill sets, and cultural lenses, amongst other challenges, can present significant hurdles as the team works to progress tasks and/or strategic initiatives (Bell and Kozlowski, 2002). These hurdles exacerbate various aspects of conflict in management and communication issues across language barriers, which can disrupt trust and increase in-group conflict among the team members (Jimenez et al., 2017).

Given the dynamic shifts in work culture, there are several challenges associated with operating highly productive and innovative dispersed teams. In the context of these teams, the role of the leader becomes even more pertinent in addressing some of the challenges to ensure the productivity and success of the team. More recently, psychological safety has also been introduced as a differentiator for teams operating in a variety of contexts (Newman et al, 2017). Whilst much has been explored on the impact of leadership on psychological safety in various

contexts (Edmondson, 1999; Nembhard, 2006; Carmeli et al, 2010; Bienefeld and Grote, 2014; Mao et. al, 2019), there has been a limited emphasis on leadership and leader style in the context of hybrid teaming and the associated impact on team psychological safety and innovation. This study aims to add to the nascent discourse on leadership's role in increasing innovation by creating psychological safety for teams in hybrid contexts.

Whilst no single leadership style, such as autocratic, democratic, or delegative seems to be superior in engendering psychological safety within teams, the attributes of transformational leadership present a promising frame to explore. Transformational leadership style is known to inspire followers to rise above self-interests to attain higher performance and is typically made up of four distinct attributes: Idealized Influence- Attributed and Behavioural, Inspirational Motivation, Individualized Consideration, and Individual Stimulation (Bass, 1985). Early research suggests that leaders who adopt a transformational orientation in line with these four attributes foster the characteristics of a 'learning organisation' better than other leadership styles (Yukl, 2002; Mao et al, 2017). The characteristics of a learning organization are defined by psychological safety, openness to diverse opinions, and participation in decision-making (Nemanich and Vera, 2009). In contrast, a transactional leadership style is aimed at motivating employees through incentivizing, monitoring, and controlling behaviors and can be described as a foil to that of transformational leader styles (Bass, 1985). Transactional leadership is most often described through two distinct behaviors: contingent reward and management by exception (Active), the first being characterized by leadership behaviors focusing on the exchange of resources and the second characterized by monitoring and correcting employee performance as needed. A third leadership behavior included by Bass is called Transactional-Passive which includes laissez-faire and management by exception (passive) and is more often labelled as non-leadership or avoidant leadership (Bono and Judge, 2004).

Some of the challenges associated with virtual working and leading hybrid teams can be especially intimidating when aiming for innovative outcomes. Though various definitions abound for both what constitutes creative work and innovation, simply put, creativity can be considered the generation of novel and useful ideas

while innovation can be considered the implementation of those ideas (Mumford and Gustafson, 1988; Amabile, 1983; Anderson et al., 2014). Creative work is typically carried out by individuals, while innovations are thought to be realized at an organisational level; though this has changed somewhat considering research exploring innovations contributed by individuals (Baur et al., 2003; Norbäck, & Persson, 2012; Koh et al., 2019). At an individual level, innovative work behaviors (IWB) have a clearer applied component with measurable outcomes than perhaps creativity itself, which includes: a recognition of a problem that needs to be solved, the initiation and intentional use of new ideas as well as the behaviours needed to develop, launch and implement said ideas (Afsar et. al, 2014).

When combined, the elements of virtuality, geographic dispersion, national diversity, technology dependence, and a dynamic structure can have significant negative impacts on innovation if not carefully considered. To clarify, hybrid teams face unique challenges in creating psychological safety across different communication modalities, cultural differences and time zones (Castro et. al, 2018; Newman et. al, 2017). Exchanges that occur online may appear more formal or permanent increasing fear or anxiety about sharing out of the box ideas or being critical of existing ways of working (Pullen, 2022). Spontaneity and immediate feedback, like when you run into someone in a corridor or near the coffee machine don't happen can limit the sparks which incite creativity and innovation (Pullen, 2022; Hughes et al., 2018). Since we know that the psychological conditions of the team influence innovation, these challenges should be carefully considered and mitigated. Research carried out by Gibson and Gibbs (2006) suggests that these negative impacts can be overcome by creating a psychologically safe communication environment. Even in less geographically dispersed teams, employee diversity can create differences in employee performance outcomes and the propensity to engage in "creative" work, however, leader inclusiveness and empowerment combined with a psychologically safe workplace has been found to positively impact both employee performance and creative or innovative outcomes (Singh et al., 2013; Zhang & Bartol, 2010). To elaborate, even in teams that are not geographically dispersed, employee diversity influences performance outcomes and engagement in creative work due to differences in cultural perspectives, cognitive diversity, and varied problem-solving approaches. For innovation and

problem-solving, team diversity can bring together a wide array of views, thoughts, and opinions which can enhance team outcomes, however these can be complicated by adverse social processes like coordination issues, communication style differences and interpersonal challenges which can make it feel less safe to engage in creative work (Elia, et. al, 2019; Hawlina et. al., 2019; Wang et. al, 2019; Yong et. al., 2014). Further, employees from different backgrounds can increase the collective creative problem-solving capacity of a team through varied cognitive frameworks, though psychological safety is a must to maximise the benefits. Attah et. al, 2024; Salazar & Lant, 2018; Aggarwal & Woolley, 2013).

Other antecedents to organisational innovation include decentralized structures, well-understood corporate policy, and processes, as well as high social connectivity (Jansen et al., 2005). Engaging in creative work and employees' displaying learning behaviors has also been directly linked to new idea generation which has resulted in improvements and innovation within the corporate context (Naqvi et al., 2019). Somewhat more promising is literature pointing to straightforward evidence that transformational leadership can positively impact creativity and innovation at individual, team, and organisational levels of measurement (Bunjak et. al., 2022; Gong et.al., 2009; Gumusluoglu & Ilsev, 2009).

Given the increasing drive to be creative, innovative, and sustainable to combat the present and future challenges, and with the current trends we see in the globally connected and highly social world around us, there has arguably never been more demanded from knowledge workers. To facilitate these outcomes, and minimize personal risk to employees, teams will need to form bonds and engender trust towards one another to meet their full potential (Gibson and Gibbs, 2006). In other words, they need to feel safe. A psychologically safe workplace has been defined in numerous ways, however, the definition best suited for this study is '[a workplace] in which employees feel safe to voice ideas, willingly seek… and provide honest feedback, collaborate, take risks and experiment' (Edmondson, 1999). Further, psychological safety has been found to be a key enabler in unleashing greater creativity, innovation, and productivity for teams and organizations (Newman et al, 2017). There has been some promising research

from practitioners and academics alike that suggests elements embedded within a psychologically safe workplace lead to better engagement, performance, and learning in a wide range of organizational contexts (Edmondson, Kramer, & Cook, 2004). Other tangible outcomes include increases in innovation, creativity, employee attitudes, communication, knowledge-sharing, and voice behaviors (Baer and Frese, 2003; Singh et al, 2013; Newman et al, 2017). Research examining the relationship between psychological safety and its outcomes leverages social learning theory, social information processing theory, social identification theory, and social exchange theory to study the impacts on teams (Newman et al, 2017). Other studies have demonstrated that inclusive leadership behaviors can have a positive impact on psychological safety (e.g., increased productivity, creativity, and knowledge sharing and learning) (Singh et al., 2013; Chen et al., 2014; Lui et al., 2014).

Hypotheses and theoretical model

In the context of conventional teams, there is extensive research about leadership style and its impact on various performance outcomes, including innovation. There is also ample literature exploring psychological safety's impact on team and individual outcomes, however, as it relates to environmental aspects like hybrid teams, research is lacking. A rigorous assessment of how leaders can potentially unlock new strategies to increase innovation in global work teams is necessary given the prevalence of virtual and hybrid workers. Therefore, this study investigates the impact of leader style (transformational and transactional) on fostering effective ways of working to increase innovation. The research also explores how the presence of psychological safety may (positively) impact the innovative outcomes in a team. To do this, the study sought to understand the perspectives of individuals working in hybrid teams, namely how they perceive their leader or manager's leadership style, the level of psychological safety in their team, and innovative outputs from their team. The research seeks to address the following research hypotheses:

H1. Leaders who are high in transformational leadership behaviors will have a higher frequency of innovative work behaviors in the team in a hybrid context.

H2. Leaders who are high in transactional leadership behaviours will have a lower frequency of innovative work behaviors of the team in a hybrid context.

H3. Psychological safety positively moderates the relationship between leadership style and employees' innovative work behaviors in a hybrid context.

Exploring these hypotheses contributes significantly to both academic research and practical applications in leadership, the domain of Human Resources, and business management, particularly in the context of virtual or hybrid work environments which have become increasingly prevalent. Each hypothesis and its practical implications for inclusion are as follows:

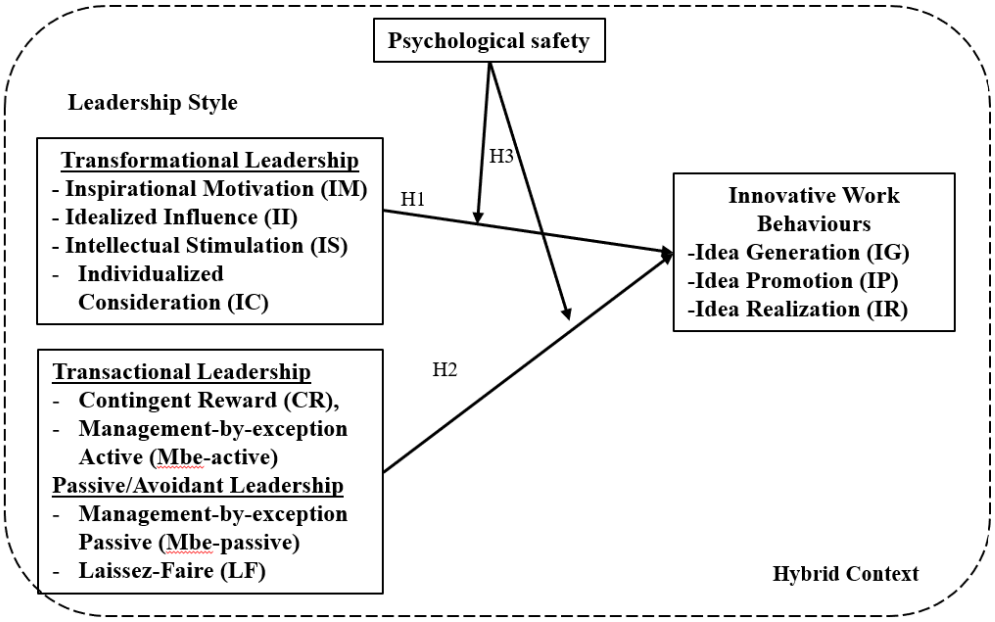
H1: The investigation into whether leaders who are high in transformational leadership behaviors enhances innovative work behaviors within their teams in virtual or hybrid contexts is important to explore how leadership can foster an environment conducive to innovation in the new normal of remote working conditions. This hypothesis suggests that transformational leadership, characterized by inspiring and motivating employees, encouraging innovation, and challenging the status quo, may be particularly effective in non-conventional work settings such as hybrid working. Understanding if there is empirical support for this could contribute to the academic canon by providing clear support for the effectiveness of transformational leadership in fostering innovation in a digital age. For leaders and HR/business practitioners, it could offer actionable insights into leadership development and training programs that emphasize transformational behaviors to enhance team innovation in hybrid teams.

H2: Exploring the impact of transactional leadership behaviours, which focus on clear structures, rewards, and penalties, on innovative work behaviors in hybrid contexts addresses whether traditional leadership methods can potentially stifle or support innovation. This hypothesis contributes to academic research by testing the applicability of transactional leadership theories in modern work environments. Understanding the potential constraints of transactional leadership in fostering innovation can provide leaders and practitioners with guidance to better support team creativity and innovation in virtual settings.

H3: This hypothesis explores the interaction of psychological safety on the other variables of innovation and leadership style in the context of hybrid teams; seeking to understand how an environment where employees feel safe to take risks without fear of negative repercussions might influence the relationship between leadership and innovation. For leaders and practitioners, it highlights the importance of fostering a psychologically safe work environment as a lever to enhance the effectiveness of leadership styles in promoting innovation, and the supportive context such as guiding policies and practices that can bolster such an environment.

Together, these hypotheses offer a comprehensive framework to explore the current research questions, as well as open other avenues for future research that can be explored in subsequent studies.

Figure 1. The theoretical model depicting the relationship between variables.



Literature Review

Leadership is one of the most important aspects of an organisation's success, and its influence on innovation would be difficult to overstate. A leader's style can

either help or hinder the innovation process, thus it is critical to understand the various leadership styles and how they affect individual and team innovation.

To come to some clear outcomes for this study, several variables will be explored to converge on the research questions posed. First, we consider leadership style with an emphasis on the Full Range of Leadership Model as introduced by Bass and Avolio and since studied extensively in various environments. Second, we explore innovation in the modern enterprise. Third, psychological safety and how leaders can impact it. As we know, context will be important, thus we will also seek to understand the factors that differ in a virtual or hybrid team perspective.

A note on the search criteria and strategy:

Articles included in the review were identified using Web of Science, where exclusion criteria included: articles published 2007 or later (unless classified as legacy or seminal research), context/setting needed to be institutional or industrial, and included in journals with at least a 9.0 impact factor as defined by Journal Citation Reports ™. A total of 352 articles were found using this exclusion criteria with the following search terms: (innovation OR creativity) AND ("psychological safety" OR "voice behaviour" OR "psychological empowerment") AND (transactional OR transformational) AND (leadership). After filtering by title and abstract, key articles were chosen, and then a snowball technique was then used by reviewing titles from the reference lists of the distilled articles.

Leadership, a view on the Full Range of Leadership Model

Here we explore the contrasting dynamics of transformational and transactional leadership styles, assessing their benefits and limitations as understood by the current research. A quick internet search on "Leadership" and "Leader Style" will produce over two billion results in about half a second, and yet these topics remain as elusive as ever. Thousands of paradigms over the years have explored and categorized leadership into distinct strata. An integrative definition of leadership was developed in 2006, and while the overall definition is more than 700 words, the thesis sentence gives a fairly comprehensive understanding of the role of a leader: "A leader is one or more people who selects, equips, trains, and influences one or more follower(s) who have diverse gifts, abilities, and skills and focuses the follower(s) to the organization's mission and objectives causing the follower(s)

to willingly and enthusiastically expend spiritual, emotional, and physical energy in a concerted coordinated effort to achieve the organizational mission and objectives (Winston & Patterson, 2006). Leadership can be seen as a process or an input to a system (Fischer et. al, 2017). Given the dynamic nature of leaders and their attributes, we will take the view that leadership is a process, where leader behaviors and/or attributes can affect performance-related outcomes like team and employee and organisational performance, innovation, and a variety of other measures are seen as outputs (Fischer et. al., 2017; Krishnan, 2012). Leadership can largely decide whether creative endeavours or innovative outcomes are going to thrive or become thwarted by organisational politics, fears, or self-serving behaviors (Tierney et al., 1999; Morales et al., 2012; Samad, 2012; Darwish et al., 2020). Leader style has not only been linked to an employee's motivation to embark on creative and improvement-type work, but also to learning behaviors, psychological safety, and employee performance overall (Naqvi et al., 2019; Nembhard and Edmondson, 2006; Carmeli et al., 2010; Singh et al., 2013), thus it provides a powerful variable in the investigation of maximizing innovation and psychological safety in virtual team settings. For this study, we will explore the Full Range of Leadership model which presents leadership across a continuum of transformational leadership and transactional leadership. This important model was first explored from the point of view of transformational leadership or the premise that people can be fundamentally changed by the leader-follower relationship (Burns, 1978) and was further evolved into a leadership continuum by Bass, Avolio, and other scholars to include transactional leadership which was further nuanced by passive/avoidant leadership including Laissez-Faire and management by exception-passive leadership styles (Bass & Avolio, 1995).

Transformational leadership

Generically speaking, a leadership method or style that can lead to changes in individuals and/or social systems is termed transformational leadership (Burns, 1978); further, in its ideal form, the changes in followers are both valuable and positive (Deschamps et al., 2016). Transformational leadership has evolved in the forty-plus years since its inception, though, unrelentingly the focus has been on fostering more intrinsic means of motivation and positively developing a leader's followers (Bass & Riggio, 2006). Leaders who adopt such a style can cultivate a valuable and positive change among their employees (e.g., followers) by satisfying

higher needs where they are empowered to be transformed into leaders (Burns, 1978; Deschamps et al., 2016). This type of leader is energetic, passionate, and enthusiastic, and focuses on activating the motivations of each of their followers to succeed not just in the organization's goals, but also in their individual goals (Buil et al., 2019).

It should be noted that 'idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration,' are the major components of the transformational leadership model (Avolio & Bass, 2002, 1994,). With the development and validation of the Multifactor Leadership Questionnaire, we have academically rigorous definitions of each of the components of transformational leadership (Bass, 1998).

> *Idealized influence - II (or charismatic leadership):* leaders serve as role models, are admired, respected, and trusted, and can be counted on to 'do the right thing.' Not just how the leader behaviors, but also how their behaviors are perceived as equally important (Bass & Riggio, 2006).
>
> *Inspirational motivation- IM:* leaders arouse inspiration and motivation by cultivating a shared vision and their expectations are clearly communicated. Enthusiasm and optimism about an attractive future state, and the followers' role is clear (Bass & Riggio, 2006).
>
> *Intellectual stimulation- IS:* leaders inspire creativity and problem-solving by reframing problems, questioning assumptions, and looking at situations from different angles. Open critique of mistakes is a non-starter and at an individual level, ideas are not criticized for simply being different from the leader's opinion (Bass & Riggio, 2006).
>
> *Individualized consideration- IC:* leaders exhibit curiosity and conscientiousness about each 'follower' and see them as a whole person, not simply an employee. Special attention is paid to an individual's needs for growth and achievement, and the leader acts as a coach and mentor (Bass & Riggio, 2006).

Empirical research on these concepts, including understanding the 'full range of leadership,' has spanned almost every institution and industry from the military, government, education, and into the private sector; and has revealed that

adopting a transformational leadership style can inspire and stimulate followers to achieve extraordinary outcomes, as well as to develop their leadership capacity in the process (Warumu et al., 2020; Ng, 2017; Choi et al., 2016; Avolio, 1999; Bass, 1999). Furthermore, additional studies have explored and found that the teams led by transformational leaders possess higher levels of performance and satisfaction, compared to groups led by leaders following other forms of leadership (Nugroho et al., 2020; Top et al., 2020; Eliyana & Ma'arif, 2019). Transformational leadership has also, helpfully, shown up repeatedly as a compelling ingredient in helping foster greater individual creativity as well as team and organisational innovative outcomes (Mahmood et al., 2019; Asfar et al., 2014; Samad, 2012; Pieterse et al., 2010; Gong et al., 2009; Gumusluoglu et al., 2009).

Transactional leadership

Often thought to be the natural foil or opposite end of the spectrum to transformational leadership, transactional leadership involves the directing and motivating of followers, primarily via the leader's self-interests (Alrowwad & Abualoush, 2020). In this leadership style, formal authority and responsibility in the organization provide institutional power to the leaders (Kark et al., 2018). Not only do leaders leverage their formal authority, but also reward or discipline behaviors based on the obedience of their employees (Dan et al., 2019; Ma & Jiang, 2018; Bass & Riggio, 2006). Contingent rewards, management by exception (active and passive), and Laissez-Faire are the four dimensions of this leadership style (Ekizler & Bolelli, 2020; Avolio & Bass, 2002, 1994).

> *Contingent Reward- CR:* leader assigns or obtains agreement from followers with promised or actual rewards offered in exchange for carrying out the assignment to the leader's satisfaction and is typically a tangible reward like compensation (Bass & Riggio, 2006).
>
> *Management by Exception- MBE:* leaders manage through corrective strategies by either actively or passively monitoring underperformance (Bass & Riggio, 2006).
>
> *Active:* leaders actively monitor deviances in performance standards and take corrective measures.

Passive: leaders take a more passive approach and wait to be confronted to react to underperformance deviations like errors and mistakes.

Laissez-Faire: While included under the umbrella of transactional leadership, this is the absence or avoidance of leadership. In other words, leaders avoid using their authority or influence in any tangible way (Bass & Riggio, 2006).

Leaders who use a transactional style tend to emphasize short-term goals, standard procedures, rules, and value attention to detail (Delegach, 2017). It is not as draconian as it appears and should be noted that this type of leadership has its' advantages, as it is particularly effective at cutting costs, enhancing productivity, as well as efficient decision-making (Sunarsi et al., 2021; Wahyuni et al., 2020; Hutagalung et al., 2020). A more transactional approach to tactically assigning projects, and team goals, and communicating directly has also been linked to enhanced team clarity and performance in virtual team settings (Gilson et al., 2015).

As espoused by Bass, Avolio, and Riggio, the concept of 'full range of leadership,' is one that encourages leaders to display a mix of attributes from both transactional and transformational leadership, as both types of leadership possess advantages and limitations in different contexts or situations (Bass & Riggio, 2006). Transactional leadership is responsive and works within the organizational culture of the team, whereas transformational leadership is proactive and works to alter the organizational culture via the implementation of novel ideas (Breevaart et al., 2014; Ahmad & Ejaz, 2019). Transactional leaders tend to use rewards and punishment to incent the achievement of managerial objectives, whereas transformational leaders appeal to higher ideals and moral values to motivate and empower employees for the achievement of organisational and individual objectives (Zagorsek et al., 2009). As mentioned, context is important, and as it relates to transactional or transformational leadership, while there are good indicators that the latter can be helpful for innovation, the former can be seen as a deliberate technique to ensure an equitable experience for teams that are geographically dispersed and reliant on technology (and therefore fewer context clues) to communicate (Gilson et al., 2015).

Ultimately, we have seen evidence that transformational leadership inspires and energizes, while transactional leadership provides clear structure and consequences for underperformance, each style possesses inherent strengths and limits that need to be carefully considered and matched to the organisational context, objectives and goals in order to achieve organisational success.

