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The impact of hybrid work on team viability, and team perceived virtuality as a mediator

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Master in Human Resources Management and Organizational
Consultancy

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IBS, ISCTE - IUL

September, 2023



BUSINESS
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Department of Human Resources and Organizational
Behavior

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Acknowledgments

This marks my academic journey.

This thesis is the culmination of all the hard work, all the doubts, all the failures and all my victories of my academic journey.

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"If you can't fly, then run. If you can't run, then walk. If you can't walk, then crawl, but whatever you do, you have to keep moving." - Martin Luther King Jr.

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Abstract

In 2020 the world was left in shock after happening the unexpected, a deadly pandemic that changed our whole lives, including the way we work. Remote work was imposed by organizations, and people saw the bright side of it, nowadays with normality restored, hybrid teams are the most common of team settings. However, little do we know about this new format of working, sometimes presential, sometimes online.

Thus, this investigation analyses how team perceived virtuality (TPV) mediates the relationship between hybrid work arrangements and team viability. Additionally, we tried to understand how the leader of the hybrid teams and the hybrid team members can have a role of moderators in this process. For that we analyzed two different operationalizations of hybrid work, measuring the number of days in the office and the number of overlapping days with other team members. In order to achieve the proposed objectives, a questionnaire accessed and answered by 91 participants of a total of 27 hybrid teams, was distributed. The results show us that that neither days in the office nor overlapping days alone directly influence the viability of teams. We can conclude that this influence is there only through the distance dimension of TPV (and not the information deficits one). We also conclude that leadership and team members only moderate the relationship between hybrid work arrangement and team perceived virtuality when considering the number of overlapping days, and not the number of office days.

Keywords: hybrid teams, team perceived virtuality, team leadership

JEL Classification: O15 – Human Resources; D23 – Organizational Behavior; O32 - Management of Technological Innovation and R&D

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Resumo

Em 2020 o mundo ficou em choque depois de acontecer o inesperado, uma pandemia que mudou toda a nossa vida, incluindo a forma como trabalhamos. O trabalho remoto foi imposto pelas organizações e as pessoas viram o lado positivo da situação. Atualmente, com a normalidade restaurada, as equipas híbridas são a configuração mais comum das equipas. No entanto, pouco sabemos sobre este novo formato de trabalho.

Esta investigação analisa a forma como a virtualidade percebida pela equipa (TPV) medeia a relação entre as modalidades de trabalho híbrido e a viabilidade da equipa. Adicionalmente, procurou-se perceber de que forma o líder das equipas híbridas e os membros das equipas híbridas podem ter um papel de moderadores neste processo. Para isso, analisámos duas operacionalizações diferentes do trabalho híbrido, medindo o número de dias no escritório e o número de dias sobrepostos com outros membros da equipa. Para atingir os objetivos propostos, foi distribuído um questionário acedido e respondido por 91 participantes de um total de 27 equipas híbridas. Os resultados mostram-nos que nem os dias no escritório nem a sobreposição de dias influenciam diretamente a viabilidade das equipas. Podemos concluir que esta influência existe apenas através da dimensão distância da TPV (e não da dimensão défices de informação). Concluímos também que a liderança e os membros da equipa apenas moderam a relação entre o regime de trabalho híbrido e a virtualidade percebida pela equipa quando se considera o número de dias sobrepostos, e não o número de dias de trabalho.

Palavras-Chave: equipas híbridas, virtualidade percebida pela equipa, liderança de equipas

Classificação JEL: O15 – Recursos Humanos; D23- Comportamento Organizacional; O32 - Gestão da inovação tecnológica e da I&D

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List of Abbreviations

TPV – Team Perceived Virtuality

SARS-CoV-2 - severe acute respiratory syndrome coronavirus 2

ICT - Information and communication technology

Introduction

Since the SARS-CoV-2 pandemic hit in 2020, hybrid work is more and more a reality, and its adoption grew exponentially. Hybrid teams can be defined as teams that use a mix of virtual and face-to-face experiences and “rely on both physical and virtual team exchanges to act on managerial directives, process information, accomplish team deliverables and achieve organizational mission” (Gilstrap et al., 2022; p.2). Nowadays hybrid teams have become more reliant on communication technology, using virtual and non-virtual contexts across digital and physical spaces (Gilstrap et al., 2022). During the past years organization used teams to solve problems and carry out work in a more effective way. More recently, teams are organized not solely in a physical space, but rather also in a virtual space, which in this case use a combination of information technologies to accomplish their goals (Kirkman & Mathieu, 2005). Being a recent dynamic, “unfortunately, the way hybrid teams understand technological usage remains sorely underexplored.”(Gilstrap et al. 2022; p.3). This can be explained because when in a virtual setting, teams can exhibit different ranges of virtuality. Academics defend that the degree of virtuality may vary in terms of spatial distance, media usage, and cultural differences (Kozlowski & Bell, 2013). However, we need to consider “how teams construct a shared sense of virtuality” (Handke et al., 2020; p.6). Thus, in this study, we will use a more appropriated concept, the Team Perceived Virtuality. This emergent state perspective helps us acknowledge the psychological nature of team virtuality as the team level emergence. The authors (Handke et al., 2020) define TPV as a “shared affective-cognitive emergent state which is characterized by team members’ co-constructed and collectively experienced 1) distance and 2) information deficits” (Handke et al., 2020; p.2).TPV explains how team interactions between team members when working virtually may be a vital part for explaining how team virtuality influences team effectiveness.(Handke et al., 2020). As teams engage in interactions with each other, whether in person or through technology, they jointly construct a meaning attached to these interactions. TPV allows to understand how close the team members feel to each other based on those interactions (Handke et al., 2020). This level of closeness may differ depending on the ability to convey “social presence”, using information-rich verbal cues, such as facial expression, voice inflections and gestures. However, the loss of information is influenced by the richness of the technology used (Kayworth & Leidner, 2002).Working hybrid teams face unique challenges like this one, the loss of information. We propose that there is an element that contribute to these challenges, the leader of the team – “certain leadership roles may be particularly important in virtual team settings”(Kayworth & Leidner, 2002; p.11). The leader in these circumstances has to face challenges that are unique and require different skills that go beyond traditional leadership to achieve effectiveness within their team

(Hooijberg & Watkins, 2021). Accordingly, in this study we are also going try to answer the question “How can a leader address the hybrid work challenges?”. To achieve team effectiveness, team leadership needs to consider team need satisfaction (Morgeson et al., 2010a). This theory is the functional team leadership theory. Furthermore, researchers commonly approach the study of team leadership through the lens of a singular source, often overlooking the potential for leadership can come from multiple sources (Morgeson et al., 2010a). In this study we are going to use this theory and explore how some leadership functions can influence team effectiveness in a hybrid work context, considering teams’ perceived virtuality.

The present dissertation in the Master of Human Resources Management and Organizational Consulting has the objective of understand how team perceived virtuality (TPV) mediates the relationship between hybrid teams and team effectiveness. Additionally, we want to understand how the leader of the hybrid teams can influence this process.

It is possible to believe that this research is relevant because there is few literature that explains how hybrid work teams perceive their closeness and how that impacts their effectiveness. Additionally, there is few literature that revolves around leadership effectiveness on virtual teams (Kayworth & Leidner, 2002).

Also, this study can become relevant to extent that virtual and hybrid teams are more and more present in the working world of today. But how can variables like the number of days in the office, or the number of overlapping days in the office with other team members affect team perceived virtuality and team effectiveness? How can the leader have a role in this process, how can he/she minimize the challenges associated with hybrid working? These questions remain a mystery in the eyes of literature. So, it becomes evident that is important to try to understand how some of these variables affect team effectiveness.

This work is divided into 4 main sections. The first section is where we can find the acknowledgements, the summary of the study and the introduction. The second section starts with the literature review, the theory we are going to discuss along the paper, in this case hybrid work teams, team perceived virtuality and team leadership. In the third section we can find the methodology used for this study, which in this case was through a questionnaire. Also, in the third section we can find the results, where we show the outputs of data analysed. Additionally, is composed by the discussion, where certain conclusions are drawn, and a connection is established with the existing body of

literature. In the discussion it is mentioned the practical implications and the limitations of this study, and recommendation for other studies. In the fourth and final section we can find the conclusion, bibliography, and the annex.

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1. Literature Review

1.1. Hybrid Work

1.1.1. Introduction

The shift to remote working and the push towards digitalisation in response to COVID-19 restrictions has had an unprecedented impact on office work (Chafi et al., 2022). Nowadays, most of companies prefer to work in a hybrid work model, thus mixing the telework with time in the office. – “Hybrid teams use a combination of virtual and face-to-face experiences and rely on both physical and virtual team exchanges to act on managerial directives, process information, accomplish team deliverables and achieve organizational mission” (Gilstrap et al., 2022; p.2). Literature points out that due to higher rates of employment, big organizations struggle to allocate all their employees in physical spaces. Therefore, organizations have begun to search for new paradigms and solutions such as remote work (Ferreira et al., 2021). To better understand the positive effects that a company can benefit from due to a hybrid work model, it is also important to explore the advantages and disadvantages of one component of hybrid work, the telework or remote work. Remote work can be defined as “the use of information and communications technologies ICTs), such as smartphones, tablets, laptops, and desktop computers, for work that is performed outside the employer’s premises” (International Labour Organization. Inclusive Labour Markets, 2020; p.1) . Remote work brings many advantages to companies and their employees, such as more autonomy and flexibility. Such flexibility is very much appreciated most predominantly by younger employees. This generation doesn’t focus solely on rewards, instead they place greater value on work-life-balance, and remote work allows that greater flexibility and mobility (Gilson et al., 2015). One of the most important benefits of remote work found in recent literature is the autonomy and flexibility that employees experience. Having the power to design and adjust work time and processes to individual needs, which in some ways increased empowerment and work satisfaction (Chafi et al., 2022). According to Gilson and colleagues (2015), virtual team members have more probability to be more viable, i.e. to work together in the future. Also, less turnover intentions, more organizational commitment and more confidence in the team capability have been noted.

