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Rebekka Kuhlmann, Ingo Klingenberg

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The impact of leader and team PsyCap on employees' individual PsyCap: An experimental analysis of transmission effects in virtual and non-virtual settings

Rebekka Kuhlmann ^{*} , Ingo Klingenberg 

Department of Business Administration, in particular Work, Human Resource Management and Organization Studies, Heinrich Heine University Düsseldorf, Germany

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ABSTRACT

As organizations increasingly adopt virtual and hybrid work models, understanding how psychological resources are developed in such settings is critical for fostering positive work cultures. This study investigates the transmission of Psychological Capital (PsyCap) in the workplace, with a particular focus on virtual interactions. Specifically, we examine how PsyCap is conveyed from leaders and team members to individuals, considering the potential moderating influence of virtual settings. Using a combination of mixed-method pilot studies and a video-vignette-based experimental main study, we manipulated leader PsyCap, team member PsyCap, and interaction settings (face-to-face/virtual, camera turned on/virtual, camera turned off). Our findings reveal that both leaders and team members positively influence individual PsyCap, and that this transmission is unaffected by the interaction setting. These results highlight the consistent impact of psychological resources across diverse work environments, challenging assumptions about the limitations of virtual communication for conveying psychological resources. The study provides practical insights for teams and leaders on how to foster and enhance PsyCap within organizations, regardless of whether interactions occur in physical or virtual spaces.

1. Introduction

Interactions in teams are increasingly mediated by technology, with meetings often conducted via video conferencing tools like Zoom or Microsoft Teams (Allen & Lehmann-Willenbrock, 2023; Dulebohn & Hoch, 2017; Queiroz et al., 2023). These platforms offer varying degrees of social presence through features like video feeds, screen sharing, and reaction buttons, fundamentally altering how team members perceive and interact with each other (Bailenson, 2021; Nurmi & Pakarinen, 2023; Queiroz et al., 2023). This shift to computer-mediated communication, despite its benefits of flexibility and accessibility, creates unique challenges in conveying social and emotional cues, potentially increasing psychological distance between leaders and team members (Dulebohn & Hoch, 2017; Handke et al., 2020; Queiroz et al., 2023; Tigre et al., 2023). The impact of such technology-mediated interactions on team members' psychological experiences becomes particularly critical as organizations continue to embrace hybrid and virtual work arrangements (Tigre et al., 2023).

In these demanding conditions of high virtuality, employees'

psychological resources play an increasingly vital role in maintaining effectiveness and well-being (Handke et al., 2020; van Zyl et al., 2024). One prominent example of a psychological resource gaining attention in the literature on human-computer interactions and organizational behavior is Psychological Capital (PsyCap), a core construct comprising self-efficacy, hope, optimism, and resilience (Avey, Reichard, et al., 2011; Loughman et al., 2023; Luthans & Youssef-Morgan, 2017). Meta-analyses reveal PsyCap as a significant antecedent of desirable outcomes such as job performance, organizational commitment, and well-being (Avey, Reichard, et al., 2011; Loughman et al., 2023). These benefits arise from the synergistic interaction of its components, exceeding their individual impact (Avey, Reichard, et al., 2011; Luthans & Youssef-Morgan, 2017).

Initial studies suggest that leaders can convey their PsyCap to followers and thus improve followers' creativity and performance (Avey, Avolio, & Luthans, 2011; Avey et al., 2012; Q. Chen et al., 2019; S.-L. Chen, 2015; Rego et al., 2019; Story et al., 2013). This transmission may occur through mechanisms like social learning, exchange, and emotional contagion (Q. Chen et al., 2019; Luthans & Youssef-Morgan,

^{*} Corresponding author. Department of Business Administration, in particular Work, Human Resource Management and Organization Studies, Heinrich Heine University Düsseldorf, Universitätsstraße 1, 40225 Düsseldorf, Germany.

E-mail address: rebekka.kuhlmann@hhu.de (R. Kuhlmann).

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2017; Waters et al., 2020). However, how these transmission mechanisms function in different contexts such as virtual environments remains largely unexplored (Dawkins et al., 2021; Rego et al., 2019). The broaden-and-build theory (Fredrickson, 2004) suggests that positive emotions play a crucial role in building psychological resources like PsyCap, but how this process operates in computer-mediated interactions — where emotional expression and perception may be constrained — is unclear. Social Presence Theory (Short et al., 1976) suggests that the reduced social cues in virtual interactions may impact the transmission of psychological states, while Media Richness Theory (Daft & Lengel, 1986) indicates that different virtual communication modes (e.g., camera turned on vs. off) could significantly affect the conveyance of complex psychological constructs like PsyCap.

Another notable gap in the literature is the exclusive focus on leaders as the source of PsyCap transmission, neglecting the potential influence of other team members. Given their central role in daily interactions (Dawkins et al., 2021), whether face-to-face or virtually (Glikson & Riordan, 2024), it is plausible to assume that team members' PsyCap could affect individual PsyCap. Surprisingly, the lateral effect of team members' PsyCap on individual PsyCap has not gained attention in the scientific literature yet (Luthans & Youssef-Morgan, 2017). Research on PsyCap in teams is still in its infancy (Heled et al., 2016; Waters et al., 2020). Rego et al. (2019) call for the investigation of PsyCap conveyed between other combinations than leader and follower.

Therefore, this study aims to analyze the effect of leaders' and team members' PsyCap on individual PsyCap, considering the moderating role of virtual settings. Our study makes several important contributions to understanding human behavior in technology-mediated environments. First, we advance the field of human-computer interaction by examining how different virtual communication modalities affect the transmission of psychological resources. Using a novel video-vignette methodology, we provide insights into how varying interaction settings impact psychological transmission processes in teams. Second, we expand our understanding of how positive psychological states can be facilitated within technology-mediated organizational settings, highlighting both downward contagion from leaders and lateral transmission among team members. This research advances our knowledge of the social dynamics through which psychological resources are transmitted in virtual workplaces and helps identify the circumstances under which this transmission is most effective (Luthans & Youssef-Morgan, 2017; Rego et al., 2019). Third, our methodological approach of using video vignettes creates realistic and controlled digital environments, opening avenues for more immersive and ecologically valid studies of psychological phenomena in technology-mediated contexts. Finally, our findings offer practical implications for organizations designing virtual collaboration tools and managing remote teams, informing how different communication features might affect team members' psychological resources and well-being.