Creativity and Innovation

Here we unpack innovation; creativity and innovation serve as close kin which enable modern enterprises to catalyse forward momentum, setting the stage for competitive performance, market differentiation, and organisational growth. Workplace creativity refers to the cognitive and behavioural strategies used to try to produce original ideas, while innovation at work refers to the procedures used when trying to put fresh concepts into practice. Innovation specifically entails a combination of problem/opportunity identification, introduction, adoption, or modification of novel or pertinent organisational needs, the promotion of these ideas, and the actual implementation of these ideas (Hughes et al., 2018). Innovation and creativity are central to the survival and growth of the modern enterprise. Typically, organisational innovation has been studied from the perspectives of technical, administrative, or ancillary innovations and how organisational factors either promote or inhibit a firm's ability to innovate (Damanpour et al., 1989). Creativity and innovation at the team and individual levels has also been linked to organisational success. For instance, innovative organisations and teams often lead to reduced costs and improved productivity and can boost a firm's competitiveness, lead to new partnerships, enhanced brand value, and recognition, as well as reduced turnover and improved profitability (Turner, 2019). Creativity is an important aspect of the innovative process, in part due to research that has suggested that there are four key components to innovation, which are: collaboration, ideation, implementation, and value creation, where creativity is seen as a vital ingredient of ideation (Lages et al., 2020; Anderson et al., 2014). Creativity, while a distinct facet of the innovative process, is typically not studied independent of innovation and vice versa suggesting a strong process link between the two when it comes to innovative outcomes within organisations (Hughes et al., 2018). More recently, employee innovative work behavior (IWB) has been studied extensively within the context of the modern enterprise and refers to the development and initiation of novel and useful ideas

along with the implementation of those ideas into new or improved products, services, or ways of working within an organisation (Asfar at al., 2014; Baer, 2012; Baregheh et al., 2009; Janssen, 2000).

While individual employees play a significant role in each discrete element of innovation, leaders are crucial in influencing the organisational capacity and climate for creativity and innovation (Bunjak et al., 2022; DiLiello et al., 2006). In fact, studies have explored how both individual leader attributes and their behaviors can affect business innovation; including a leader's inclusiveness, empowerment and autonomy behaviors which can positively affect innovation (Hughes et al., 2018), along with the leader's low in risk appetite, need for achievement, and higher narcissistic quality which tend to reduce innovative outcomes (Mai et al., 2022).

The conditions under which innovation can thrive are also extensively studied, antecedents to innovation include decentralized structures, well-understood corporate policy and processes, perceived fairness as well as high social connectivity (Hughes et al., 2018; Raisch & Birkinshaw, 2008). In the context of modern teaming, some insight derived from empirical meta-analysis suggests that leaders and organisations at large need to remain ambidextrous or nimble to both exploit and explore both incremental innovation and new opportunities (Andriopoulos & Lewis, 2008) in kind. An employee's propensity toward creative work, knowledge sharing, and learning behaviors in general as influenced by leader style have also been found as positive steps along the pathway of innovation (Yin et al., 2020; Javed et al., 2019; Samad, 2012; Carmeli et al., 2010).

In sum, innovation stands as a fundamental pillar in the theoretical and practical conversations on modern business theory, bridging the gap between abstract creativity and practical execution, serving as the process by which new ideas are transformed into practices that reshape businesses.

Psychological Safety

In this next section we explore the current literature on psychological safety. A psychologically safe workplace has been defined as '[a workplace] in which employees feel safe to voice ideas, willingly seek and provide honest feedback, collaborate, take risks and experiment' (Edmondson, 1999). At an individual level, psychological safety feels like having the ability to show up as your full self without fear of negative consequences towards your status, self-image, or career (Castro et. al., 2018). Having psychological safety embedded in the company's culture has led to a positive team climate and better interpersonal relationships, which has been shown to improve employee retention (Pfeifer & Vessey, 2019), elevate revenue (Chandrasekaran & Mishra, 2012; Lenberg & Feldt, 2018; Higgins et. al., 2020), harness the power of diversity and improve 'speaking up' or voice behaviors (O'Donovan et. al. 2021; Obrenovic et. al., 2020; Hans & Gupta, 2018; Edmonson & Roloff, 2008), and double the effectiveness of managers (Förster, 2019). Especially powerful in the context of supportive learning behaviors, it has been reported in numerous studies that team psychological safety can lead to an increase of up to 70% in team engagement (Mahmoud et. al. 2021; Kim et. al., 2020). Additionally, increases in emotional (8%), health (14%), financial (15%), and professional (35%) well-being have been noted within teams with high degrees of psychological safety (Nguyen et.al., 2017; Agarwal & Farndale, 2017). While the benefits of psychological safety have been documented in various industries and contexts, it remains a somewhat elusive item to embed effectively.

That said, what we know suggests that a psychologically safe culture can be cultivated in a team in numerous ways in different situations. Overall, it is especially important to frame the work as a learning challenge, where acknowledging everyone's inherent fallibility, discussing mistakes openly, and modelling curiosity and inquiry is routine (Yin, et. al, 2019; Edmondson & Lei, 2014). Further, leaders play a significant role in fostering psychological safety in a team by leading by example, encouraging, and modelling active listening, creating a safe environment, and developing an open mindset (Jha, 2019; Scheepers et. al., 2018). Managers should cultivate ways of working that allow for regular touchpoints and connectivity that increases communication, and it can be especially important to provide clarity on priorities, constructive feedback on tasks, and check in on the career aspirations of the individual team members to

maintain high levels of team psychological safety (Lee et al., 2018; Triplett & Loh, 2018).

In this section, we have explored psychological safety as a construct of team climate and individual employee engagement which can have a positive impact on a number of organisational, team and individual outcomes.

Leadership and Innovation

We will now examine the existing literature on the intersection between leadership and innovation. This study seeks to explore the nuanced relationship between leadership styles—specifically transformational and transactional dimensions — and innovation. Transformational leadership, characterized by its' ability to inspire and motivate followers beyond their self-interests, plays a pivotal role in imbuing work with significance and challenge. In contrast, transactional leadership revolves around a system of rewards and penalties based on performance, with laissez-faire leadership—a subset of transactional leadership—emphasizing a hands-off approach that allows employees autonomy in decision-making and task execution.

Emerging research is mixed as to what extent distinct levels of transformational or transactional leadership can impact innovation. Leaders who adopt a transformational style can foster an environment ripe for creativity and risk-taking—which are essential elements for innovation (Oke et al., 2009). They encourage out-of-the-box thinking and risk-taking, thereby not only promoting creativity, but also driving meaningful work and intrinsic motivation (Gumusluoglu & Ilsev, 2009; Pieterse et al., 2010). Conversely, transactional leadership, with its' focus on rewards and punishments, might inhibit innovation by making employees more risk-averse, concerned more with metrics than with experimentation (Lee, 2008). However, studies in varied contexts suggest that when mediated by high intrinsic motivation and knowledge-sharing behaviors, transactional leadership can indeed support creative and innovative behaviours (Hussain et al., 2017; Faraz et al., 2018).

The laissez-faire leadership style, regardless of context, tends to negatively impact team innovation. It is lack of direction and control can lead to confusion and

demotivation, thereby stifling collaboration and innovation (Khan et al., 2012; Ahmed et al., 2019).

In the modern knowledge economy, innovation has become a cornerstone, acting as a key determinant of performance, success, and longevity for organizations. The last quarter-century has seen it solidify as a major competitive advantage, necessitating a focus on the ideation and implementation process (Anderson et al., 2014). Research into the determinants of an innovative company culture or work environment has highlighted the importance of task, social, and leadership contexts, among others, in fostering innovation (Anderson et al., 2014). Leaders are tasked with creating environments that not only generate new ideas but also balance operational needs to facilitate implementation.

The seminal study by Tierney et al. (2006) on nearly 200 R&D firms examined the influence of leader characteristics and leader-member exchange (LMX) on creativity, revealing that both an employee's and a leader's intrinsic motivational orientations can significantly enhance creativity. The study also found that LMX could explain variations in employee creativity, with the dynamics between employee and supervisor playing a crucial role.

Innovation-centric leadership involves creating a culture of openness, encouraging the sharing of ideas, and providing safe spaces for experimentation. This approach not only fosters organizational agility and collaboration but also celebrates success and learns from setbacks (Holbeche, 2015). Factors such as supervisory support, developmental feedback, and empowerment behaviours are instrumental in enhancing innovative behaviours (Anderson et al., 2014).

Diverse leadership styles, including entrepreneurial, transformational, charismatic, and participative, have been identified as beneficial for fostering innovation within teams (Newman et al., 2018). Interestingly, research has also shown empirical correlations between transformational and transactional leadership styles and innovation, with transformational leadership often linked positively to creativity and innovation. Certain aspects of transformational leadership are deemed more conducive to innovation than others (Mahmoud et al., 2019; Gong et al., 2009), while some research even suggests positive associations between transactional leadership—specifically the contingent reward component—and innovation (Chang et al., 2015).

The role of transformational leadership in enhancing a firm's ability to assimilate external knowledge and foster internal learning processes for innovation has been notably recognized, unlike transactional leadership, which does not mediate the relationship between learning processes and innovation (Darwish et al., 2020). Samad (2012) highlighted a significant positive correlation between transformational leadership, innovation, and overall organizational performance, demonstrating the pivotal role of leadership in driving firm performance and innovation (Samad, 2012; Morales et al., 2012).

While promising correlations have been made, equally, research has revealed that for leadership style there may be "diminishing returns" that suggest a non-linear relationship with innovation such that too much of a certain style (be it transformational or transactional) may promote or inhibit innovation, suggesting an even more nuanced association than we may think. Research done by Bendell et. al (2018) and Rosing et. al. (2011) suggests that innovation does not necessarily increase with increasing levels of transformational leadership, and an ambidextrous style may be more beneficial to borrow the best from multiple leadership frameworks to ascertain the optimal leader style which can cultivate innovative work behaviours. (Bendell et. al., 2018; Rosing et. al., 2011)

This nuanced exploration reveals the complex relationship between leadership styles and innovation, highlighting the critical importance of adopting the leadership approach which is most conducive to creativity and innovation, keeping in mind the overall context. Based on the above, the first two hypotheses can be formulated as follows:

H1. Leaders who are high in transformational behaviours will increase the innovative behaviours of the team in a virtual context.

H2. Leaders who are high in transactional leadership behaviours will have a lower frequency of innovative work behaviours of the team in a virtual or hybrid context.

Leadership and Psychological Safety

The following section seeks to explore the cross-sections of leadership and psychological safety. Leadership is pivotal in establishing a culture of psychological safety in organizations, fostering an environment where employees freely share

ideas, opinions, and concerns without fear of retribution (Edmondson, Kramer, & Cook, 2004; Newman et al., 2017). Emphasizing openness, transparency, risk-taking, and acknowledging mistakes, leaders can create a learning culture that encourages experimentation. Open communication and a genuine interest in employees' contributions build trust and respect, making team members feel valued and heard. Celebrating risk-taking and innovation further encourages employees to confidently tackle challenges, promoting a supportive atmosphere conducive to continuous innovation.

The research underscores the importance of leadership behaviour in enhancing psychological safety. Edmondson et al. (2017) found a positive relationship between leadership behaviours—such as humility, openness, and learning from mistakes—and team psychological safety across 108 work teams in various industries. Leaders who exhibit these behaviours are more likely to cultivate a psychologically safe environment.

The link between leadership and psychological safety extends to fostering a culture of innovation, essential for organizational success and growth. Transformational leadership, characterized by individualized consideration and non-self-serving actions, significantly boosts team psychological safety and performance, enhancing creativity and innovation (Mao et al., 2017; Koh et al., 2018; Javed et al., 2019). This leadership style is particularly effective during times of change, embodying change-oriented attributes like environmental monitoring, encouraging innovative thinking, and risk-taking, which correlate strongly with psychological safety and learning (Ortega et al., 2014).

The connection between transformational leadership and psychological safety highlights a positive team climate and improved performance, especially under transformational and "identity" leadership styles (Fransen et al., 2020; Yin et al., 2019). By prioritizing psychological safety, leaders not only foster a culture of innovation, but also position their organisations for sustained success and growth, underscoring the critical role of leadership in achieving these outcomes.

Psychological Safety and Innovation

This next section aims to examine the literature on psychological safety’s impact on innovation. Psychological safety is pivotal for fostering innovation within

organisations, providing a foundation where openness, trust, and risk-taking catalyse creativity and experimentation crucial for innovation (Anderson et al., 2014). This concept posits that environments encouraging and rewarding exploration and risk-taking are essential for driving innovation, as they enable individuals to propose novel ideas, challenge conventional norms, and engage in creative problem-solving. The absence of psychological safety stifles these endeavours, as fear of judgment or repercussions inhibits idea-sharing and risk-taking, thereby hampering innovation.

Empirical research underscores the positive correlation between psychological safety and innovation. Studies illustrate that environments high in psychological safety promote increased creativity, knowledge exchange, and willingness to take risks—elements vital for innovation (Edmondson & Lei, 2014; Edmondson, 2017). For instance, Edmondson and Lei's (2014) examination of forty-nine project teams in healthcare revealed a direct relationship between psychological safety, team creativity, and favourable project outcomes. Another study within an IT firm highlighted that psychological safety boosts knowledge sharing, subsequently enhancing team innovation (Carmeli et al., 2013).

Beyond innovation, psychological safety contributes to several beneficial organizational outcomes, including higher employee engagement, job satisfaction, and retention rates. A psychologically safe work environment encourages employees to fully engage, increases job satisfaction, and fosters a stronger commitment to the organisation (Edmondson, 2017).

Psychological safety plays a pivotal role in innovation in organizations. The evidence linking psychological safety to both innovation and broader positive organizational outcomes underscores its significance as a strategic imperative for organizational success and growth. Given the above, the final hypothesis can be formulated as follows:

H3. Psychological safety positively moderates the relationship between leadership style and employees' innovative work behaviors in a virtual or hybrid context.

Virtual, Dispersed, and Hybrid Teams as a contextual factor

Here we explore the extant literature on teams who work across different geographic or physical spaces (e.g. hybrid teams) as a contextual factor of this study. Conventional teams which are traditionally collocated and complete tasks face-to-face are unable to capitalize on resources and capabilities that may exist in other parts of a multinational organization (Bell and Kozlowski 2002). Furthermore, organizations are increasingly developing themselves into global firms, and capitalizing on the available virtual technologies to capture global market share and utilize diverse talents (Tidd et al. 2018). Even before the global pandemic that began in 2019, the importance of high-functioning multicultural teams was evident in this competitive corporate world. Dispersed teams are formed via virtual platforms to construct and implement significant global strategies, solve challenges, and sustain the organization (Trautrims et al. 2016). An operational definition of virtual teams is outlined in the preeminent work of Townsend and colleagues (1998) which defines these teams as "groups of geographically and/or organizationally dispersed coworkers that are assembled using a combination of telecommunications and information technologies to accomplish an organizational task." A hybrid team is also formed largely via virtual means, but with some members potentially sitting collocated to an office location creating a sometimes in-office and sometimes at-home dynamic within a dispersed team. For the sake of the research, hybrid, dispersed, and virtual teams will be used interchangeably.

Virtual teams have several advantages. They are economically highly beneficial in bringing talented employees from several parts of the world, without making them leave their house or home location (Killingsworth et al. 2016). Further, dispersed teams provide opportunities, such as diversity in team composition, the incorporation of knowledge-based views from across the world, utilization of technology-mediated communication channels to reduce conflict and social fragmentation between peers, all while providing positive experiences, better work-life balance, job satisfaction and enhanced motivation for team members. However, virtual teams can have various challenges such as time-zone conflicts, knowledge gaps, conflict in management styles, and communication issues across language barriers, which may disrupt the trust as well as relationships between peers and the leader (Jimenez et al. 2017). The complex dynamics of dispersed

teams require the management of an effective leader. The leadership style can greatly affect the team dynamics and the capacity of the team to complete assigned tasks through shared experiences, respect, and values.

"Virtual Leadership"

Leadership is crucial in guiding and maintaining virtual teams and is essential for the effective operation and sustainability of modern enterprise organizations. Back when digitalization was just beginning to change the modern workforce, research by Kayworth and Leidner (2002) highlighted the dynamic nature of leadership in virtual settings, where leaders perform multifaceted roles—coaching, mentoring, providing support, and creating structured directives—across diverse time zones to effectively engage team members. This complexity is heightened by the managerial challenges and unique dynamics presented by virtual work, necessitating a departure from traditional face-to-face leadership models. Virtual team leaders must navigate complexities arising from leading at a distance, with staff who often have multiple reporting lines and diverse backgrounds, requiring enhanced cooperation and collaboration (Saarinen, 2016).

Davis and Bryant (2003) further explored global virtual leadership, presenting a comprehensive model that integrates national culture, organizational context, communication technologies, leadership levels, and styles, all influenced by spatial distance and the team's lifecycle stage. They posited that transformational leadership styles, in particular, yield more positive outcomes by inspiring change and structuring execution across dispersed teams. Liao (2017) provided a multilevel perspective on virtual team leadership, emphasizing the importance of both task and relationship orientations. Effective virtual leadership involves fostering collaboration, trust, shared mental models, conflict management, and shared leadership, which is more challenging, yet even more critical in virtual contexts compared to traditional settings.

Promoting innovation within virtual teams is another critical aspect of leadership. By establishing a clear vision, fostering communication, and ensuring resource availability, leaders can cultivate a culture of psychological safety and innovation, helping organizations remain competitive (Wang & Kim, 2020; Huang et al., 2018). Furthermore, establishing psychological safety in virtual teams is essential for member well-being and engagement. Leaders must create a supportive and

inclusive climate, encouraging open communication and trust, to foster a sense of safety among team members. Leaders should be adept at identifying the right problems to fuel ideas, facilitating virtual brainstorming, promoting diversity, and valuing collaborative teamwork to build innovation within their teams (Ale Ebrahim et al., 2011; Govindarajan et al., 2010; Agrawal, 2012). The management of distributed teams involves complicated dynamics; thus leadership style can have a significant impact on the team's capacity to accomplish its performance objectives creatively and innovatively, therefore it may be likely that a combination of leader styles will be more effective given the context of virtuality. This section has explored both the strengths and weaknesses of hybrid teaming, as well as the challenges in leading them, all significant contextual insights which play into the backdrop of the present study.

In this chapter, we delved into the crucial role of leadership in fostering organizational success, particularly through its' significant impact on innovation at various levels through a critical review of existing literature. Recognizing that leader style can either help or hinder the innovation process, the chapter sought to explore the complexities of various leadership styles and their effects on both individual and team innovation capacities. To further describe the study's variables of interest, a systematic approach was taken to reveal key literature across a range of interrelated subjects using specific search criteria. First, there was an examination of leadership style, focusing on the Full Range of Leadership Model as introduced by Bass and Avolio (1991), which has been the subject of extensive research in many different contexts and industries. Second, we shifted to the concept of innovation within modern enterprises, followed by an investigation into psychological safety and the pivotal role leaders play in shaping it. Various intersections of the subject variables were also explored. Finally, to understand the unique challenges and opportunities presented by virtual or hybrid teaming, literature related to this working style and the associated challenges in leading a dispersed team were also presented. Through this comprehensive approach, the chapter aimed to set the stage for the subsequent exploration of the research design, analysis, and discussion. In the next chapter, the research methodology, analytical approach, and ethical considerations are discussed.

Chapter 3

Research Strategy and Methods

Overview

This chapter details the research strategy and methodological approach for the present study's strategy from research design, methodology, to collection methods, analytical approach and ethical considerations taken.

A survey methodology was employed to conduct a thorough investigation of the relationships between different leadership styles (Transformational and Transactional), psychological safety, and innovative work behaviours in hybrid teams. To be exact, the hypotheses being explored were articulated as:

> H1. Leaders who are high in transformational leadership behaviors will have a higher frequency of innovative work behaviors in a team in a hybrid context.
>
> H2. Leaders who are high in transactional leadership will have a lower frequency of innovative work behaviors in a team in a hybrid context.
>
> H3. Psychological safety positively moderates the relationship between leadership style and employees' innovative work behaviors in a hybrid context.

Research Design

The research design was shaped by the questions it sought to explore, and insights gleaned from an extensive review of the literature. This involved choosing the appropriate methods to address the specific aims of the research.

Variables and Sub-dimensions

This study focuses on **innovative work behaviors** as the outcome or dependent variable (DV); which has been captured through its' three phases: a) Idea Generation b) Idea Promotion and c) Idea Realization. The study examines innovation situated alongside several inputs or independent variables (IV):

1) **Transformational leadership**, including its' dimensions of:
    a. Idealized Influence (Attributed and Behavior),
    b. Inspirational Motivation,
    c. Intellectual Stimulation, and
    d. Individualized Consideration;
2) **Transactional leadership**, including its' dimensions of:
    a. Contingent Reward, and
    b. Active Management-by-exception (Bass & Avolio, 1991);
3) And finally, **psychological safety**, which is proposed to mediate the relationship between the leadership styles and innovative work behaviors.

These variables were measured using previously validated scales in an effort to add to the existing canon and contribute to the expanding base of academic and practitioner literature which studies innovation, leadership style, psychological safety, and hybrid teaming.

Research Philosophy

Research philosophy serves as a crucial foundation to shaping a research strategy, it influences how data is collected, analysed and interpreted (Saunders et al, 2019). In this section, we will outline some of the key research philosophies using insights from the *Business Research Methods* book by Bell, Bryman and Harley (2018) along with the current approach this research took.

First we explore *positivism*, which is based on the idea that the only credible and "authentic" knowledge is scientific and gleaned through strict scientific methods and empirical evidence which can be observed and predicted based on an absolute reality or truth. This research philosophy is most commonly associated with quantitative methods. Next, *post-positivism*, developed from positivism, recognizes that absolute reality might not be attainable, but can be estimated through observation and reason. This approach also accepts that the

researcher's perspective influences the process of inquiry and the subsequent outcomes. *Interpretivism*, the next philosophy we explore, espouses a view that our reality is socially constructed, with individuals developing their beliefs and understanding about the world through personal experience and interpersonal interactions. Here, knowledge is not so much as discovered, but rather constructed through perceptions. Qualitative methods feature more heavily in this philosophic orientation. Next, we come to *critical theory*, which integrates elements of realism and subjectivism which aim to identify and challenge power structures and inequalities. This often utilizes participatory and action research approaches. Further, *pragmatism* takes on features of realism and adds in elements of pluralism, or the idea that there is both objective and subjective realities to be explored. This approach often utilises mixed methods, advocating that objective reality is influenced by human perception and social structures, and therefore both methods (qualitative and quantitative) should be used to unearth the underlying reasons and contextual factors which have been observed. Finally, *realism* assumes that reality exists with or without human thought or perception and seeks to explain the underlying mechanisms and structures which influence observed phenomena. Each philosophy provides different lenses by which researchers can understand the world around them, based on various assumptions, methods and goals.

For the research in this current study, post-positivist, with a critical realism ontology and modified objectivism epistemological orientation was used. Post-positivism accepts the limitations of positivism and rejects its' claim to absolute truth and builds in room to explore the complexity of human behaviour. This research approach is underpinned by the assumptions that: observations are often dependent on perceptions and social experiences; knowledge can be both objective and subjective- with theory dependence inherent in observations; theory development is provisional and iterative; and the complexity of reality can be limited by human understanding (Bell et al, 2018). This approach allowed for the exploration of the constituent research questions as it was grounded in an empirical approach using evidence and data, which can lead to more robust and valid results, as well as more practical and actionable insights. Additional and important benefits were increased objectivity and reduced researcher bias through robust statistical analysis. The iterative approach to hypothesis testing

which will be discussed later was also a key feature of the study and foundational to the post-positivism philosophical outlook.

