

## INTRODUCTION & BACKGROUND

Teamwork has been defined as multiple people interacting with each other over a period of time to achieve a common goal that is fundamentally important to the operations and success of organizations. Teamwork also permeates almost every facet of today's professional organization landscape.

Traditionally, teamwork has been studied within the context of human communication in a physical environment within close proximity (e.g., face-to-face teams). However, the rapid development of information and communication technology's (ICT) globalized use, call for the evolution of organization structure and operation frameworks. As a result, all aspects of teamwork need to adapt to the emerging digitization of the global society. This is especially needed for teams whose members do not share a common workspace and must therefore collaborate using ICT tools (e.g., virtual teams), this form of virtual collaboration has emerged as the next stage of evolution in teamwork.

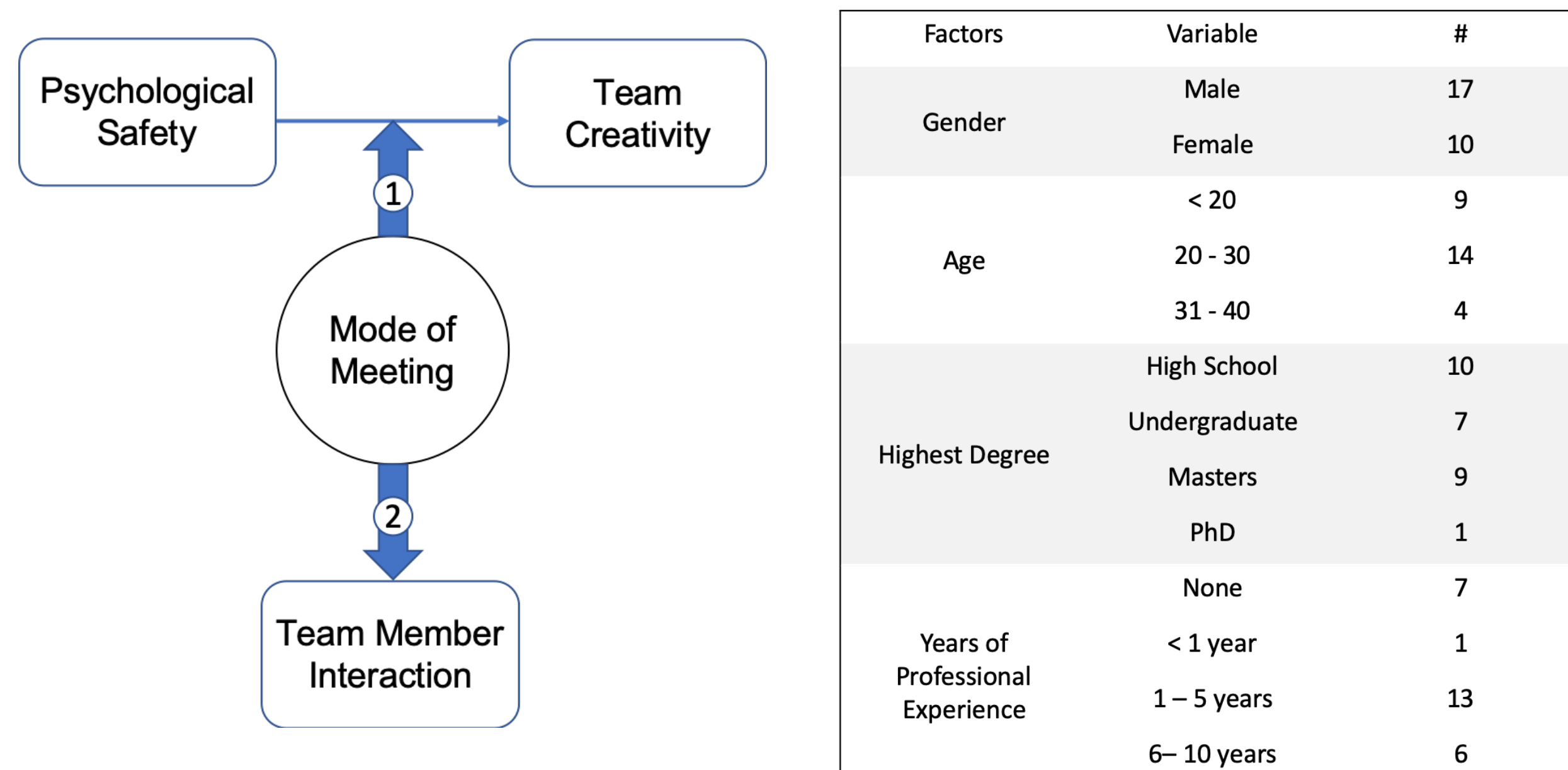
Team leadership is a type of leadership that facilitates the team's ability to develop the shared behavior, cognition, and affect that allow teams to progress towards and accomplish team goals.