2. Theoretical background and hypotheses

PsyCap refers to a higher-order construct characterized by '(1) having confidence (efficacy) to take on and put in the necessary effort to succeed at challenging tasks; (2) making a positive attribution (optimism) about succeeding now and in the future; (3) persevering toward goals and, when necessary, redirecting paths to goals (hope) in order to succeed; and (4) when beset by problems and adversity, sustaining and bouncing back and even beyond (resilience) to attain success' (Luthans, Youssef, & Avolio, 2007, p. 3). Based on the shared properties of the four psychological resources and their distinctive qualities, they form a resource caravan that is based on a sense of control, intentionality, and agentic goal pursuit (Luthans, Avolio, et al., 2007; Luthans & Youssef-Morgan, 2017). Positioned on a continuum between stable traits (e.g., intelligence) and fluctuating states (e.g., emotions), PsyCap is classified in the middle as state-like, meaning that it is open to change and development (Luthans & Youssef-Morgan, 2017).

In interactions, individuals convey affective states, beliefs, and cognitive information to others that can be used to infer an individual's level of PsyCap (Rego et al., 2019). PsyCap is conveyed through confident, positive, and energized behavioral displays via affect- and cognition-based pathways such as emotional contagion and cognition-based inferential processes (Luthans & Youssef-Morgan, 2017; Rego et al., 2019). Emotional contagion involves instinctive imitation and synchronization with another's expressions and behaviors, leading to emotional convergence (van Kleef, 2009; van Knippenberg & van Kleef, 2016). This process is integral to how individuals 'catch' the positive emotions associated with high PsyCap (Bono & Ilies, 2006; Da et al., 2021). The broaden-and-build theory (Fredrickson, 2004) suggests that positive emotions play a crucial role in building psychological resources like PsyCap. Positive emotions widen the way of thinking, perceiving, and acting, leading to the development of new behaviors and capabilities, which in turn may have the potential to raise new positive emotions, resulting in an upward spiral. Empirical evidence has validated these core propositions, demonstrating how positive emotions facilitate the development of social and psychological resources that enhance organizational outcomes (Vacharkulksemsuk & Fredrickson, 2013). The broaden-and-build theory therefore provides a well-established theoretical framework for understanding PsyCap transmission in organizational settings (Luthans & Youssef-Morgan, 2017). The theory's focus on building psychological resources through positive experiences explains the mechanism by which exposure to confident, optimistic behaviors can strengthen observers' own psychological resources. The cyclical nature of this process - where positive experiences build resources that then facilitate more positive experiences - helps to explain how psychological states can accumulate and reinforce each other within team settings. Consequently, people with high levels of PsyCap may positively energize others because of the transmission of positive affect and energy (Bono & Ilies, 2006; Luthans & Youssef-Morgan, 2017; Rego et al., 2019). This broaden-and-build effect for positive emotional contagion has already been demonstrated for a range of outcomes such as enhanced well-being, organizational citizenship behavior, and creativity (Barsade et al., 2018; Clarkson et al., 2020).

At work, individuals often interact primarily with their team leader and members. They rely on these interactions to make sense of ambiguous work situations using verbal and nonverbal cues (Liegl & Furtner, 2024; van Kleef et al., 2015). These cues can be used to infer team leader's and members' PsyCap, potentially leading to emotional contagion and transmission of PsyCap. Several empirical studies have already demonstrated this transmission from leaders to followers (see e.g., Avey, Avolio, & Luthans, 2011; Avey et al., 2012; S.-L. Chen, 2015; Rego et al., 2019), concluding that leaders' confident and positive behaviors lead followers to appraise situations positively and act energetically. We suggest that the same accounts for the transmission of PsyCap from team members to individuals and therefore propose.

Hypothesis 1. Leader's PsyCap positively affects individual PsyCap.

Hypothesis 2. Team members' PsyCap positively affects individual PsyCap.

Rego et al. (2019) found that leaders who consistently display high PsyCap have a stronger transmission effect on individuals than leaders who display PsyCap inconsistently. It is therefore likely that consistency across sources (leader and team members) influences the strength of the transmission. Following the broaden-and-build theory (Fredrickson, 2004), more consistent levels of PsyCap across leader and team members should lead to stronger broaden-and-build effects at the individual level and thus to higher individual PsyCap, as more positive emotions are aroused in the individual. Thus, when both team members and the team leader convey high levels of PsyCap, a synergistic effect is likely to occur, amplifying the impact on individual PsyCap. On the contrary, inconsistent or predominantly negative PsyCap levels could attenuate

this effect. Therefore, we hypothesize.

Hypothesis 3. Leader's PsyCap and team members' PsyCap interact in their effect on individual PsyCap such that the positive effect is stronger when the leader's PsyCap and the team members' PsyCap are consistently positive versus inconsistent or negative.

As interactions increasingly shift to virtual settings, understanding the impact of this shift on PsyCap transmission becomes critical (Allen & Lehmann-Willenbrock, 2023; Dulebohn & Hoch, 2017; Foster et al., 2015). Drawing on the broaden-and-build theory (Fredrickson, 2004) and the Media Richness Theory (Daft & Lengel, 1986), we propose that different interaction settings vary in their capacity to transmit PsyCap effectively. Face-to-face interactions offer a rich environment for PsyCap transmission, as they enable full observation of others' behaviors, expressions, and emotions (Story et al., 2013). This richness is crucial for accurately modeling and internalizing others' psychological states. In face-to-face settings, nonverbal cues like gestures, facial expressions, and tone of voice are fully available, enhancing emotional arousal and cognitive processing (Shin et al., 2017).