Research Approach and Method

Once clear on research philosophy, one must consider the appropriate approach for the research aims. There are a variety of choices here including, deductive versus inductive (or abductive), qualitative versus quantitative (or mixed methods); and there is also the selection of an appropriate research design (e.g. case study, ethnographic, experimental, etc).

Research Approach:

A deductive research approach starts with theory (or hypothesis) and designs a research strategy to test said hypotheses. This process involves developing a hypothesis utilizing existing extant theory and published literature to understand the contemporary thought, collecting data to test the hypotheses and analyze the results in juxtaposition to the original theory and/or literature (Bell et al, 2018). By contrast, an inductive approach starts with observations and seeks to generate new theory from the data collected. This process involves analysing patterns without any preconceived theories in mind and developing new knowledge based on the observed data (Bell et al, 2018).

As previously mentioned, different research philosophies also lend themselves towards different research data collection approaches. For quantitative research, or research that predominately focuses on quantifying numerical data and generalizing results from a sample of a population, philosophies closer to the positivism end of the spectrum are well suited as they favour measurable, observable data which can then be generalized to other situations or contexts. Qualitative research focusses on understanding social dynamics from the perspective of the sampled participants, predominantly through spoken conversations, interviews, observations and the likes. The latter approach is more in line with the constructivism end of the philosophical continuum and lends itself to a more in depth and complex understanding of human behaviour. A researcher can of course also decide on a mixed methods approach which can provide a much more comprehensive understanding of the research question or problem. By collecting numeric and non-numeric data, the results can be

integrated to identify both patterns and understand more about the underlying reasons.

As it relates to the present study, a deductive quantitative approach was taken to explore the various hypotheses which were generated after an extensive literature review.

Research Methods:

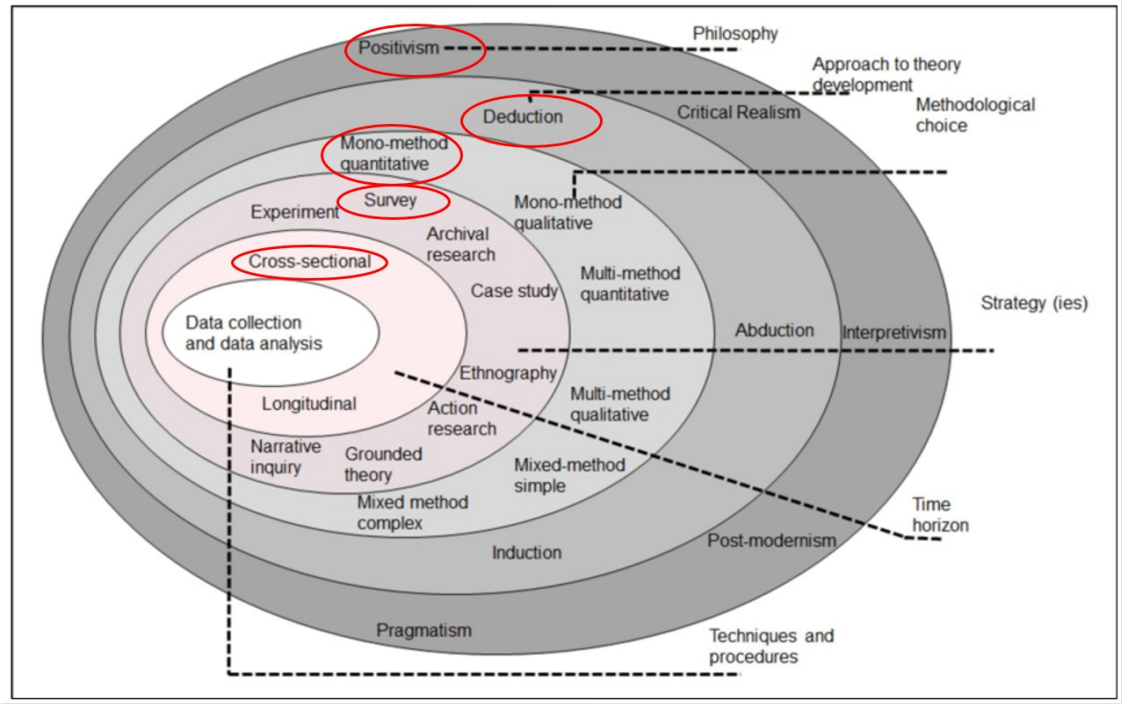
It is also worth noting here that there are a few prominent methods of research design. Again, using the book *Business Research Methods* by Bell, Bryman, and Harley (2018) we explore the various methods.

- *Case studies* involve a deep dive into a single case or multiple cases within a real-life context which can glean detailed insights into complex issues.
- *Ethnography* uses a systematic approach using observations and participation to study people and culture allowing for deeper understanding into the everyday practices and interactions of the observed people or environment.
- *Experimentation* is used to test hypotheses and provide evidence for causal relationships by manipulating variables and observing/measuring the impact on the other variables.
- *Surveys* involve large data sets which have been collected from a sample of respondents using certain inclusion or exclusion criteria, enabling for more generalizable insights to the larger population the sample is from.
- *Longitudinal studies* track the same participants over an extended period allowing for the examination and understanding of developments over time.
- *Cross-Sectional* studies involve observing a sample or population at a single point in time to describe the current state or relationships between variables of interest.
- *Content analysis* systematically analyses primary or secondary content like text, images, media etc to find patterns or themes which can offer insights into the research question or problem.

As it relates to the objectives of this study, this study employed a non-experimental and cross-sectional methodological design. By virtue of fact that a quantitative approach was used, all data that was collected was numeric (or converted to a numeric scale) so as to explore the relationships between the variables in question. No variables were manipulated, and participants were not assigned different conditions, rather variables were observed and measured without intervening or altering the context (Bell et. al, 2022) to better understand the current relationship between the variables of interest.

The Research Onion by Saunders et al, 2019 is depicted in Figure 2, and shows a combination of each of the outlined elements of research strategy. A red circle has been added to show the choices made for this study.

Figure 2. The Research Onion by Saunders et al, 2019, p. 108 adapted for current study.



Data Collection

Data were collected at a single point in time, which provided a snapshot of a moment in time, which aimed to analyse insights from a representative subset of a population of interest (Bell et. al, 2018).

Conducted online, the survey targeted individuals who were part of virtual teams across the capital projects and technology organisation within a top (Fortune 100) multinational energy firm. It included a range of questions aimed at identifying

the predominant leadership styles within these teams, examining the impact of these styles on psychological safety, and assessing their influence on innovative behavioural outcomes. The survey specifically explored the potential correlations between leader style, psychological safety, and innovation, providing insight into how these factors interact within a virtual or hybrid team setting.

Questions pertaining to leadership styles were adapted from the Multifactor Leadership Questionnaire (MLQ), which measures transformational and transactional leadership. Psychological safety was measured using the Psychological Safety Scale, which gauges the extent to which team members feel safe to take risks. Innovation was assessed through the Innovative Work Behaviours Scale, which captures the frequency and quality of innovative behaviors exhibited by the team.

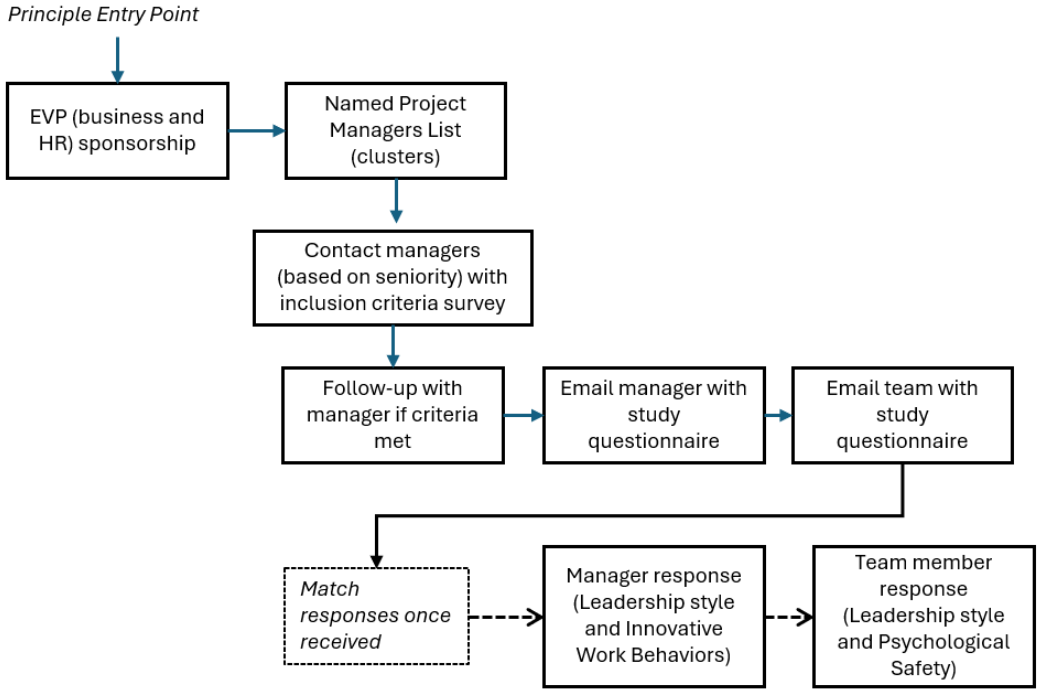
Sampling

The study used a complex, proportional clustered sampling approach, strategically designed to capture diverse perspectives from multinational teams working on energy-related capital projects and research and development projects. This approach took advantage of the researcher's position within a prominent multinational energy company. In contrast to simple random sampling, which typically calls for prohibitively larger sample sizes for generalizability or stratified sampling which would divide the population into distinct subgroups and then randomly sample them, this approach ensured a representative and efficient sample from the organisation which was studied. Clustered across various departments and geographical regions within the capital projects and R&D divisions of the prominent multinational energy company, managers who were within 2-3 levels of the CEO were contacted to test interest in participating as a team for the study. Participants were recruited from diverse departments that rely on virtual teamwork to execute these intricate projects. Inclusion criteria included working individuals who spent at least 1 day out of the week working remotely and did not see their team members or line manager on a daily basis in person. These managers proved pivotal as they provided access to their respective teams, ensuring that the sample accurately reflected hierarchical and operational structures within the company. Questions to ascertain responses to this inclusion

criteria were included in the questionnaire and anyone who did not meet this criterion were not invited to continue.

Recruitment communication was conducted through various online and virtual channels including email, chat platforms, and virtual conversations with prospective leaders and team members. Further, by leveraging the expertise and network of the leaders we could ensure high participation rates and robust data quality. Figure 3 depicts the approach to data collection.

Figure 3. A flowchart depicting the data collection approach.



To ensure a representative sample and analytical robustness, the study targeted a minimum of thirty teams to ensure statistical feasibility (Aguinis et al. 2013; Mathieu et al., 2012). The team members, which were asked to answer screening questions related to their level of virtuality, operated within a hybrid context, which combined both in-office and remote work environments—a model increasingly relevant in contemporary corporate structures.

The recruitment of participants included teams that were part of a specific business directorate known for its' pioneering work in capital projects and technology development. The researcher secured sponsorship and buy-in for the research between the Executive Vice-President of Engineering Projects and the Executive Vice President of Human Resources before approaching participants for

recruitment into the study, further solidifying the research's relevance in the context of the organisation's strategic and business imperatives. Participants were approached directly by the researcher using both her company email address and student email address. The scope and relevant particulars of the study were clearly shared in plain language, and it was emphasized that participating in the study was completely voluntary with no negative consequences for not participating. Informed consent along with a statement of confidentiality was shared to assure participants about their rights and the data protection regiment being followed. Contact details were provided for the supervision team for the research in case further questions or concerns wanted to be raised indirectly. Participants who agreed were sent the link to complete the online survey where they were again reminded of the scope of the study and asked to respond affirmatively to the informed consent statements before proceeding with the study questionnaire. Two follow-up reminders were sent to further encourage participation.

The resultant sample size was ultimately contingent upon the number of responses received from these targeted outreach efforts. The aim was to gather data from a broad cross-section of teams to achieve a robust analytical foundation. By setting the response rate goal at a minimum threshold, the research aimed to establish a substantial dataset that would render valid and reliable findings, but also help with the inferential power of the study's subsequent findings. The employed strategies aimed to enhance the thoroughness and comprehensiveness of data gathering and strengthened the study's dedication to a methodically sound investigation of the intended variables.

Survey Instrument

To achieve the desired research outcomes a survey was designed and structured into various sections, each intended to measure the constructs of interest using validated survey instruments. The first section collected demographic information and details about the participants' team environments to control for potential confounding variables. These questions were completely voluntary. Subsequent sections employed validated scales to assess transformational and transactional leadership behaviors, the level of psychological safety perceived by team members, and specifically for the manager of the team, the frequency of

innovative work behaviors within the team. As these were the main variables of interest, participants were reminded if they missed one of these questions before moving on to complete the rest of the survey.

The survey instruments were administered via the online questionnaire tool Qualtrics and were measured using Likert-scale close-ended questions. The questionnaire was pre-tested before distribution to ensure its' validity and reliability. More details about the scales are as follows:

Demographics: This section included optional questions about the participants' age, gender, education level, years of experience at the organisation, years on their present team, race/ethnicity, country of origin, and country of employment.

Leadership Styles (MLQ 5X Short form): This section included questions that sought to understand the team's perception of the leadership styles used in their virtual team. Participants were asked to rate the extent to which their team leaders utilized different leadership styles along a spectrum including;

Transformational leadership, with dimensions for Idealized Influence (Attributed and Behavior), Inspirational Motivation, Intellectual Stimulation, and Individualized Consideration; Transactional leadership, with dimensions for Contingent Reward and Active Management-by-exception, and laissez-faire, which also includes Passive Management-by-exception (and was not a variable of interest). The Multifactor Leadership Questionnaire (MLQ) which has been previously validated was used (Bass & Avolio, 1997). Cronbach's alpha coefficient α was reported at .91 (Bass & Avolio, 2000). Permission to use the instrument and a license to redistribute was obtained directly from Mind Garden, Inc. 5X Short form is the current version and is widely used to measure the dimensions of leadership across a number of subscales. The form is comprised of 45 items, with 37 relating to Transactional (8 items), Transformational (20 items), and Passive-avoidant (9 items) leadership dimensions. Outcomes of leadership were also captured (8 items), including, but not limited to leadership effectiveness, satisfaction, and extra effort derived from the employed leadership style. Perceptions of leadership style were asked of team members, and a self-rating form was also included in the manager version of the questionnaire. Responses ranged on a 5-point Likert scale from Not at all to Frequently, if not always.

Psychological Safety: This section included questions that examined the levels of psychological safety in the team. Team members were asked to rate the extent to which they feel psychologically safe in their team, including questions on interpersonal trust, team cohesion, and the ability to speak up without fear of retribution. A 5-item scale that was previously developed and validated by Edmondson (1999), and further used by Carmeli et al (2014) was used. Cronbach's alpha α coefficient was reported at .71. Responses ranged on a 7-point Likert scale from Never to Always.

Innovative Work Behaviours: This section included questions that sought to examine the impact of leadership styles on innovation in these teams. Managers were asked to rate the extent to which their virtual teams are innovative, including questions on creativity, idea generation, and the ability to promote and implement new ideas. The previously validated Innovative Work Behaviours 9-item scale from Janssen (2000) was used which expanded Scott & Bruce (1994) 6-item scale. Cronbach's alpha α coefficient was reported at .96 when supervisors were asked to rate their team. Responses ranged on a 7-point Likert scale from Never to Always.

A copy of both versions of the questionnaire can be found in the Appendix.

Survey Design and Administration

Given the subject matter and to mitigate self-assessment bias, two versions of the survey were designed and implemented. The version for managers or team leaders included a section for demographic information, a self-assessment of their leadership style, along an assessment of the team's innovative work behaviors. The version for subordinate team members comprised demographic questions, a leader-style questionnaire, and psychological safety questions pertaining to the team. These were then coded and matched by a unique group ID number.

Following the necessary quality checks, the main phase of the study commenced with the administration of the surveys to the targeted sample size of 30 teams. The researcher, having unique access to a group of project professionals operating in virtual and/or hybrid environments, requested and secured senior-level stakeholder support to conduct the research within this specified context.

The questionnaires were administered to the relevant participants once teams opted into the study. It was ensured that supervisors and staff completed their respective versions of the questionnaire, which were then matched and coded by the researcher after electronic collection. A secure survey administration tool, Qualtrics, was utilized to confidentially collect the survey responses, ensuring the anonymity and integrity of the data collection process.

Data Analysis

In order to prepare the data for analysis, responses to the scale items were computed into mean scores resulting in new variables (Aguinis et al. 2013). Instructions were followed as prescribed for the MLQ to compute average variables for Transformational, Transactional, and Passive-Avoidant styles. Psychological Safety and Innovation scores were also averaged to transform into new composite variables for the analysis.

The data collected from the survey were analysed using a combination of descriptive and inferential statistical techniques. Although the responses were obtained at the individual level, the hierarchical nature of the data—where individuals were nested within teams, and teams within their respective leaders—necessitated the use of multi-level regression modelling to test the proposed hypotheses. This approach was particularly pertinent given that the presumption of independence typical in traditional statistical methods (e.g. ANOVA) was not viable due to this nested structure (Luke, 2019).

Hierarchical Linear Modelling (HLM), which is a form of multi-level regression modelling, was the chosen method for this task, as it is particularly adept at dissecting and interpreting data that is organized at more than one level. The use of HLM was instrumental in assessing the relationships posited in the study's hypotheses and theoretical framework. It facilitated the analysis of data at both the individual and team levels simultaneously and is adept at employee-employer matched data (Villemez & Bridges, 1988) thus providing nuanced insights into the dynamics at play. For this study, Innovative Work behaviours represented the dependent variable (DV), with leadership style, represented by Transformational

and Transactional styles acting as independent variables (IVs), and Psychological Safety representing a moderating variable (MV).

A number of assumptions must be met for the use of HLM, like most other statistical modelling techniques (Aguinis & Gottfredson, 2010). In this case, the data were pre-processed to ensure it met the basic assumptions of:

- Outliers: refers to data points that are significantly different than most others in the presenting data set. These can skew results leading to inaccurate predictions.
- Normality of the distribution of residuals: refers to the differences between the observed values and the values predicted by the model which should adhere to plottable line of best fit.
- Homoscedasticity: refers to the spread of the variability of the residuals (or errors between the predicted versus the actual values) in the model. This should roughly be equally spread across all levels of the independent variables.
- Linearity: refers to the expectation that the relationship variables between variables being studied can be observed as fitting in a straight-line.
- Multicollinearity: refers to the phenomenon of predictor variables being too closely related to one another which can inhibit the ability to determine individual impacts of each predictor variable on the outcome variable of interest.

For the statistical computation and analysis, the lme4 package within RStudio was employed. This package is specifically designed for fitting linear and non-linear mixed-effects models, making it well-suited for the complexities of HLM. During the analysis, special attention was given to the significance of coefficients t-values, and intercepts, including the random effects (variance components and random slopes and intercepts) ensuring that the interpretation of these statistics was both rigorous and cautious. In the context of this study, three models were fit to explore the hypotheses. See Table 1 which summarizes the models. To assess the model fit, the residual maximum likelihood (REML) was also compared across models. By thoroughly appraising the significance and relevance of these values, the study aimed to avoid any erroneous conclusions regarding the acceptance or rejection of the hypotheses.

Table 1. Variables

MODEL	VARIABLES STUDIED
NULL MODEL (INTERCEPTS ONLY)	Innovative work behaviours (DV)
MODEL 1	Innovative work behaviours (DV) Transformational Leadership (IV) Transactional Leadership (IV)
MODEL 2	Innovative work behaviours (DV) Transformational Leadership (IV) Transactional Leadership (IV) Psychological Safety (MV)

This careful and methodical approach to data analysis proved crucial, not only to enhance the trustworthiness of the research findings but also bolstered the validity of the inferences drawn. The robustness of the survey design, combined with the sensitivity and nuance HLM allows, contributed to a greater confidence in the analytical outcomes. Consequently, this lent credibility to the resultant recommendations and strategic implications for the organization and the specific teams that were the focus of the research. The methodological rigor adopted throughout the study, particularly in the data analysis phase, ensured that the findings were not only statistically sound but also organizationally relevant and actionable.

Ethical Considerations

This research underwent thorough ethical and governance reviews, in line with the mandatory requirements for all research conducted at Aston University. Prior to any data collection, a comprehensive plan outlining participant consent, privacy, confidentiality, and data management was rigorously reviewed and approved by the Ethics Review Board. Additionally, the researcher ensured the study fit within the ethical guidelines set out by the firm including discussions with the information compliance and survey offices, securing written consent to conduct the study internally. Transparency regarding the research methods and objectives was maintained, and agreements on disclosure and communication of results were established with the sponsoring organisational leadership.

Throughout the research process, ethical considerations were paramount. Participants were guaranteed anonymity and the confidentiality of their survey responses. They provided informed consent, clearly stating that participation was

voluntary and not linked to their employment status or performance outcomes. The survey design and data handling procedures were intentionally developed to preserve participant privacy, with responses being anonymized and securely stored.

A copy of the Ethical Review Application and Approval can be found in the Appendix.

In this chapter, the approach to both the survey design and administration was outlined. The main variables of interest were presented along with their valid and reliable scales. The analytical approach most appropriate for the composition of the data collected was outlined along with the ethical consideration of the present study. In the next chapter, the results of the study will be presented.

Chapter 4

Results

Introduction to Results

This chapter presents the results of the study aimed at exploring the dynamics between leadership styles, psychological safety, and innovation within virtual and hybrid teams within the context of a multinational Energy firm. Here the empirical findings related to these hypotheses, describing the process by which the data was prepared, the model fitting process for HLM, and hypothesis testing are explored further.

Data Description

Data for the study was procured through an online questionnaire which targeted teams who work in virtual and hybrid teams across the capital projects and technology organisation in a large multi-national energy firm. Out of the managers initially approached to participate in the study (extended leadership team of approximately 120 leaders), 36 surveys were finished, however due to screening questions related to the level of virtuality and duplication, 31 team managers surveys were usable (86%) and included in the present analysis. For the team member survey, 416 employees were approached, and 196 completed the survey, however, only 149 of the surveys were usable after screening for completeness and consistency (76%). The survey period extended over 5 months and included a lag due to seasonal holidays and business unit changes, with follow-up emails sent from the researcher at reasonable intervals after initial recruitment.