## STUDY PURPOSE

In this research, we aim to study team leadership behaviors of student teams in two different environments (i.e., face-to-face teamwork and virtual teamwork). We conducted a study to compare and contrast the team dynamics and team leadership characteristics in these two environments.

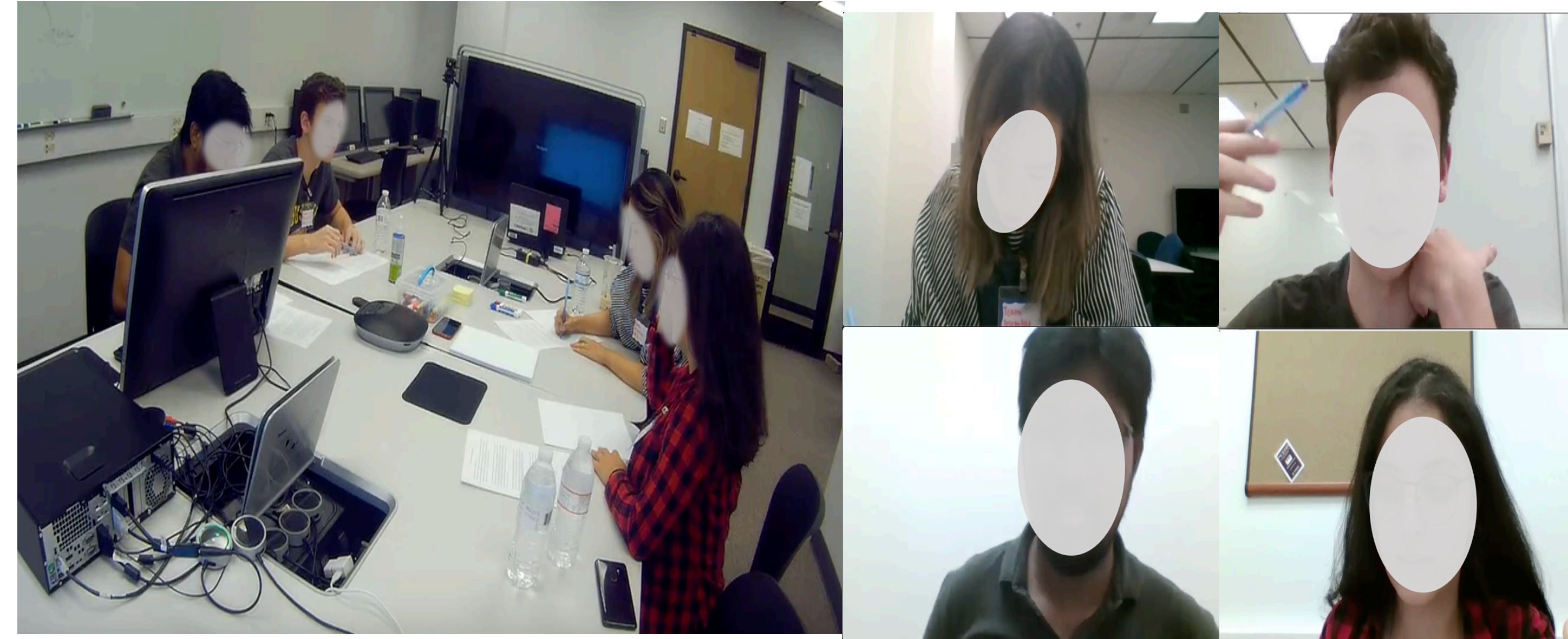
## RESEARCH QUESTIONS

- What are the impacts of mode meeting (i.e., physical meeting vs virtual meeting) on the relationship between team psychological safety and team creativity?
- What are the impacts of mode meeting on team member interactions?
- How do team functions change in face-to-face environments vs virtual environments?
- Do the behaviors of the team change in face-to-face environments vs virtual environments?



The diagram above is an illustration of the relationship between research questions 1 and 2. Followed by a table representing participant demographics.

## METHODOLOGY



**RECRUITMENT:** Participants were recruited through a university wide bulk email.

**WHEN:** Researchers and participants agreed upon a meeting time and met in a designated location on campus. The study lasted approximately 1 hour and 30 minutes.