In contrast, virtual environments impose limitations. Media Richness Theory suggests that communication channels vary in their capacity to convey information complexity, resolve ambiguity, and transmit social cues (Daft & Lengel, 1986; Ishii et al., 2019). Virtual meetings in which the cameras are turned on can still offer relatively high richness by enabling some nonverbal communication, yet they fall short of face-to-face interactions due to restricted physical presence and spatial cues (Bailenson, 2021; Nurmi & Pakarinen, 2023). Nonetheless, using video can enhance engagement and foster a greater sense of connection, which may support PsyCap transmission to a reasonable extent. This is particularly important for virtual teams, where video can enhance communication quality and facilitate emotional contagion (Marlow et al., 2017). Virtual meetings with the camera turned off, however, represent the least rich medium, as they limit nonverbal communication and emotional engagement. The absence of facial expressions and body language reduces the opportunity for participants to model and internalize others' emotional states, potentially decreasing the transmission of PsyCap (Allen & Lehmann-Willenbrock, 2023; Karl et al., 2022). Emotions should thus be conveyed most strongly in meetings that take place face-to-face, followed by meetings taking place virtually with the camera turned on, followed by virtually with the camera turned off. In the same sequence, stronger broaden-and-build effects can be assumed. Accordingly, we hypothesize.

Hypothesis 4. The effects of the leader's PsyCap (H4a), team members' PsyCap (H4b), and their interaction (H4c) on individual PsyCap are moderated by the setting, with the strongest effects in face-to-face meetings, followed by virtual meetings with the camera turned on, and weakest in virtual meetings with the camera turned off.

Fig. 1 depicts our conceptual model.

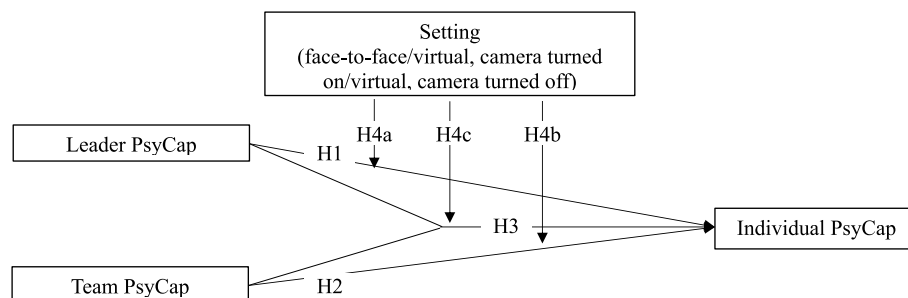


Fig. 1. Conceptual Model

Note. H = Hypothesis, PsyCap = Psychological Capital.

3. Overview of studies

To test our hypotheses, we conducted a vignette-based, experimental study using a $2 \times 2 \times 3$ between-subjects factorial design, manipulating leader PsyCap (high/low), team members' PsyCap (high/low), and setting (face-to-face/virtual with camera on/virtual with camera off). Vignette-based experiments allow precise manipulation of variables while controlling for confounding factors that are not controllable in real-life settings (Aguinis & Bradley, 2014). An important feature of vignette-based experiments is their versatility in presentation; it is not limited to written material but can also encompass images, videos, and other media formats (Aguinis & Bradley, 2014). We used video-based vignettes to enhance psychological realism and participant engagement, offering a more immersive and reliable experimental environment compared to text-based scenarios (Aguinis & Bradley, 2014; Grundke et al., 2023; Lonati et al., 2018). These video vignettes effectively present complex scenarios, combining audio and visual elements to evoke stronger emotional and cognitive responses, critical for studying emotions and decision-making. This approach allowed us to precisely control and standardize virtual meeting characteristics that typically vary in field studies, such as video quality, internet connectivity, and audio synchronization. By creating controlled versions of both face-to-face and virtual interactions, we could isolate the effects of communication medium while maintaining experimental rigor. Before the main study, extensive mixed-method pilot studies were conducted to refine our manipulations and ensure the robustness of the research design. The procedures used in this study adhere to all the relevant national regulations, institutional policies, and the tenets of the Helsinki Declaration. The participants' privacy rights have been observed and all participants provided written informed consent prior to participating.

3.1. Pilot studies

3.1.1. Procedure and sample

Following Podsakoff et al. (2013), we used a systematic approach to develop and validate our video stimulus material. After a clear conceptual definition of the focal constructs, we developed video scripts manipulating these constructs. Then, these scripts were refined through two qualitative pretests before being filmed with professional actors. A final quantitative pretest assessed the effectiveness of the videos.

In the first qualitative pretest, PsyCap experts reviewed the scripts, evaluating realism and manipulation appropriateness, and providing improvement suggestions. Based on their feedback, we refined the scripts. In the second qualitative pretest, we presented the revised scripts to a small target sample ($n = 33$), asking them to describe the leader and team. Their responses were coded to ensure alignment with the intended content (Norman et al., 2010), leading to further refinements before filming. For the quantitative pretest, we tested the videos on a sample of 102 German employees, excluding 7 due to failed attention checks, leaving 95 participants (54 female, 40 male, 1 diverse; average age 28.62 years). We aligned our cover story and procedure with former

studies manipulating PsyCap via text-based vignettes (Avey, Avolio, & Luthans, 2011; Avey et al., 2012; Norman et al., 2010; Rego et al., 2019) and studies using video-based vignettes (Sauer, 2011). Participants first read a brief introductory text, in which they were asked to imagine themselves as working in a fictitious company. This company would soon be holding a competition in which the different work teams of the company had to develop creative solutions. This competition was to be discussed in a team meeting with their team leader and two other team members. After reading the scenario description, participants were asked to carefully watch a sequence of this team meeting with their team leader and the other two team members. In this video sequence, the leader and team members discuss the competition, while leader PsyCap, team members' PsyCap, and setting are manipulated. Participants were randomly assigned to one of the twelve conditions resulting from the combination of these three manipulations. After watching the sequence, which lasted about 2 min in each condition, participants responded to questionnaires regarding perceived leader and team PsyCap, perceived realism of the scenario, stimuli checks, attention checks, and socio-demographic and control variables.