Survey respondents represented a wide demographic spectrum. Amongst team members surveyed, 72% of respondents identified as male, and 36% identified as

female. Age distribution spans from 25 to 65, with the largest proportion of respondents reporting an age range between 45-55 years old. For company tenure, over half of respondents had between 11-20 years of service (27% and 25% respectively), while from a team tenure perspective, most (42%) reported having between 1-3 years of experience embedded within the same team at the time of survey completion. From a racial and ethnicity perspective, 50% of the respondents identified as Caucasian or White, with 25% identifying as Asian & Pacific Islander. 36% of survey respondents from teams had a country of origin of the United States followed by the Netherlands and India (14% and 13% respectively). For a full breakdown of participant demographics refer to Table 2.

Table 2. Background Characteristics of Employees.

Variable	Category	Count	% Representation
Age	25-34 years of age	15	9%
	35-44 years of age	47	32%
	45-54 years of age	59	38%
	55-64 years of age	23	17%
	65 or above	3	2%
	Prefer not to specify	2	2%
Gender	Male	111	72%
	Female	37	36%
Degree	High School	6	4%
	Bachelors	57	38%
	Masters	60	41%
	Doctorate	26	17%
Team Tenure	1 year or less	37	27%
	1-3 years	67	42%
	3-5 years	31	21%
	5+ years	14	10%
Company Tenure	1 year or less	7	5%
	Between 1- 5 years	9	6%
	Between 6- 10 years	28	19%
	Between 11- 15 years	44	27%
	Between 16-20 years	36	25%
	20+ years	25	18%
Race/Ethnicity	Asian & Pacific Islander	37	25%
	Black	11	8%
	Latino or Hispanic	13	9%
	White or Caucasian	78	50%
	Prefer not to specify	11	8%
Note: N = 149			

As it relates to the demographic characteristics of the group of participating managers, a majority were between the ages of 45-54 (48%), predominantly male (84%), and most held a master's degree (65%). In terms of team tenure, the highest frequency of managers had been with their team for 1-3 years (55%), while the length of company service was more skewed towards longer tenure, with 58% having been with the company for over 20 years. The racial/ethnic composition of the group was mostly White or Caucasian (48%), with Asian & Pacific Islander representation also being significant at 23%. The remaining identified as Black (13%), Latino or Hispanic (6%), and those who prefer not to specify (10%). 64% of responding managers had a country of origin of the United States (29%) followed by the United Kingdom (23%) and the Netherlands (13%). Find further details in Table 3.

Table 3. Background Characteristics of Managers.

Variable	Category	Count	% Representation
Age	35-44 years of age	5	16%
	45-54 years of age	15	48%
	55-64 years of age	10	32%
	65 or above	1	3%
Gender	Male	27	84%
	Female	5	16%
Degree	Bachelors	9	29%
	Masters	20	65%
	Doctorate	2	6%
Team Tenure	1 year or less	1	3%
	1-3 years	17	55%
	3-5 years	8	26%
	5+ years	5	16%
Company Tenure	Between 11- 15 years	3	10%
	Between 16-20 years	10	32%
	20+ years	18	58%
Race/Ethnicity	Asian & Pacific Islander	7	23%
	Black	4	13%
	Latino or Hispanic	2	6%
	White or Caucasian	15	48%
	Prefer not to specify	3	10%

Note: N = 31

This demographic diversity served as a representative sample of the target population of similarly situated employees working in a multinational organisation within virtual and hybrid teams.

Anonymization of the data and factor labelling was performed to glean condensed demographic information and the distributions of key variables. The preliminary assessment played a critical role in preparing the dataset for the HLM analysis by verifying that the data corresponded to the assumptions required and the analytical framework of the study. The finalized dataset, comprised of 149 usable responses from team members which were matched to their corresponding supervisor's information (31 managers). This dataset forms the empirical basis for exploring the aforementioned research hypotheses in the context of a large multinational energy firm. This rigorous screening procedure served as the foundation for the study's objective of providing a comprehensive understanding of the interconnected dynamics of leadership style, psychological safety, and innovation in hybrid teams.

Analysis Overview

The survey data were analysed using advanced statistical methods to handle the nested setup of individuals grouped into teams, with those team members linked to specific leaders. Traditional techniques like ANOVA were not suitable due to the assumption of independence of the responses, which is not the case given the grouped nature of this dataset. Instead, HLM was chosen for its ability to analyse and interpret insights across different levels of data—in this case, individuals, and teams—simultaneously (Bates, Maechler, Bolker & Walker, 2015). This was of paramount importance in understanding the ways in which leadership styles influence innovation in hybrid and virtual teams within the same organisation.

Analysis was conducted primarily using the 'lme4' package in RStudio, which is designed for complex models like HLM. During the analysis, close attention was paid to the statistical significance of the findings for the model and hypothesis testing, ensuring that the conclusions reached were solid, reliable, and ultimately generalizable. Adhering to the model specification process of Hierarchical Linear Modelling (HLM) was done to increase the trustworthiness of the results and ensure that the insights are relevant and usable in the real-world working context.

<u>Pre-Analysis Procedures</u>

Data Cleaning and Preparation

Before conducting the analysis, data was cleaned and prepared to ensure both its quality and fitness for the intended software (RStudio). The initial step involved identifying and addressing missing data. Given incompleteness, a number of responses were excluded, however, in cases with missing values, these were carefully examined to determine a pattern or randomness. Where appropriate, missing values were imputed to preserve the dataset's integrity.

Confirmatory Factor Analysis

Ahead of finalizing the composite variables which would be used in the hypothesized measurement model, Confirmatory Factor Analysis (CFA) was run to assess the construct validity and item relevance in the context of the data gathered for this study. While validated scales were used for each variable (e.g. Multi-factor Leadership Questionnaire 5X for Leadership Style, Psychological Safety assessment, and IWB for Innovative behaviours), it was necessary to examine how well the measured variables represented their underlying latent constructs. Model fit was assessed by considering a variety of fit indices, including the Chi-square test of model fit, the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA).

First, all relevant items were reverse coded so that there was alignment in each latent construct. This included items 1, 3, and 5 for the psychological safety scale, which were asked in a negative direction versus the remaining items which were asked positively. Using the Statistical Package for Social Sciences (SPSS), the items were transformed accordingly. Data was then read into RStudio, where the 'lavaan' package was used to conduct a CFA for the isolated latent factors for the variables of leadership style (transformational and transactional), psychological safety, and innovative work behaviours. For the MLQ 5X, standardized factor loadings of above .5 are generally viewed favourably (Muenjohn & Armstrong, 2008). All items were scored on a 5-point Likert scale (1 = Not at all, 5 = Frequently, if not always). Transformational leadership showed slightly better model fitness with the exclusion of Idealized Influence-Active (question 4: "Displays a sense of power and confidence"), so this was excluded from the composite analysis to improve model fitness. See Table 4 for changes to model fit before and after the exclusion of II-A 4.

Table 4. CFA for Transformational Leadership.

Model fit Index (149 observations)	With II-A4	Without II-A4
Chi-Square Statistic (χ^2) / Degrees of Freedom (df)	267.44/ 164 (*df*)	242.52/ 146 (*df*)
Comparative Fit Index (CFI)	0.925	0.929
Tucker-Lewis Index (TLI)	0.913	0.916
Root Mean Square Error of Approximation (RMSEA)	0.068	0.069
Standardized Root Mean Square Residual (SRMR)	0.053	0.052

Transactional leadership, excluding the laissez-faire questions, showed a better model fitness with the exclusion of Management by Exception- Passive (Question 3: "Shows that he/she is a firm believer in 'If it ain't broke, don't fix it.'"), so this was excluded from the composite analysis to improve model fitness. See Table 5 for changes to model fit before and after the exclusion of MbE-Passive 3.

Table 5. CFA for Transactional Leadership.

Model fit Index (149 observations)	With MbE-P 3	Without MbE-P 3
Chi-Square Statistic (χ^2) / Degrees of Freedom (df)	73.32/ 51 (*df*)	60.311/ 41 (*df*)
Comparative Fit Index (CFI)	0.943	0.95
Tucker-Lewis Index (TLI)	0.926	0.933
Root Mean Square Error of Approximation (RMSEA)	0.057	0.059
Standardized Root Mean Square Residual (SRMR)	0.07	0.07

The Psychological Safety scale's confirmatory factor analysis showed that questions 5 and 6 had high variance, with question 5 having a significance factor loading below the acceptable .4 threshold described by other empirical studies (Edmondson, 1999; Edmondson, 2004). All items were scored on a 7-point Likert scale (1 = Very inaccurate, 7 = Very accurate). Question 5, which was reverse-coded was originally worded as: "It is difficult to ask other members of this team for help." The standardized factor loading was 0.280, however when excluded, both CFI and TLI suggested that the overall model fitness further deteriorated. Despite its' lower factor loading in the previous model, Question 5 was thought to contribute significantly to the model's representation of psychological safety as

such it was not excluded from the scale. See Table 6 for changes to model fit with and without all seven questions from the validated scale.

Table 6. CFA for Psychological Safety.

Model fit Index (149 observations)	With all items	Excluding Item 5
Chi-Square Statistic (χ^2) / Degrees of Freedom (df)	20.63/14 (*df*)	19.34/ 9 (*df*)
Comparative Fit Index (CFI)	0.955	0.928
Tucker-Lewis Index (TLI)	0.932	0.879
Root Mean Square Error of Approximation (RMSEA)	0.059	0.091
Standardized Root Mean Square Residual (SRMR)	0.049	0.054

The CFA for Innovative Work Behaviours, which was conceptualized as a team-level construct where the participating managers provided inputs, proved to have a good fit despite the relatively small sample size of 31 managers. All items were scored on a 7-point Likert scale (1 = Never, 7 = Always). The outputs were: (χ^2) = 40.45 / Degrees of Freedom (*df*) = 24, CFI = .949, TLI =.923, RMSEA = .146 and SRMR = .055.

Although the RMSEA is higher than the desired threshold of 0.05, indicating a less-than-optimal fit, the confidence interval is wide (90% CI [0.059, 0.223]), reflecting uncertainty due to the small sample size. All items had significant loadings on their respective factors, suggesting strong associations between items and their intended constructs, with standardized loadings ranging from 0.834 to 0.980, and as such no modifications were made to the validated scale (Janssen, 2000; Scott & Bruce, 1994).

By rigorously testing the factor structure of the variables included in the measurement model through CFA, construct validity was established, providing a strong foundation for further analysis. SPSS was used to then transform the individual latent variables into composite variables for model fitting and hypothesis testing.

Using the scores from across the variables of interest for the study, new composite scores were transformed to aid in their analysis. See Table 7 for the summary of the variable transformation process.

Table 7. Summary of variable transformation.

Description	Scales	New variable name	New variable label
Innovative work behaviours (DV)	Idea Generation Idea Promotion Idea Realisation	'IWB_composite'	Innovative work behaviours averaged
Transformational Leadership (IV)	Idealized Influence (Behaviours and Attributed) Inspirational Motivation Intellectual Stimulation Individual Consideration	'Transformational_composite'	Transformational Leadership averaged
Transactional Leadership (IV)	Management-by-Exception, passive Contingent Response	'Transactional_composite'	Transactional Leadership averaged
Psychological Safety (MV)	Psychological Safety	'Psych_Safety_composite'	Psychological Safety averaged

Categorical variables, such as gender and race, were re-coded to facilitate their use in regression analysis. Simple correlations were run to test for relationships inherent within the dataset. See Table 8 for descriptive statistics for the continuous variables of interest, followed by Table 9 for a Correlation table.

Table 8. Descriptive Statistics for variables of interest.

Descriptive Stats	**IWB**	**Psychological Safety**	**Transformational Leadership**	**Transactional Leadership**
mean	5.660	6.076	4.164	3.331
median	5.667	6.143	4.267	3.250
SD	0.662	0.684	0.530	0.570

Table 9. Correlation table for variables of interest and control variables.

Correlations	**1**	**2**	**3**	**4**	**5**	**6**
1. IWB	.	0.205	0.213	0.060	0.289	0.000

2. Psychological Safety	0.205	.	0.014	-0.131	0.186	0.186
3. Transformational Leadership	0.213	0.014	.	0.476	0.034	0.193
4. Transactional Leadership	0.060	-0.131	0.476	.	-0.120	0.159
5. Age	0.289	0.186	0.034	-0.120	.	-0.086
6. Gender	0.000	-0.121	0.193	0.159	-0.086	.

Assumption Checking

- Outliers & Normality of the distribution of residuals: the former refers to data points that are significantly different than most others in the presenting data set. The latter refers to the differences between the observed values and the values predicted by the model which should adhere to a plottable line of best fit. Figure 4 depicts a QQ-plot of the observed versus predicted model and Figure 5 presents a histogram with a fitted bell curve for the dependent variable, Innovative Work Behaviours (IWB). Outliers were retained in the analysis in an effort to model 'real-world' data and prevent overfitting to the models.

Figure 4. QQ-plot of the observed versus predicted model.

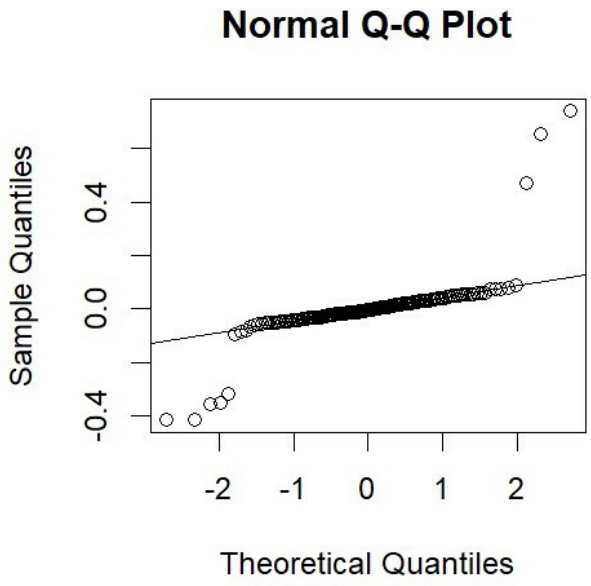


Figure 5. Histogram of the dependent variable (IWB).

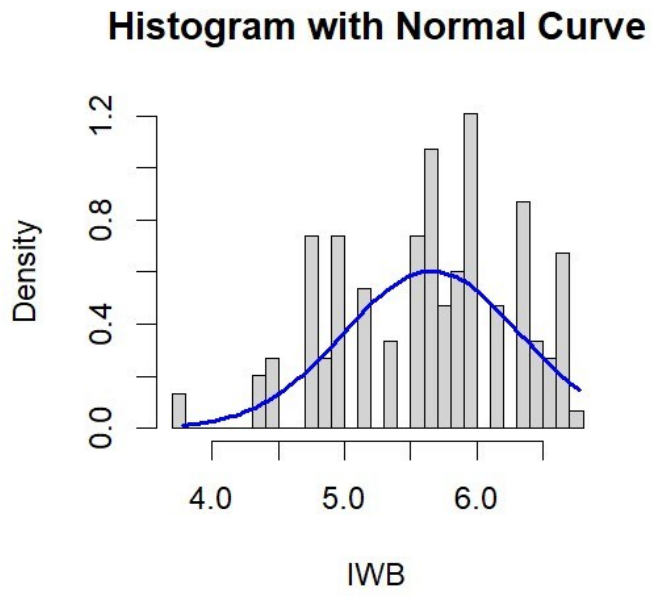
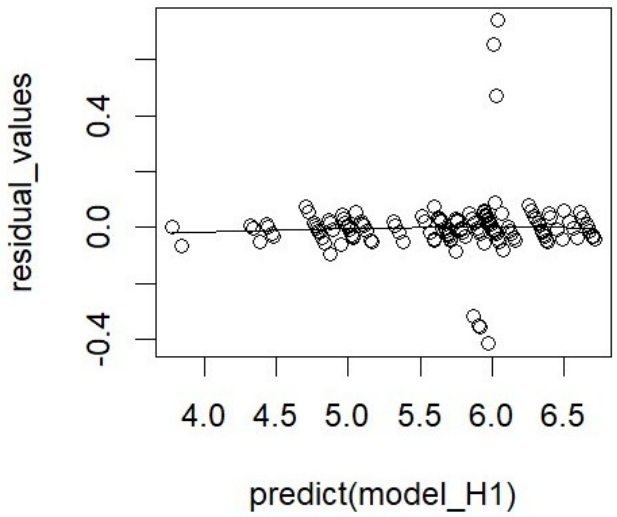


Figure 6. Scatter-plot of the residual versus fitted values of the independent variables.



Multicollinearity: assessed through variance inflation factors (VIFs), ensures that the independent variables in the model did not overly correlate with one another. VIFs below 10 are acceptable values which indicate a lack of multicollinearity. See the VIF values for the independent variables in Table 10.

Table 10. VIF values.

Transformational Leadership VIF	Transactional Leadership VIF
1.30	1.34

Model Specification and Hypothesis Testing (Null, Base, and Full Models)

Model Specification

To test our hypotheses, HLM uses a series of steps from Aguinis et al (2013) which outline that first a null model is built using just the dependent variable, Innovative Work Behaviours providing an intercepts only view of the outcome variable. Proceeding the null model, Model 1 was built to include the independent variables of interest (Transformational and Transactional Leadership) along with the control variables of age and gender, which have often been reported as potentially impactful for social science research exploring similar themes (Kotur & Anbazhagan, 2014; Reuvers et. al., 2008) Finally, a full model which introduced the interaction of the moderating variable, Psychological Safety was built. (Aguinis, Gottfredson, & Culpepper, 2013). This next section describes the various models, contrasts their fit against one another, and gives a summary of the findings for the present study.

Null model

The null model's Restricted Maximum Likelihood (REML) criterion converged at a value of -20.1, serving as a baseline fit index for the data structure. The REML index will be instrumental when comparing the null model to the other models of interest at different levels of the hierarchy.

The scaled residuals of the null model indicate that their median value is proximate to zero, with modest dispersion around the median, with some residuals implying the presence of outliers. The random effects aspect reveals meaningful between-group variability, as we see an intercept variance for the `Manager ID` (grouping factor) of 0.46595. The standard deviation (0.6826) indicated that there is a significant inter-manager variance, which justifies the use of a hierarchical modelling approach (Luke, 2019). Conversely, the within-group residual variance of 0.01929, with a reported standard deviation of 0.1389, underscores relatively little variance within distinct groupings.

There is a robust fixed effect intercept estimate (5.5127) with a minimal standard error (0.1233), and a significant t-value and associated p-value (44.72, $p < .0001$) which builds a solid foundation with which to further study the variables and data within the study's given context.

Model 1 (Introduction of Leadership Style and control variables)

The REML criterion at convergence improved to -8.5 from the null model's -20.1, suggesting including the fixed effects (IVs) of Transformational and Transactional Leadership has improved the model's fitness to the data, compared to the null model.

For the scaled residuals, the minimum and maximum values are somewhat less extreme than the values from the null model, indicating a potential reduction in outliers. As it pertains to the random effects, the variance and standard deviation for the `Manager ID` intercept are slightly lower than in the null model, which indicates a reduction in between-grouping variability when accounting for the fixed effects.

The Fixed effects in this model included:

- Transformational Leadership: which was positively associated with Innovative Work Behaviours (t-score = 2.373) and was statistically significant ($p = 0.02$).

- Transactional Leadership: was negatively associated with Innovative Work Behaviours (t-score = -2.771) and was also statistically significant ($p = 0.01$).

- Age and Gender: have been included as control variables with no statistically significant impact on the model.

Model 2 (Introduction of Psychological Safety as a Moderator)

The REML criterion at convergence has increased from -8.5 to 2.1, indicating a different model fit, which now has the addition of interaction terms. Overall, however, the random effects, variance, and standard deviation for the 'Manager ID' intercept in this model are nearly identical when compared to Model 1, suggesting consistent between-manager variability across both models. The intercept remains significant, and now with the introduction of a more nuanced fixed effect interaction of Psychological Safety against each IV, we observed that:

- The Transformational Leadership and Psychological Safety interaction term trends towards significant, with a p-value = 0.09 and associated t-value of 1.707 suggesting that the presence of Psychological Safety might somewhat dampen the positive association with Innovative Work Behaviours in this context.

- Additionally, the interaction term between Transactional Leadership and Psychological Safety was statistically significant (p = 0.04), suggesting that the relationship between Transactional Leadership style is positively influenced by the level of Psychological Safety when it comes to increasing Innovative Work Behaviours (t = -2.09). The associated t-value is lower as compared to the model without the interaction term (t = -2.771). See Table 11 for summary outputs.

Table 11. Model Specifications.

Model Specification Summary			Random Effects		Fixed Effects T-tests use Satterthwaite's method				
Model	Items	REML	Variance	SD	Estimates	St. error	Df	t-value	p-value
Null model	IWB only	-20.1	0.0193	0.139	5.5127	0.1233	29.94	44.72	2e-16 ***
Model 1	Transformational	-8.5	0.0182	0.135	0.0683	0.0288	114.88	2.373	.019*
	Transactional				-0.0699	0.0252	114.53	-2.771	.006**
Model 2	Transf.: PS	2.1	0.0178	0.134	0.0794	0.0465	111.57	1.707	.09 ·
	Transac.: PS				-0.0745	0.0355	111.41	-2.099	.038*

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.'

Supplementary Analysis

In summary, we contrasted the results from three different model fittings using HLM. The intercepts only model, or null model, set a strong (statistically significant) foundation for the analysis. Model 1 introduced the main independent variables of interest, which also rendered statistically significant insights, and finally with Model 2, we introduced the interaction term of Psychological Safety as a moderator of the relationships between leadership style and Innovative Work Behaviours. We have strong evidence to support the three main hypotheses explored in this study, however, in an attempt to better understand the interactions between the individual dimensions of leader style and their potential

impact on innovation, a second phase of exploratory analysis was conducted to understand how the discrete dimensions of leadership better and which aspects may have a more influence on Innovative Work Behaviour. To do this, another model was tested using HLM techniques, but this time each individual aspect of leadership style from Transformational (Idealized Influence- Attributed and Behavioural, Inspirational Motivation, Intellectual Stimulation, and Indiviualised Consideration) to Transactional (Contingent Reward, and Management-by-Exception Active) was modelled against IWB. Among the leadership dimensions examined none showed a statistically significant effect on IWB at the conventional $p < 0.05$ level. However, Inspirational Motivation and Indiviualised Consideration came close to significance, suggesting that these dimensions may most positively influence the relationship on IWB. Inspirational Motivation includes the behaviours of communicating a clear, appealing, and optimistic vision for the future, motivating followers to commit to shared goals and co-creating a vision of what they can achieve; and relatedly, Individualized Consideration involves leaders offering tailored encouragement and support and addressing each individual's specific need for achievement and progress, in order to promote personal development (Bass & Avolio; 1991).