On the other hand, it also brings a set of disadvantages and challenges, one of the most commons barriers found in remote work is the communication. With poorer communication due to the technology nature of conversations, it’s been found that it takes more time to teams in virtual settings to make a decision (Gilson et al., 2015). According to Ferreira and colleagues, 2021, problems of misunderstandings of judgment, due to the virtual nature of communications, either from

the voice tone or due to the signal cuts during teleconferences. Despite the success and benefits of remote work, it also has some significant disadvantages, per example teleworkers ran a high risk of falling outside their companies' work organisational flows (Mariniello et al., n.d.-a). However, we can close this gap with Hybrid Work. According (International Labour Organization. Inclusive Labour Markets, 2020) workers who benefit most from telework are those who do it occasionally. These workers usually have better work-life balance and improvements in some aspects of health and well-being (Mariniello et al., 2021). Hybrid work models, done right, will allow organizations to better recruit talent, achieve innovation, and create value for all stakeholders (Hilberath et al., 2020). Authors defend that employees in flexible working arrangement culture will be less distracted by co-workers and they can work during their most productive hours in a day will improve their overall performance (Ateeq, 2022). Nowadays it is more crucial than ever that employers should promote hybrid work, to better adapt to the employee's needs. Nevertheless, it's important to keep in mind, hybrid work or remote work is an option, and employers should not oblige working remotely or at the office, the choice to work in a hybrid model should be based on the voluntary consent of employees ((Chafi et al., 2022), (Sampat et al., 2022)).

1.1.2. Challenges and Advantages

As we have seen, the hybrid model of work fills most of the gaps that remote work and traditional work have. Thus, if we specifically refer to hybrid work, there are not many challenges we can address. However, according to (Cousins et al., 2007) hybrid teams face unique challenges that are not present in purely virtual or purely face-to-face teams. The authors state that teams, despite having frequent opportunities for face-to-face interactions and simultaneously having the best technical resources regarding technology, many hybrid teams fail to establish a shared identity, which potentially affects their performance. This happens because they don't identify neither as a virtual team neither as a traditional work team, thus they can't find a balance. This will enhance other existing problems such as developing and transferring organizational knowledge, managing conflicts, and making decisions.

With the emergence of the hybrid work model, companies and collaborators can benefit from the advantages of traditional face-to-face teams and remote work (Mitchell & Brewer, 2022a). Literature points out that one challenge of remote work can be the negative impact that can have in terms of balance of work, family and personal problems (Ferreira et al., 2021), however in hybrid teams this backlash is less probable to happen, according to (Ateeq, 2022) having a healthy balanced life between the work- home scenario may be playing a vital role in maintaining personal well-being

- health-conscious employees prefer the hybrid working model due to the health issues that emerged in the “work from home” model (Sampat et al., 2022). It’s safe to assume that not being present in the office, isn’t always good, “workers who opt to be physically present when others are teleworking have more control of the flow of information within the office, they can more easily send signals to the management about how much work they do and quality of their performance”(Mariniello et al., 2021; p.9), these teams that remain on site have a clear advantage over teleworking colleagues in promotion and career development (Mariniello et al., 2021) because remote and hybrid employees have fewer workplace interactions, each exchange makes a stronger impact (Gartner, 2022). Also, at an individual level, employees that show up to the office can more easily build informal networks that can help them progress in their career. Another advantage that hybrid teams have is that they often use technology to traverse physical and digital spaces and engage in multisynchronous work on behalf of organizational, individual and project management needs (Gilstrap et al., 2022) .This will allow teams to better manage ambiguity and diversity, offer flexibility to members and navigate task-orientations, relational orientations, conflict, cohesiveness, and identification, thus enhancing their performance. Although electronically mediated cooperation is often accompanied by feelings of uncertainty and perceived risks (Alves et al., 2022), the hybrid model allows teams to balance the presential and remote and preserve or build trust. In short “Hybrid team members have the capacity to make sense of and accomplish work based upon faster and richer information sharing through electronic interconnectedness” (Gilstrap et al., 2022; p.4) .That will lead to teams to have more autonomy over their working timings and arrangements which may give employees a sense of independence over their job (Ateeq, 2022). Since team members often change roles and teams more regularly than in previous generations (Gilstrap et al., 2022), hybrid work allows them balance multiple roles and change teams with more ease (Sampat et al., 2022) There is an untapped potential, a possible efficiency gain that can be grabbed by employers and employees who are willing to adopt a hybrid model. For everything mentioned above we can hypothesize the following.

The intent of this research on hybrid work is to get better insights in how hybrid work, and its ramifications can influence team effectiveness, more specifically the dimension team viability. Team viability stands as a pivotal measure of team effectiveness, as it hinges on a team's capability to flexibly respond to environmental changes, assimilate feedback, and resolve conflicts arising from disparities between established practices and evolving performance standards (Santos & Passos, 2013). According to (Hackman, 1987), team effectiveness is a tridimensional construct, and one of the criteria being team viability, that can be defined as the degree to which team members have the capability to work together in the future. It is important to teams to be viable those type of teams are

expected to exhibit enhanced effectiveness and superior performance over time in comparison to teams lacking such viability (Sapientiae & Nicole Cooperstein, 2017)

Although hybrid work has been proving beneficial for most organizations, it is not known, in what way. Is it because the time spent in the office, is it because of the time spent virtually? In this research we propose two operationalisations of hybrid work, that will impact positively team viability. The first one is “number of the days in the office”, and the second is “number of days spent in the offices simultaneously with at least half of team”.

We chose these perspectives, thinking both in in a more individualistic way, that only depended on the individual (“number of office days”) and also on the team perspective (“number of days spent in the offices simultaneously with at least half of team”). It is believed that is important to team members to interact face-to-face. According to (Johnson et al., 2009), teams that communicate face-to-face less than 10% of the time that really suffered in terms of effectiveness. It is vital to organisations promote face-to-face interactions to globally dispersed teams, even if it means to invest in dislocations and accommodations of team members, with the intent to increase affective relations between them. If employees come to the office more often there is a greater probability to meet the members of their team, thus more opportunities to socialize and strengthen their bonds of trust, avoid misunderstandings, and improve team cohesion and satisfaction.

We included this second operationalisation because we think it is not enough to measure this variable uniquely by going to/being in the office. If a team member goes to the office, but he/she is the only person to go, it has same effect as working remotely, because he/she will not interact with team members face-to-face. In the same line of thinking, if it is a larger team, per example of 10 members, and only one or two go to the office the same days as the person in question, it can cause a division among team members. So, we propose, we have in mind the number of days we spent in the office simultaneously, with at least half of the team to maximise team viability. Hence, throughout this work, we will test our hypotheses always with the two operationalizations of “hybrid work”, in an exploratory attempt to clarify how to approach this complex issue.

In view of the above we propose the following first two hypotheses:

H1a – “The number of office days positively impacts team viability”.

H1b – “The number of days spent in the office simultaneously with at least half of the team (i.e. overlap) positively impacts team viability”.

However, we also believe that these operationalisations can impact team viability indirectly. Being present in the office together may simply not be enough to understand how co-workers behave with one another and how that can impact their team viability, thus their effectiveness on the job. It’s

vital to understand how they perceive their relationship with other colleagues, and how they communicate. So, we propose to analyse their team perceived virtuality to better understand in what way this emergent state has an impact in the relationship between number of office days / number of days spent in the office simultaneously with at least half of the team and team viability.

1.2. Team Perceived Virtuality

The literature surrounding the concept of virtuality within teams can be classified on two main pillars. On one side, there is research that emphasizes the objective aspects of communication through technology and in the other hand we have the geographic or organizational dispersion of team members (Costa et al., 2021) (Handke et al., 2020) (Gilson et al., 2015). Several decades ago, the exploration of virtual teams became an integral part of the domains of organizational behaviour and management and nowadays with the increase of remote and hybrid work, new problems and new points of view emerge in this field, such as Team Perceived Virtuality. The authors (Handke et al., 2020) define **team perceived virtuality** as” a cognitive-affective team emergent state which is grounded in collectively experienced feelings of distance and perceptions of information deficits.” It is also described as a shared affective-cognitive emergent state which is characterized by team members’ co-constructed and collectively experienced distance and information deficits. The first dimension of Team Perceived Virtuality is the Collectively-Experienced **Distance**. The affective dimension of TPV is characterized by “team members’ collective feelings of being distant from one another” (Handke et al., 2020). This dimension can be viewed as how distant the team members feel, the emotional gap between one another’s, rather than merely their perception of physical proximity. Team members can be physically distant but feel close to each other, to the same degree they can be working in the same physical space and still feel distant from one another (Handke et al., 2020). In fact, individuals collaborating from different ends of the world have the potential to foster a warm and intimate connection. This can be achieved through the exchange of personal interactions during the initial stages of work meetings, sharing family photos, or even utilizing emojis to convey emotional context within written messages. Conversely, even members of teams located in close proximity might find themselves distant due to a lack of informal social interactions at work and tend to speak harshly to one another (Costa et al., 2021). The second dimension of Team Perceived Virtuality can be denominated Collectively-Experienced **Information Deficits**. The cognitive dimension of TPV is characterized by “team members’ collective perceptions regarding insufficient and/or untimely information exchange. This dimension can be viewed as the perceived inability to transmit and receive information promptly; transmit in a way that meet team requirements, transmit information with diverse cues and exchange and receive information that uses rich and varied

language. Per example, in the event that team members do not promptly address each other's inquiries, they will experience deficits in meaning convergence, because it becomes challenging to determine whether they are aligned or not. Furthermore, extended periods of waiting for feedback from others might severely disrupt the workflow, ultimately leading to a deficit in timing and an overall disruption in the team's functioning (Handke et al., 2020). Experiencing communication deficits gaps isn't solely a result of technological features but can also be shaped by how teams utilize these features and establish communication norms around them. This way, information deficits emerge from team interactions, influenced by structural aspects of team virtuality like technology usage. For instance, if a team leader offers broad face-to-face feedback without addressing specific behaviours or events, this might be collectively interpreted as insufficient information exchange (Costa et al., 2021). The authors propose the need for an emergent state perspective which help explain how social constructions of team virtuality collectively emerge, as a function of both team members' interactions and their embedding environment. Complementing the concept of team virtuality, the concept of TPV enable us to comprehend how team virtuality is shaped through social construction. Additionally, by considering its emergence at the team level, TPV provides insights into the underlying reasons for the operational dynamics of virtual teams (Costa et al., 2021). TPV enables teams with high degree of structural virtuality to maintain a sense of proximity and information richness. This implies that even when teams possess equivalent dispersion across work locations and use identical communication technologies, their perceptions of distance and information deficits can differ significantly (Costa et al., 2021). This happens because team perceived virtuality “acknowledges both the psychological (as opposed to merely structural) nature of team virtuality as well as its team level emergence” (Costa et al., 2021)

According to its theoretical model, and being an emergent state, TPV will develop and evolve depending on team processes and on fluctuations in antecedent variables, such as structural virtuality or team design (Costa et al., 2021) suggest that having even a small amount of face to- face time may improve team effectiveness (Johnson et al., 2009)

However, the amount of face-to-face time, in this case the number of days in the office, and the number of office day with overlap with at least half of team, may impact the way how team members view each other. The collaborative construction of meaning by team members regarding their virtual work experiences might serve as a core aspect in elucidating the impact of team virtuality on team effectiveness. This encompasses various outcomes, ranging from task-related results like team performance to affective and social outcomes such as team satisfaction, team viability, and other emergent states (Handke et al., 2020). The amount of face-to-face time is generally considered by experienced managers the richest form of communication, so if team members lean more heavily on

computer-mediated communication as opposed to face-to-face interaction, the task of fostering shared understanding among them becomes progressively more complex (Griffith & Neale, 2001). For example, if a team member may not be aware that a comment is meant to be sarcastic, this is likely to lead to a misunderstanding, and decrease cohesion and satisfaction (Handke et al., 2020) So it is important to team members to communicate and share information in the interaction-context, this increases the probability to solve conflicts and learn feedback, thus contributing to more success in performance and willingness to work together in the future (Santos & Passos, 2013)

We propose that the dimensions of team perceived virtuality can mediate the relationship between the operationalisations of hybrid work and team viability.