3.1.2. Manipulations

The manipulations of leader and team member PsyCap were based on previous studies that manipulated leader PsyCap via written statements aligned with PsyCap's facets in vignette-based experiments (Avey, Avolio, & Luthans, 2011; Avey et al., 2012; Norman et al., 2010; Rego et al., 2019). For example, to manipulate optimism and resilience, in the high (vs. low) leader PsyCap condition, the leader states that he always (vs. not always) expects the best and is very (vs. not so) optimistic that the team will manage the competition well because it has (vs. not) overcome difficulties in one way or another before. The team members' PsyCap is likewise manipulated via comparable statements. For example, to manipulate hope, in the high (vs. low) team member PsyCap condition, the team members argue that, if confronted with problems, they always (vs. not always) find ways to solve them together. To manipulate self-efficacy, the team members for example state that they are confident (vs. not so confident) that they are able to win the competition.

To manipulate the setting, a third of the interactions was shot face-to-face in an office space from a first-person perspective, placing the participants in the role of a team member interacting with the team leader and the other two members. For the next third, we screencasted the interaction in a videoconferencing tool with the video of the team leader and team members turned on, and the last third in a videoconferencing tool with the video turned off. This videoconferencing tool featured common interface elements such as participant windows, meeting controls, and typical platform layouts. The camera-on condition featured professionally filmed video feeds within a virtual meeting interface, while the camera-off condition displayed standard profile icons with synchronized audio. Special attention was paid to ensuring technical consistency across virtual conditions. This approach allowed us to maintain consistent verbal content while manipulating only the visual presence of team members, isolating the effect of camera use in virtual meetings. For participants' instructions and transcripts of the video vignettes, please refer to [Appendix A.1](#) and [A.2](#).

3.1.3. Measures

Perceived leader and team PsyCap were measured as manipulation checks via the German 12-item short form of the Psychological Capital Questionnaire (PCQ) (Luthans, Avolio, et al., 2007), adapted to the leader and the team members as reference points (e.g., 'My team members feel confident helping in this competition'). Participants rated all items on a 6-point scale ranging from 1 (strongly disagree) to 6 (strongly agree). The congruency reliability of both measures was very good ($p_{\text{leader}} = 0.96$, $p_{\text{team}} = 0.97$).

We assessed stimuli checks regarding the setting ('In which setting did the team meeting take place?' with answering options 'in a meeting

room in the office', 'in a digital meeting; the others had switched on their camera', and 'in a digital meeting, the others had switched off the camera') and the content of the meeting ('What was the team meeting about?' with answering options 'a creativity competition', 'the introduction of new software', and 'the reorganization of the company').

Furthermore, we assessed the perceived realism of the scenario ('How realistic do you think the situation just described is?' on a scale from 1 'not realistic at all' to 7 'very realistic') and the ability to immerse into the scenario ('How well were you able to empathize with the situation described?' on a scale from 1 'not at all' to 7 'very much'). We then measured participants' age, gender, employment status, and level of education.

3.1.4. Results and implications for the main study

To analyze the success of our manipulations, we built models in which perceived leader and team PsyCap were regressed on the manipulation condition. As our dependent variables represent latent variables, we used structural equation modeling with the lavaan package in R. We first established a CFA with two separate second-order factors for leader and team PsyCap and compared it to the fit of a model with 1 s-order factor. The fit of the 2 second-order factors model was acceptable, $\chi^2(243) = 478.81$, $p < .001$, CFI = 0.90, TLI = 0.88, RMSEA = 0.10, SRMR = 0.07, and significantly outperformed the one-factor model, $\chi^2(5) = 842.50$, $p < .001$.

We then proceeded with our path model to test the effectiveness of our manipulations using the multiple-indicator-multiple-cause (MIMIC) approach (Breitsohl, 2019). The model had an acceptable fit to the data, $\chi^2(329) = 635.17$, $p < .001$, CFI = 0.89, TLI = 0.87, RMSEA = 0.10, SRMR = 0.07. The manipulations were effective across all communication settings: participants rated leader PsyCap higher in the high versus low condition ($b = 0.84$, $SE = 0.13$, $p < .001$), and similarly for team members' PsyCap ($b = 0.79$, $SE = 0.16$, $p < .001$). Furthermore, a χ^2 -test confirmed that participants accurately distinguished between face-to-face, camera-turned-on, and camera-turned-off conditions ($\chi^2(4) = 121.17$, $p < .001$), with 85% correctly identifying their assigned setting. On average, the scenario was rated as realistic ($M = 5.15$, $SD = 1.35$) and the participants were able to empathize well with the scenario ($M = 5.38$, $SD = 1.40$), regardless of the scenario assigned to them (all p s > 0.05).

Therefore, our pilot study was able to demonstrate the effectiveness of our experimental manipulations. Hence, we used these manipulations in our main study to test our hypotheses.

3.2. Main study

3.2.1. Procedure and sample

Following the validated procedure of our pilot study, participants first read the introductory text followed by the video sequence developed in the pilot study, in which we manipulated leader PsyCap, team member PsyCap, and the setting. Participants were randomly assigned to one of the twelve scenarios. After that, participants responded to questionnaires regarding their individual PsyCap. To test the success of our manipulation, they then responded to questionnaires regarding leader and team members' PsyCap, stimuli checks, perceived realism of the scenario, and ability to immerse into the scenario. They also answered attention checks and reported their socio-demographic and control variables. The main study's sample consisted of 370 employees, of which 175 identified as female, 194 as male, and 1 as diverse. This exceeded the target sample size of 251 which we calculated in an a priori power analysis (G*Power 3.1.9.7) with a medium effect size of 0.25, a 0.05 alpha error probability, and a power of 0.95. The mean age was 33.21 years ($SD = 10.98$) and the majority held a university degree (65.40%). The sample was recruited through sharing the questionnaire with private contacts and social media ($n = 174$) and Prolific Academic's online panel ($n = 196$) between October and November 2023. To ensure the attentiveness of our participants, we included several attention and

content checks. Attrition analysis revealed that participants recruited through Prolific were slightly younger ($M_{\text{Prolific}} = 31.39$; $M_{\text{Private}} = 35.32$) and the percentage of males was higher (Prolific = 70.40 %, Private = 32.20 %). In our analysis, we included the recruitment route as a control, which had no significant effect on our dependent variable.

