

# Preliminary Experimental Findings Play at Work

Prepared by

Associate Professor Janneke Blijlevens (School of Economics, Finance and Marketing)

Jo Wong (School of Economics, Finance and Marketing)

Dr. Argho Bandyopadhyay (AB) (School of Management)

From

RMIT University  
RMIT Behavioural Business Lab

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# Controlled Student Experiment

## EXECUTIVE SUMMARY

The initial literature review for this research highlighted the importance of integrating play into the workplace, emphasizing its potential to enhance creativity, collaboration, and a sense of belonging. While research suggests that purposeful play positively impacts creativity, work engagement, and belonging, there is a lack of quantitative studies, particularly on its effects on learning adaptability. More empirical research is needed to establish a clear cause-and-effect relationship between play and behavioral outcomes. To address this gap, the second phase of this study involved a controlled student experiment to examine the impact of play on sense of belonging, innovation, work engagement, and learning adaptability, testing the proposed conceptual framework.

The controlled experiment examined the impact of play on key behavioral outcomes, including Sense of Belonging, Work Engagement, Learning Adaptability, and the Ability to Produce Innovative Solutions. The study followed a 3 x 1 between-subjects experimental design, where participants were randomly assigned to one of three conditions: (1) play, (2) non-play collaboration, or (3) a pure control condition.

The experiment involved 127 RMIT University students aged 18 and above, who were recruited from a pre-registered ORSEE database. All participants engaged in a problem-solving task relevant to student experiences at the university. The study was conducted online via Microsoft Teams, with tasks completed collaboratively using Miro boards. Each group explored the issue of why students are not attending classes and then brainstormed solutions. The play group was instructed to create humorous memes to represent the problem, the non-play collaboration group discussed the issue without playful elements, and the control group worked independently without collaboration.

The manipulation results showed that participants did not perceive significant differences between the conditions (play vs. non-play, collaborate vs. pure control), suggesting the manipulation was unsuccessful. However, when playfulness was measured from a subset of the sample, it was found from correlation analysis that playfulness positively influenced all measured behavioural outcomes including sense of belonging, sense of producing innovative solutions, work engagement and learning adaptability. Additionally, from multivariate regression analysis, it confirmed that playfulness significantly impacts all outcome variables. It had the strongest effect on work engagement, followed by innovative idea generation, sense of belonging, and the least (but still significant) effect on learning adaptability.

Furthermore, analyzing the full sample (n=127) revealed key relationships between the behavioural outcomes. A strong positive correlation was found between learning adaptability and work engagement suggesting that higher engagement enhances adaptability to future tasks. The weakest but still significant correlation was between learning adaptability and sense of belonging, indicating that while belonging may influence adaptability, it is not a primary driver. Instead, playfulness likely impacts learning adaptability through its relationship with work engagement.

These results have implications for organizations that use playfulness, which should focus on boosting work engagement, innovation, and potentially learning adaptability, with the secondary benefit of fostering social cohesion. However, if the goal is inclusivity and a sense of belonging, a different approach may be needed.

Moving forward, future research should involve teams with prior working relationships, longer face-to-face interactions, and revised play interventions designed to enhance psychological safety and engagement. Additionally, measuring long-term effects as an alternative through follow-up studies could provide deeper insights into the potential benefits of play in fostering collaboration and innovation

## GOAL AND AIM OF CONTROLLED EXPERIMENT

The goal of this controlled experiment was to determine whether engaging in play, the independent variable, influences behavioral outcomes such as Sense of Belonging, Work Engagement, Learning Adaptability, and the Ability to Produce Innovative Solutions as shown in the conceptual framework below (see Figure 1).