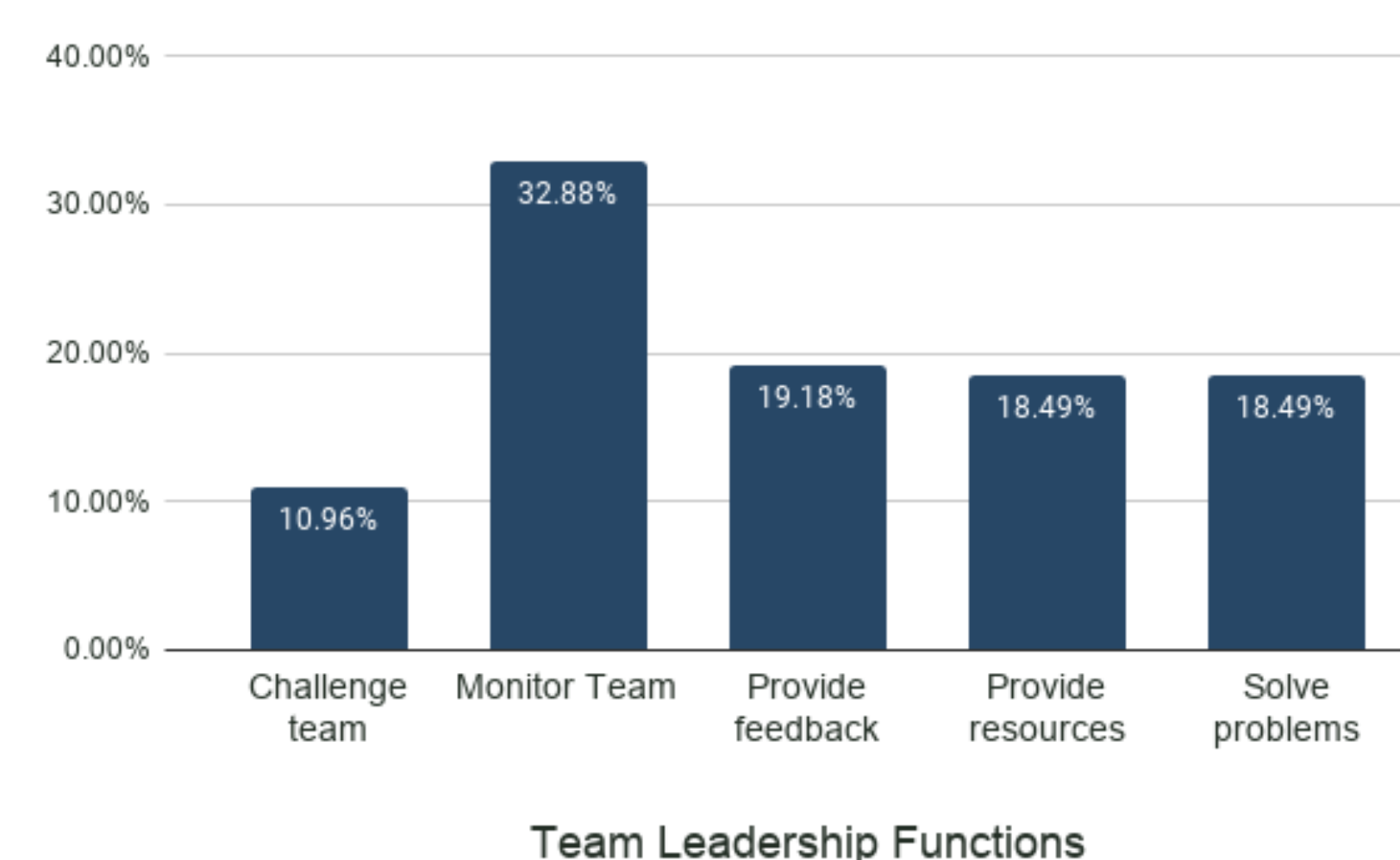
**WHAT THEY DID:** In this within subjects study design participants were placed in both a *face-to-face* environment and a *virtual environment* (e.g., zoom) for collaborative work. Participants were asked to produce a solution for a global world issue selected from the United Nations website (e.g., global warming and clean water).

## DATA ANALYSIS

A total of 8 groups participated in the study totaling 27 participants. Data was collected through audio and video recording for all groups. A total of 16 videos were collected averaging 1,440 minutes. To answer RQ1 a cross-lagged panel model was constructed to see the relationship between variables (team psychological safety vs team creativity) and occasion (i.e., face-to-face vs virtual environment). RQ2 was approached by using Social Network Analysis. For RQ3 and RQ4 data was analyzed qualitatively using the program MaxQDA. We were interested in understanding the differences between team leadership functions[1] and behaviors [2] in the different environments.

## FINDINGS

This cross-lagged panel shows correlations between the two factors, psychological safety and team creativity in two different times (i.e. face-to-face and virtual environments). Our study found that team creativity in face-to-face environment influenced team psychological safety in virtual environment ( $B = -0.157, p = 0.003$ ). Our SNA data did not yield any significant results regarding the possible difference between the team interactions in the two environments. Qualitative analysis was conducted to understand team leadership functions[1] and behaviors [2] in the different environments. The instances coded identify moments during the study where participants engaged in various forms of teamwork, behaviors and the types of individual roles individuals took on during the study.