3.2.2. Measures

We measured participants' PsyCap using the German 12-item short form PCQ (Luthans, Avolio, et al., 2007). Following previous experimental research, we adapted and framed the scale to our manipulation (Avey, Avolio, & Luthans, 2011; Avey et al., 2012). Therefore, we stated in the beginning 'Considering the sequence which you have just watched, please respond to the following statements with the scale provided' and asked for the individuals' beliefs and expectancies toward the actual competition of the manipulation story. Accordingly, this measurement employs a distinct, more proximate reference point in comparison to the regular PCQ, which refers to work in general. However, this reference point is more suitable for our research design (Avey, Avolio, & Luthans, 2011; Avey et al., 2012). Examples of the items are: Self-efficacy (e.g., 'I feel confident helping in this competition'), Hope (e.g., 'If I should find myself in a jam at this competition, I could think of many ways to get out of it'), Resilience (e.g., 'I feel I can handle setbacks while working on this competition'), and Optimism (e.g., 'I expect the best on this competition'). For the full set of items, please refer to Appendix A.3. Participants rated all items on a 6-point scale ranging from 1 (strongly disagree) to 6 (strongly agree). The congeneric reliability of the measure was very good ($\rho = 0.93$).

Participants then rated leaders' and team members' PsyCap, their liking of the leader and the team members, perceived realism of the scenario, ability to immerse into the scenario, and experience with videoconferencing tools. On average, the scenario was rated as realistic ($M = 4.98$, $SD = 1.55$ on a scale from 1 'not realistic at all' to 7 'very realistic') and the participants were able to empathize well with the scenario ($M = 4.98$, $SD = 1.55$ on a scale from 1 'not at all' to 7 'very much'). Most people were experienced with videoconferencing tools ($M = 4.18$, $SD = 1.17$ on a scale from 1 'less experienced' to 5 'very experienced'). We then measured participants' age, gender, employment status, and level of education.

3.2.3. Results

Table 1 shows the means and standard deviations for each experimental condition. Before testing our hypotheses, we first again assessed the effectiveness of our manipulations. As in our pilot study, we fitted a MIMIC model with leader and team member PsyCap as dependent variables. The model had an acceptable fit to the data, $\chi^2(41) = 78.35$, $p < .001$, CFI = 0.93, TLI = 0.90, RMSEA = 0.10, SRMR = 0.06. The manipulation of leader PsyCap ($b = 1.36$, $SE = 0.16$, $p < .001$) and team member PsyCap ($b = 1.57$, $SE = 0.18$, $p < .001$) were effective. Participants were aware of the setting assigned to them ($\chi^2(4) = 339.52$, $p < .001$), with 95% of the sample correctly perceiving the setting assigned to them.

Confirmatory factor analysis revealed that the second-order factor

model of individual PsyCap, in which the scores of each dimension are considered indicators of the higher-order construct, had a good fit to the data, $\chi^2(50) = 142.66$, $p < .001$, CFI = 0.97, TLI = 0.95, RMSEA = 0.07, SRMR = 0.04. Furthermore, the second-order factor model fit the data better than a first-order factor model, $\Delta\chi^2(4) = 72.45$, $p < .001$.

Next, we fitted a MIMIC model with individual PsyCap as the dependent variable and leader PsyCap, team member PsyCap, and the setting as the independent variables. We controlled for recruitment source, liking of the leader and the team members, perceived realism of the scenario, ability to immerse into the scenario, and experience with videoconferencing tools. We compared the fit of this baseline MIMIC with models in which we constrained the factors concerning each hypothesis to zero (Breitsohl, 2019, see Table 2).

The model comparisons revealed a significant main effect of leader PsyCap ($b = 0.38$, $SE = 0.14$, $p = .006$). Participants in the high leader PsyCap condition reported higher individual PsyCap values ($M = 4.30$, $SD = 0.70$) than participants in the low leader PsyCap condition ($M = 3.99$, $SD = 0.93$), supporting Hypothesis 1. Likewise, the main effect of team members' PsyCap, i.e. Hypothesis 2, was supported, as participants in the high team members' PsyCap condition reported higher individual PsyCap values ($M = 4.25$, $SD = 0.78$) than participants in the low team members' PsyCap condition ($M = 4.04$, $SD = 0.88$, $b = 0.30$, $SE = 0.15$, $p = .041$). However, we did not find support for the interaction between leader and team members PsyCap, which was hypothesized in Hypothesis 3, and no support for the moderating role of the setting proposed in Hypothesis 4 (see Table 2). Taken together, these results hint at the independent importance of both leaders' and team members' PsyCap for individual PsyCap, regardless of the setting in which interactions take place.

4. General discussion

This study analyzed how computer-mediated communication affects the transmission of PsyCap from leaders and team members to individuals. While previous research focused on PsyCap transmission from leaders to followers, our study extends this by investigating the influence of both leaders and team members and considering the rise of videoconferencing in their interactions. Our results show that both leaders and team members are crucial, independent sources for individuals in building psychological resources, with this impact being consistent across face-to-face and virtual settings. This consistency challenges assumptions about the limitations of computer-mediated communication for conveying psychological resources.

Our research makes several theoretical contributions to the fields of human-computer interactions and organizational behavior. First, our results highlight the robustness of PsyCap transmission across different settings, challenging the assumption that the virtuality of the interaction alters the transmission of psychological resources from leaders and team members to individuals. This finding is intriguing, especially considering the increasing prevalence of virtual and hybrid work environments. It suggests that the impact of leader and team members' PsyCap on individual PsyCap is robust across different settings. While Media

Table 1
Individual PsyCap Means and Standard Deviations across each Experimental Condition.

Leader PsyCap	Low						High					
	Low			High			Low			High		
Team PsyCap	Low			High			Low			High		
Setting	Face- to-face	Virtual, camera on	Virtual, camera off	Face- to-face	Virtual, camera on	Virtual, camera off	Face- to-face	Virtual, camera on	Virtual, camera off	Face- to-face	Virtual, camera on	Virtual, camera off
<i>M</i>	3.96	3.64	3.83	4.12	3.98	4.09	4.41	3.98	4.24	4.34	4.23	4.46
<i>SD</i>	0.94	1.02	0.91	0.76	1.03	0.87	0.62	0.85	0.72	0.83	0.65	0.70
<i>n</i>	36	28	16	36	26	36	32	34	32	32	29	33

Note. PsyCap = Psychological Capital.