When the model incorporated the interaction term for Psychological Safety, we observed a notable, though not statistically significant, moderating effect on the dimensions of Transactional Leadership. Specifically, the dimension of Management-by-Exception Active showed a positive trend toward contributing to IWB ($t = 1.399$, $p = .1649$), and the dimension of Contingent Reward transitioned from a negative to a positive relationship in the context of Psychological Safety (t shifted from -.767 to .195). This suggests that teams within a psychologically safe climate may still see the benefits from leadership behaviors that either reward performance and/or penalize underperformance. Moreover, such a climate seems to soften any negative impacts potentially associated with leaders who could be perceived as "micro-managing." Such leaders typically monitor their team's work closely to spot deviations from rules and standards and take proactive steps to correct errors. This supplementary finding serves as a possible area for future investigations.

In this chapter, we outlined the pre-processing conducted to ensure that the data was appropriately suited for analysis, including a confirmatory factor analysis of

the scale items, transformation of the variables of interest, basic assumption tests, along with model fitting in HLM for hypothesis testing. Demographic descriptions of the sampled employees and managers who participated in the study, along with descriptive statistics and correlations were also presented. Results from the null, base, and full models were presented, indicating the data were a good model fit, and statistical significance was established across multiple models below the threshold of p = .05. From an exploratory perspective, an investigation on the strength of the various dimensions of leadership styles that may contribute to Innovative Work Behaviours was also presented. In the next chapter, the interpretation, meaning and implications of these results will be presented, along with the limitations of the research.

Chapter 5

Discussion

This chapter further interprets the findings to assess whether the hypotheses outlined may be accepted or rejected in the context of the present study and expounds on further areas of exploration related to the topical variables and context of hybrid working.

Introduction to the Discussion

The present study sought to understand the potential impact of leadership styles on Innovative Work Behaviors within teams operating in hybrid contexts. Specifically, we explored how Transformational and Transactional leadership behaviors influence the innovation related behaviours of idea generation, idea promotion, and idea realization of team members, as well as how the climate of psychological safety within teams might affect these relationships. The findings generated offer insightful contributions to understanding the dynamics of leadership and innovation in contemporary work environments. As a reminder, the hypotheses examined were:

H1. Leaders who are high in transformational leadership behaviors will have a higher frequency of innovative work behaviors in a team in a hybrid context.

H2. Leaders who are high in transactional leadership will have a lower frequency of innovative work behaviors in a team in a hybrid context.

H3. Psychological safety positively moderates the relationship between leadership style and employees' innovative work behaviors in a hybrid context.

Interpretation of Key Findings

Transformational Leadership and Innovative Work Behaviours:

H1. Leaders who are high in transformational leadership behaviors will have a higher frequency of innovative work behaviors in a team in a hybrid context.

The results presented in Chapter 3 substantiate Hypothesis 1, providing empirical evidence that leaders who engage in transformational leadership behaviors have a substantial impact on the promotion of innovative work behaviors among team members, particularly in a hybrid work environment. In other words, the study provides a resounding affirmative answer to the posited question of "does leadership style have an impact on innovative work behaviours?"

The HLM analysis conducted produced a positive association between Transformational Leadership and Innovative Work Behaviors, with a notable t-score of 2.373. The statistical significance of this relationship was validated by a p-value = 0.02, suggesting that the probability of this correlation occurring by chance is quite low.

The work as depicted originally by Bass and Avolio (1994) and further adapted later, outlined Transformational Leadership dimensions as:

Idealized influence - II (or charismatic leadership): Leaders act as a role model.

Inspirational motivation- IM: Leaders communicate a compelling vision.

Intellectual stimulation- IS: Leaders encourage creativity and innovative thinking.

Individualized consideration- IC: Leaders attend to each follower's needs.

Combined these dimensions have been shown to have a positive influence on many aspects of working life, including employee motivation, learning behaviors, psychological safety, and employee performance overall (Naqvi et al., 2019; Nembhard and Edmondson, 2006; Carmeli et al., 2010; Singh et al., 2013). Furthermore, literature consistently demonstrates a positive association between transformational leadership attributes and innovation and creativity (Bunjak et. al., 2022; Gong et.al., 2009; Gumusluoglu & Ilsev, 2009). In a hybrid context, challenges in communication and collaboration can impede innovative processes leading to mixed results on the effectiveness of transformational leadership (Agrawal, 2012; Ale Ebrahim et al., 2011; Govindarajan et al., 2010), however this study adds significant evidence which affirms transformational leadership style as effective in these challenging contexts.

By contrast, we also see from the literature, more nuanced antecedents and contextual factors, ranging from team cohesion, digital proficiency, and organisational support and culture as other moderating influencers on leadership's impact on innovation (Wang & Kim, 2020). Given the specifications and inclusion criteria of this study, we have sufficient alignment with existing literature which generally supports the positive impact of transformational leadership on innovative work behaviours. The study of additional contextual factors in a hybrid environment may lead to an even more nuanced or dynamic understanding of the variables in question and may be an area for future research.

The implications of these findings are manifold. They suggest that leaders who exhibit more transformational behaviours, as characterized by their ability to inspire, motivate, intellectually stimulate, and consider the individual needs of their followers, can play a crucial role in cultivating a workplace and team culture that is conducive to creativity and innovation. Leaders like this are not only adept at articulating a vision that galvanizes action, but as we have seen, tend to encourage brainstorming, problem-solving, educated risk-taking, and out-of-the-box thinking which serve as essential ingredients for innovative outcomes (Yin et al., 2020; Javed et al., 2019; Pieterse et al., 2010). The implications of

higher transformational leadership fostering more innovative behaviors have wide-reaching effects, especially within the constituent context of the present study, the broader energy sector, and across project teams in a variety of industries. In the energy sector, where the energy transition is in full swing, and the demands on technology and sustainability efforts are rapidly evolving, transformational leadership can serve as a catalyst for innovation. The findings here align with the existing literature which demonstrates that leaders who embody these qualities motivate and inspire their teams to embrace change, think creatively, and push the boundaries of existing technologies and processes by driving the team's connection to meaningful work (Gumusluoglu & Ilsev, 2009). This is particularly crucial in an industry that faces the dual challenges of meeting the global energy demands of today while also addressing environmental and climate concerns and meeting the carbon neutrality commitments of the future. By fostering a culture of innovation, leaders can accelerate the advancement of renewable energy technology, enhance energy efficiency, and facilitate the sector's shift towards more sustainable practices.

For project teams working in multinational firms, like those who participated in the present study, the impact of Transformational Leadership transcends industry. Project environments are inherently challenging due to their matrixed leadership and team working contexts, with individuals often 'serving many masters' when working on projects due to having to balance and prioritize capital constraints, safety and environmental non-negotiables and execution timelines across various phases of project delivery. Leaders who flex towards more transformational qualities can articulate a clear vision and align team efforts towards creative solutions, which is essential for the success of projects that often involve complex challenges and tight deadlines, which can be further exacerbated by levels of virtuality (Kozhevnikova & Starovoytova, 2021; Kayworth & Leidner, 2002). Transformational leaders across sectors like technology and healthcare, finance, and education, can empower their team members by recognizing their contributions and encouraging autonomy and independent working. This empowerment enhances morale and fosters creative thinking and problem-solving, leading to the improvement of processes and products, and the generation of novel ideas.

As it relates to the exploration of hybrid teaming, where face-to-face contact is sporadic, the ability of a leader to maintain an effective influence over their team's innovation processes becomes even more relevant. The outcome of the study suggests that the qualities of transformational leadership are also helpful in addressing the communication and cooperation challenges that may arise in distant and dispersed work settings (Kozhevnikova & Starovoytova, 2021; Kayworth & Leidner, 2002). As the working world becomes increasingly more digital and globalized, the ability of transformational leaders to maintain high levels of team engagement and motivation is and will remain instrumental. This approach to leadership can bridge the perceived physical distance in remote and hybrid work settings, safeguarding against team members feeling disconnected, unsupported, or excluded from the team. The sense of belonging and shared purpose is critical for building and strengthening an innovative mindset among members of the team, and ultimately can enable them to more effectively collaborate across geographical and cultural divides.

Furthermore, as it relates to organisational and human resource management, the significance of the findings underscores the strategic importance of integrating leadership development into organisational strategies. Organisations can stimulate innovation in the energy sector and beyond by investing in programs that improve transformational leadership abilities among their existing and future leaders. These investments are crucial for organisations aiming to excel in the quickly evolving work context, as they not only drive innovative outcomes, but also attract and retain talent by offering opportunities for growth, challenge, and meaningful work. By investing in leadership development that highlights the right attributes to bolster innovation, organizations can be well-equipped to thrive in dynamic environments, leveraging the power of transformational leadership to advance their business strategy and performance objectives.

As observed, the evidence to support the hypothesis that leaders who are higher in transformational behaviours have teams who exhibit higher innovative work behaviours is strong. The strength of these findings can play a critical role in driving progress within other multinational organisations in the energy sector and beyond. By creating an environment that nurtures innovation, leaders who are high in transformational leadership can not only increase their team’s

competitiveness but also contribute significantly to the broader firm's success. A digital-age leader must possess the capacity to inspire, encourage, and empower their team in order to overcome problems and exploit new opportunities, highlighting the significance of these leadership attributes in accomplishing business objectives in complex and dynamic organisational settings. This is especially pertinent for organizations adapting to the evolving landscape of work that is becoming more flexible and digitally oriented, emphasizing the need for leadership that can guide teams through the challenges and opportunities of this shift. This is crucial for organisations adapting to the changing work environment, which is increasingly flexible, dynamic, and digital-first (Uhl-Bien & Arena, 2018).

Transactional Leadership and Innovative Work Behaviours:

> H2. Leaders who are high in transactional leadership will have a lower frequency of innovative work behaviors in a team in a virtual or hybrid context.

The results presented in Chapter 3 substantiate Hypothesis 2, providing empirical evidence that leaders who are higher on the spectrum of transactional leadership behaviors have a lower frequency of innovative work behaviors among team members, particularly in virtual or hybrid work environments. The HLM analysis conducted produced a negative association between Transactional Leadership and Innovative Work Behaviors, with a notable t-score of -2.771. The statistical significance of this relationship was highly significant (p-value = 0.01), suggesting that the correlation can reliably be attributed to an actual effect as opposed to random variation.

The work as depicted originally by Bass and Avolio (1994) and further adapted later, outlined Transactional Leadership dimensions as:

> *Contingent Reward (CR):* Leaders provide rewards for achieving performance goals and targets.
>
> *Management by Exception- Active (MbE-Active):* Leaders only intervene when performance does not meet the required standards or expectations.

Throughout the extant literature, transactional leadership has been shown to have either a limited or negative influence on innovation and creativity, as it can be much less effective in fostering innovation due to its' tendency to focus on maintaining the status quo and meeting pre-established objectives which can stifle risk-taking (Dan et al., 2019; Ma & Jiang, 2018; Lee, 2008; Bass & Riggio, 2006). Further, the emphasis on rewards (and penalties) can be seen as focussing on short-term outcomes and objectives rather than longer term or horizon oriented innovative thinking (Lee, 2008). Additionally, working in a hybrid fashion, as a contextual factor, has been seen to exacerbate communication and collaboration challenges in teams which are crucial elements of the innovation process (Gilson et al., 2015). The outcomes of this study also align with existing literature to the extent that transactional leadership is generally less conducive to fostering innovative work behaviours, especially in hybrid contexts. However, we also know that the effectiveness of transactional leadership can depend on the specific context and moderating factors including team dynamics, organisational culture, task specifications and more (Sunarsi et al., 2021; Wahyuni et al., 2020; Hutagalung et al., 2020). We will explore the moderating influence of psychological safety to add further nuance to our findings later in this chapter when we expound on the findings for Hypothesis 3.

The substantiated findings carry implications for reassessing the leadership styles conducive to innovation in digital work environments. As is typical in project and/or manufacturing environments, leadership can often focus on structured tasks and clear rewards, and pre-established (often mandated) requirements, which may stifle innovation where flexibility and autonomy are more conducive. This finding emphasizes the need for firms to reconsider the dominant pull toward transactional leadership styles even when in an operational or project context.

Transactional Leadership, characterized by its' focus on clear objectives, structured tasks, rewards for achieving goals, and consequences for failure, may be more commonplace in the energy sector and similarly situated industries for several historical and operational reasons (Martínez-Córcoles, & Stephanou, 2017). However, this leadership style may hinder the goals of the energy transition, which requires substantial innovation, flexibility, and a move toward more environmentally sustainable practices (Lee, 2008).

The reasons why transactional leadership can make sense in such a setting are varied. For one, the highly operationally efficient and safety-centric industry of oil and gas operates on extremely tight margins where operational efficiency is paramount. Moreover, safety standards are heavily regulated and reported to ensure that safety violations up to and including fatalities are avoided. This leadership style can be effective in ensuring there is clarity around guidelines and standards and that business goals are achieved, which can be critical in high-risk settings. The energy sector has also been known to be quite hierarchical in structure. Many organisations have layered organisational structures which are meant to provide a clear chain of command and straightforward reward systems. Transactional leadership can align well with this structure to contribute to operational success. As mentioned, in the heavily regulated oil and gas sector, there are a number of compliance standards across environment, safety, and operations. The clear structure and accountability that Transactional Leadership affords can be adept at navigating these numerous requirements by focusing on achieving specific benchmarks via direct oversight and control.

However, when we consider the future of the industry and the demands of the present moment as consumer standards shift, and as countries and governments are increasingly holding private enterprises accountable for the myriad ripple effects of their products, supply chain processes, and overall emissions, we understand that the status quo is no longer enough (Sovacool, 2016).

The energy transition, which is moving society towards more sustainable practices, renewable energy sources, and decarbonized legacy products, demands flexibility, creativity, and a willingness to explore new business and operating models—qualities that the behaviours of Transactional Leadership may not best support. If society and private industry are to converge and successfully confront the energy transition, there are several factors needed:

A) A clear need for innovation: The energy demands of today are growing, not shrinking, and we know that not every country or region is starting with the same level of infrastructure. Calls for a 'just transition' where each country is met where they are and clean energy is accessible for all will take as yet unseen levels of creative and innovative thinking (Hoppe &

de Vries, 2018). Transitioning to more sustainable practices, renewable energy sources, and decarbonized legacy products will take a social innovation alongside technological advancements, from developing new technologies to rethinking energy distribution and consumption models, and even 'exnovation,' or the phasing out of unsustainable legacy products over time (Davidson, 2019). Transactional leadership, with its' focus on existing operations and rewards for meeting predefined goals, might inhibit the creative thinking and risk-taking necessary for innovation. Transactional leadership, which tends to emphasize current operations and rewards for achieving set targets, could inhibit the very thinking and calculated risk-taking required for innovation.

B) A need to be adaptable and flexible: As the energy sector moves towards more sustainable models, adaptability and flexibility become crucial. The rigid structures and processes favoured by transactional leadership can clash with the need for quick pivots in strategy, experimentation with novel approaches, and learning from failure—all essential for navigating the uncertainties of the energy transition.
C) Increased engagement and empowerment: The energy transition is predominately a cultural and social shift, granted, changes to technology and products will be of paramount importance, yet the community, social, and enterprise engagement required will demand buy-in from all levels of an organisation. Transformational leadership styles, which are known for their ability to inspire and motivate, may be more effective in engaging employees (and communities) in a compelling vision of the future, whereas Transactional Leadership may not cultivate the same degree of dedication to the overarching goals of sustainability and innovation.

To navigate the complexities of the energy transition effectively, companies must consider evolving. The inverse relationship between innovation and Transactional Leadership, particularly within the context of the energy sector and project teams, can have critical implications for how organisations approach leadership development, team management, and strategic planning. The integration of transformational leadership elements alongside the established strengths of transactional leadership can forge a more balanced leadership model. This hybrid approach can be a herald to the operational efficiency and safety benefits inherent

in Transactional Leadership styles while simultaneously fostering the creativity, innovation, flexibility, and employee empowerment critical for a successful transition where there is an urgent need for sustainable forward-thinking solutions, fostering innovation is not just beneficial, but vital.

The Role of Psychological Safety:

> H3. Psychological safety positively moderates the relationship between leadership style and employees' innovative work behaviors in a virtual or hybrid context.

The results presented in Chapter 3 also substantiate Hypothesis 3 to a certain extent, providing empirical evidence that team climates marked by higher levels of psychological safety can have more positive outcomes on Innovative Work Behaviors among team members, particularly in virtual or hybrid work environments. It would appear we also have conclusive evidence to the question "does leadership style impact innovative work behaviours more significantly when psychological safety is higher." In Model 2 of the HLM analysis output, we saw a reduction in the negative strength of the association between Transactional Leadership and Innovative Work Behaviors, with a reduced t-score of -2.099, which was statistically significant (p-value = 0.038). Meanwhile, and perhaps more intriguingly, there was also a reduction in the strength of the positive t-value of Transformational Leadership when interacting with Psychological Safety, but this score was not statistically significant (t-value = 1.707, p-value = .090)

Psychological safety, defined as the shared belief that a team is safe for interpersonal risk-taking, can play a crucial role in moderating the observed inverse relationship between Transactional Leadership and Innovative Work Behaviours, especially within the constituent context of hybrid teams working in the energy sector. This moderating effect can be especially relevant as organisations navigate through the challenges of the energy transition while managing dispersed teams.

In fact, the existing canon on psychological safety abounds with case after case of its' positive influence on innovation and creativity (Javed et al., 2019; Koh et al., 2018; Mao et al., 2017; Newman et al, 2017; Gumusluoglu & Ilsev, 2009). When employees feel safe, they are more likely to show up fully by proposing

new ideas, challenging the status quo, and taking calculated risks in favour of the enterprise (Edmondson, 1999). Further, in environments where psychological safety is high, transactional leaders can facilitate innovation by creating clear expectations, providing stability and support for new ideas, while transformational leaders create more responsive teams who enhance the positive effects of psychological safety (Wang, 2020). The findings of this study didn't wholly corroborate psychological safety's ability to enhance transformational leadership's impact on innovation due to a reduced (albeit insignificantly so) t-score, however, there was unmitigated confirmation that psychological safety can enhance innovative work behaviours in teams who are led by a transactional leadership style in a hybrid context. Clearly, the relationship is more complex as it relates to transformational leadership, and influenced by other factors which were not necessarily explored in this study but may be picked up in areas of future research. For instance, transformational leaders may need to adapt their strategies of maintaining psychological safety in hybrid contexts to further benefit creativity and innovation by being more inclusive, promoting autonomy, collaboration and responsibility in their teams (Contreras et al, 2020).

As it relates to implications of the study, in environments like the energy sector, where Transactional leadership may dominate due to the focus on structured tasks, clear rewards, and penalties for underperformance, can hinder the innovative behaviors of team members due to a perceived fear of failure or stepping beyond defined roles. However, this study again proves that in the presence of psychological safety, a leader can effectively counteract this by encouraging team members to voice novel ideas, experiment, and take risks without fear of negative consequences for failure by modelling active listening and developing an open mind-set (Jha, 2019; Scheepers et. al., 2018). Virtual project-based teams often deal with unique challenges, including communication barriers, lack of face-to-face interaction, and the need for rapid adaptation to changing circumstances (Hertel & Orlikowski, 2015). Cultivating psychological safety in these teams can increase the collective sense of trust and support, thereby encouraging team members to engage in experimentation, creative problem-solving, and innovative thinking despite the transactional nature of leadership. In the energy industry, where project teams are frequently tasked with developing

solutions to complex, high-stakes problems under significant uncertainty, this can unlock hitherto unseen benefits in business performance.

As noted, there was also a rather counterintuitive outcome relating to the reduction in strength in the positive relationship between innovative work behaviours and transformational leadership. While the relationship was not statistically significant, the trend is worth noting. There are a variety of potential reasons why in this case psychological safety might not generally enhance the innovative behaviours of staff. One situation where the positive impact of psychological safety in a hybrid team may be unhelpful is in situations where teams become too comfortable or complacent. Where Transformational leadership encourages challenging the status quo to generate new ideas and bring them to fruition, a comfortable team may lack a sense of urgency to push the boundaries. Another possibility could be due to psychological safety's intent to support and promote open communication and collective respect amongst the team leading to an overemphasis on harmony. The reluctance to disrupt the team's cohesion could lead to an absence of critique or challenging each other's ideas, which when done respectfully are essential ingredients to building innovative and productive teams. Additionally, the challenges associated with remote work are myriad, and leaders may find it difficult to accurately gauge the level of psychological safety and its impact on individual team members. This may also impede the leader's ability to provide specific feedback in a timely fashion which of course is crucial to leading innovative processes and shepherding team members from idea generation to idea realization in complex environments.

Potential mitigation strategies are available, however. Leaders can ensure that psychological safety is balanced with the need for constructive conflict, candour, and a sense of urgency as it relates to innovation or continuous improvement projects and initiatives. Furthermore, monitoring the overall team dynamics and fostering individual accountability should be part and parcel to a leader's role and responsibilities. As alluded to previously, adapting one's leadership style to ensure effective communication, collaboration and continuous improvement is essential. The demands of the present and future leaders of dynamic organisations facing unprecedented levels of change, volatility, ambiguity, and complexity call for adaptive leadership. Facilitating adaptive leadership in sectors like the energy industry serves as an imperative to navigate the complexities of

modern challenges, including the transition to renewable energy sources, regulatory shifts, and evolving consumer demands. Adaptive leadership refers to the ability of leaders to anticipate, prepare for, and respond to changes in their environment by encouraging flexibility, learning, and innovation among their teams (Govindarajan, 2016). Without the presence of psychological safety, which engenders a felt sense of safety to raise concerns, opinions, and ideas, leaders will be handicapped to anticipate and respond to their organisations and broader society's demands. In transactional leadership-dominated environments, fostering psychological safety can lead to a culture where learning is valued over blame, normalizing the need for iteration and refinement of ideas. This culture is crucial for virtual teams and project environments where adaptation and rapid learning are vital for achieving success (Govindarajan, 2016).

Building on the initial analysis that extended Hypothesis 3 as a supplementary analysis, which examined the leadership dimensions across both Transformational and Transactional behaviors in the context of psychological safety, we gained further insights. This added nuance aids in understanding how specific leadership dimensions influence innovative work behaviors within teams. The near-significant positive relationship of Inspirational Motivation and Individualised Consideration with innovation suggests that leadership approaches that focus on motivating and connecting with individual team members to understand their professional ambitions may be particularly effective in fostering an innovative team environment in a virtual context. The various dimensions did not individually have statistically significant direct effects on innovative work behaviors in this model; however, the findings offer a good foundation for future research on how different leadership dimensions can effectively promote and stimulate creativity and innovation within teams in similar contexts. Furthermore, the positive moderating effect of psychological safety to counteract both aspects of transactional leadership could warrant further study with a larger sample size or different contexts to explore if a statistically significant relationship can be established.