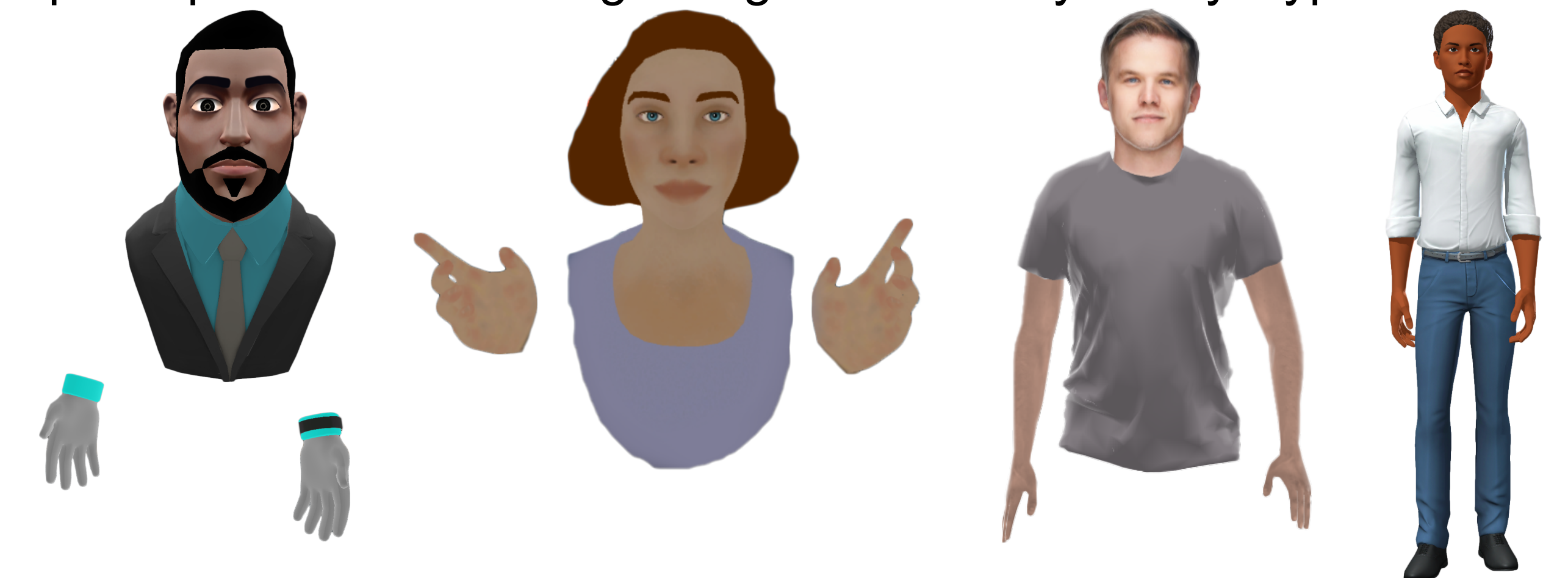


## CURRENT WORK

In this research, we plan to investigate people's trusting and distrusting experience and behaviors in Virtual Reality Education. Education has been increasingly recognized as a field where VR technology have substantial potential for contributing to its advancement. One of the fundamental factors for effective education is trust among learners and teachers. While trust and distrust has been extensively studied across many scenarios, there are scant studies in understanding trust and distrust in VR environment. More specifically, in this research, we address the following two research questions:

- Do people display any trust/distrust behaviors while interacting with virtual elements (e.g., virtual avatars, environments, interactions) in educational VR environments?
- What are the practical implications of human trust and distrust in VR education environments on the design, development, implementation, and adoption of VR education systems?

We are currently investigating participants' experiences while they interact with virtual elements in educational VR environments and how the VR environment and characters affect participants' behaviors. One of the aspects that we focus on is how different VR avatar styles (i.e., their voices, appearance) impact the participant's behavior regarding the Uncanny Valley Hypothesis.



## CONCLUSION & FUTURE STEPS

Our initial findings showed a correlation between face-to-face interactions and virtual interactions. Positive team creativity during face-to-face interactions was correlated with lower psychological safety in the virtual environment which can be explained by individual's lack of experience in such environments. Team creativity went down as well in the virtual environment as opposed to face-to-face. These findings highlight the discrepancy individuals feel when moving and interacting between different environments. Participants also most commonly monitored their team members and contributed by providing feedback to the group.

Future steps for the project include designing avatars and developing an environment for a Virtual Reality educational tutorial video. Currently the team is in the process distributing a survey asking people's perception of different avatars as well as developing avatars and an environment for the video.