Table 2
Results of the hypotheses tests.

Model	χ^2 (df)	CFI	TLI	RMSEA	SRMR	AIC	$\Delta\chi^2$ (df)
Baseline	441.70 (203)	0.92	0.91	0.06	0.06	19063.74	
H1 Leader PsyCap	449.10 (204)	0.92	0.91	0.06	0.04	19069.14	7.40 (1)**
H2 Team PsyCap	445.84 (204)	0.92	0.91	0.06	0.04	19065.88	4.14 (1)*
H3 Leader*Team PsyCap	441.93 (204)	0.92	0.91	0.06	0.04	19061.97	0.23 (1)
H4a Setting*Leader PsyCap	441.70 (204)	0.92	0.91	0.06	0.04	19061.74	0.00 (1)
H4b Setting*Team PsyCap	442.35 (204)	0.92	0.91	0.06	0.04	19062.39	0.65 (1)
H4c Setting*Leader*Team PsyCap	441.70 (204)	0.92	0.91	0.06	0.04	19061.74	0.00 (1)

Note. PsyCap = Psychological Capital.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Richness Theory (Daft & Lengel, 1986) suggests that reduced social cues in virtual settings might impair psychological transmission and therefore broaden-and-build-effects (Fredrickson, 2004), our findings indicate that PsyCap can be effectively conveyed even in leaner digital environments. This suggests that previous assumptions about the necessity of rich media for complex psychological transmission may need revision in the context of modern virtual work environments. Our results indicate that the transmission of psychological resources may be more resilient to changes in media richness than previously thought. This resilience might be attributed to users' growing adaptation to virtual communication or the development of compensatory strategies for conveying psychological states through different channels when visual cues are limited (Glikson & Riordan, 2024).

Another explanation for the lack of moderation might be that different effects balance out, as prior research shows that videoconferencing can both strengthen and weaken social and personal experiences (Fauville et al., 2022; Nguyen et al., 2022; Queiroz et al., 2023). On one hand, virtual environments may limit the ability to observe and perceive the emotions and PsyCap of other individuals (Bailenson, 2021; Nurmi & Pakarinen, 2023). Furthermore, videoconferencing can increase fatigue symptoms and reduce the social connection between team members (Queiroz et al., 2023). On the other hand, in settings where face-to-face interactions and physical support are limited, psychological resources become particularly valuable (Handke et al., 2020). Consequently, individuals may be more attentive to and appreciative of the PsyCap exhibited by their colleagues and leaders. These dual influences — reduced observational cues and connection but increased reliance on psychological resources — could counterbalance each other in virtual environments. Future research should explore these complex dynamics further, considering how virtual work environments shape the perception and value of PsyCap and whether there are nuanced differences in the transmission process. Additionally, researchers could examine how features of digital communication tools (e.g., emoji reactions, virtual backgrounds, avatar customization) might influence PsyCap transmission in virtual teams, as some studies hint at the contagious effects of leaders' emoji use (see e.g. Liegl & Furtner, 2024). However, our null finding also prompts a consideration of other potential moderating variables that might influence this transmission. Future studies could explore factors such as team size, task interdependence, or the nature of communication within the team as possible moderators.

Second, by confirming that both leaders and team members serve as PsyCap sources, our study corroborates and extends existing work regarding the transmission of PsyCap (Avey et al., 2012; S.-L. Chen, 2015; Rego et al., 2019). Beyond leaders, we highlight the significant but often overlooked influence of team members' PsyCap on individuals, reinforcing the idea that individuals are influenced by the collective mood and psychological state of their group (Barsade, 2002; Barsade et al., 2018). This answers calls from Rego et al. (2019) to investigate the effects of PsyCap conveyed toward peers and from Luthans and Youssef-Morgan (2017) to also study lateral contagion effects among team members, concluding that next to leaders' PsyCap, it also matters how confident, positive, and energized team members behave. This finding has particular relevance as organizations increasingly rely on

virtual collaboration, where team members' daily digital interactions play a crucial role in shaping workplace experiences (Dawkins et al., 2021; Glikson & Riordan, 2024). The effectiveness of lateral PsyCap transmission in virtual settings suggests that digital platforms can support meaningful peer-to-peer psychological influence, despite potential limitations in social presence. Interestingly, our findings reveal an additive rather than synergistic effect of leader and team member PsyCap on individual PsyCap. This nuanced perspective suggests distinct pathways for how leaders and team members influence individuals. While leaders may exert a more direct and possibly authoritative influence as a role model, explained by mechanisms indicated in social learning theory (Bandura, 1997), team members' PsyCap might operate through more peer-based, collective mechanisms, indicated by emotional contagion theory (van Kleef, 2009; van Knippenberg & van Kleef, 2016). These independent pathways can both contribute to building individual PsyCap, but they may not synergistically reinforce each other. Future research could explore these differential pathways further. Our study captured the immediate, state-level effects of leader and team member PsyCap on individual PsyCap. The demonstrated effects of both leader and team member PsyCap on individual state-level PsyCap suggest that even brief interactions can shape psychological resources, though these effects may differ from longer-term trait-level changes that occur through sustained exposure. These findings align with previous experimental research showing that PsyCap can be influenced through short-term interventions (Lupsa et al., 2020), while acknowledging that more enduring changes might require repeated or prolonged exposure to high-PsyCap leaders and team members.