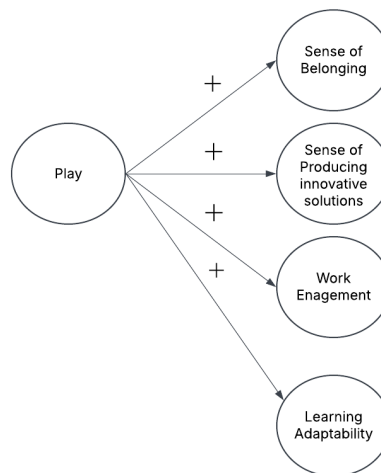


Figure 1: Conceptual Framework

## METHOD

In this controlled experiment, all groups of participants were asked to come up with innovative solutions to an issue that is relevant to students' experience at university, thereby providing some internal motivation to engage in this task. In the first task, they were prompted to gain a deeper understanding of the issue prompted by a question- "why are students not coming to class?". This is where we manipulated our independent variable. The second task, which was exactly the same across groups, was to brainstorm solutions to the issue as a group of three.

## SAMPLE

In this controlled experiment we had one participation group and that consisted of RMIT University students and staff aged 18 years and above. All potential participants were recruited from a pre-registered ORSEE database (a database to which participants voluntarily sign up to be invited for participation in experiments) and were treated uniformly during recruitment. All recruited participants were then randomly assigned to one of three experimental group condition. Participants were paid \$25 for their participation time.

A total of 131 students completed the experiment. Of those, we had to eliminate four (4) from analyses for the main reason: 1) they did not complete the survey. In total, we ended up a sample size of n=127 (45 in play condition, 40 in collaborate-non play and 42 in pure control condition).

## PROCEDURE

We conducted a 3 x 1 experiment with three independent groups of participants. The first group was our experimental condition which included play, the second group was a control conditions wherein

participants were encouraged to collaborate, but not through a playful task, and in the pure control condition participants were not engaged in a play or collaborative task at all.

First, participants were greeted in an online Teams session wherein they received a short introduction to the experiment, and tasks that were followed. Then participants were divided into three virtual breakout rooms. For each group, three participants were randomly allocated to a breakout room, and each breakout room was randomly allocated one of the three conditions: 1) play, 2) non-play collaborate, and 3) pure control. The facilitator of the session then joined each room separately to provide individual instructions and access to a Miro board wherein the participants completed the experimental tasks.

In the Play condition, participants were instructed to collaborate with their team members in a playful task to help them gain an understanding and gain deeper insights into the issue “why students are not coming to class”. Playfulness was manipulated as follows:

Upon accessing the Miro Board, participants were first asked to take individual selfies of a funny face that they pulled. Then they worked together collaboratively to select one or more selfies and transform them into memes that illustrate why students are not coming to class according to them. To encourage fun and enjoyment, participants were invited to create as many memes as they wished. An example meme was provided to ensure clarity on the task requirements. This activity was designed to be fun, engaging, collaborative, and purposeful, with the goal of deepening participants' understanding of the issue at hand.

In the collaborative non-play condition, participants were instructed to engage with the same task in collaboration with others but not in a playful manner. In this condition, participants were tasked with instructions to collaborate with each other and discuss the previously mentioned question, with the goal of generating as many answers on sticky notes as possible.

Lastly, in the control condition, participants were instructed to independently consider the aforementioned issue and generate as many answers as possible without collaborating with others, nor providing their answers on the Miro board.

In the second phase-ideation/solutions phase, participants in all the three conditions were tasked, as a group working together, to come up with as many solutions to the issue they had just explored in the previous task.

Finally, after completing the first two phases, participants were asked to respond to survey questions hosted on Qualtrics, which assessed behavioral outcomes.

## MEASUREMENT ITEMS

The specific behavioral outcomes investigated in this research included Sense of Belonging (coded as SOBComp), Work Engagement (coded as WEngComp), Learning Adaptability (coded as LAdaptComp), and Sense of Producing Innovative Solutions (coded as SOPISComp). The questions measuring these outcomes were adapted from well-established literature (see Appendix 1).