In view of the above we propose the following hypothesis:

H2a- “Team Perceived Virtuality, namely distance, mediates the relationship between the number of office days and team viability”.

H2b - “Team Perceived Virtuality, namely Information Deficits, mediates the relationship between the number of office days and team viability”.

H2c - “Team Perceived Virtuality, namely distance, mediates the relationship between the number of office day with overlap with at least half of team and team viability”.

H2d - “Team Perceived Virtuality, namely Information Deficits, mediates the relationship between the number of office days with overlap with at least half of team and team viability”.

As we have seen, the different arrangements within hybrid work practices can influence how close we feel with our coworkers and how we perceive the information exchange. However, we propose that other variables can moderate this relationship, the leader of the team and team processes. Leaders play a pivotal role in the functioning of virtual teams, especially in shaping how teams confront challenges and ultimately adjust in response to these difficulties.(Gilson et al., 2015)

1.3. Leadership

1.3.1. Team Leadership and Team Processes – “How can a leader address the hybrid work challenges?”

First, given the “altered” social context, leaders must be able to build and maintain a social climate necessary for ensuring adequate levels of team unity and cohesiveness,(Kayworth & Leidner, 2002), for that it is important leaders must show genuine care and engagement, communicate a vision and empowering employees (Brunelle & Professor HEC Montréal, 2013), (Kevin Kelloway et al., 2003)

.Although the source of team leadership can vary, all sources are ultimately focused on satisfying team needs with the goal of enhancing team effectiveness (Morgeson et al., 2010b). The team must adapt to this new reality but so as the leader of the team, since he/she is the piece that glues the team together - “As this trend may persist, it is crucial that leaders adapt to the new needs of their organizations and their employees. Leadership has been shown to be vital for remote team performance and success” (Whiteside & Dixon, 2022; p.155). In order to maximise the level of efficacy within the team is necessary a certain level of trust to allow a better communication flow. One way to strengthen trust is to invest in face-to-face communication, is vital to from time to time to personally check in with your team members to see how they are coping, how their work is progressing, and what help they might need. (Hooijberg & Watkins, 2021). Indeed, some authors defend that this degree of contact is necessary for leadership to occur (Kevin Kelloway et al., 2003). As we seen communication can be quite a challenge to hybrid teams, moreover poor communication practices can lead to “misinformation and the division of the team into subgroups” (Mitchell & Brewer, 2022; p.4). Despite investing in face-to-face communication can be helpful to strengthen trust, it’s also important to prioritize remote first communication “for aiding in the inclusion and equity off all team members regardless of their location” (Mitchell & Brewer, 2022; p.4) if possible, communicate through multiple channels, this way we can ensure mutual knowledge. A practice that can help with alignment of information within the team, is to organize daily 15-to-20-minute virtual sessions, where team members share the work, they did and their adversities (Mariniello et al., 2021). With the phenomenon of globalization, organizational leaders now face the fact that they have to lead a team with employees who work in diverse locations, or “leading with so many employees that direct face to face contact on a regular basis is difficult” (Kevin Kelloway et al., 2003; p.164). So, another way leaders can address the hybrid work challenges is to rethink the traditional concept of workplace. (Mariniello et al., 2021), suggest we should view offices as “workplace ecosystems”, where employees can go to learn, collaborate with co-workers and socialize. Nevertheless, the hybrid workplace shouldn’t be viewed as a physically space, it should be a space created from both online and physical space. This suggests that leaders should prioritize flexibility ensuring that their team has the right tools both in the office and remotely. Authors defend that this concept of workplace works the best when leaders arrange with their team members which tasks should be done remotely versus face-to-face (Mitchell & Brewer, 2022a).

“A team is comprised of a set of members who interact, dynamically, interdependently, and adaptively toward a common and valued goal” (Kozlowski et al., 2009; p.3), nevertheless teams always need a leader to manage a set of variables, (Morgeson et al., 2010b) suggests that team

leadership can be viewed as oriented around team need satisfaction, with the ultimate goal of maximizing team effectiveness, this perspective is the functional leadership.

Functional leadership theory suggests that the role of the leader is to be the final piece of the puzzle, that is the leader's duty to observe what is missing, what are the functions that are not being performed, and give the team what it needs to accomplish the goals, it is through the satisfaction of the needs of followers, to these improve their outcomes (Bell et al., 2022) (Morgeson et al., 2010b). Leaders can improve this satisfaction within the team through the development of affective commitment – “the extent to which members become identified with, emotionally attached to, and involved with the team and others” – team members begin to build more cohesive relations, thus accepting group goals and make better decisions, creating a greater satisfaction and better outcomes (Kozlowski et al., 2009).

However, managing motivations, expectations and behaviours in a virtual team is completely different from managing a traditional team. These teams fail because of lack of leadership, it is necessary a leader to moderate the team, even if they are not in the same room. However, it is natural, leadership of virtual teams is a fairly new concept. Although leadership it is not an easy task, leading a team that works through a hybrid work model, with a certain degree of virtuality has its own unique challenges, that require managers to address a variety of potential paradoxes – “whereas undoubtedly face similar challenges as traditional global virtual teams, we argue that these dispersed work groups may also face unique issues” (Kayworth & Leidner, 2002; p.9) (Cousins et al., 2007) (Hooijberg & Watkins, 2021). These challenges ranged from communications to fighting procrastination, to work-home integration, to isolation and loneliness (Whiteside & Dixon, 2022).

Team processes

On this research we also emphasize team processes, more specifically we highlight the team backup behaviors. Team processes can be envisioned as a comprehensive entity, encompassing the team's inclination to perform adeptly in converting inputs into outcomes.

Marks et al.'s (2001) model tells us that there are three main types of team processes. The first one is interpersonal processes, this domain focuses on relationships between team members, where they have as primary processes conflict management, motivation and confidence building and affect management. The second domain is transitions processes these types of processes have a focus on previous accomplishments where team members reflect and interpret these situations to prepare for the future, mission analysis and goal specification are examples (Mathieu et al., 2020).

In this particular case we chose action team process since it is more focused on goal accomplishment. Action processes encompass the behaviors that group members undertake while

striving to achieve their goals (Mathieu et al., 2020). These processes involve the dynamics occurring during the execution of a group's tasks, including communication, participation, coordination, and the monitoring of the group's progress (Martins et al., 2004) The team monitoring and backup process consists of the members of the team assisting other members of the team to conclude with success a specific task, by conducting feedback, or even helping with the task (Mathieu et al., 2020). In this case, since we are talking of hybrid work teams, it is more probable to a team member help one another with a task if both people are presential in the office. Otherwise, if both people are remote working, or even, one in the office and another virtually, the colleague that is busier can pass unnoticed with their load of work, and the other colleague won't know that they need help.

In the same line of thought, giving feedback virtually can be more difficult to give and receive, this happens because delivered feedback tends to be less timely, contains fewer socioemotional cues, and is more formal in nature. This can make it more challenging for employees to gauge their performance effectively (Bell et al., 2022). Additionally, it is easier to “knock on the door” of the colleague and to ask for feedback than to schedule a online meeting, or even make a video call, however, this might not answer,

In view of the above we propose the following hypothesis:

H3a – “The team process of Backup behaviours moderates the relationship between the number of office days and distance”.

H3b – “The team process of Backup behaviours moderates the relationship between the number of days spent in the office simultaneously with at least half of the team and distance.”

Morgeson et al. (2010) developed a taxonomy of 15 team leadership functions (Bell et al., 2022). On this study we highlight the “Train and develop team” function. This leadership function emphasizes the essential skills needed for individual task execution and the interpersonal team dynamics that foster exceptional team performance. Consequently, it empowers the team to take more effective self-leadership in the future. Studies have demonstrated that leadership actions aimed at coaching, developing, and mentoring the team significantly improve team processes and overall effectiveness. This positive impact has been observed across various formal and informal leadership sources (Morgeson et al., 2010a)

According to (Bell et al., 2022), training programs specifically designed for virtual work can offer both leaders and team members the essential skills required to navigate virtual environments effectively. This suggests the potential value in providing training for virtual team members to address common challenges inherent in remote collaboration, including the selection and proficient utilization of appropriate communication technologies. So, if team members are better prepared to address these communication challenges, they will be capable of transmitting more trustworthy information, and

better the level of proximity between them, thus increasing the feeling of closeness between one and another.

In view of the above we propose the following hypothesis:

H3c – “The leadership function of Development the team moderates the relationship between the number of office days and information deficits”.

H3d – “The leadership function of Development the team moderates the relationship between the number of days spent in the office simultaneously with at least half of the team and information deficits.”

We propose that this leadership function and this team process can moderate the relationship between the operationalisations of hybrid work, previously mentioned, and the two dimensions of team perceived virtuality.