Theoretical and Practical Implications

These findings uniquely contribute to the academic canon and practitioner literature by highlighting the significance of leadership style in shaping innovative

work behaviors in virtual or hybrid contexts. They echo and extend previous research by illuminating the nuanced ways in which Transformational and Transactional Leadership can influence team Innovative Work Behaviours, along with how the relationship changes in the presence of Psychological Safety.

The study enriches our theoretical understanding of how leadership styles influence innovation in the complex and dynamic context of dispersed teaming. They give further insights into teams challenged to navigate through the current paradoxes of the energy transition in a global context. Transformational Leadership continues to show its various strengths towards positive team outcomes, and in this case, significantly strengthens Innovative Work Behaviours for the teams in this study. The findings also suggest revisiting traditional views on transactional leadership, proposing that with the moderating effects of Psychological Safety, these behaviours may not be inherently detrimental to team innovation in a virtual environment.

For leaders and practitioners alike, these findings underscore the importance of fostering psychological safety and suggest that leaders should adopt a flexible leadership style that speaks to the constituent context of the team, the business objectives, and the challenges faced in a hybrid team environment. Practitioners can influence their executive and management clients to spend sufficient time on the dyadic relationship to reinforce the behaviours inherent in the dimensions of Inspirational Motivation and Individualised Consideration. Leaders too can explore with their team to what extent team members feel psychologically safe to increase innovative work behaviours more effectively in their team.

For organisations, on a more strategic level, these results carry implications for leadership development, organisational culture, and strategic project planning. From a leadership development perspective, organisations should consider the programming and coaching offered for leaders who are managing complex projects and virtual teams. By understanding the nuanced and complex challenges facing these leaders, a comprehensive approach to leadership development can offer training and coaching that can highlight the positive attributes of Transformational Leadership and help leaders effectively build or strengthen levels of Psychological Safety to increase the efficacy of pre-existing attributes of Transactional Leadership. As it relates to organisational culture and especially in

the context of the energy transition, firms should be careful of the implicit ways they may be undermining the very ambitions they would like to meet. These findings highlight the importance of matching organisational culture and structure with the needs of hybrid working and advocating for a culture that values experimentation and risk-taking over rigid task execution. Behaviours like calculated risk-taking, experimentation, radical candour, and creative thinking can be (un)intentionally undermined by various components of the broader organisational culture, regardless of the team climate. A systemic dialogic exploration of these elements from beliefs, values, symbols, processes & systems, to structure & accountability, and people & skills can present a descriptive picture of where the as-is culture sits and equally can give detailed insights into the gap to the aspired culture. As it relates to strategic planning, firms should recognize the antecedent climate which can help accelerate the effectiveness of the business cycle and project lifecycles. For instance, the leadership behaviours which drive idea generation are likely to be somewhat different from the behaviours which influence idea realization. Considering how these align with the cyclical nature of business and projects can help the organisation and its' leadership know when to dial up or down certain behaviours to get to the aspired outcome.

Limitations of the Study

This study, while providing valuable insights into the relationship between leadership behaviors and Innovative Work Behaviors within project teams, is subject to certain limitations that warrant mentioning. A primary limitation stems from its focus on project teams within a single directorate of one multinational organisation, namely the directorate looking after the firm's capital projects and research and development technologies. This scope may inhibit the generalizability of the findings to other contexts, organisations, or industries, potentially limiting the applicability of the insights to broader settings.

Additionally, the use of close-ended questionnaires as the sole method for data collection introduces constraints on the depth of understanding of the gained insights. While such questionnaires can efficiently gather data on specific aspects of leadership behaviors, Psychological Safety, and innovative work behaviours, they limit the ability to capture more nuanced, detailed, and layered insights from

participants. This methodological choice may overlook the complex interplay of factors that influence IWB within teams, including subtleties in individual perceptions and experiences that open-ended questions or interviews might reveal.

Moreover, the potential for common method bias, which occurs when data is collected through the same method and at the same time, may further limit the generalizability of the findings. Such biases could artificially inflate the observed relationships studied.

To address these limitations and further substantiate the study's findings, related research could expand on this study by adopting longitudinal designs that track changes over time, or by following up with participating teams in interview or focus group style format to expound on the quantitative findings presented. Additionally, future research could look to incorporate more objective measures of innovative behavior, such as patents filed, projects completed, or other tangible outcomes, which may offer a more concrete assessment of innovation within teams. Finally, expanding the scope of research to include multiple directorates and/or organisations would further enhance the generalizability of the findings, offering a more comprehensive understanding of how leadership behaviors impact IWB across different departmental and industry contexts.

Chapter 6

Conclusion

When the present study was originally scoped and envisaged, COVID-19 had recently evolved work culture and the escalating expectations placed on leaders and employees alike to succeed in an uncertain and transformative period in organizational life. Four years on from the start of the pandemic, this era, which is now characterized by the ubiquity of technology, work which extends beyond traditional boundaries, and nearly constant communication through synchronous and asynchronous channels within contemporary organizations; the demands on knowledge workers to not only be productive, but also to innovate and improve have intensified. Concurrently, the expectations placed on leaders to navigate

these shifts and drive organisational success through innovation have become increasingly demanding.

Amidst this backdrop of change, highlighted by the swift and widespread transition to remote working for millions of employees and leaders across matrixed organisational structures, this study aimed to delve into the dynamics at the intersection of leadership style, innovation, and psychological safety within virtual or hybrid team settings. The urgency and relevance of these dynamics have never been more pronounced, as organisations globally continue to grapple with the challenges and opportunities presented by this new normal.

This research sheds light on the complex relationships between varying leadership styles across the continuum of Transformational and Transactional Leadership, the interplay of Psychological Safety, and the advancement of Innovative Work Behaviors among teams operating in virtual or hybrid environments. The findings, while significant, also underscore the importance of a nuanced, adaptive approach to leadership—one that recognizes and leverages the unique motivations and contributions of individual team members while fostering a collective environment of trust and safety. Such an approach is pivotal for firms striving to balance a culture of innovation while exploiting their traditional channels for revenue and performance, thereby enhancing their adaptability, vitality, and success in an increasingly digitalized world.

Avenues of Future Research

The avenues of future research for organisational behaviour and leadership development for cultivating innovation in hybrid teams present a rich backdrop for exploration. As highlighted previously, more work can be done to understand which specific leadership attributes are most beneficial in cultivating and strengthening Innovative Work Behaviours in dispersed teams. Hybrid work environments, which combine both remote/at-home and in-office arrangements, can pose unique challenges and opportunities for leadership and innovation. Future research could further expound on the supplementary analysis to deepen the understanding of whether certain aspects of transactional leadership can be combined with transformational elements to create a leadership framework that supports operational efficiency, safety criticality, and complex project demands without stifling innovative work behaviours in hybrid teams. Additionally, other

leadership styles including inclusive, adaptive, and servant leadership may be explored in a comparative way to uncover the additional nuance of how leadership influences creativity and innovation outcomes. While not explicitly explored in this study, future research could also delve more into comparing and contrasting leaders' self-reports of leadership style and how they vary as compared to the reports of team members, and to what extent that may influence innovative outcomes or levels of psychological safety.

With the nearly unavoidable reliance on digital tools in hybrid work environments, understanding the role of technology and innovative outcomes begs for further exploration. How leaders can effectively increase Psychological Safety despite physical distance, communication challenges, and interpersonal team dynamics using different modes of technology and/or understanding how the use of technology can mediate their effectiveness as a leader could be a focus of future research.

As previously noted, the influence of organisational culture on the effectiveness of leadership's ability to promote innovation warrants further investigation as well. Future studies could explore the intersection of organisational archetypes and how they may support or hinder the implementation of innovative leadership practices in hybrid teams. Exploring this using cross-industry data and sectoral comparisons could prove particularly illuminating, highlighting the various opportunities and challenges across industries.

Finally, future longitudinal research can provide insights into how leadership attributes affect innovation in hybrid teams over time. Teams could be studied at various points in the project life cycle to determine the longer terms impacts of Transformational and Transactional Leadership on innovation in remote working teams.

By focusing on these areas, future research can contribute to the growing interest in theoretical and practical implications for organisational behaviour and leadership development research looking into innovation, Psychological Safety, and leader style in virtual teams, providing critical insights for firms and teams looking to succeed.

In summary, this study, while limited, provides a timely and critical perspective on the essential elements required to spur innovation in virtual teams. It offers valuable insights for leaders and practitioners aiming to navigate today's complexities of digital working, emphasizing the need for leadership behaviours that not only adapt to changing work contexts, but also actively promote a climate of psychological safety, and a culture of innovation. Through this lens, organisations can better position themselves to thrive amidst the challenges of today and the uncertainties of tomorrow.

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Appendices

Appendix 1

Responses to Examiner Comments

1. *How is the interplay between leadership style and innovation been conceptualised in hybrid teams at the moment? What is problematic about this conceptualisation?*

   Literature, which has hitherto fore explored the impact of leadership style on team or organisational innovation in hybrid settings, reveals a few conceptual limitations.

To start, the topic of hybrid teaming and virtuality is an emergent topic. The number of empirically peer-reviewed published studies focussed on virtual/remote/hybrid teaming and

innovation (as key words) grew to nearly 17,000 since 2021. This staggering number has undoubtedly been driven by some of the irrevocable changes experienced by evolving and easier-to-access technology along with the global pandemic. The traditional conceptualisations have framed transformational leadership as a primary driver of innovation, while viewing transactional leadership as either neutral or detrimental to innovation (Darwish et. al, 2020; Kark et. al, 2018; Tahir, 2015). However, these have emerged predominantly from research which focussed on conventional or co-located teams working face-to-face and operated under the presumption that leadership styles remain constant regardless of team structure, work modality, or psychological conditions.

Many existing frameworks tend to overemphasize technological solutions while underplaying crucial social and psychological factors such as team climate and psychosocial dimensions in hybrid teams (Castro et. al, 2018; Newman et. al, 2017). Leadership in hybrid environments extends beyond the effective management of virtual tools to encompass the creation of psychological safety and trust across different modes of interaction. While existing conceptualizations often present oversimplified relationships between leadership and innovation, the current research demonstrates the crucial intermediary role of psychological safety in enabling innovative behaviors.

From a methodological point of view, the current research on leadership in hybrid teams is notably limited by its' dependence on theoretical models and small-scale investigations, which have generally been undertaken in controlled environments or with student samples (Jameson et. al., 2022; Podsakoff & Podsakoff, 2019). Further, many studies utilize sample sizes under 100 participants or examine fewer than 20 teams, limiting their statistical power and generalizability. Additionally, studies often use simplistic analytical methods which fail to account for the complex, nested nature of team dynamics in organisational settings (Crawford & Kelder, 2019; Marlow et. al., 2018)

2. *How are these problems be addressed via your study?*

This study addresses several gaps in the existing literature on leadership and innovation in hybrid contexts. By focussing on the interaction of leadership style, psychological safety and innovation in this unique environment, this research goes beyond the typical office-centric/colocation paradigms that dominate current research.

Unfortunately, despite the rise in hybrid working, most existing leadership-innovation models do not look at the unique challenges inherent within the hybrid work environment, rather they assume that leadership functions uniformly across all settings. This study, by contrast, explicitly situates leadership within the hybrid/virtual context, providing empirical evidence that leadership effectiveness is uniquely shaped by team climate (e.g. psychological safety) which in turn can dial up or dial down a team's ability to innovate effectively.

Additionally, by conducting the research in an empirically rigorous way in a "real-world" setting using a robust statistical technique like HLM, the research further illuminates the complexities inherent within working in a global, matrix organisation.

3. *How do the findings of your study contribute to existing understandings of leadership style and innovation in hybrid teams?*

Teams are becoming central to creativity and innovation in organisational settings. Advancements in technology have driven dynamic improvements in how teams are formed, composed, communicate and produce results. This study represents a significant step forward in refining how leadership and innovation are understood in hybrid teams. The integration of psychological safety as a moderating variable provides a more sophisticated and empirically validated model, moving beyond traditional frameworks which have heavily relied on static views of collocated teams working largely face-to-face.

This research addresses a key gap in understanding how team climate or the psychological conditions of the team influence innovation. By establishing the crucial role of psychological safety in moderating leadership effectiveness, we demonstrate that successful innovation in hybrid teams requires more than just an "appropriate" leadership style, it demands the creation of any environment where members of the team feel safe to take calculated risks, contribute ideas, and bring contrarian views regardless of their physical location.

Further, the research points to a more context specific understanding of both transformational and transactional leadership styles within geographically dispersed teams. While existing literature often presents transformational and transactional leadership as having universal effects (Sunarsi et al., 2021; Wahyuni et al., 2020; Hutagalung et al., 2020; Warumu et al., 2020; Ng, 2017; Choi et al., 2016; Avolio & Bass, 1999) this study reveals a more nuanced impact for geographically dispersed teams. These findings open new avenues to explore more adaptive and situational leadership models which may be better suited to dynamic hybrid environments.

Additionally, by situating this study within a Fortune 100 company, we have large scale empirical evidence that adds to our understanding of leadership principles and how they may translate from traditional to hybrid settings. This real-world validation offers more practical insights into how leadership dynamics manifest in complex organisational structures where teams operate across multiple modalities of interaction.

4. *Why is the moderating influence of psychological safety particularly important for virtual/hybrid teams?*

In conventional team set-ups where people work together frequently, in person, team members can rely on physical proximity, non-verbal cues, and informal interactions to establish trust, build rapport and assess interpersonal risk. However, in virtual and hybrid settings, these natural trust-building mechanisms are often diminished or absent entirely, making trust, team cohesion and psychological safety more difficult to develop and sustain (Benda et. al, 2023; Pullen, 2022; Jimenez et al., 2017). Hence, the moderating role of psychological safety for this study takes on critical importance given the level of virtuality for teams working geographically dispersed.

Furthermore, hybrid teams face unique challenges in creating psychological safety across different communication modalities, cultural differences and time zones (Castro et. al, 2018; Newman et. al, 2017). Digital interactions may appear more formal or permanent (e.g. digital trails) than face to face chats, thus increasing fear or anxiety about sharing new ideas or criticising established ways or working (Pullen, 2022). Spontaneous engagement and immediate feedback are also less common which can limit creativity and innovation (Pullen, 2022; Hughes et al., 2018). Given the finding that psychological safety plays a statistically significant moderating role between leadership style, we know that to be effective, leaders

must actively work to create an environment where all members of the team feel safe to bring their full selves to work, offer dissenting points of view and take calculated risks to benefit innovation in these contexts.

5. *Are there any other moderating variables that are useful to consider for hybrid teams – e.g., diversity composition within the team –value, socio categorical and/or occupational diversity? Given that diverse leads are seen as more prone to conflict in at least the forming stage? Perhaps this can be raised as an area for future research?*

A number of studies have explored a variety of moderating variables influence on team effectiveness in hybrid or virtual teams and have findings which suggest other variables which can enhance overall performance, and specifically creativity and innovation.

a) Functional, educational and cognitive diversity can be highly beneficial. A study conducted by Bell et al. (2011) found that diversity across functional background positively impacted team creativity and innovation particularly in design and product development teams. The Bell study found a positive impact for educational background in top management teams which can bring different methodological approaches and theoretical frameworks (Bell, et al, 2011). Other studies have proven that by combining members from cross-disciplines, teams can enjoy better problem-solving capabilities, innovative outcomes, and higher quality decision making (Attah et. al, 2024; Salazar & Lant, 2018). For cognitive diversity, Aggarwal and Woolley (2013) found that it can be a double-edged sword, while it increases a team's ability to pull in a wide range of knowledge and skills thereby stimulating divergent thinking, it can be inhibiting when it reduces interactions and decreases communication effectiveness. Drawing even more relevance to overall team climate and social interactions amongst team members.
b) Team characteristics, specifically geographic diversity, gender diversity and values can have promising effects on innovation; Research has shown that when properly managed cultural and national diversity can achieve higher levels of innovation by enhancing exploratory problem solving, and creativity by bringing different perspectives and approaches when challenges arise (Elia, et. al, 2019; Wang et. al, 2019). Further, research has shown that when paired with inclusive leadership practices, gender-balanced hybrid teams achieve better performance through more effective communication, enhanced team collaboration and higher innovation metrics (Zografou, 2024; Yang et. al, 2022; Mlambo-Ngcuka, & de Silva de Alwis, 2019). Finally, for value diversity, research has shown some strong linkages for shared core values which is important in bolstering team cohesion, however, diversity in peripheral values (e.g. secondary or non-core values) can contribute more to increasing innovation, especially when moderated by leadership style (Munoz et. al., 2020; Bell & Outland, 2017).
c) Temporal aspects; Several studies have indicated that the impact of diversity can change over time as teams move through different maturation curves and develop, deepen and evolve shared working norms (Mathieu et. al., 2014), especially as it relates to psychological safety (Edmonsdon & Harvey, 2018).

While the scope of this study was to better understand leader's style impact on innovation through the moderating influence of psychological safety, there is a ripe landscape of

further areas to explore. For instance, it could be postulated that in order to glean any significant benefit from the various aspects of diversity as listed above one should consider the psychologically (un)safe environment that the team operates in, which makes psychological safety's moderating influence even more meaningful as one explores different dimensions of team diversity. Future research could also explore how technology impacts different diversity variables. Longitudinal studies could better understand how diversity dynamics evolve over time in hybrid teams. For practitioners and leader alike, future studies that identify ways to maximise the benefits of diversity while minimizing challenges in geographically dispersed teams would be highly valuable.

6. *To what extent does transformational leadership capture inclusivity?*

The relationship between transformational leadership and inclusivity has been explored to some extent through empirical research. If we look at the individual components themselves, some dimensions speak directly to promoting inclusion.

Individualized consideration recognizes and values individual differences by definition, while also addressing the unique needs and strengths of team members, which has been shown to foster a more inclusive team climate (Dionne et al, 2004). Intellectual stimulation encourages diverse perspectives and ideas, thereby indicating that transformational leaders can promote inclusivity by creating an environment where these diverse ideas are not only valued and supported, but in turn linked to creativity and innovation (Bosselut et. al, 2020). Inspirational motivation has also been shown to promote team and social cohesion and building a shared vision, making diverse team members feel included and contributing to a unified direction (Shedow & George, 2021; Callow et. al., 2009).

Through the combined dimensions, transformational leaders have been shown to promote psychological empowerment, which can empower team members and foster a sense of self-determination which can lead to increased discretionary effort and higher performance (Dust et. al., 2014). Additional evidence shows that transformational leadership can also promote a knowledge-sharing environment which can integrate diverse perspectives and strengthen team innovation (Jiang & Chen, 2018).

It's important to note there are some limitations, however to how transformational leadership captures inclusivity.

a) *Psychological Safety*; while transformational leadership can contribute to psychological safety (Yukl et. al., 2002; Mao et. al., 2019), the dimensions do not explicitly focus on creating inclusive contexts where all members feel safe to contribute without fear of negative consequence.
b) *Power dynamics*; transformational leadership could be overlooking the importance of power-sharing, self-directed teams, collective leadership approaches given its somewhat hierarchical view of leadership (Anderson & Sun, 2017).
c) *Cultural competence*; transformational leadership and the multi-factor leadership questionnaire do not explicitly take into account cultural competence which is considered to be an integral component of modern leadership (Caligiuri & Tarique, 2012; Zander 2012; Javidan & Bowen, 2013). Individualized consideration does account for meeting team members in their specific contexts but does not detail or give specific guidance around navigating cultural difference or mitigating bias.

d) *Equity*; the traditional conceptualisation of transformational leadership does speak to the development of all team members but lacks any nuance around the leader's role in actively removing barriers which might uniquely face marginalized followers. (Shields & Hesbol, 2020)

7. The energy industry is set on diversifying its workforce to enhance innovation. How would the findings of your study contribute to this conversation?

This study contributes in a few meaningful ways to the on-going conversation around workforce diversification and innovation for the energy industry to meet the challenges and demands of a changing energy landscape:

a) *Leader's role in innovation*; the findings show that transformational leadership significantly influences innovation and gives a more nuanced understanding of psychological safety's role in increasing innovation in hybrid teams- for the energy sector's efforts, this suggests that diversifying the workforce is not enough. But rather, adopting transformational approaches can more effectively engage diverse teams and by creating psychologically safe environments, leaders can better realize the innovative potential of a diverse workforce. Additionally, the findings on the inverse relationship between Transactional Leadership and innovative work behaviours underscores the importance of adaptability and vision-driven leadership styles when managing diverse, remote teams.
b) *Psychological safety as an enabler*; the findings on psychological safety are particularly relevant for diversification because diverse teams may face additional barriers and challenges to exhibiting voice behaviours (or speaking up) (Eisenburg et. al., 2019; Maznevski & Chui, 2017; Gibson et. al., 2014) building trust can be more challenging in these geographically dispersed teams with different ethnic compositions (De Jong et. al, 2017) and communication can be more challenging in the midst of asynchronous and synchronous technology (Eisenburg et. al., 2019). As the workforce becomes more diverse across gender, ethnicity, and discipline, fostering psychological safety will be essential to unlocking employees' full potential. Ensuring all voices are heard, valued, and empowered is especially critical in hybrid environments, where limited interpersonal cues can make meaningful engagement more challenging.
c) *Leadership development for diverse, hybrid workforce*; the findings also underscore the need for leadership training and development which promote transformational leadership, and more specifically the dimensions of individualized consideration to value diverse perspectives, intellectual stimulation and the active encouragement of creative problem-solving across diverse teams, and inspirational motivation through the effective alignment of diverse team members to share a vision of innovation.
d) *Hybrid work as a talent strategy*; by increasing our understanding of what are the drivers of success in virtual and hybrid teams, organisations in the energy sector can use hybrid work to access a more diverse talent pool and retain talent.
e) *Data-driven insights from Energy sector;* given the research has been conducted within a Fortune 100 multinational energy company offers industry specific insights making the findings directly actionable for energy firms aiming to diversify and drive innovation. The research design and use of HLM analysis also offers empirical evidence which can inform leadership development programmes.

8. Can you better articulate your theoretical contribution(s)?

This study makes a significant contribution by empirically validating the link between Transformational leadership and innovative work behaviors in hybrid environments. This is particularly important because previous conceptualisations often assume that leadership style translates directly to hybrid environments without empirical validation. This research provides concrete evidence that Transformational leadership maintains its' effectiveness in fostering innovation even in virtual and hybrid contexts.

The findings regarding the inverse relationship between Transactional leadership and innovative work behaviors is also of interest. This challenges the assumption that structured, transaction-based leadership might be more effective in virtual settings due to their inherent need for clear coordination and task management (Brown et. al., 2021). Instead, this research suggests that even in hybrid environments, transformational approaches that emphasize inspiration and individualized consideration are more conducive to innovation.