Third, our findings contribute to the application of the broaden-and-build theory (Fredrickson, 2004) by demonstrating how positive psychological resources can be built in team settings. This extends previous applications of broaden-and-build theory, which typically focus on individual-level processes or single-source influences (Peñalver et al., 2019). Furthermore, our findings suggest the potential for gain spirals within teams: as individual team members' PsyCap increases through additive effects from leaders and peers, they themselves are likely to become stronger sources of PsyCap for their colleagues (Halbesleben & Wheeler, 2015). Such reciprocal effects align with and extend the upward spiral dynamic central to the broaden-and-build theory (Fredrickson, 2004), suggesting that positive psychological resources can create expanding cycles of growth through peer-to-peer transmission. The persistence of these effects across virtual settings indicates that such gain spirals can develop even in computer-mediated environments. However, our findings also raise questions about the adequacy of the broaden-and-build theory as the sole theoretical framework for explaining the PsyCap transmission mechanism. Specifically, we hypothesized that the combination of high leader and team PsyCap would amplify the transfer process, aligning with the broaden-and-build theory's emphasis on positive emotions facilitating broader thought-action repertoires (Fredrickson, 2004). Similarly, we anticipated that the virtual setting would hinder the transfer process due to fewer transferable emotions (Bailenson, 2021; Karl et al., 2022). The lack of support for these hypotheses suggests that the role of positive emotions in PsyCap transmission may be more complex than previously

theorized and may need further investigation. Future research could explore via longitudinal studies how PsyCap transmission unfolds over time and whether cumulative positive interactions eventually produce the hypothesized interacting and moderating effects.

4.1. Practical implications

From a practical standpoint, our findings have significant implications for leadership and team management, particularly in virtual settings. The demonstration that PsyCap can be effectively transmitted from leaders and team members to individuals, regardless of the setting, underscores the need for organizations to foster environments that support and enhance PsyCap. This includes developing leadership competencies that emphasize the cultivation of hope, efficacy, resilience, and optimism, alongside team-building practices that encourage mutual support and positive psychological exchanges among team members. To achieve this, organizations can employ evidence-based interventions aimed at increasing PsyCap (Luppa et al., 2020; Salanova & Ortega-Maldonado, 2019), targeting these primarily towards well-connected leaders and team members who are most likely to disseminate their PsyCap throughout the organization. These interventions should focus not only on promoting one's own PsyCap but also on how to actively communicate one's own PsyCap and actively encourage development in others (Rego et al., 2019). Activities that promote mutual support, collaboration, and the sharing of positive experiences can reinforce the team's collective psychological resources. Such practices are not limited to formal settings; they can be integrated into the day-to-day interactions and operations of the team, making the cultivation of PsyCap a continuous and integral part of the (virtual) work environment. Digital platforms could further facilitate PsyCap cultivation through features like peer recognition tools, goal-sharing dashboards, and informal communication spaces designed for exchanging positive experiences.

Strategically embedding PsyCap development into human resource practices offers another avenue for organizations, including recruitment, training, and performance management systems. Encouraging practices that build psychological resources could for example involve creating platforms for sharing success stories and instituting mentorship programs that focus on developing psychological resources. Mentorship programs represent a particularly powerful tool for PsyCap development, pairing individuals with mentors who exemplify high levels of psychological resources (Carter & Youssef-Morgan, 2019). Additionally, organizations can ensure that they select managers with high psychological capital to achieve trickle-down effects on their teams and, subsequently, on individuals. Performance management systems, too, can be aligned with PsyCap development, incorporating goals and feedback mechanisms that encourage growth in hope, efficacy, resilience, and optimism. Creating a feedback-rich environment where achievements and areas for growth in PsyCap components can facilitate continuous improvement and development.

4.2. Limitations and directions for future research

While our study offers valuable insights, it is not without limitations. The controlled experimental design, though beneficial for isolating the effects of the variables of interest, may constrain the generalizability of the findings to real-world organizational settings. Even though we employed video vignettes instead of text vignettes to enhance realism and immersion and controlled for perceived realism of the scenarios, there may be concerns about external validity because of our design (Aguinis & Bradley, 2014). For instance, the manipulation of the settings may not have reflected exactly the experience of employees in their everyday work lives. To address this limitation, future research endeavors could consider employing longitudinal designs in the field that replicate and extend our findings in more naturalistic contexts.

Furthermore, the experimental design allowed us to disentangle the

unique impacts of team members' and leaders' PsyCap on individual PsyCap. However, it is important to recognize that leaders, team members, and individuals exist within a nested structure within organizations. To fully capture this, multilevel research designs are needed (Liao, 2017). These designs would enable a nuanced examination of reciprocal and trickle-down effects between leader PsyCap, collective team PsyCap, and individual PsyCap over time, contributing to a deeper understanding of how PsyCap develops within organizational hierarchies.

Next to this, we used a proxy for individual PsyCap, asking for the individuals' beliefs and expectancies towards the task of the manipulation story. We have thus captured a more short-term, state-related manifestation of PsyCap that is not generally work-related but was more suitable for our research design (Avey, Avolio, & Luthans, 2011; Avey et al., 2012). It may be reasonably assumed that the general work-related PsyCap will only undergo change over the course of several such interactions. Consequently, future research should investigate this with the aforementioned longitudinal multilevel designs. However, preliminary findings on transfer from leaders to followers indicated that the results of transfer studies employing experimental designs are comparable to those obtained with multilevel designs (see e.g., Rego et al., 2019).

Another limitation of our study is that we did not measure participants' baseline levels of PsyCap prior to the experimental manipulation. Given that PsyCap is conceptualized as state-like (Luthans & Youssef-Morgan, 2017), individuals' pre-existing levels of hope, optimism, resilience, and self-efficacy may have influenced how they responded to leader and team member PsyCap displays. As individuals have been shown to differ in their susceptibility to contagion (Barsade et al., 2018), individuals with higher baseline PsyCap might be more receptive to positive psychological displays from others, potentially amplifying transmission effects. However, our randomized experimental design should have distributed these individual differences in baseline PsyCap evenly across conditions, reducing potential systematic bias in our results. Future research should consider employing pre-post designs that account for baseline PsyCap levels, allowing for more nuanced analysis of how individual differences moderate PsyCap transmission processes.

Our study focused on the moderating influence of the different interaction settings. Additionally, it is worth exploring other potential moderators and/or mediators in the relationship between leader/team PsyCap and individual PsyCap. For instance, studies could investigate how specific aspects of computer-mediated communication, such as text-based interactions or asynchronous communication influence the effectiveness of PsyCap transmission. Understanding whether and how digital cues like emoji use (Lieg & Furtner, 2024), virtual backgrounds, or avatar customization impact psychological resource transfer could offer valuable insights into designing tools and practices that optimize PsyCap cultivation in virtual teams. Additionally, future research could examine the role of emerging technologies such as artificial intelligence (AI) in PsyCap transmission. One intriguing avenue would be to explore whether AI systems — such as conversational agents, virtual coaches, or collaborative AI tools — can exhibit and transmit PsyCap to individuals (Han et al., 2023). This could not only expand the theoretical framework of PsyCap transmission but also provide practical applications for integrating AI technologies into workplace strategies aimed at fostering psychological resources.