The Sense of Belonging items, adapted from La Guardia et al. (2000), assessed how participants felt about the team dynamics during their collaborative ideation session. The Work Engagement items, adapted from Schaufeli et al. (2006), measured the extent to which participants felt engaged or fully immersed in the collaborative ideation process. Additionally, the Learning Adaptability items, adapted from Ployhart and Bliese (2006), gauged participants' ability to adapt to solving complex problems

during the ideation session. Lastly, the Sense of Producing Innovative Solutions items, adapted from Janssen (2000), evaluated how participants perceived the innovative work behaviors of their fellow group members during the ideation session.

## RESULTS

To make sure that the questions we used to measure the different outcomes were accurate, we performed a type of analysis called exploratory factor analysis (EFA) and reliability analyses, which helps us see if the questions are really measuring what we think they are and consistently so. As a result of these analyses were able to create composite variables averaging the multiple questions to measure on concept (e.g., sense of belonging). We use these composite variables in our analyses reported.

### MANIPULATION SUCCESSFULNESS

Our results (refer Appendix 3) indicate that participants did not perceive the intended differences between conditions (play vs non-play collaborate vs pure control), which meant that no significant differences between groups exist for our main dependent variables (sense of belonging, sense of producing innovative solutions, work engagement and learning adaptability). While our manipulation was not successful, we did measure the level to which our participants found the tasks that they participated in playful for 53 of our participants (this measure was included after we analysed a first sample of the data and started to suspect that our manipulation may not have been successful). This allowed us to still assess the relationship of perceived playfulness with our dependent variables.

### CORRELATION RESULTS BETWEEN PLAYFULNESS AND INVESTIGATED DEPENDENT VARIABLES

The results from the correlation table (see Table 1 below) provided insights into the importance of playfulness. It was noted that experiencing a task as playful had a positive influence ( $p < 0.05$ ) on participants' sense of belonging, sense of producing innovative solutions, work engagement and learning adaptability. For other dependent variables that we also measured (see detailed correlation table in Appendix 1), we find that playfulness also has a significant effect ( $p < 0.05$ ) on the behavioural outcomes team creativity, knowledge integration, collective identity and feeling cognitively energised.

*Pearson's Correlations*

Variable		Playfulness	Sense of Belonging	Sense of Producing Innovative Solutions	Work Engagement	Learning Adaptability
1. Playfulness	Pearson's r	—				
	p-value	—				
2. Sense of Belonging	Pearson's r	0.458	—			
	p-value	< .001*	—			
3. Sense of producing innovative solutions	Pearson's r	0.508	0.624	—		
	p-value	< .001*	< .001*	—		
4. Work Engagement	Pearson's r	0.577	0.616	0.531	—	
	p-value	< .001*	< .001	< .001*	—	
5. Learning Adaptability	Pearson's r	0.401	0.365	0.381	0.730	—
	p-value	<b>0.003*</b>	0.007	0.004	< .001*	—

Note: \*= $p < 0.05$  (significance level)

Table 1: Correlation results between playfulness and dependent variables

To gain a better understanding of the relative importance that playfulness has in influencing the dependent variables relative to each other, we conducted a multivariate regression analysis with playfulness as independent variable and the behavioural outcome variables as dependent variables. This analyses confirmed our correlation results in that playfulness has a significant positive effect on all the outcome variables ( $\eta^2 = .391$ ,  $P < .01$ ). Further, it showed that relative to the others, playfulness has the strongest effect on work engagement ( $\eta^2 = .333$ ), followed by sense of producing innovative ideas ( $\eta^2 = .258$ ), sense of belonging ( $\eta^2 = .210$ ) and had the least effect (but still significant) on learning adaptability ( $\eta^2 = .161$ ).