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2. Research Model

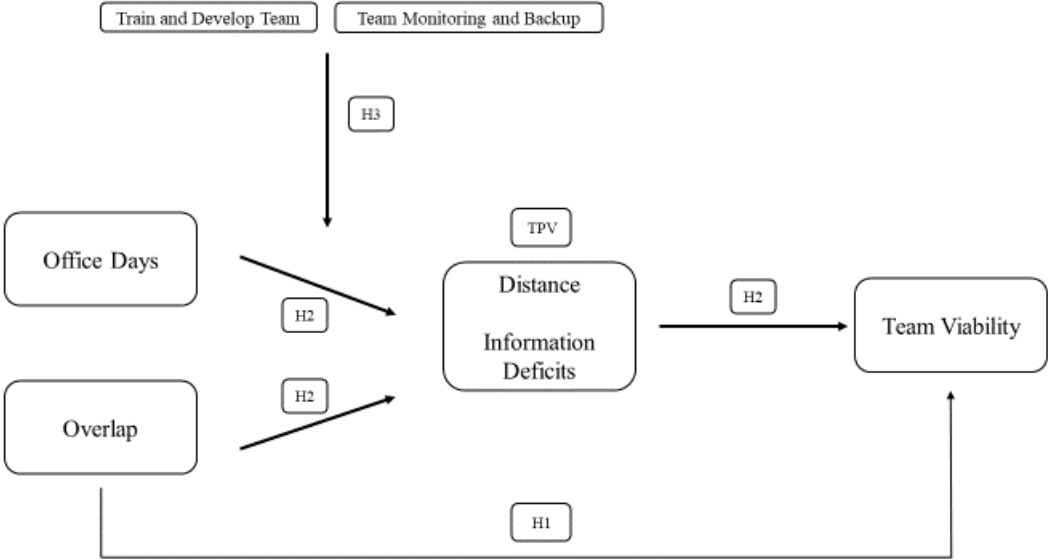


Figure 2.1 – Research Model

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3. Methodology

Sample

The target for this study consists in teams of any industry that have at least 3 elements, currently working in Portugal in a hybrid work model. This criterion covers public and private sectors, and organizations of any dimension. The criteria defined for this study are purposely broad to gather a larger sample size, yet reliable. All the individuals/teams that do not fit in the referred conditions were excluded. It was used the snowball sampling, a non-probabilistic sampling method. (Taherdoost, 2016), defines snowball sampling as “a non-random sampling method that uses a few cases to help encourage other cases to take part in the study, thereby increasing sample size”. The goal for this investigation was to gather a trustworthy sample of 30 teams. However, gathering data with the characteristics mentioned before was more challenging than expected. With nearly 80 contacts that fulfilled the requirements and agreed to answer the surveys, only 27 teams answered the questionnaire properly.

A total of 91 employees (N= 91) in various sectors of activity participated, with activity with greater incidence in the area of consultancy (39.3%).

With regard to the teams specifically, the average employee has been working in their respective company for 3 years, being the IT and HR department the most representative in the study (31.5% and 25.8%, respectively). The average employee has been working with their respective team for 12,9 months with a standard-deviation of 18.162 Also, in this line of thought, a large part of the participants in this study are women (57.3%), with only 41.6% being men, (1.1% rather not disclose the gender). With regards to the age of the respondents, the mean and standard deviation were respectively, 28.03 years old and 8.19, 77.5% are people between 21 and 30 years old.

Procedure

The data was collected through an online questionnaire, designed on Qualtrics. The survey was anonymous and was sent by e-mail and via direct message through WhatsApp, to the participants. According to (Ragab & Arisha, 2017), there are two purposes of using questionnaires can be either descriptive or explanatory. In this investigation we used an explanatory method because they “involve a more analytical perspective where there is interest in investigating the relationship between variables. They therefore require predetermination of the variables that would be examined before the questionnaire is designed.” (Ragab & Arisha, 2017).

The questionnaire was developed with the purpose of individual response and was entirely in Portuguese. In this sense, it was shared with people who were absolutely comfortable with this

language. For this reason, all scales used in the questionnaire had to be, undoubtedly, translated to Portuguese. The questionnaire had a response duration of approximately 7 minutes.

The questionnaire was divided into 8 blocks of questions. In a first block, a brief description of the study was present, followed by the informed consent. In this block, confidentiality and anonymity were ensured as participation was voluntary, a question was included regarding the intention to participate in the study (i.e., "I am aware of and agree to participate in the study"). On the contrary, if the participant did not wish to do so, their participation was immediately terminated. The second block is to fill in a code. In this sense, a random code was created, composed of a letter and one or two numbers. This code was then shared with the team members so that they could place it in their questionnaires, guaranteeing anonymity, ensuring the pairing and validity of the data. Next, in order to measure the variables under study, five blocks of questions were included in the questionnaire. The first one refers hybrid work, the second to team perceived virtuality, the third to the interdependence, the fourth to the team efficacy and finally, the fifth to the leadership (moderator variables). Additionally, a final block composed of sociodemographic questions for sample characterisation and description. After all the data was collected it was used the IBM SPSS Statistics 28 to apply the tests that are necessary to achieve more trustworthy and reliable results.

Instruments

All the scales administrated in the questionnaire were originally in English. Therefore, it was necessary to translate the scales since the survey was applied for Portuguese workers to answer. These translations were reviewed by me and my supervisor and retranslated in a way that the items of each scale would lose the minimum possible of the original meaning.

Hybrid Work

After a thorough search, we couldn't find any scale that could measure hybrid work. So, we have chosen to measure two perspectives that, in the context of teams, made sense to the study, one perspective more individualistic, and another one more team focused on.

Number of office days

To measure the amount of office days we asked, "Think in a usual work week: How many days do you work at the office?". The participants answered in a scale from zero to five.

Number of office days with overlap with at least half of team

To measure the number of office days where an individual would overlap with at least half of their team, we asked “Think in a usual work week: How many days do you work at the office with at least half of your team?”. The participants answered in a scale from zero to five.

Team Perceived Virtuality Scale

To measure the degree of team perceived virtuality, we chose the scale created by Handke et al. (2020), through a scale of 10 items. Participants had to respond within a range from 1 (“completely disagree”) to 7 (“completely agree”). The scale is subdivided in two dimensions, the first is the Distance, with 5 items. Examples of items are “In my team we feel detached from each other”, “In my team we feel that our relationship is cold”. The second dimension is the Information Deficits, it has the remaining 5 items. Examples of items are “The ways in which we can express ourselves are limited” and “It’s difficult to understand if we are on the same page or not”. The Distance sub-scale had a Cronbach's alpha of 0.874. The Information Deficit subscale had a Cronbach's alpha of 0.88.

Team Viability

To measure team viability, it was applied to the questionnaire the scale created by (Standifer, 2009) Viability Scale. Participants had to respond a 7-item scale within a range from 1 (“Totally Disagree”) to 7 (“Totally Agree”). Examples of items are “I would not hesitate to work with the same team again” and “If it were possible, I would have changed teams.”. The team Viability Scale had a Cronbach's alpha of 0.80.

Leadership function:

The other scale, created by (Morgeson et al., 2010b) that was chosen derived from action processes Team Monitoring and Backup Scale, a 5-item scale where participants had to respond within a range from 1 (“nothing”) to 5 (“extremely”). Examples of items are “To what extent does our team actively work to . . . : Develop standards for acceptable team member performance?” and “To what extent does our team actively work to . . . : Assist each other when help is needed?”. The Team Monitoring and Backup Scale had a Cronbach's alpha of 0.86.

Team Process:

The team process scale used is the Train and Develop Team Scale (Transition Phase), created by (Mathieu et al., 2020). Examples of items are “Makes sure the team has the necessary problem solving and interpersonal skills” and “Helps new team members learn how to do the work”. They are

both a 5-item scale where participants had to respond within a range from 1 (“completely disagree”) to 5 (“completely agree”). The Train and Develop Team Scale had a Cronbach's alpha of 0.94.

4. Results

After data collection and with a view to data analysis, data were exported to IBM SPSS Statistics 28 software. Additionally, to calculate moderation and mediation effects, the Process macro (Hayes, 2018) was used. Model 1 was used which concerns moderation, and Model 4 was used which concerns mediation. When the models were ran, we always introduced seniority as a control variable.

Data Aggregation

Regarding the aggregation of data per team, it is crucial to understand whether the members of the team members do or do not have the same perspective, because if there is no agreement, we cannot obtain information about what they think or do not think as a team. In this sense, it was necessary to prove that there was then a high level of agreement, comparing the group variances with an expected variance, using the weighted average weighted average of the answers of the team members, aggregating afterwards the values through the RWG(j), using a value of .70 and above as an acceptable value of agreement (James, Demaree & Wolf, 1984). The truth is, the higher these values are, the better, and considering that they are above .70 we can state that there is, therefore a high level of agreement between team members. We can note that all RWG's values are higher than 0.70, thus we can conclude that there is a high level of agreement.

Subsequently, it was analysed the value of ICC (1), which explains the value of the variance that exists in the individual response, more specifically, is how much the individual response and its variance depends not only on the person as an individual, but on the team. Looking at table 1 we can conclude that the values were between the recommended values of .05 and .20 (DeShon, Kozlowski, Schmidt, Milner & Wiechmann, 2004).

Next, we proceeded to the analysis of the ICC (2) which tests the reliability of the means of the group, and which must have a value greater than the ICC (1). Once again, when we look at table 1, we can see that all values of ICC2 were higher than the respective ICC1.

Correlations and descriptive statistics

As can be seen, table 1 presents the means, standard deviation, and correlations between all variables under study. Also, the values of the means of the RWG(j) and the ICC (1) and ICC (2) values. In this study the variable "Seniority" works as a control variable, so as it was expected doesn't

have any significant correlation with the rest of the variables. Viability negatively correlates with Distance and Information Deficits, ($r=-0,49,p=0.05$; $r=-0,62,p=0.01$, respectively), although it positively correlates with Back Up behaviours and Team Development. Naturally Distance and Information Deficits have a strong positive correlation ($r=0,68,p=0.01$), which means when one increases, the other also increases. As expected, BackUp and Development being two leadership functions have a strong positive correlation, ($r=0,62,p=0.01$), the increase in one also means an increase in the other. Distance and Information Deficits have a negative correlation with the leadership variables. Distance has a negative correlation of $r=-0,43,p=0.05$ and $r=-0,46,p=0.05$, with the variables BackUp and Development respectively. Information Deficits presents even stronger negative correlation with BackUp and Development $r=-0,70,p=0.01$; $r=-0,50,p=0.01$. We can conclude that besides seniority, all the variables have correlation with each other's. The hybrid functions present a strong positive correlation between each other, as expected, with $r=0,73,p=0.01$. They also correlate negatively with Distance, being the $r=-0.41,p=0.05$ and $r=-0.44^*,p=0.05$, with Number of office days, and number of office days with overlap with at least half of team, respectively.