5. Conclusion

In conclusion, our study advances the understanding of PsyCap transmission from leaders and team members to individuals, highlighting the importance of both sources in building psychological resources. While our findings did not support an interaction effect between leader and team PsyCap, they underscore the distinct pathways through which these sources influence individuals. Moreover, our results challenge assumptions about the moderating role of the setting, suggesting

that the impact of PsyCap remains consistent across different work environments. This consistency underscores the adaptability of psychological resource transfer in digital environments, providing important insights into human behavior in increasingly technology-mediated workplaces. In addition, it offers theoretical implications that may help to better understand the mechanisms underlying the transmission of PsyCap. Future research should continue to explore these dynamics, addressing limitations and investigating additional variables. By doing so, we can further refine our understanding of how PsyCap is transmitted and harnessed to enhance individual and organizational well-being. Our findings could have significant implications for the management of (virtual) teams and remote work policies. They underscore the need for organizations to actively develop PsyCap in both leaders and team members, as their influence persists regardless of the physical work environment. Organizations may need to prioritize the development of PsyCap not only in leaders but also in team members to foster a positive work culture and support well-being.

CRediT authorship contribution statement

Rebekka Kuhlmann: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Project administration, Methodology, Investigation, Formal analysis, Data curation,

Conceptualization. **Ingo Klingenberg:** Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Methodology, Investigation, Conceptualization.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used Grammarly and ChatGPT in order to check the grammar and improve the language. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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Appendix A

A.1: Participant Instructions for the Experiment (Translation, Original in German)

Please imagine that you have been working for a company that specializes in creative project management solutions for three years now. You, your colleague Laura and your colleague Max have been working together for two years in a team headed by your manager Daniel.

It is very important to the company’s management that the departments work well together and develop imaginative solutions for customers. To encourage this, the different departments in the company compete against each other once a year in a creativity competition. Each year, a new challenge is developed that relates to customers’ everyday lives and requires inventive solutions. The department with the best ideas wins a prize.

As this year’s competition is approaching, your manager, Daniel, has scheduled a meeting with the team to discuss the experience of previous years. You have been asked to attend this meeting as you are an important part of the team.

In the following, you will be presented an extract from this meeting. You will then be asked to answer some questions about the situation shown. This depends on your personal judgement. There are no right or wrong answers.

A.2: Transcripts of the Video Vignettes (Translation, Original in German)

Manipulation of the Setting

Face-to-face	Virtual, camera on	Virtual, camera off
<i>The team meets in an office space in a meeting room.</i>	<i>The team meets in a videoconferencing tool with all cameras turned on.</i>	<i>The team meets in a videoconferencing tool with all cameras turned off.</i>

Daniel (Manager): "Hi everyone. I’m glad we have a moment to exchange ideas. As you know, this is an important topic: the creativity competition, in which we compete against other teams, as we do every year.

It will start in a week. Then we will have two days to work on the task together. I don’t know much more yet, but I still think it’s important that we share our experiences from the past years. That’s the rough plan for now. Do you have any questions so far?"

Laura (Colleague): "How do you assess our chances of being successful in this competition?"

Daniel (Manager): „Mhh ... compared to the other teams and based on past experiences ...

Manipulation of Leader’s PsyCap

High Leader PsyCap	Low Leader PsyCap
... I definitely believe we are capable of putting in the necessary effort to find good solutions in the competition. I always expect the best from our work, which is why I am very optimistic that we will handle the task well. Moreover, our team has always overcome difficulties in the past, so I have no doubt that we will do the same in this competition and grow beyond ourselves. We always find many ways to support each other. Overall, I have a positive assessment of our chances of success.	... I am torn about whether we are capable of putting in the necessary effort to find good solutions in the competition. I don’t expect too much at first from our work, which is why I am cautiously optimistic that we will handle the task well. Moreover, our team hasn’t always overcome difficulties in the past, so I have some doubts that we are able to do so in this competition and grow beyond ourselves. We might find ways to support each other. Overall, if I’m being honest, I have a mixed assessment of our chances of success.

But that is my perspective as the team leader. What do you think?“
Max (Colleague): „Hm. Well, I see our chances in the competition like this...

Manipulation of Team’s PsyCap

high Team PsyCap	low Team PsyCap
... I believe that because of our past experiences overcoming difficulties, we can tackle this challenge as well. If we get stuck, we always find many ways to support each other.	... I believe that because of our past experiences overcoming difficulties, we need to approach this challenge carefully. If we get stuck, we might find ways to support each other.

Or what do you think, Laura?“
Laura (Colleague): „I ...

Manipulation of Team’s PsyCap

high Team PsyCap	low Team PsyCap
... I definitely believe we can do this. We will manage this. I am very optimistic that the task will suit our team. Overall, I feel positive and am excited to see what challenge the management gives us to train our creativity."	... I kind of believe we can do this. Maybe we will manage this. I'm not 100% sure that the task will suit our team. Overall, I feel not so positive and am anxiously waiting for the challenge the management gives us to train our creativity.

Daniel (Manager): "Thank you for your assessments, Max and Laura. Now we’re just missing your opinion. What do you think?" (Looks into the camera).

A.3: Items for the Post-Experimental Measurement of Participants’ PsyCap (Translation, Original in German)

- I feel confident helping in this competition.
- I feel confident contributing to discussions about the competition strategy.
- I feel confident presenting information about the competition to a group of colleagues.
- If I should find myself in a jam at this competition, I could think of many ways to get out of it.
- Right now I see myself as being pretty successful in this competition.
- I can think of many ways to reach my competition goals.
- I will achieve the competition goals I set for myself.
- I can complete my work in this competition “on my own,” so to speak, if I have to.
- I can handle stress well in this competition.
- I feel I can handle setbacks while working on this competition.
- I look on the bright side of things regarding this competition.
- I expect the best on this competition.

Data availability

Data will be made available on request.

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