## DEEPER UNDERSTANDING BETWEEN INVESTIGATIVE DEPENDENT VARIABLES

While the above analyses have consisted of only responses from a subset of our participants, to understand how the investigative main behavioural outcomes (such as sense of belonging, sense of producing innovative solutions, work engagement and learning adaptability) were related to each other, we decided to analyse this with the whole sample ( $n=127$ ). The results from the correlation table (see table 3 below) provided insights on the importance of relationships between the investigative behavioural outcomes. The results showed that a high positive correlation relationship exists between learning adaptability and work engagement (Pearson's  $r = 0.751$ ). This means that the more they are engaged with their work, the more likely they are to adapt to future tasks and challenges with a positive mindset. It was also observed that the weakest, yet still significant, correlation emerged between learning adaptability and sense of belonging (Pearson's  $r = 0.369$ ). This

suggests that when individuals experienced a lower sense of belonging, they also feel less capable of adapting to future tasks; however, because this effect was relatively weak, we do not believe that belonging is a precursor to learning adaptability and instead that any effect of playfulness on learning adaptability coincides with work engagement instead.

*Pearson's Correlations*

Variable		Sense of Belonging	Sense of Producing Innovative Solutions	Work Engagement	Learning Adaptability
1. Sense of Belonging	Pearson's r	—			
	p-value	—			
2. Sense of Producing Innovative Solutions	Pearson's r	0.549	—		
	p-value	< .001	—		
3. Work Engagement	Pearson's r	0.559	0.508	—	
	p-value	< .001	< .001	—	
4. Learning Adaptability	Pearson's r	<b>0.369</b>	0.504	<b>0.751</b>	—
	p-value	< .001	< .001	< .001	—

Note: \*= $p < 0.05$  (significance level)

Table 1: Correlation results between playfulness and dependent variables

Finally, the fact that all correlations between the investigative behavioral outcomes —sense of belonging, sense of producing innovative solutions, work engagement, and learning adaptability - are positive and significant, combined with the fact that playfulness positively influences all of these, validates our conceptual framework, which was created in the first phase of the project as a result of the extensive literature review.

## DISCUSSION

The results of this study indicate that playfulness is indeed positively related to work engagement, sense of creating innovative ideas, sense of belonging, and learning adaptability (and a host of other behavioural outcomes as given in Appendix 1). We see that playfulness has the strongest effect on work engagement and the weakest effect on learning adaptability. The relative difference in importance that playfulness has on these behavioural outcomes could be due some of these variables being experienced more immediately (e.g., for sense of creating innovative ideas, “My group members developed original solutions to address the issue.”) while others are more speculative about the future (e.g. for learning adaptability “After doing this session, I feel like I will quickly adapt myself by gaining new information and skills to refine and enhance my ideas.”). Indeed, the relative importance appears to be an artefact of what the behavioural outcomes measure in terms of what they experienced during the session, and how they expect it to influence their future work and collaborations. Based on this we suggest it may be valuable to include a longitudinal measurement of our outcome variables to assess if this relative importance changes over time and whether, for example, learning adaptability is more strongly influenced by playfulness after some time has passed since the playful workshop took place. This argument does not necessarily hold for sense of belonging though, which was the second weakest influenced by playfulness, because sense of belonging was measured in relation to what they experienced during the activity. While belonging is positively influenced, out of the more immediate behavioural outcomes, this one was least affected by playfulness.

Further, we see that while playfulness appears to have the strongest influence on work engagement, work engagement, out of all the behavioural outcomes, is the most strongly related to learning adaptability. This could indeed suggest that work engagement as a result of a playful activity is an important precursor to activating and developing a stronger learning adaptability over time. Moreover, the relatively weak relationship between learning adaptability and sense of belonging, paired with the insight that sense of belonging is the second least influenced by playfulness, suggests that if learning adaptability is the end goal, that the precursor for this is less likely to be sense of belonging. Further, out of the ones that are more immediately experienced, sense of belonging is the least influenced by playfulness and mostly influenced separately to learning adaptability, indicating it to be more of a side effect to work-task related impacts.

These results suggest that if an organization engages in playfulness, it will mostly want to do so because it mainly wants to increase work engagement, creation of innovative ideas, and potentially further down the line, learning adaptability. In other words, playfulness workshops will mainly affect ways of working but will have a positive side effect of potentially building a more socially cohesive culture. If the main aim is to create inclusivity, a sense of belonging, and a positive cohesive culture, then perhaps a different approach is more warranted.