	Mean	SD	RWG Mean	ICC(1)	ICC(2)	1	2	3	4	5	6	7	8
1. Viability	5,9	0,7	0,78	0,2	0,45	-							
2. Distance	1,81	0,71	0,9	0,54	0,8	-0,49**	-						
3. Information Deficit	2,02	0,64	0,82	0,2	0,49	-0,62**	0,68**	-					
4. BackUp	3,88	0,42	0,81	0,1	0,29	0,68**	-0,43*	-0,70**	-				
5. Development	4,11	0,52	0,77	0,2	0,45	0,41*	-0,46*	-0,50**	0,62**	-			
6. Number of office days	2,53	1,09	-	-	-	0,04	-0,41*	-0,33	0,12	0,13	-		
7. Number of office days with overlap with at least half of team	1,72	1,06	-	-	-	-0,1	-0,44*	-0,16	-0,09	0,01	0,73**	-	
8. Senioriy	2,85	-	-	-	-	0	0,21	-0,15	0,14	0,1	0,12	-0,18	-

*. Significant correlation at the 0.05 level | **. Significant correlation at the 0.01 level.

Table 4.1 – Correlation of the variables

Hypothesis Testing

In order to test the hypotheses of the study, three statistical procedures were carried out - simple regression (H1), mediation (H2) and moderation (H3).

Regressions

Regression analysis between Viability and Office Days – H1a – “The number of office days positively impacts team viability”.

	β	t	p
Viability: Office days	0.04	0,18	0,857

Table 4.2 – Regression analysis between Viability and Office Days

To test the first hypothesis a regression was carried out. As we can see on the tables 4.1 and 4.2, the number of office days is not a significant predictor of viability. (B = .04, p = .857)

Regarding the hypothesis in question, with a significance value of $0.857 > 0.05$, we reject H1a.

Regression analysis between Viability and Office Days with overlap with at least half of team – H1b – “The number of days spent in the office simultaneously with at least half of the team positively impacts team viability”.

	β	t	p
Viability: Office days with overlap with at least half of team	-0.09	-0.44	0,666

Table 4.3 – Regression analysis between Viability and Office Days with overlap with at least half of team

To test the second hypothesis a regression was carried out. As we can see on the tables 4.1 and 4.3, the number of office days spent simultaneously with at least half of team is not a significant predictor of viability. (B = -.09, p = .666)

Regarding the hypothesis in question, with a significance value of $0.67 > 0.05$, we reject H1b.

Mediation

Result of the Mediation analysis of the mediator Distance between number of Office Days and viability – H2a- “Team Perceived Virtuality, namely distance, mediates the relationship between the number of office days and team viability”.

	<i>Unstand. Value</i>	<i>coeff</i>	<i>LLCI</i>	<i>ULCI</i>
<i>Bootstrap results for Indirect effect</i>	0.15	0.08	0.02	0.34

LLCI =Lower Limit Confidence Interval; ULCI=Upper Limit Confidence Interval

Table 4.4 - Result of the Mediation analysis of the mediator Distance between number of Office Days and viability

Table 4.4 represents the values of Hypothesis H2a that tests the mediation role of Distance in the relationship between number of office days and viability. It can be seen that with the values presented, with regard to the indirect effect of Office Days on Viability, through Distance, the values in question (UV=0.1498; LLCI=0.0186; ULCI=0.3367), show that there is a significant effect and that, therefore, there is a mediation of Distance between these variables.

Result of the Mediation analysis of the mediator Information Deficits with Office Days and viability– H2b - “Team Perceived Virtuality, namely Information Deficits, mediates the relationship between the number of office days and team viability”.

	<i>Unstand. Value</i>	<i>coeff</i>	<i>LLCI</i>	<i>ULCI</i>
<i>Bootstrap results for Indirect effect</i>	0.15	0.09	-0.01	0.37

LLCI =Lower Limit Confidence Interval; ULCI=Upper Limit Confidence Interval

Table 4.5 - Result of the Mediation analysis of the mediator Information Deficits with Office Days and viability

Table 4.5 represents the values of Hypothesis H2b that tests the mediation of Information Deficits in the relationship between number of Office Days, and viability. It can be seen that with the values presented, with regard to the indirect effect of Office Days on Viability, through Information Deficits, the values in question (UV=0.1466; LLCI=-0.0119; ULCI=0.3700), show that there is not a significant effect and that, therefore, Information Deficits is not a mediator between these variables.

Result of the Mediation analysis of the mediator Distance with number of Office Days with overlap with at least half of team, and viability– H2c - “Team Perceived Virtuality, namely distance, mediates the relationship between the number of office day with overlap with at least half of team and team viability”.

	<i>Unstand. Value</i>	<i>coeff</i>	<i>LLCI</i>	<i>ULCI</i>
<i>Bootstrap results for Indirect effect</i>	0.19	0.08	0.04	0.35

LLCI =Lower Limit Confidence Interval; ULCI=Upper Limit Confidence Interval

Table 4.6 - Result of the Mediation analysis of the mediator Distance with number of Office Days with overlap with at least half of team, and viability

Table 4.6 represents the values of Hypothesis H2c that tests the mediation of Distance in the relationship between number of Office Days with overlap with at least half of team, and viability. It can be seen that with the values presented, with regard to the indirect effect of Office Days with overlap with at least half of team on Viability, through Distance, the values in question (UV=0.1881; LLCI=0.0385; ULCI=0.3476), show that there is a significant effect and that, therefore, there is a mediation of Distance between these variables.

Result of the Mediation analysis of the mediator Information Deficits with Office Days with overlap with at least half of team, and viability -H2d - “Team Perceived Virtuality, namely Information Deficits, mediates the relationship between the number of office days with overlap with at least half of team and team viability”.

	<i>Unstand. Value</i>	<i>coeff</i>	<i>LLCI</i>	<i>ULCI</i>
<i>Bootstrap results for Indirect effect</i>	0.08	0.96	-0.102	0.29

LLCI =Lower Limit Confidence Interval; ULCI=Upper Limit Confidence Interval

Table 4.7 - Result of the Mediation analysis of the mediator Information Deficits with Office Days with overlap with at least half of team, and viability

Table 4.7, represents the values of Hypothesis H2d that tests the mediation of Information Deficits in the relationship between number of Office Days with overlap with at least half of team, and viability. It can be seen that with the values presented, with regard to the indirect effect of Office Days with overlap with at least half of team on Viability, through Information Deficits, the values in question

(UV=0.0854; LLCI=-0.1020; ULCI=0.2831), show that there is not a significant effect and that, therefore, Information Deficits is not a mediator between these variables.

As we can see from the mediation hypotheses, only the dimension distance of team perceived virtuality, is a mediator between number of office days/number of office days with overlap with at least half of the team members and team viability.

Moderation

Analysis of the interaction of BackUp and Office Days with distance – H3a – “The team process of Backup behaviours negatively moderates the relationship between the number of office days and distance”.

<i>Moderator</i>	<i>coeff</i>	<i>LLCI</i>	<i>ULCI</i>
	0,23		
BackUp		-0,36	0,82

LLCI =Lower Limit Confidence Interval; ULCI=Upper Limit Confidence Interval

Table 4.8 - Analysis of the interaction of BackUp and Office Days with distance

As for the interaction effect, it is positive and not significant ($\beta = 0,2253$; $t=0.7909$; LLCI=-0.3656; ULCI=0.8162; $p=0.4375$).

Thus, H3a, is not supported, so we cannot confirm the moderating effect of BackUp on the relationship between Office Days and distance.

Analysis of the interaction of BackUp and Office Days with overlap with at least half of team with Distance – H3b – “The team process of Backup behaviours negatively moderates the relationship between the number of days spent in the office simultaneously with at least half of the team and distance.”

<i>Moderator</i>	<i>coeff</i>	<i>LLCI</i>	<i>ULCI</i>
	0,62	0,01	1,23
BackUp			

LLCI =Lower Limit Confidence Interval; ULCI=Upper Limit Confidence Interval

Table 4.9 - Analysis of the interaction of BackUp and Office Days with overlap with at least half of team with Distance

As for the interaction effect, it is positive and significant ($\beta = 0,6216$; $t=2.1164$; LLCI=0.0124; ULCI=1.2307; $p=0.0459$).

Thus, H3b, is supported, so we can confirm the moderating effect of BackUp on the relationship between Office Days with overlap with at least half of team, and distance.

Analysis of the interaction of Development and Office Days with Information Deficits -H3c – “The leadership function of Development behaviours negatively moderates the relationship between the number of office days and information deficits”.

<i>Moderator</i>	<i>coeff</i>	<i>LLCI</i>	<i>ULCI</i>
	0,29	-0,13	0,71

Development

LLCI =Lower Limit Confidence Interval; ULCI=Upper Limit Confidence Interval

Table 4.10 - Analysis of the interaction of Development and Office Days with Information Deficits

As for the interaction effect, it is positive and not significant ($\beta= 0,2876$; $t=1.4200$; $LLCI=-0.1324$; $ULCI=0.7076$; $p=0.1696$).

Thus, H3c, is not supported, so we cannot confirm the moderating effect of Development on the relationship between Office Days and Information Deficits.

Analysis of the interaction of Development and Office Days with overlap with at least half of team with Information Deficits -H3d – “The leadership function of Developing behaviours negatively moderates the relationship between the number of days spent in the office simultaneously with at least half of the team and information deficits.”

<i>Moderator</i>	<i>coeff</i>	<i>LLCI</i>	<i>ULCI</i>
	0,7571	0,1743	1,3398

Development

LLCI =Lower Limit Confidence Interval; ULCI=Upper Limit Confidence Interval

Table 4.11 - Analysis of the interaction of Development and Office Days with overlap with at least half of team with Information Deficits

As for the interaction effect, it is positive and significant ($\beta= 0,7571$; $t=2.6942$; $LLCI=0.1743$; $ULCI=1.3398$; $p=0.0133$).

Thus, H3d, is supported, so we can confirm the moderating effect of Development on the relationship between Office Days with overlap with at least half of team, and Information Deficits.

As we can see from the regression hypothesis, there is not a direct relation between, the number of office days (and office days simultaneously with at least half of the team) and team viability.

For the mediations hypothesis we can see that only the distance dimension of TPV, and not both dimensions (information deficits), it is a mediator of the relationship between the number of office days (and office days simultaneously with at least half of the team) and team viability.

Summing up, both leadership functions moderate the relationship between office days with *overlap* with at least half of team both dimensions of Team Perceived Virtuality but are not moderators when only the number of office days (and not the overlap with other team members) is considered.