Through the introduction of psychological safety as a moderating variable, this work makes a significant theoretical contribution. While psychological safety has been extensively studied in traditional team settings, it has rarely been integrated into leadership models for hybrid or geographically dispersed teams.

This research further demonstrates that the impact of leadership on innovation is contingent upon the psychological conditions within the team, moving beyond binary "good versus bad" descriptions of leadership styles in existing literature. The findings prove that leaders who promote high psychological safety also enable higher innovative work behaviours, especially in virtual and hybrid settings, challenging the conventional view of leadership as a static individual trait rather than a relational and dynamic process.

Further, the methodology also substantially strengthens the theoretical contributions. Through the collection of data from 149 team members across 31 global teams in a top Fortune 100 multinational energy firm, the study provides robust empirical validation in a real-world hybrid context. The use of Hierarchical Linear Modeling (HLM) improves the validity of these relationships by capturing the nested nature of team dynamics and moving beyond surface-level correlations to provide insights that can be usefully applied to leadership development and organisational policies.

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Appendix 2

Copy of Employee and Manager Questionnaire

Level of Virtuality (Screening questions)

S1. Do you interact with your team members predominately via virtual means (e.g. conference calls, video calls, emails, and instant messages)?

a) Yes
b) No

S2. How often do you work from a company office?

a) Daily
b) Weekly

c) Occasionally
d) When needed
e) Almost never

S3. How often do you see members of your team face to face?

a) Daily
b) Weekly
c) Monthly
d) 1-3 times per year
e) Have never met face to face

Questionnaire Items

Demographics

1. Select the range that best describes your length of service at the company.
   a) 1 year or less
   b) Between 1- 5 years
   c) Between 6- 10 years
   d) Between 11- 15 years
   e) Between 16-20 years
   f) 20+ years
2. Select the range that best describes the length of time in your current team.
   a) 1 year or less
   b) 1-3 years
   c) 3-5 years
   d) 5+ years
3. What is your gender?
   a) Male
   b) Female
   c) Non-binary
   d) Prefer not to specify
4. Select the range that best describes your age.
   a) 24 and under years of age
   b) 25-34 years of age
   c) 35-44 years of age
   d) 45-54 years of age
   e) 55-64 years of age
   f) 65 or above
   g) Prefer not to specify
5. What is your highest level of education attained?
   a) High-school, Secondary school or equivalent
   b) Bachelor's degree (BA/BS)
   c) Master's degree (MA/MS)
   d) Doctoral degree (PhD, MD, etc.)
6. What is your race or ethnicity?
   a) White or Caucasian (includes American, British, French, German, etc.)
   b) Black (includes American, Caribbean, Nigerian, etc.)
   c) Indigenous or Aboriginal (includes American, Canadian, Australian, etc.)
   d) Latino or Hispanic (includes Mexican, Brazilian, South American, Spanish, etc.)

e) Asian & Pacific Islander (includes Japanese, Korean, Chinese, Indian, etc.)
f) Prefer not to specify

7. What is your country of origin? (e.g. your base country)
   - Includes a drop down of all countries
8. What is the country you are working from? (e.g. your host country)
   - Includes a drop down of all countries

Afghanistan
Albania
Algeria
Andorra
Angola
Antigua and Barbuda
Argentina
Armenia
Austria
Azerbaijan
Bahrain
Bangladesh
Barbados
Belarus
Belgium
Belize
Benin
Bhutan
Bolivia
Bosnia and Herzegovina
Botswana
Brazil
Brunei
Bulgaria
Burkina Faso
Burundi
Cabo Verde
Cambodia
Cameroon
Canada
Central African Republic
Chad
Channel Islands
Chile
China
Colombia
Comoros
Congo
Costa Rica
Côte d'Ivoire
Croatia
Cuba
Cyprus
Czech Republic

Denmark
Djibouti
Dominica
Dominican Republic
DR Congo
Ecuador
Egypt
El Salvador
Equatorial Guinea
Eritrea
Estonia
Eswatini
Ethiopia
Faeroe Islands
Finland
France
French Guiana
Gabon
Gambia
Georgia
Germany
Ghana
Gibraltar
Greece
Grenada
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Holy See
Honduras
Hong Kong
Hungary
Iceland
India
Indonesia
Iran
Iraq
Ireland
Isle of Man
Israel
Italy
Jamaica
Japan
Jordan
Kazakhstan
Kenya
Kuwait
Kyrgyzstan

Laos
Latvia
Lebanon
Lesotho
Liberia
Libya
Liechtenstein
Lithuania
Luxembourg
Macao
Madagascar
Malawi
Malaysia
Maldives
Mali
Malta
Mauritania
Mauritius
Mayotte
Mexico
Moldova
Monaco
Mongolia
Montenegro
Morocco
Mozambique
Myanmar
Namibia
Nepal
Netherlands
Nicaragua
Niger
Nigeria
North Korea
North Macedonia
Norway
Oman
Pakistan
Panama
Paraguay
Peru
Philippines
Poland
Portugal
Qatar
Réunion
Romania
Russia
Rwanda
Saint Helena

Saint Kitts and Nevis
Saint Lucia
Saint Vincent and the Grenadines
San Marino
Sao Tome & Principe
Saudi Arabia
Senegal
Serbia
Seychelles
Sierra Leone
Singapore
Slovakia
Slovenia
Somalia
South Africa
South Korea
South Sudan
Spain
Sri Lanka
State of Palestine
Sudan
Suriname
Sweden
Switzerland
Syria
Taiwan
Tajikistan
Tanzania
Thailand
The Bahamas
Timor-Leste
Togo
Trinidad and Tobago
Tunisia
Turkey
Turkmenistan
Uganda
Ukraine
United Arab Emirates
United Kingdom
United States
Uruguay
Uzbekistan
Venezuela
Vietnam
Western Sahara
Yemen
Zambia
Zimbabwe

Multifactor Leadership Questionnaire (Leader Form)

***To only be completed by the team manager*

Use the following rating scale:

Not at all			Sometimes		Frequently, if not always
0	1	2	3	4	5

CR1. I provide others with assistance in exchange for their efforts.....
IS2. I re-examine critical assumptions to question whether they are appropriate.....
MEP3. I fail to interfere until problems become serious.....
MEA4. I focus attention on irregularities, mistakes, exceptions, and deviations from standards.
LF5. I avoid getting involved when important issues arise .....
II6. I talk about my most important values and beliefs.....
LF7. I am absent when needed .....
IS8. I seek differing perspectives when solving problems .....
IM9. I talk optimistically about the future .....
II10. I instil pride in others for being associated with me .....
CR11. I discuss in specific terms who is responsible for achieving performance targets .....
MEP12. I wait for things to go wrong before taking action .....
IM13. I talk enthusiastically about what needs to be accomplished .....
II14. I specify the importance of having a strong sense of purpose.....
IC15. I spend time teaching and coaching .....
CR16. I make clear what one can expect to receive when performance goals are achieved .....
MEP17. I show that I am a firm believer in "If it ain't broke, don't fix it.".....
II18. I go beyond self-interest for the good of the group.....
IC19. I treat others as individuals rather than just as a member of a group .....
MEP20. I demonstrate that problems must become chronic before I take action .....
II21. I act in ways that build others' respect for me .....
MEA22. I concentrate my full attention on dealing with mistakes, complaints, and failures.....
II23. I consider the moral and ethical consequences of decisions .....
MEA24. I keep track of all mistakes.....
II25. I display a sense of power and confidence .....
IM26. I articulate a compelling vision of the future .....
MEA27. I direct my attention toward failures to meet standards .....
LF28. I avoid making decisions..... ...
IC29. I consider an individual as having different needs, abilities, and aspirations from others .....
IS30. I get others to look at problems from many different angles .....
IC31. I help others to develop their strengths ....
IS32. I suggest new ways of looking at how to complete assignments ....
LF33. I delay responding to urgent questions.....
II34. I emphasize the importance of having a collective sense of mission .....
CR35. I express satisfaction when others meet expectations .....
IM36. I express confidence that goals will be achieved .....
E37. I am effective in meeting others' job-related needs.....
S38. I use methods of leadership that are satisfying.....
EE39. I get others to do more than they expected to do.....
E40. I am effective in representing others to higher authority .....
S41. I work with others in a satisfactory way .....

EE42. I heighten others' desire to succeed .....
E43. I am effective in meeting organizational requirements.....
EE44. I increase others' willingness to try harder .....

E45. I lead a group that is effective .....

Multifactor Leadership Questionnaire (Rater Form)

***To only be completed by the team members*

Not at all			Sometimes		Frequently, if not always
0	1	2	3	4	5

THE PERSON I AM RATING. . .

CR1. Provides me with assistance in exchange for my efforts.....
IS2. Re-examines critical assumptions to question whether they are appropriate .....
MEP3. Fails to interfere until problems become serious.....
MEA4. Focuses attention on irregularities, mistakes, exceptions, and deviations from standards...
LF5. Avoids getting involved when important issues arise .....
II6. Talks about their most important values and beliefs.....
LF7. Is absent when needed.....
IS8. Seeks differing perspectives when solving problems.....
IM9. Talks optimistically about the future.....
II10. Instills pride in me for being associated with him/her .....
CR11. Discusses in specific terms who is responsible for achieving performance targets .....
MEP12. Waits for things to go wrong before taking action.....
IM13. Talks enthusiastically about what needs to be accomplished.....
II14. Specifies the importance of having a strong sense of purpose .....
IC15. Spends time teaching and coaching .....

CR16. Makes clear what one can expect to receive when performance goals are achieved .....
MEP17. Shows that he/she is a firm believer in "If it ain't broke, don't fix it." .....
4 II18. Goes beyond self-interest for the good of the group .....
IC19. Treats me as an individual rather than just as a member of a group .....
MEP20. Demonstrates that problems must become chronic before taking action .....
II21. Acts in ways that builds my respect.....
MEA22. Concentrates his/her full attention on dealing with mistakes, complaints, and failures.....
II23. Considers the moral and ethical consequences of decisions.....
MEA24. Keeps track of all mistakes .....
II25. Displays a sense of power and confidence.....
IM26. Articulates a compelling vision of the future .....
MEA27. Directs my attention toward failures to meet standards .....
MF28. Avoids making decisions.....
IC29. Considers my different needs, abilities, and aspirations from.....

IS30. Gets me to look at problems from many different angles .....
IC31. Helps me to develop my strengths .....
IS32. Suggests new ways of looking at how to complete assignments .....

LF33. Delays responding to urgent questions.....
II34. Emphasizes the importance of having a collective sense of mission .....
CR35. Expresses satisfaction when I meet expectations.....
IM36. Expresses confidence that goals will be achieved.....
E37. Is effective in meeting my job-related needs.....
S38. Uses methods of leadership that are satisfying .....
EE39. Gets me to do more than I expected to do.....
E40. Is effective in representing me to higher authority.....
S41. Works with me in a satisfactory way .....
EE42. Heightens my desire to succeed .....
E43. Is effective in meeting organizational requirements .....
EE44. Increases my willingness to try harder.....
E45. Leads a group that is effective .....

Key

Transformational Leadership (TRL)	Transactional Leadership (TAL)
Idealized Influence (II)	Contingent Reward (CR)
Inspirational Motivation (IM)	Management-by-exception Active (MEA)
Intellectual Stimulation (IS)	Management-by-exception Passive (MEP)
Individualized Consideration (IC)	Laissez-Faire (LF)

Leadership Outcomes: Effectiveness (E)
Leadership Outcomes: Satisfaction (S)
Leadership Outcomes: Extra Effort (EE)

Psychological Safety

***To only be completed by the team members*

Use the following rating scale:

Very inaccurate						Very Accurate
1	2	3	4	5	6	7

1. If you make a mistake on this team, it is often held against you.

2. Members of this team are able to bring up problems and tough issues.

3. People on this team sometimes reject others for being different.

4. It is safe to take a risk on this team.

5. It is difficult to ask other members of this team for help.

6. No one on this team would deliberately act in a way that undermines my efforts.

7. Working with members of this team, my unique skills and talents are valued and utilized.

Modified from: Edmondson, A., 1999. Psychological safety and learning behavior in work teams. *Administrative science quarterly*, *44*(2), pp.350-383.

Innovative Work Behaviors

***To only be completed by the team manager*

Use the following rating scale:

Never	Once in a while		Sometimes		Frequently	Always
1	2	3	4	5	6	7

IG1. My team is able to come up with new ideas for difficult issues…….

IG2. My team is able to search out new working methods, techniques, or tools…

IG3. My team is able to generate original solutions for issues or problems...…

IP1. My team is able to mobilise support for their innovative ideas……

IP2. My team is able to acquire approval for their innovative ideas…….

IP3. My team is able to generate excitement for their ideas with key stakeholders……

IR1. My team is able to transform innovative ideas for useful application…….

IR2. My team is able to introduce innovative ideas into the workplace in a systematic way…..

IR3. My team is able to evaluate the usefulness of their innovative ideas……

Adapted from Scott, S.G. and Bruce, R.A., 1994. Determinants of innovative behavior: A path model of individual
innovation in the workplace. Academy of management journal, 37(3), pp.580-607.
Janssen, O., 2000. Job demands, perceptions of effort-reward fairness and innovative work
behaviour. Journal of Occupational and organizational psychology, 73(3), pp.287-30

Appendix 2

Ethics Application and Approval

Aston University Ethics Application Form

Please note that if your research involves NHS patients, staff, or their data, you will need to complete an IRAS application form instead of this form. This also applies if you are recruiting adults who lack capacity to consent. Please visit our Sponsorship webpage for further information.

Section 0: Ethics Application Triage

Does your research involve any of the following?	*Delete as applicable*
Human participants *(Including all types of interviews, questionnaires, focus groups, records relating to humans, use of online datasets or other secondary data, observations, etc.)*	Yes
Human tissue or cells *(Please contact Becky Case via research_governance@aston.ac.uk – your research cannot commence until ethics approval and Designated Individual approval is in place.)*	No
Risk to members of the research team such as:	No
lone working during data collection	No
travel to areas where researchers may be at risk *(Any request for research requiring international travel should be accompanied by a University travel risk assessment form)*	No
risk of emotional distress	No
other: *please outline*	No
Any risk to the environment	No
Any conflict of interest	Yes
Research that could be considered controversial or be of reputational risk to Aston University	No
Social media data and/or data from internet sources that could be regarded as private	No
Any other ethical considerations *(Please state here or contact the Research Ethics Officer via your College Ethics inbox if there are any substantial ethical considerations you are aware of and would like to flag for the reviewer.)*	No

If you have answered YES to any of the above, you need to take the following steps in applying to your College Research Ethics Committee (CREC) in order to seek approval to commence your research:

1. Complete this application form and all necessary accompanying materials such as but not limited to:
   - Advertising materials (posters, recruitment e-mails);
   - Letters of invitation to participate;
   - Participant information sheets;
   - Consent forms;

- Questionnaires, surveys, demographic data collection sheets, etc.;
- Interview schedules, interview question guides, focus group materials/scripts, etc.;
- Debriefing sheets (if applicable);
- Risk assessment; and
- Standard Operating Procedure (if applicable, as agreed with Health & Safety) – *an example of when this is required may be for Covid-19 safe working, when undertaking Phlebotomy work, a distress protocol etc.*

2. Create a zip file containing all application materials (i.e., application form and all of the applicable documents noted above).
3. Submit the zip file to your dedicated CREC e-mail address:
   - College of Engineering and Physical Sciences: eps_ethics@aston.ac.uk
   - College of Health and Life Sciences: hls_ethics@aston.ac.uk
   - College of Business and Social Sciences: bss_ethics@aston.ac.uk
4. If required by invitation, be available to attend a CREC meeting to present and answer questions on your application (this is mostly for complex proposals).

Please note, you must obtain ethical approval from your College REC prior to your research commencing (including recruitment of participants). Failure to do so could amount to research misconduct.

Section 1: Ethics Application Form

Research Team Details	
Title of research project:	Leader Style, Team Dynamics, and Innovation in Hybrid Teams
Principal Applicant Details:	Name: Ariana Danquah Email: 190244178@aston.ac.uk Contact Telephone Number: +1713-417-0397
College: *(Delete as applicable)*	Business & Social Sciences (BSS)
Supervisor(s) Name(s): *(If the principal applicant is a PhD/MPhil/MSc by Research student, please provide details of the supervisory team; expand as required)*	Name: Donato Masi Email: d.masi@aston.ac.uk Contact Telephone Number: 0121 204 4779 Name: Joshua Ignatius Email: j.ignatius@aston.ac.uk Contact Telephone Number: 0121 204 3442 Name: Kanimozhi Narayanan Email: K. Narayanan@aston.ac.uk Contact Telephone Number: 0121 204 3658
Details of Other Research Team Members: *(If applicable, expand as required to accommodate all research team members)*	Name: Email: Contact Telephone Number: Name:

	Email: Contact Telephone Number: Name: Email: Contact Telephone Number:
Anticipated Start Date for the Research: *(Please note that the start date must fall after ethics approval has been granted so please allow a reasonable time after the date of submission for ethical approval)*	15 July 2023
Anticipated End Date for the Research: *(Please give yourself enough time to complete your data collection)*	30 Jan 2024
If this application is linked to previously submitted/approved ethics applications, please list the respective CREC reference number(s): *(For example if this application is for a follow-on study)*	N/A
Please provide a *brief* overview (summary) of your research, clearly outlining your objectives/aims and rationale in language suitable for a generalist/lay audience.	
This study will be undertaken to study the link between leader style, team dynamics (e.g. psychological safety) and innovative outputs for team members who are a part of a virtual or hybrid team. The objective of the research is to explore any potential significant linkages between various leadership styles (e.g. transformational, transactional) and the innovative work behaviours of colleagues. We will also test whether the relationship between those two variables is impacted by the team climate of psychological safety, which is the belief that someone can speak up, share ideas or feedback without any fear of potential backlash or recrimination. The overall context for the research is within the realm of virtual of hybrid teams who are not co-located in the same office or geographic region, an occurrence which has become much more prevalent during the COVID-19 pandemic. The outcomes of this study will enhance the practice areas of leadership development, organisational development, and team development.	

Section 1.A: Secondary Human Data

Secondary Human Data: Existing Documents/Data Only ***This section needs to be completed if your study proposes to use data from existing datasets/documents OR if the data will be collected from social media or other online spaces where privacy and anonymity are contentious. Typically, no recruitment of human participants will take place if you are only using secondary data.*** **Is this section applicable to this application: No (if no, skip to section 1.B)**	
1.	What data will be studied and what evaluation will be undertaken? *(Please provide a clear outline of your research protocol, including the data sources you will be accessing and what evaluation will be conducted with that data; be mindful of the fact that it is not necessarily the case that just because online data is "out there" it can be used without due consideration of consent and legal implications. Please be as detailed as possible here and be aware that permission to use data may require specific levels of assessment).*
N/A	

2.	How will data or records be obtained? *(Please indicate how you will obtain the data/records and what permissions are in place for you to do so).*	
N/A		
3.	Is the secondary data you will be using in the public domain? *(Please indicate the original purpose for which the data was collected, and comment on whether consent was gathered for additional later use of the data and/or how your use of the data falls within the scope of the consent originally given)*	YES/NO
N/A		
4.	If your study involves re-analysis and potential publication of existing data which was gathered as part of a previous project involving direct contact with human participants, how will you ensure that your re-analysis of this data maintains confidentiality and anonymity as guaranteed in the original study? *(Please indicate what the original agreement was and how you will observe confidentiality and anonymity of data going forward)*	
N/A		
5.	How will you store the data and who will have access to it? *(Please indicate how you will store the data – ideally this will be on an encrypted storage facility provided by Aston; you should ensure that any storage complies with stipulations of the dataset (if applicable) such as geographical location of physical servers; please also outline who will be accessing it for analysis)*	
N/A		
6.	How will the findings of your research be disseminated? *(Please indicate how you will publish your work, including any revisions to the dataset itself)*	
N/A		
7.	What other ethical considerations (if any), not previously noted on this application, do you think there are in your proposed study? How will these issues be addressed? *(Please indicate if there are any ethical considerations that need factored in terms of your access, use and publishing of the data and, if so, how you will address them)*	
N/A		
8.	Will you be gathering data from discussion forums, online 'chat rooms,' and similar online spaces where privacy and anonymity are contentious? *(Please note that if, for example, a forum/chat room/etc. requires membership for access, the use of data from such sources needs careful consideration and you MUST therefore complete Section 1.B of this application form; you should justify your response to this question here)*	NO
Please include here any other comments/information in relation to the use/analysis of this proposed data that will assist in the ethics application approval review process: *(For example, if you have an existing data sharing agreement or other supporting documents that demonstrate your permissions to use any data, please state this here and attach those documents to your e-mail submission for your application)*		

N/A

Section 1.B: Involvement of Human Participants

Human Participants Involved: Data Collected Directly or Indirectly from Human Participants ***This section needs to be completed if your study proposes to involve human participants, either directly or indirectly. This includes observation of people in public spaces/at public events where consent is not feasible/appropriate and/or necessary; where questions in this section don't apply to your study on these grounds, please just indicate this. Please note, this section should be completed in addition to section 1.A if the data will be collected from social media or other online spaces where privacy and anonymity are contentious.*** **Is this section applicable to this application: Yes (if no, skip to section 1.C)**	
9.	Please describe briefly the intended human participants (including number, age, gender, and any other relevant characteristics): *(Please provide a clear outline of your participant pool, paying particular attention to inclusion/exclusion criteria for your study and the inclusion of any vulnerable groups. Please remember that inclusion/exclusion criteria should also be reflected in study advertisements and participant information sheet as appropriate)*
As the researcher is a current employee of a large multi-national organisation with many hybrid and virtual work teams, the intended participant pool will be drawn from within her current place of employment. The study will be conducted in the context of the Capital Projects organisation with more than 1000 employees across 10+ countries who work across various phases of project maturation. Anywhere from 10-100 project teams (with employees of various experience levels, genders, and ages) may participant in the study voluntarily. Inclusion criteria includes teams and individuals who work in hybrid and/or remote teams who communicate via technology and whom are seldom if ever co-located. Approval to conduct the research internally has been secured through the relevant internal stakeholders.	
10.	How will participants be recruited and from where? *(Please indicate how you will recruit your participants and provide evidence of any applicable permissions you must do so (e.g., if you are recruiting via organisations, what permission do you have to contact prospective participants); please remember that your submission package should include all relevant recruitment material)*
Managers will be invited to participant via direct email from the researcher and can register their interest on behalf of their teams using an MS Forms generated expression of interest form that will be sent directly to the researcher. After that, managers and team members will be sent the PIS and will be asked for their consent before participating. Approval to conduct the research internally has been secured through the relevant internal stakeholders (business and HR.)	