The manipulation in our experiment was unsuccessful, meaning that our meme activity did not do what we had expected it to do. We hypothesize the following explanations for this lack of success. First, the participants in this experiment met for the first time during this experiment and were not colleagues who had previously worked together. Being playful with strangers, versus with people whom you already know, is more daunting, and this may have amplified differences (in humour, in technical capabilities, in knowledge) between participants which may have led to the Play group not having been experienced as more playful than the other groups. Play with colleagues that you know may be slightly uncomfortable at first, but because you know each other many differences between people are not new and thus may be less salient during the activities. When differences are experienced as significant, this will reduce levels of comfort to step out of their comfort zone. Typically, high psychological safety is important for playfulness to occur (Rosso, 2016), and we believe that the fact that all our participants were strangers to each other may not have provided the level of psychological safety that was required for Play to be experienced as such and as differently between groups. Second, in the Play condition, we equated humour with play (we asked people to take funny selfies and then transform them into funny memes). While play is fun (Brown & Vaughan, 2009), fun is not necessarily play. We need different unique indicators that distinguishes play from non-play to assure that in any future experiments we are able to manipulate play itself.

## MOVING FORWARD AND NEXT STEPS

Most importantly, our results provide a first indication that playfulness does positively influence the behavioural outcomes of interest. The next step is to assess whether a playful workshop, as delivered in the field, replicates these insights. We recognize the limitations of conducting a controlled experiment in this context and the difficulty of manipulating playfulness in a controlled environment. However, we also believe that many of these issues as mentioned above would likely not arise in face-to-face 1.5-hour workshops, where interactions tend to be more straightforward and natural and amongst people who are relatively well-known to each other.

Moving forward, we can conclude that several adjustments are necessary for the field experiment. First, it is crucial to ensure that the teams involved have prior experience working together and are not new to each other, as this familiarity will likely enhance collaboration and minimize any challenges

arising from unfamiliarity. Second, the nature of the play should be carefully considered to ensure that it does indeed reflect play, and not something else (e.g., fun). Third, we must guarantee that participants have adequate time to interact closely with one another in a face-to-face setting, allowing for meaningful engagement. Fourth, it will be essential to distinguish whether the observed effects are truly a result of the playful elements rather than simply the opportunity for collaboration and interaction. Fifth, we would ideally have participants in the field-experiment that will work together in the future in a way that requires a level of belonging, learning adaptability, creativity and knowledge integration. Finally, because the behavioural elements that we are interested in may take a while to develop, as an alternative, we recommend that a follow-up after three months is undertaken as that could provide insights into whether any observed effects are delayed or sustained over time.