Summary of Hypothesis Results

Hypotheses	Supported/Not Supported
H1a – “The number of office days positively impacts team viability”	Not Supported
H1b - “The number of days spent in the office simultaneously with at least half of the team positively impacts team viability”	Not Supported
H2a - “Team Perceived Virtuality, namely distance, mediates the relationship between the number of office days and team viability”	Supported
H2b - “Team Perceived Virtuality, namely Information Deficits, mediates the relationship between the number of office days and team viability”	Not Supported
H2c - “Team Perceived Virtuality, namely distance, mediates the relationship between the number of office day with overlap with at least half of team and team viability”	Supported
H2d - “Team Perceived Virtuality, namely Information Deficits, mediates the relationship between the number of office days with overlap with at least half of team and team viability”	Not Supported
H3a - “The team process of Backup behaviours negatively moderates the relationship between the number of office days and distance”	Not Supported
H3b - “The team process of Backup behaviours negatively moderates the relationship between the number of days spent in the office simultaneously with at least half of the team and distance.”	Supported
H3c - “The leadership function of Development the team negatively moderates the relationship between the number of office days and information deficits”	Not Supported
H3d - “The leadership function of Developing the team negatively moderates the relationship between the number of days spent in the office simultaneously with at least half of the team and information deficits.”	Supported

Table 4.12 - Summary of Hypothesis Results

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5. Discussion

As we mentioned before, one of the objectives of this study is to understand how the different configurations of hybrid work that we chose affected the viability of hybrid teams. Going to the office plays a vital role in communication between team members, virtual teams face a more difficult challenge due to their virtual context that don't allow them to communicate effectively due reduced social context cues (Martins et al., 2004).

Regarding the first two hypothesis (H1a, H1b), contrary to our expectations, they are not supported. We cannot conclude that neither days in the office nor overlapping days alone influence the viability of teams. Despite the fact that we couldn't find a direct relationship between these variables, we found an indirect relationship.

Regarding the hypothesis from the mediation (H2a, H2b, H2c, H2d), we can conclude that the only influence in team viability there is it's through the distance dimension of TPV. This happens because the days in the office and the overlap affect the perception of distance that influences the viability. Despite the exchange of information being a very important concept in communication, the feeling of closeness might play a more relevant role in team viability. For example, in organizations there is a constant flow of events happening many of which are informal, and understanding and interpreting them correctly often requires active participation. Informal interactions, such as chatting with colleagues during lunch breaks or in a colleague's office, are instrumental in resolving misunderstandings, and create empathy and trust. In telework these opportunities are excluded (Wojcak et al., 2016). As team members gather in the office the probability to socialize is higher, this means that sharing knowledge, feedback and other skills is more likely to happen naturally, this is vital to their willingness to work together as team in the future (i.e., team viability) (Santos & Passos, 2013). We can also look at these results using the TPV model. Teams can fit into one of four quadrants, depending on their levels of distance (high/low) and information deficits (high/low). Two of these quadrants reflect states of low distance. The first one is the "nightclub" state. Team members describes teams that experience high information deficits but low levels of distance. Consequently, these teams find their information exchange to be lacking and not timely, yet they maintain a strong emotional closeness. This deep sense of warmth and intimacy, forged through shared experiences, leads us to expect that team members are likely to place a high level of trust in one another. They also tend to have a strong desire to continue being part of this team, resulting in relatively elevated levels of satisfaction (Handke et al., 2020).

The second type is the lowest level of TPV would then be experienced in teams in a "cruising speed" state, where they feel simultaneously close to each other and effective in information sharing and meaning convergence. These teams are characterized by "low TPV teams", that is, teams that

experience both low distance and low information deficits. Consequently, these teams tend to have a strong sense of emotional closeness among members and perceive their information exchange as highly effective. In simple terms, these teams are highly unlikely to perceive themselves as virtual, as they operate with a strong sense of closeness and effective communication. As we can see through the results of the hypotheses' tests, hybrid work arrangements only influence the experienced distance, and not the experienced information deficits. This can be explained by the capacity to process rich information. According to (Daft & Lengel, 1986), the media that has the richest classification is face to face, secondly is telephone or calls, thirdly is personal documents such as e-mails. Face-to-face communication is deemed the richest medium due to its capacity to provide instantaneous feedback, which allows for real-time clarification of interpretations, through the number of cues and channels utilized, personalization, and language variety. Media with low richness indeed process fewer cues, provide limited feedback, and are generally less suitable for addressing ambiguous or equivocal issues. However, it's important to note that media with low richness are effective when handling well-understood messages and standardized data.

These low richness media can be email, chat, video conferencing, most of the times.

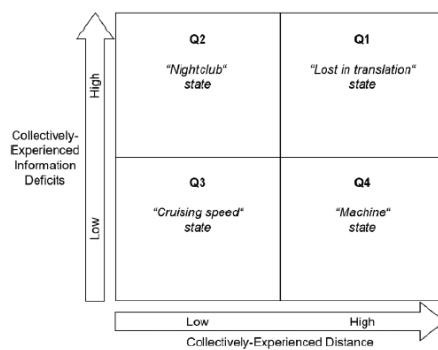


Figure 5.1 – Team Perceived Virtuality States

Regarding the hypothesis from the moderation (H3a, H3b, H3c, H3d), we can conclude that the leadership function train and develop team, and the team process monitoring and backup only moderate when considering the number of overlapping days, and not the number of office days. Although being present in the office is important, as we've seen is not enough. Team members need to be together to shorten the feeling of perceived virtuality. It is crucial that leaders promote days that most of the team members are present in the same physical space.

As we've seen the leader plays a crucial role in hybrid teams, with increased responsibilities and challenges compared to virtual or traditional teams. Effective virtual leaders are instrumental in ensuring that their teams are content with their communication processes, have clearly defined roles, and perceive communication as effective (Kayworth & Leidner, 2002). However, as the leader gives tools and training to members develop their communication skills in hybrid environments, leaders might need to be less involved in orchestrating certain interpersonal aspects of the team's social climate. The increased physical proximity and social presence of team members should naturally facilitate the development of familiarity and the establishment of social bonds (Bell et al., 2022). However, when team members gather in person, leaders should seize the opportunity to engage in more complex and interdependent tasks that may be challenging to accomplish virtually (Bell et al., 2022).

Practical Implications

Regarding the practical implications of this research, we concluded that leadership functions and team processes, more specifically "Train and develop team" and "Team monitoring and backup", respectively, only moderate when considering the number of overlapping days, and not the number of office days. It would be pertinent to leaders fix days in the office that the majority of the team members will be present, assuring that at least half of the team works face-to-face. Leaders should talk with their team members and firstly, explain to them the importance of being in the office occasionally, and that would be more beneficial if most of them showed up in common days. Secondly, the leaders should adopt the work model that better suit their team needs, and in that model trying to reach to a consensus of what day(s) would better fit their schedule, in order to optimize their work life balance. Thirdly, they should try different hybrid arrangements from time to time, to comprehend what is the best scheme for their team.

They also should focus in improving communication. Poor communication, especially in hybrid work arrangements, can lead to segmentation of groups within the team. Leaders of these types of teams must create communication practices that guarantee the proper flow of information,

regardless of members being in the office or virtually. For effective communication and knowledge sharing within hybrid teams, it becomes imperative to lean on collaborative technologies and prioritize the concept of "remote-first" communication (Mitchell & Brewer, 2022b). As part of their remote-first approach, should make a dedicated commitment to utilize a variety of communication channels and collaboration technology features. This variety of channels will help ensure the proper flow of information and increase the feeling of closeness.

Limitations and future studies

The first limitation has to do with the size of the sample, it was not possible to collect enough responses to allow the results to be generalised. Future research should ideally study larger samples larger samples and teams of at least 4 people in order to obtain more enriching results and to enriching results and lead to conclusions that are more representative of the reality of the hybrid context.

The second limitation has to do with the fact that we only collected data about the team members, and we should have included another set of questions or another questionnaire for also the team leader. It is important in the future that the perspective of the leader be taken into consideration.

Another limitation we found is we only analysed data from one moment in time. To collect information more accurately, it would be important to the participants of the study to answer the questionnaire in two distinct moments of time, with approximately a gap of 6 months between the questionnaires.

In this research it were used one leadership function and one team process as a moderator of the relationship between the dimensions of TPV, and the operationalisations of the hybrid work. It would be interesting to include more than one process and function, in future studies. A leadership function that can defined as one of as the most important is "compose team" a transition phase function, assuring that a team is well balanced in knowledge, skills, and values can have a positive impact in communication, cohesion, and help among team members (Morgeson et al., 2010a). On the other hand, a team process that would be interesting to include is "conflict management", fostering a healthy environment among team members is vital to good communication and overall interactions, so it crucial to team members to proactively deal with their conflicts (Mathieu et al., 2020).

Hybrid work is the future. Every day is more present in organizations, and it showed that the benefits are greater than the challenges. However, there is still a long way to go, different configurations have different outcomes, and leaders should adapt their teams the best they can, to take advantage of this way of working. This research shows us that is a theme that have more variables and is more complex that it seems, thus it should continue to be studied in more depth.

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7. Annexes

Annex A - Questionnaire

O meu nome é Ricardo Roque, e sou aluno do mestrado de Human Resources Management and Organizational Consultancy no ISCTE.

No âmbito da Dissertação de Mestrado encontro-me a realizar um trabalho de investigação sobre o impacto do trabalho híbrido e da virtualidade das equipas na eficácia das equipas de trabalho.

Os dados recolhidos são anónimos e confidenciais, destinando-se apenas a fins académicos, pelo que o seu sigilo estará assegurado.

O questionário tem uma duração de aproximadamente 7 minutos.

Obrigado pela atenção dispensada!

Deseja continuar?

Sim

Não



Indique aqui o código da sua equipa



Pense numa semana de trabalho habitual:

0 1 2 3 4 5

Quantos dias por semana trabalha no escritório?

Pense numa semana de trabalho habitual:

0 1 2 3 4 5

Quantos dias por semana trabalha no mesmo espaço físico que toda a sua equipa?

Quantos dias por semana trabalha no mesmo espaço físico, pelo menos com 1 membro da sua equipa?

Quantos dias por semana trabalha no mesmo espaço físico, com metade da sua equipa?

Qual o grau de flexibilidade que tem para escolher os seus dias de trabalho remoto?