11.	Please describe your data collection methods, drawing particular attention to any potential ethical issues: *(Please provide an outline of the problem you are trying to solve, the goals of your study, how you are structuring your study and how the data collection relates to that, what you are asking participants to do on which basis to collect data (or how you are collecting data if indirectly) and the data you will be collecting, your proposed analysis, etc.; please also indicate where the research will be taking place – e.g., online, in-person in the UK or abroad, etc.)*	
The problem this research is attempting to solve is to help leaders and practitioners better understand which leadership styles help to cultivate more innovative outputs from virtual/hybrid teams. Goals include understanding more about the potential differences between innovative outputs when a leader exhibits more transformational or transactional behaviours, how psychological safety may or may not play a role in the impact of a leader's style and innovative outcomes in a team or individual and how all of this may or may not be impacted by the context of virtuality. Expression of interest forms will be collected to understand which team managers may want to participant along with their team. As such, teams who fit the inclusion criteria will be asked to take the questionnaires which they will access online (via Qualtrics). Given this is a team level analysis, individuals would not be invited to participate without their managers. Managers of teams will be asked to take a particular version of the questionnaire around their leadership style and their perception of innovative outputs from their team, while members of the team will be asked to take a version of the questionnaire that asks them about the leadership style of their manager and the team dynamics of their team (e.g. psychological safety). Answers to both will be matched by the researcher/team to protect confidentiality. Team member answers will not directly be accessible or shared with the manager (only aggregate insights will be shared with the team manager upon request). Data from the questionnaire will be analysed via various statistical means with the appropriate analysis package (SPSS). Data will be collected across multiple regions (e.g., most likely US, UK, Netherlands).		
12.	Will you take all necessary steps to obtain, *before participation*, the voluntary and informed consent of the prospective participants or, in the case of individuals not capable of giving informed consent, the permission of a legally authorised representative in accordance with applicable law?	YES
*Voluntary, informed consent is at the heart of ethical research conduct, but it is acknowledged that at times this cannot be obtained before participation for several reasons. If you answer **YES**, please jump to **Question 15**; if you answer **NO**, please **continue to Question 13**.*		
13.	If it will be necessary for participants to take part in the study without their knowledge and/or full informed consent *at the time*, please explain why (**if you intend to recruit adult participants who lack capacity to consent, please contact ethics@aston.ac.uk before proceeding with this application**). *(Covert observations, for example, may be necessary in some settings/contexts and some studies may need to use deception or partial deception upfront to avoid influencing the findings; if these situations apply to your study, please explain them carefully and justify why this approach is necessary)*	
N/A		
14.	If your study involves withholding information about the aims of the research beyond the final debriefing and/or deliberate deception of the participant that is not clarified in a debriefing session, please justify, and provide details here. You may then skip to Question 16. *(Please explain and justify if it will not be possible to achieve full disclosure, even after participation)*	
N/A		

15.	Please explain the procedure you will use for obtaining informed consent from your participants. If applicable, please explain the procedures you intend to use to gain permission on behalf of participants who are unable to give informed consent (e.g. children). Where partial deception is required before participation, please explain your debrief and final consenting process at the end of participants' involvement. If your study runs over a long period or where reconsenting is advisable for other reasons, please explain your process here. *(Please explain in detail your process for informed consent; your submission package should include appropriately constructed Participant Information Sheets and Consent Forms for this purpose (this may necessitate bespoke forms for different participant cohorts as well as debriefing content and re-consenting forms where applicable))*
After initial recruitment into the study via email and Expression of Interest form, the researcher will send an email containing basic information about the study and questionnaire to team managers to invite their teams to participate. After enough interest is generated (ideally within 2 weeks) to be statistically relevant (e.g. at least 75 teams), participant information sheets will be sent to all interested individuals who fit the inclusion criteria, to allow them to opt into the research directly. Follow-up emails will be sent 2x during the two-week recruitment period to remind those interested to sign-up. Actual consent will be asked for on an initial screen before participants enter any data into the survey tool.	
16.	How will you protect participants' confidentiality and/or anonymity in data collection (e.g., interviews, focus groups, video surveillance, etc.), data storage, data analysis, presentation of findings and publications? *(It is important to protect the confidentiality and/or anonymity of participants; consider carefully how their data will be handled to protect this, including in settings such as focus groups where disclosure is to more than just the research team; care should also be taken in terms of ensuring the data will not be delivered into the hands of, for example, employers when interviewing employees)*
Individual responses will be captured using an online survey tool. Each invited participant will be sent a questionnaire with a code to aid in matching to other team members/team manager after completion to protect participant confidentiality. Any insights from the analysis on the data collected will be shared with leadership only via aggregated means as to protect the confidentiality of participant responses. For team level summaries, at least 4 team members must submit feedback for an aggregated summary to be produced. For more senior stakeholders, various aggregate splits can be produced based on interest (e.g. team, department, VP-level, etc as long as enough respondents have answered to protect individual data). To protect the data, all downloaded data and analysis done will be password protected and encrypted to prevent any potential data leaks from jeopardizing the reputation of any respondent or the organisation of the research. Aston Box, an online cloud storage service will be used to store (encrypted) data.	
17.	Could participation cause discomfort (physical and/or psychological – e.g., distressing, sensitive or embarrassing topics), inconvenience and/or danger beyond the risks encountered in normal life? Please indicate the level of risk and plans to address these potential risks. *(Please consider if the study might cause a participant physical discomfort (e.g., use of devices/sensors, physical exertion, application of substances, etc.) or require any limitations to activity before/after their participation, psychological discomfort (e.g., questions about mood, mental or physical health, personal behaviours/experiences, etc.) or if by participating in your study an*

	individual could be placed in a compromising position – e.g., an employee could risk their job by participating; please ensure appropriate measures are in place to mitigate such risks – e.g., risk assessment of physical devices/substances, support resources in place for psychological distress, avoiding running interviews with employees in their workplace and suitable measures to mitigate employer coercion; finally, please document how you will handle disclosures during data collection that would require action on your part – e.g., indication of risk to the individual or someone else)
The level of risk for participating in this research is LOW. Participants will be asked to answer non-confrontational questions about their perception of their leader's style and the climate of psychological safety, all of which are questions they would typically voluntarily answer through a similar employee engagement questionnaire on an annual basis. In turn, leaders in the organisation will be asked to assess the innovative behaviours of members of their team or work group, which again would not be dissimilar to assessments they may make as a regular part of their job duties. Participants can withdraw at any time prior to submitting the answers to their questionnaire (by closing the website). Once responses are submitted, there will not be an opportunity to withdraw their response.	
18.	State the timescales within which participants may withdraw from the study, noting your reasons. *(Where data has been collected completely anonymously – e.g., fully anonymised online surveys – it will not typically be possible for participants to withdraw after submission and this needs to be made clear in the PIS; where participants have contributed to the likes of a focus group, they can withdraw their participation and no quotes from them should be used but their data up to the point of withdrawal cannot be fully withdrawn as it has influenced the direction of the group discussion and this needs to be made clear in the PIS; for most other studies, participants should be given a reasonable window within which to withdraw their research data – e.g., 2 weeks from the date of their participation – but if you are holding any personal data (e.g. e-mail addresses of participants for future contact) this should be deleted if the participant requests at any time.*
Data will be collected confidentially via online means therefore we have included in the participant information sheet that withdrawing once survey is completed will not be possible. Withdrawing their participation in the study is only possible prior to completing the survey, and participants can do so by closing out of the website/window where the questionnaire is hosted (either JISC, Qualtrics or similar)	
19.	Do you anticipate any power imbalances or dependent relationships, either with participants or with/within the research team? If yes, please explain how you intend to address these? *(Power imbalances can lead to coercion or perceived coercion and so it is best to avoid these where possible; examples of such relationships include staff recruiting to studies students they teach/supervise, employers recruiting employees to a study on behalf of a researcher, etc.; as such, consider how you could recruit your participants in such a way as to remove this imbalance or avoid dependent relationships in the recruitment process)*
Given sponsorship has been obtained from business leadership and HR to conduct the research within different work groups and teams- the researcher will send direct mail to the organisation's managers with the help of HR. This is to avoid having the sponsoring EVP send the email directly, which may be construed as less than 'optional.' However, participants will be made aware that the EVP is supporting the work in the PIS. In addition to that, the researcher will ensure that a) informed consent is clear a thorough b) confidentiality will be reinforced c) correspondence details of the researcher will be provided in case there are any questions or concerns and d) whether they participate in the study or not, it will be made clear that there will be no impact to their employment/status at the organisation. The opportunity to withdraw (prior to submitting the completed questionnaire) will also be mentioned in invitation email and participant information sheet.	

20.	Please give details of any conflicts of interest which need to be considered for your project? *(Such conflicts could include power imbalances as noted above, where research is funded by an external, commercial entity which stands to gain directly from the research, where members of the team have vested interest in the outcome of the research, etc; these should be clearly declared and mitigating measures outlined where applicable/possible)*

A potential conflict of interest is that as mentioned, the researcher is also employed at the company that the study is intended to research. As such the objectivity and independence of the research could be called into question. Given this, careful consideration has been taken to mitigate that by enlisting guidance from the researcher's supervisory team who has advised extensively on the design and method of approach for the study.

This ethical review process is also a necessary measure in ensuring that any potential CoI is registered and accounted for. Other mitigating measures include using rigorous statistical techniques to ensure that any insights are grounded in solid evidence, using a method like a clustered sampling approach, and collecting data at two different times as a part of the design.

The researcher will also make sure there is adequate transparency around the methods and results, and that all data is documented accurately.

21.	What potential risks may exist for the researcher and/or research team? Please indicate plans to address such risks? *(Just as it is important to protect study participants, we need to ensure the safety of our researchers; to this end, please consider where there is potential for risk to members of your research team – such risks might include lone working, exposure to distressing subject matter, conducting the research in some international research locations; support for researchers would include lone worker considerations which should be covered by a risk assessment, access to support networks related to the topic of study and, in extreme cases, regular professional/psychological assessment to monitor the researchers' wellbeing, submission of travel risk assessment and suitable approval for international travel, etc.)*

The risk to the researcher is LOW. Given this is doctoral level research that is being embarked on to reach a terminal degree, the usual potential risks are present such as time management, resource constraints, and mental/physical health risks like stress and burnout.

To mitigate potential time management risks, the researcher creates realistic plans and timeframes with the assistance of her supervisory team to ensure that the research is being broken down into manageable chunks. To mitigate any potential resource constraints such as access to participants and funding the researcher has considered alternative plans in case collaboration isn't possible within her current organisation. Finally, to mitigate possible health risks, the researcher prioritizes mental and physical health by remaining active and connecting in with yoga, meditation, and other spiritual practices, alongside relying on a good support system of loved ones, colleagues, and her supervisory team.

Given the researcher also works in the same organisation she is studying, there is some chance of awkward interactions with managers or coworkers during and after the research, so this must also be mitigated where possible. It is also worth mentioning that even though it is a normal part of the annual processes in this organisation to be surveyed about the topics of leadership style and team dynamics, evaluating your manager and/or team output can potentially cause some discomfort. This should also be acknowledged and addressed.

In addition to keeping data confidential, keeping communications clear to all participants about the study and impacts, and ensuring there are robust feedback and communication channels (email, phone, messenger direct to researcher and also the supervisory team), the researcher is also committed to conducting follow-up debrief sessions where requested to discuss results and

any potential lingering concerns or distress anyone may have. Given the researcher's background in HR, group and individual coaching and facilitation, the appropriate level of sensitivity will be given during these various interactions.	
22.	Whilst there may not be any significant *direct* benefits to participants because of this research, please state here any (including indirect) benefits that may result from participation in the study. *(It is appropriate to state in the PIS that there is no direct benefit but to then explain the wider benefit of the work)*
The wider benefit of the work will inform leaders, organisational development practitioners, HR, and leadership coaches/consultants in that it will uncover possible connects to leadership style, innovation, and psychological safety in a context that has not been researched extensively (e.g. virtual/hybrid work environments). The study will give practical insights into what leader behaviours might better influence innovative outcomes in non-conventional settings.	
23.	Depending on the nature of your study, there may be scope for *incidental findings* to emerge from the data collection. Please outline where this may occur in your study and the measures you will include to handle such findings. *(For example, if your study involves the recording of physiological data (e.g., brain scan) it may highlight potential cause for concern; you need to consider where this could happen and what protocol you will have in place if it does, placing duty of care to your participants at the centre of any such protocol)*
Given the data to be collected, the occurrence of incidental findings is quite LOW. In the event that other useful correlations can be made based on any demographic data collected (e.g. gender, tenure, educational background, etc) they will be carefully considered and included in the results and discussion aspects of the write-up.	
24.	Please provide details of any incentives/payments (including out-of-pocket expenses), and the rationale for these, that will be made to participants. *(it is entirely reasonable to cover participants' expenses – e.g., modest travel and parking costs – associated with their participation in your study; it is also reasonable to compensate participants for their time but the rate of compensation needs to be carefully considered to avoid the compensation becoming a potentially coercive incentive; a rule of thumb is often £10/hr paid in gift tokens but exceptions can be made where specialist participants are required – e.g., clinicians – and the level of compensation needs to reflect the value of their time)*
Given the low bar of 'inconvenience' to participants (online survey, able to be done in 10-15 mins), no monetary incentives have been considered to participating to date. However, there will be an optional opportunity for leaders or individual participants whose teams participate to request one-on-one or small group coaching/feedback about their results from the researcher (at no additional charge) who has experience in leader and individual coaching.	
25.	What are your plans for the storage of data (electronic, digital, paper, etc.)? Please ensure that your plans comply with the General Data Protection Regulation (GDPR) and the (UK) Data Protection Act 2018. *(Please outline how you will store your data, its security and who will have access to it, ensuring that any data sharing is in line with GDPR; please also describe your plans for data erasure/deletion)*
Names and email address will be collected during the initial participant expression of interest and matched to a questionnaire via a code to further protect confidentiality of participant responses. Data like gender, age range, etc (which is considered personal data according to GDPR) might also be collected in the demographic section of the questionnaire hence any reported data will only be identified via an (alpha) numeric code. Aston Box will be used as a secure data storage solution, with the researcher taking the extra step to encrypt (password protect) the document with names and questionnaire codes to protect participant confidentiality.	

The researcher and team will be the only ones with access to the data via Aston Box, and the data will be stored only as long as it is relevant for the analysis, with any personal identifiable information deleted once no longer in use (e.g., roughly 12-month period).		
26.	How will you make your data available to meet your funders open access requirements (if applicable)? *(Please note the open access requirements that apply to your data based on funding provider and how you plan to meet those requirements)*	
There are no funding providers sponsoring this research.		
27.	Are there any restrictions on sharing your data for open access purposes (if applicable)? *(Please note any restrictions on sharing your data – including for patent application purposes – and how this can be addressed considering funding provider requirements)*	
The researcher's company has approved the research, however as a pre-condition, non-disclosure agreements, etc will be necessary to protect any potential outcomes of the study (anticipated or unanticipated) which would not be allowed to be attributed back to the company. Therefore, anonymised data sets will not be available, nor will the company name be used in any of the printed or published findings.		
28.	Will audio or video recording of participants take place? *(Please delete as applicable; if you answer **NO**, please proceed to **Question 33**)*	NO
29.	Please confirm that portable devices (laptop, USB drive, etc) will be encrypted where they are used to store identifiable data, especially audio/video recordings. If it is not possible to encrypt your portable devices, please comment on the steps you will take to protect the data. *(Ideally audio/video will be kept on encrypted portable storage for as short a time as possible before being transferred to an encrypted storage facility provided by Aston; please provide a clear outline of your handling of personally identifiable data of this nature, including who will have access to it)*	
Any laptops used by the researcher (including her company provided one and her personal one) are encrypted and password protected, and she is the only one with access to the relevant files. The questionnaire email and follow-ups will be sent via researcher's personal computer via the Qualtrics survey admin tools. The researcher has been asked to send the recruitment emails from her work account to minimise confusion to participants and reduce the likelihood that the recruitment email gets marked as SPAM. All storage will be on Aston BOX.		
30.	If your study includes audio/video recordings, what are the implications for participants' anonymity? If participants are identifiable on/via the recordings, how will you explain to them what you will do with the recordings? *(consider what you will advise participants in the PIS in terms of the audio/video recordings and how they will be handled; ideally audio/video recordings will be transcribed and anonymised as soon as possible after data collection and, once the anonymised transcripts are verified, the original recordings securely destroyed; if any still images are to be retained for use from videos, participant consent should have been obtained and the images anonymised before use; similarly, if alternative mechanisms are to be used to anonymise the data, please explain the measures clearly here)*	
n/a		
31.	What arrangements have been made for audio/video data storage? At what point in the research will tapes/digital recordings/files be destroyed? *(As noted above, anonymisation of audio/video recordings is really important and this is typically done via the creation of anonymised transcripts; if an external transcription service is to be used, this should be outlined here and reassurances provided that the service has been approved by Aston)*	
n/a		

32.	What are the plans for dissemination of findings from the research? Please also include any impact activities and potential ethical issues these may raise. *(In addition to expected research publications, please consider how results might be effectively shared with the participants and the wider community, as applicable; this could include a lay summary that is made available on request, via community groups, etc or could include dissemination workshops, etc; please consult with the RKE impact team in terms of any planned impact activities and associated ethical issues and outline those here)*
While results will be shared via doctoral thesis, the company name will not be shared or published publicly. Aggregated results will be shared with applicable internal stakeholders (participants, senior leadership, etc) to inform their work. To mitigate any potential ethical issues around confidentiality, results will only be shared if a minimum of 4 responses have been received within a team. Executive level summaries can also be shared (e.g. department, VP level), and again, only if a suitable number of responses have been received to mask any potential individual inputs (e.g. 4+). The researcher is also intending to submit a lay summary to all participants post analysis.	
33.	Do you wish to highlight any ethical considerations, not previously noted on this application, that you think are applicable proposed study? Are there any matters about which you wish to seek guidance from the CREC? *(This application form has attempted to guide you to consider the standard ethical concerns intrinsic in most human participant studies; there may, however, be additional or alternative concerns that have not been mentioned – in which case, please outline these below for discussion with the CREC)*
There is nothing further that the researcher wishes to highlight.	

Section 1.C: Involvement of Human Tissue

Human Tissue: Samples Collected Directly or Indirectly Obtained from Human Participants ***This section needs to be completed if your study proposes to involve human tissue samples. Please also complete Section 1.B if you are collecting tissue directly from human participants.*** **Is this section applicable to this application: No**	
34.	What tissue are you collecting? Does this fall under the definition of relevant material? *(Please refer to the Human Tissue Authority guidance - https://www.hta.gov.uk/guidance-professionals/hta-legislation/relevant-material-under-human-tissue-act-2004/list-materials - to determine whether your tissue falls under the definition of relevant material. If yes, you will require Designated Individual approval as well as ethics approval. Please confirm the nature and quantity of tissue you wish to use.)*
N/A	
35.	From where will tissue samples be obtained? *(Indicate from where you will source your samples, either directly from participants or from which organisation, and any licensing or use restrictions that apply)*

N/A	
36.	Will a Material Transfer Agreement (MTA) be required prior to, during, or after the study? *(Please outline the need for any such agreement and who will be responsible for this)*
N/A	
37.	Where will the tissue samples be stored? Please confirm whether this is an already approved location listed in the Quality Manual. *(Human tissue samples need to be appropriately logged and stored – including for protection against damage during an adverse event – so please ensure that the storage arrangements and information provided here are clear and appropriate)*
N/A	
38.	How long will the samples be stored at Aston University? *(Please indicate the duration of storage at Aston)*
N/A	
39.	What will happen to the tissue once the project has finished? *(Please indicate the arrangements for handover or disposal of the tissue samples, including responsibility)*
N/A	
Please include here any other comments/information in relation to your application that will assist in the ethics application approval review process:	
N/A	

Section 2: Supervisor Comments

Is this section applicable to this application: Yes/No

Please include comments from supervisor(s) here:
Supervisors should be involved in and guide student applications. Supervisors should comment on the proposal and outline any discussion that has taken place in the drafting of this application. This application has been filled under the supervision and with the agreement of the main supervisor. Discussions pertaining to this research and application have been wide-ranging and included considerations on method, approach, and potential constraints within the context of the hosting organisation. The secondary supervisor has also been involved in various discussions pertaining to the survey instruments, analysis, and methods.

Section 3: Declarations

The following declaration should be acknowledged and signed before submission to the CREC for approval
I understand that as Principal Investigator/Researcher/PhD candidate I have overall responsibility for the ethical management of the project and confirm the following: • I have read the Research Integrity Policy and will abide by it in relation to the current proposal; • I will manage the project in an ethically appropriate manner according to: (a) the subject matter involved; (b) any applicable funder requirements and associated codes of conduct; and (c) the Research Integrity Policy; • On behalf of the University I accept responsibility for the project in relation to promoting good research practice and the prevention of misconduct; • If applicable, I will give all staff and students involved in the project guidance on the good practice and ethical standards expected in the project in accordance with the Research Integrity Policy; • If applicable, I will take steps to ensure that no students or staff involved in the project will be exposed to inappropriate situations; and • I confirm that I have completed all risk assessments and other Health and Safety requirements as advised by my College/Departmental Safety Officer and appropriate controls are in place for the hazards and/or risks identified.

All research team members (including supervisors where the principal applicant is a student) should sign* and date below:	
Signatures: Donato Masi Donato Masi Ariana Danquah	Date: 17/4/2023

** note, typed/e-signatures are acceptable, but students must copy their supervisor(s) into the email when submitting their applications. Feedback will be cc'd to supervisor(s).*

Aston University
Aston Triangle
Birmingham
B4 7ET
0121 204 3000

19th July 2023

Ariana Danquah
Copy: Donato Masi, Joshua Ignatius, Kanimozhi Narayanan
College of Business and Social Sciences

Dear Ariana Danquah,

Study title:	Leader Style, Team Dynamics and Innovation in Hybrid Teams
REC REF:	#BSS21072

Confirmation of Ethical Opinion

On behalf of the Committee, I am pleased to confirm a favourable opinion for the above research on the basis described in the application form, protocol and supporting documentation listed below.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	***Version***	***Date***
Aston University Research Ethics Application Form_DM 1872023.docx	3	18/07/2023
AstonUniversity_Consent AYD 04072023.docx	2	04/07/2023
AstonUniversity_Manager PIS_AYD2023 04072023.docx	2	04/07/2023
AstonUniversity_Team member_PIS_AYD2023 04072023.docx	2	04/07/2023
Email from mng to team_04072023.docx	1	04/07/2023
Email invite for research participation_04072023.docx	2	04/07/2023
EOI_ updated 04072023.pdf	2	04/07/2023
Questionnaire Items_FINAL 23042023.docx	1	17/04/2023

With the Committee's best wishes for the success of this project.

Yours sincerely,

Dr Lauren Traczykowski
Interim Chair of the Business & Social Sciences Research Ethics Committee