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## Appendix

### Appendix 1: Measurement Items

<p>Sense of Belonging (SOB) (La Guardia et al. 2000)</p>	<ol style="list-style-type: none"> <li>1. I liked the people I interacted with in my group during the ideation session.</li> <li>2. I got along with the people in my group that I met during the ideation session.</li> <li>3. I pretty much kept to myself when I participated in the ideation session.</li> <li>4. I considered the people I interacted with in my group to be my friends when I participated in the ideation session.</li> <li>5. Team members in my group cared about my input.</li> <li>6. I didn't feel close to many people in my group during the ideation session.</li> <li>7. The people I interacted with in my group during the ideation session didn't seem to like me very much.</li> <li>8. The people in my group were generally friendly towards me during the ideation session.</li> </ol>
<p>Work Engagement (Weng) (Schaufeli et al. 2006)</p>	<ol style="list-style-type: none"> <li>1. I felt like collaborating with the other members of my team in the ideation session.</li> <li>2. I felt full of energy during my participation in the ideation session.</li> <li>3. I felt strong and vigorous when I was participating in the ideation session.</li> <li>4. I was enthusiastic about my participation in the ideation session.</li> <li>5. I was proud of my participation in the ideation session.</li> <li>6. During the ideation session online, I got carried away.</li> <li>7. I was immersed in the ideation session.</li> <li>8. I felt happy during the ideation session.</li> </ol>
<p>Learning Adaptability (LAdapt) (Ployhart &amp; Bliese, 2006)</p>	<ol style="list-style-type: none"> <li>1. After doing this session, I feel more confident that I am able to take responsibility for acquiring new skills.</li> <li>2. After doing this session, I feel like I would enjoy learning new approaches to problem-solving.</li> <li>3. After doing this session, I feel like I will take action to improve my collaborative performance deficiencies.</li> <li>4. After doing this session, I feel like I will quickly adapt myself by gaining new information and skills to refine and enhance my ideas.</li> <li>5. After doing this session, I feel like I will continuously learn and apply new skills to adapt to problems.</li> <li>6. After doing this session, I feel like I will be able to adapt my ideas by learning and incorporating new information as it becomes available.</li> <li>7. After doing the session, I feel like I will proactively learn new idea generation skills before they are needed.</li> </ol>
<p>Sense of Producing Innovative Solution (SOPIS) (Janssen, 2000)</p>	<ol style="list-style-type: none"> <li>1. My group members came up with new ideas to address the issue that required solving.</li> <li>2. My group members explored new methods and techniques to solve the issue.</li> <li>3. My group members developed original solutions to address the issue.</li> <li>4. My group made sure that they inspired key group members to be enthusiastic about developing innovation ideas.</li> </ol>

	<p>5. My group members transformed innovative ideas into useful applications.</p> <p>6. My group members introduced innovative ideas into the team environment in a systematic way.</p>
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## Appendix 2: Correlation Results of Playfulness with other dependent variables (behavioural outcomes)

### *Pearson's Correlations*

Variable		Playfulness	Individual Creativity	Team Creativity	Cognitive Load	Cognitive Energised	Knowledge Integration	Individual Identity	Collective Identity
1. Playfulness	Pearson's r	—							
	p-value	—							
2. Individual Creativity	Pearson's r	0.098	—						
	p-value	0.479	—						
3. Team Creativity	Pearson's r	0.406	0.064	—					
	p-value	<b>0.002*</b>	0.645	—					
4. Cognitive Load	Pearson's r	0.002	-0.118	0.316	—				
	p-value	0.989	0.396	0.020	—				
5. Cognitive energised	Pearson's r	0.539	0.022	0.303	0.035	—			
	p-value	<b>&lt; .001*</b>	0.877	0.026	0.801	—			
6. Knowledge Integration	Pearson's r	0.450	0.028	0.763	0.200	0.310	—		
	p-value	<b>&lt; .001*</b>	0.842	< .001	0.146	0.023	—		
7. Individual Identity	Pearson's r	-0.081	0.084	0.019	0.095	-0.038	0.027	—	
	p-value	0.561	0.545	0.890	0.497	0.786	0.848	—	
8. Collective Identity	Pearson's r	0.358	0.170	0.490	0.495	0.255	0.508	0.089	—
	p-value	<b>0.008*</b>	0.218	< .001	< .001	0.063	< .001	0.522	—

Note: \*= $p < 0.05$  (significance level)

Table 2: Correlation results between playfulness and other behavioural outcomes

**Appendix 3: Comparison of means for the investigative dependent variables**

	Sense of Producing Innovative Solution			Sense of Belonging			Work Engagement			Learning Adaptability		
	Play	Non-play collab	Pure control	Play	Non-play collab	Pure control	Play	Non-play collab	Pure Control	Play	Non-play collab	Pure control
No of Participants	45	40	42	45	40	42	45	40	42	45	40	42
Mean	5.159	5.5	5.262	5.817	6.206	5.851	5.196	5.571	5.492	5.219	5.571	5.35
Std. Deviation	1.02	1.18	1.06	0.863	0.766	1.039	0.983	1.024	1.09	1.046	1.222	1.137