Descreva por favor como se concretiza. Exemplo: "É obrigatório estar segunda-feira e terça-feira no escritório, o resto dos dias tenho liberdade de escolha"

Nenhum

Pouco

Algum

Muito

Total



Pense na equipa em que trabalha ou em que trabalhou no último projeto. Por favor indique o grau de concordância com as seguintes afirmações:

	Discordo Totalmente	Discordo Muito	Discordo em parte	Não concordo nem discordo	Concordo em parte	Concordo muito	Concordo plenamente
Na minha equipa sentimo-nos desligados uns dos outros.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Na minha equipa sentimos que a nossa relação é fria.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Na minha equipa, sentimos que estamos distantes uns dos outros.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Na minha equipa, estamos afastados uns dos outros.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Na minha equipa, sentimos que não conseguimos comunicar uns com os outros.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As formas em que nos podemos expressar são limitadas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
É difícil transmitir o verdadeiro significado do que estamos a dizer.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
É difícil de compreender se estamos ou não na mesma página.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Não somos capazes de transmitir a informação necessária na sua totalidade.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Não sabemos se todos tiveram acesso à mesma informação.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Pense na equipa em que trabalha ou em que trabalhou no último projeto. Por favor indique o grau de concordância com as seguintes afirmações:

	Discordo Totalmente	Discordo	Não concordo nem discordo	Concordo	Concordo Totalmente
As minhas tarefas são altamente afectadas pelo trabalho dos outros.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O trabalho depende do trabalho de um diverso número de pessoas para a sua conclusão.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O meu trabalho não pode ser feito sem que os outros façam o seu.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Escala Viabilidade

👁️ ★

Pense na equipa em que trabalha ou em que trabalhou no último projeto. Por favor indique o grau de concordância com as seguintes afirmações:

	Discordo Totalmente	Discordo Muito	Discordo em parte	Não concordo nem discordo	Concordo em parte	Concordo muito	Concordo plenamente
Não hesitaria em trabalhar novamente com a mesma equipa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Se fosse possível, teria trocado de equipa.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Se tivesse oportunidade, preferia ter trabalhado com outra equipa em vez desta.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Esta equipa poderia trabalhar bem em projetos futuros.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

BackUp

👁️ ★

Pense na equipa em que trabalha ou em que trabalhou no último projeto. Até que ponto a equipa trabalha activamente para . . .

	Nada	Muito pouco	Um pouco	Bastante	Extremamente
Desenvolver normas para um desempenho aceitável dos membros da equipa?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Equilibrar a carga de trabalho entre os membros da nossa equipa?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ajudar-se mutuamente quando a ajuda é necessária?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Informar os membros da equipa se o seu trabalho não cumprir os padrões?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Procurar compreender os pontos fortes e fracos uns dos outros?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Development



Pense no líder da equipa em que trabalha ou em que trabalhou no último projeto. Por favor indique o grau de concordância com as seguintes afirmações:

	Discordo Totalmente	Discordo	Não concordo nem discordo	Concordo	Concordo Totalmente
Assegura que a equipa tem a capacidade necessária para resolver problemas e competências interpessoais	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ajuda os novos membros da equipa a aprender como fazer o trabalho	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fornecer aos membros da equipa instruções relacionadas com as tarefas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ajuda os novos membros da equipa a desenvolverem ainda mais as suas competências	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ajuda a equipa a aprender com eventos ou experiências passadas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Qual o seu género?

Masculino

Feminino

Outro

Prefiro não dizer

Prefiro Auto-descrever-me

Qual a sua idade?

Há quanto tempo está na empresa?

0-6 Meses

6 Meses- 1 Ano

1-2 Anos

2-5 Anos

5-10 Anos

10-20 Anos

+20 Anos

Há quanto tempo trabalha com a sua equipa atual?

Qual o sector da empresa?

Indústria

Telecomunicações

Consultoria

Saúde

Banca e Seguros

Tecnologia

Engenharia

Financeira e Contabilidade

Formação e Educação

Recursos Humanos

Marketing e Comunicação

Legal e Advocacia

Outro

Em que departamento é que a sua equipa se insere?

Recursos Humanos

Marketing

Financeiro

Jurídico

Administração/Operacional

Comercial

IT



Annex B – Output Results (Process)

Regression

Regressão

[DataSet1] C:\Ricardo\ISCTE\2º Ano\Tese\Data Analysis\MeaninTeam.sav

Variáveis Inseridas/Removidas^a

Modelo	Variáveis inseridas	Variáveis removidas	Método
1	TH1_mean ^b	.	Inserir

a. Variável Dependente: VI_mean

b. Todas as variáveis solicitadas inseridas.

Resumo do modelo

Modelo	R	R quadrado	R quadrado ajustado	Erro padrão da estimativa
1	,036 ^a	,001	-,039	,71540

a. Preditores: (Constante), TH1_mean

ANOVA^a

Modelo		Soma dos Quadrados	df	Quadrado Médio	Z	Sig.
1	Regressão	,017	1	,017	,033	,857 ^b
	Resíduo	12,795	25	,512		
	Total	12,812	26			

a. Variável Dependente: VI_mean

b. Preditores: (Constante), TH1_mean

Coefficientes^a

Modelo		Coefficients não padronizados		Coefficients padronizados		Sig.
		B	Erro Erro	Beta	t	
1	(Constante)	5,836	,353		16,543	<,001
	TH1_mean	,023	,128	,036	,182	,857

a. Variável Dependente: VI_mean

Variáveis Inseridas/Removidas^a

Modelo	Variáveis inseridas	Variáveis removidas	Método
1	TH4mean ^b	.	Inserir

a. Variável Dependente: VI_mean

b. Todas as variáveis solicitadas inseridas.

Resumo do modelo

Modelo	R	R quadrado	R quadrado ajustado	Erro padrão da estimativa
1	,087 ^a	,008	-,032	,71315

a. Preditores: (Constante), TH4mean

ANOVA^a

Modelo		Soma dos Quadrados	df	Quadrado Médio	Z	Sig.
1	Regressão	,097	1	,097	,191	,666 ^b
	Resíduo	12,715	25	,509		
	Total	12,812	26			

a. Variável Dependente: VI_mean

b. Preditores: (Constante), TH4mean

Coefficientes^a

Modelo		Coefficients não padronizados		Coefficients padronizados	t	Sig.
		B	Erro Erro	Beta		
1	(Constante)	5,995	,265		22,590	<,001
	TH4mean	-,058	,132	-,087	-,437	,666

a. Variável Dependente: VI_mean

Mediation

```

Run MATRIX procedure:

***** PROCESS Procedure for SPSS Version 4.2 beta *****

                Written by Andrew F. Hayes, Ph.D.      www.afhayes.com
                Documentation available in Hayes (2022). www.guilford.com/p/hayes3

*****
Model   : 4
      Y  : VI_mean
      X  : TH1_mean
      M  : TPV1_mea

Sample
Size: 27

*****
OUTCOME VARIABLE:
TPV1_mea

Model Summary
      R      R-sq      MSE      F      df1      df2      p
      ,4080      ,1665      ,4321      4,9937      1,0000      25,0000      ,0346

Model
      coeff      se      t      p      LLCI      ULCI
constant      2,4784      ,3242      7,6456      ,0000      1,8108      3,1461
TH1_mean      -,2631      ,1178      -2,2347      ,0346      -,5057      -,0206

*****
OUTCOME VARIABLE:
VI_mean

Model Summary
      R      R-sq      MSE      F      df1      df2      p
      ,5239      ,2745      ,3873      4,5396      2,0000      24,0000      ,0213

Model
      coeff      se      t      p      LLCI      ULCI
constant      7,2471      ,5608      12,9239      ,0000      6,0897      8,4045
TH1_mean      -,1265      ,1221      -1,0360      ,3105      -,3786      ,1255
TPV1_mea      -,5692      ,1894      -3,0059      ,0061      -,9600      -,1784

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***** TOTAL EFFECT MODEL *****
OUTCOME VARIABLE:
VI_mean

Model Summary
      R      R-sq      MSE      F      df1      df2      p
      ,0363      ,0013      ,5118      ,0330      1,0000      25,0000      ,8574

Model
      coeff      se      t      p      LLCI      ULCI
constant      5,8364      ,3528      16,5429      ,0000      5,1098      6,5630
TH1_mean      ,0233      ,1282      ,1816      ,8574      -,2407      ,2872

***** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y *****

Total effect of X on Y
      Effect      se      t      p      LLCI      ULCI
      ,0233      ,1282      ,1816      ,8574      -,2407      ,2872

Direct effect of X on Y
      Effect      se      t      p      LLCI      ULCI
      -,1265      ,1221      -1,0360      ,3105      -,3786      ,1255

Indirect effect(s) of X on Y:
      Effect      BootSE      BootLLCI      BootULCI
TPV1_mea      ,1498      ,0805      ,0186      ,3367

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
5000

----- END MATRIX -----

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Run MATRIX procedure:

***** PROCESS Procedure for SPSS Version 4.2 beta *****

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Documentation available in Hayes (2022). www.guilford.com/p/hayes3

Model : 4
Y : VI_mean
X : TH1_mean
M : TPV2_mea

Sample
Size: 27

OUTCOME VARIABLE:
TPV2_mea

Model Summary

R	R-sq	MSE	F	df1	df2	p
,3332	,1110	,3829	3,1222	1,0000	25,0000	,0894

Model

	coeff	se	t	p	LLCI	ULCI
constant	2,5191	,3051	8,2556	,0000	1,8907	3,1476
TH1_mean	-,1959	,1108	-1,7670	,0894	-,4242	,0324

OUTCOME VARIABLE:
VI_mean

Model Summary

R	R-sq	MSE	F	df1	df2	p
,6479	,4198	,3097	8,6827	2,0000	24,0000	,0015

Model

	coeff	se	t	p	LLCI	ULCI
constant	7,7218	,5298	14,5753	,0000	6,6283	8,8153
TH1_mean	-,1233	,1057	-1,1663	,2550	-,3416	,0949
TPV2_mea	-,7484	,1799	-4,1606	,0004	-1,1197	-,3772

***** TOTAL EFFECT MODEL *****

OUTCOME VARIABLE:

VI_mean

Model Summary

R	R-sq	MSE	F	df1	df2	p
,0363	,0013	,5118	,0330	1,0000	25,0000	,8574

Model

	coeff	se	t	p	LLCI	ULCI
constant	5,8364	,3528	16,5429	,0000	5,1098	6,5630
THi_mean	,0233	,1282	,1816	,8574	-,2407	,2872

***** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y *****

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI
,0233	,1282	,1816	,8574	-,2407	,2872

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI
-,1233	,1057	-1,1663	,2550	-,3416	,0949

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TPV2_mea	,1466	,0968	-,0119	,3700

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:

95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:

5000

----- END MATRIX -----

Run MATRIX procedure:

***** PROCESS Procedure for SPSS Version 4.2 beta *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
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Model : 4
Y : VI_mean
X : TH4mean
M : TPVl_mea

Covariates:
Seniorid

Sample
Size: 27

OUTCOME VARIABLE:
TPVl_mea

Model Summary

R	R-sq	MSE	F	df1	df2	p
,4621	,2136	,4247	3,2589	2,0000	24,0000	,0560

Model

	coeff	se	t	p	LLCI	ULCI
constant	2,0661	,4149	4,9801	,0000	1,2098	2,9224
TH4mean	-,2781	,1228	-2,2647	,0328	-,5315	-,0246
Seniorid	,0784	,1048	,7483	,4615	-,1378	,2946

OUTCOME VARIABLE:
VI_mean

Model Summary

R	R-sq	MSE	F	df1	df2	p
,6104	,3726	,3495	4,5526	3,0000	23,0000	,0120

Model

	coeff	se	t	p	LLCI	ULCI
constant	7,3306	,5367	13,6586	,0000	6,2203	8,4409
TH4mean	-,2418	,1227	-1,9701	,0610	-,4957	,0121
TPVl_mea	-,6763	,1852	-3,6523	,0013	-1,0594	-,2932
Seniorid	,0721	,0961	,7505	,4606	-,1267	,2710

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***** TOTAL EFFECT MODEL *****
OUTCOME VARIABLE:
VI_mean

Model Summary
      R      R-sq      MSE      F      df1      df2      p
      ,0932      ,0087      ,5292      ,1052      2,0000      24,0000      ,9005

Model
      coeff      se      t      p      LLCI      ULCI
constant      5,9332      ,4631      12,8110      ,0000      4,9773      6,8891
TH4mean      -,0537      ,1371      -,3918      ,6987      -,3366      ,2292
Seniorid      ,0191      ,1169      ,1636      ,8714      -,2222      ,2605

***** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y *****

Total effect of X on Y
      Effect      se      t      p      LLCI      ULCI
      -,0537      ,1371      -,3918      ,6987      -,3366      ,2292

Direct effect of X on Y
      Effect      se      t      p      LLCI      ULCI
      -,2418      ,1227      -1,9701      ,0610      -,4957      ,0121

Indirect effect(s) of X on Y:
      Effect      BootSE      BootLLCI      BootULCI
TPV1_mea      ,1881      ,0784      ,0385      ,3476

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
5000

WARNING: Variables names longer than eight characters can produce incorrect output
when some variables in the data file have the same first eight characters. Shorter
variable names are recommended. By using this output, you are accepting all risk
and consequences of interpreting or reporting results that may be incorrect.

----- END MATRIX -----

```

***** PROCESS Procedure for SPSS Version 4.2 beta *****

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Model : 4
Y : VI_mean
X : TH4mean
M : TPV2_mea

Covariates:
Seniorid

Sample
Size: 27

OUTCOME VARIABLE:
TPV2_mea

Model Summary

R	R-sq	MSE	F	df1	df2	p
,2398	,0575	,4228	,7319	2,0000	24,0000	,4914

Model

	coeff	se	t	p	LLCI	ULCI
constant	2,4928	,4140	6,0214	,0000	1,6383	3,3472
TH4mean	-,1171	,1225	-,9558	,3487	-,3700	,1358
Seniorid	-,0944	,1045	-,9028	,3756	-,3101	,1214

OUTCOME VARIABLE:
VI_mean

Model Summary

R	R-sq	MSE	F	df1	df2	p
,6556	,4298	,3176	5,7784	3,0000	23,0000	,0043

Model

	coeff	se	t	p	LLCI	ULCI
constant	7,7507	,5685	13,6326	,0000	6,5746	8,9269
TH4mean	-,1391	,1082	-1,2855	,2114	-,3629	,0847
TPV2_mea	-,7291	,1769	-4,1212	,0004	-1,0951	-,3631
Seniorid	-,0497	,0921	-,5393	,5949	-,2403	,1409

***** TOTAL EFFECT MODEL *****

OUTCOME VARIABLE:
VI_mean

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	,0932	,0087	,5292	,1052	2,0000	24,0000	,9005

Model

	coeff	se	t	p	LLCI	ULCI
constant	5,9332	,4631	12,8110	,0000	4,9773	6,8891
TH4mean	-,0537	,1371	-,3918	,6987	-,3366	,2292
Seniorid	,0191	,1169	,1636	,8714	-,2222	,2605

***** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y *****

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI
-,0537	,1371	-,3918	,6987	-,3366	,2292

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI
-,1391	,1082	-1,2855	,2114	-,3629	,0847

Indirect effect(s) of X on Y:

Effect	BootSE	BootLLCI	BootULCI	
TPV2_mea	,0854	,0956	-,1020	,2831

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
5000

Moderation

```
Run MATRIX procedure:

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*****
Model   : 1
      Y : TPV1_mea
      X : TH1_mean
      W : BU_mean

Covariates:
      Seniorid

Sample
Size: 27

*****
OUTCOME VARIABLE:
      TPV1_mea

Model Summary
      R      R-sq      MSE      F      df1      df2      p
      ,6560      ,4303      ,3356      4,1549      4,0000      22,0000      ,0118

Model
      coeff      se      t      p      LLCI      ULCI
constant      1,3260      ,2920      4,5409      ,0002      ,7204      1,9317
TH1_mean      -,2547      ,1052      -2,4220      ,0241      -,4728      -,0366
BU_mean      -,6939      ,2795      -2,4827      ,0211      -1,2736      -,1143
Int_1      ,2253      ,2849      ,7909      ,4375      -,3656      ,8162
Seniorid      ,1663      ,0959      1,7343      ,0969      -,0326      ,3652

Product terms key:
      Int_1      :      TH1_mean x      BU_mean

Test(s) of highest order unconditional interaction(s):
      R2-chng      F      df1      df2      p
X*W      ,0162      ,6255      1,0000      22,0000      ,4375

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
      95,0000
```

***** PROCESS Procedure for SPSS Version 4.2 beta *****

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Documentation available in Hayes (2022). www.guilford.com/p/hayes3

Model : 1
Y : TFWI_mea
X : TH4mean
W : BU_mean

Covariates:
Seniorid

Sample
Size: 27

OUTCOME VARIABLE:
TFWI_mea

Model Summary							
	R	R-sq	MSE	F	df1	df2	p
	,7402	,5480	,2662	6,6695	4,0000	22,0000	,0011

Model						
	coeff	se	t	p	LLCI	ULCI
constant	1,5736	,2618	6,0117	,0000	1,0307	2,1165
TH4mean	-,3480	,1000	-3,4802	,0021	-,5553	-,1406
BU_mean	-,7115	,2538	-2,8033	,0104	-1,2380	-,1851
Int_1	,6216	,2937	2,1164	,0459	,0124	1,2307
Seniorid	,0920	,0844	1,0901	,2875	-,0820	,2671

Product terms key:
Int_1 : TH4mean x BU_mean

Test(s) of highest order unconditional interaction(s):
R2-chng F df1 df2 p
X*W ,0920 4,4790 1,0000 22,0000 ,0459

Focal predictor: TH4mean (X)
Mod var: BU_mean (W)

Conditional effects of the focal predictor at values of the moderator(s):

BU_mean	Effect	se	t	p	LLCI	ULCI
-,4773	-,6446	,1895	-3,4015	,0026	-1,0377	-,2516
-,0773	-,3960	,1074	-3,6884	,0013	-,6187	-,1733
,4747	-,0529	,1523	-,3472	,7318	-,3688	,2630

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
95,0000

Run MATRIX procedure:

***** PROCESS Procedure for SPSS Version 4.2 beta *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2022). www.guilford.com/p/hayes3

Model : 1
Y : TPV2_mea
X : TH1_mean
W : DE_mean

Covariates:
Seniorid

Sample
Size: 27

OUTCOME VARIABLE:

TPV2_mea

Model Summary

R	R-sq	MSE	F	df1	df2	p
,6199	,3843	,3014	3,4322	4,0000	22,0000	,0252

Model

	coeff	se	t	p	LLCI	ULCI
constant	2,1597	,2728	7,9129	,0000	1,5929	2,7245
TH1_mean	-,1663	,1001	-1,6617	,1108	-,3738	,0412
DE_mean	-,3101	,2766	-1,1213	,2742	-,8837	,2635
Int_1	,2876	,2025	1,4200	,1696	-,1324	,7076
Seniorid	-,0549	,0890	-,6170	,5435	-,2395	,1296

Product terms key:

Int_1 : TH1_mean x DE_mean

Test(s) of highest order unconditional interaction(s):

R2-chng	F	df1	df2	p	
X*W	,0564	2,0165	1,0000	22,0000	,1696

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
95,0000

***** PROCESS Procedure for SPSS Version 4.2 beta *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2022). www.guilford.com/p/hayes3

Model : 1
Y : TPV2_mea
X : TH4mean
W : DE_mean

Covariates:
Seniorid

Sample
Size: 27

OUTCOME VARIABLE:
TPV2_mea

Model Summary

R	R-sq	MSE	F	df1	df2	p
,6824	,4657	,2615	4,7939	4,0000	22,0000	,0062

Model

	coeff	se	t	p	LLCI	ULCI
constant	2,1837	,2855	8,5475	,0000	1,6538	2,7135
TH4mean	-,1549	,0980	-1,5807	,1282	-,3582	,0483
DE_mean	-,0871	,2712	-,3214	,7510	-,6495	,4752
Int_1	,7571	,2810	2,6942	,0133	,1743	1,3398
Seniorid	-,0583	,0827	-,7050	,4882	-,2300	,1133

Product terms key:
Int_1 : TH4mean x DE_mean

Test(s) of highest order unconditional interaction(s):

R2-chng	F	df1	df2	p	
X*W	,1763	7,2585	1,0000	22,0000	,0133

Focal predict: TH4mean (X)
Mod var: DE_mean (W)

Conditional effects of the focal predictor at values of the moderator(s):

DE_mean	Effect	se	t	p	LLCI	ULCI
-,4082	-,4640	,1637	-2,8338	,0097	-,8036	-,1244
,0931	-,0845	,0968	-,8726	,3923	-,2852	,1163
,4611	,1941	,1477	1,3141	,2023	-,1123	,5005

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
95,0000