COMPARING THE USE OF TECHNOLOGY-BASED VS TRADITIONAL TEAM BUILDING INTERVENTIONS IN DEVELOPING GROUP PROBLEM-SOLVING AND LEARNING BEHAVIOURS: INSIGHTS FROM TWO EXPERIMENTAL STUDIES

by

MATTHEW SELLIER

SLLMAT002

Supervisor: Professor Anton Schlechter

School of Management Studies

Faculty of Commerce

University of Cape Town

2020

University of Cape Town

PLAGIARISM DECLARATION:

1. I know that plagiarism is wrong. Plagiarism is to use another's work and pretend that it is my own.
2. I have used the APA referencing guide for citation and referencing. Each contribution to, and quotation in this research report from the work(s) of other people has been attributed and has been cited and referenced.
3. This research report is my own work.
4. I have not allowed, and will not allow, anyone to copy my work.

Signature: Signed by candidate Date: ……22/03/21……

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

University of Cape Town

ACKNOWLEDGEMENTS

Firstly, thank you to the University of Cape Town for being an institution that encourages inquisitive minds. To my supervisor, Anton Schlechter, you have helped guide me through a difficult process and I am proud of our work together. Mum and Tami, you two have been my rock during this journey. Thank you. To Dad, thank you for always having my back and helping me keep my eye on the ball at the end of the day. To my friend, Megann Reynolds, thank you for helping me discover this topic. Without our chat I may not have been here. Then to the rest of you, you know who you are, thank you from the bottom of my heart.

ABSTRACT

The increasing reliance on technology for communication seems to have shown that non-technology or traditional team building activities may not be effective in improving certain interpersonal skills (Klein et al., 2009). The researcher investigated whether the use of a serious game, i.e. an educational video game, is a better mode of delivery to improve group problem-solving, team cohesiveness, team learning behaviours and, perceived team psychological safety rather than traditional team building intervention, i.e. a non-technology-based team building intervention (Emsley & Rumeser, 2018; Edmondson, 1999). The researcher conducted two post-test only quasi-experiments to compare the methods of team-building. In Study 1, four teams of university students (*n=15 total students)* took part in either a serious game or a traditional team building intervention. The serious game was based on a scavenger hunt mobile application while the traditional team building activity was an obstacle course. Each team was assessed, after the team building interventions, on their group problem-solving skills and team cohesiveness in order to determine if there was a significant difference between the scores of the two dimensions above for intervention groups. Study 2 consisted of six teams of university students (*n=30 total students*) participated in either a traditional online team-building activity or an online team-based serious game. The traditional online team-building activity was a spectrum mapping activity, and the online team-based serious game was an online escape room. Each team then participated in the same thought experiment and were finally asked to answer a questionnaire. Furthermore, a field researcher participated in both activities and her experiences were noted through an interview. There did not seem to be sufficient evidence to support the hypotheses for the second quasi-experiment. However, the was evidence collected throughout both quasi-experiments that suggests that serious games are more enjoyed by participants and there seems to be a clearer initiative to utilise the interpersonal skills acquired in the future.

Keywords: team building; serious games; group problem-solving; team cohesiveness; team learning behaviour; team psychological safety

Table of Contents

CHAPTER 1

INTRODUCTION

The present chapter was an exploration of how and why the utilisation of serious games in team building activities could be more effective at developing certain team climate dimensions and team skills (Tseng & Yeh, 2013). The focus of the present chapter is to establish the argument that serious games utilised in team building may be a more effective mode of teaching than utilising a traditional team-building activity. Furthermore, the researcher put forth an argument to create awareness of the real-world outcomes of utilising serious games in team building and shows a motivation for why the present study was undertaken. The argument presented was utilised to establish certain dimensions that have been previously utilised to measure the successfulness of team building intervention and that are seen as learning outcomes established for many team building interventions. Finally, the argument presented was utilised to formulate a research aim for the present study.

Introduction

The exponential growth in the number of teams working remotely or virtually is the result of at least two recent developments, the first being the rapid increase in organisations operating in the global or gig-economy resulting in teams becoming increasingly geographically dispersed; and second the more recent advances in online communication/virtual collaboration software that has made meeting virtually a close proximation of meeting face-to-face. Even teams that are not geographically dispersed, are increasingly meeting virtually given the cost and time savings of not having to travel to attend meetings. Teams that primarily meet face-to-face seem to be slowly phased out to be a more hybrid approach of virtual and face-to-face teams (Tseng & Yeh, 2013). Moreover, the shift in increasingly working virtually has, for similar reasons, also become the preferred mode for delivering training and development interventions, with online learning becoming the new norm (Tseng & Yeh, 2013).

Arguably, the most popular team training and development intervention, in both face-to-face and in an online or virtual contexts, is team building (Lukić & Vračar, 2018). Typically, team

building interventions are designed to improve interpersonal skills and team climate, as well as develop group processes, such as goal setting and interpersonal relationships management (Ciasullo et al., 2017; Klein et al., 2009; Sottilare et al., 2017). The more prevalent team building interventions have been those designed to specifically develop group problem-solving (GPS), as well as related team processes which support GPS, including 1) team cohesiveness, 2) team learning behaviours, and 3) team psychological safety (Ortega et al., 2010; Lamm et al., 2012). Group problem-solving, supported by the socially supportive attitudes and sentiments listed above, is key for team performance and effectiveness outcomes, which when taken collectively, ultimately contribute to organisational performance and sustained success.

Group problem-solving is described as the process of bringing together a group of individuals who work collaboratively or collectively to identify a novel or optimal solution to a problem that they are faced with or tasked to deal with (Lamm et al., 2012). In other words, GPS is a key team process and there is an expectation that team members work synergistically toward a common goal, no matter the mode of interaction used, i.e. face-to-face or virtual (Ciasullo et al., 2017; Lamm et al., 2012). A team's GPS capability is a function of acquired problem-solving skills, as well as supportive or enabling interpersonal or social skills, which include cohesiveness and, individually, team members feeling they can positively contribute to group discussions, make suggestions that will be heard and considered, and even make mistakes without the fear of being ostracised or ridiculed for doing so (Ciasullo et al., 2017; Lamm et al., 2012).

As suggested above, one of the key attitudes or sentiments that support GPS, is the level of cohesiveness or connectedness of individuals within teams. Highly cohesive teams are more likely to unlock the benefits of synergistic effort, which is arguably one of the main reasons organisations favour team decision-making over individuals making decisions in isolation (Greitemeyer & Cox, 2013; Depping et al., 2016). Team cohesiveness is defined as the closeness and/or identification an individual perceives to have with team members, and it is cohesiveness that separates groups from teams (Greitemeyer & Cox, 2013; Depping et al., 2016). As a result, team building interventions are most often designed and implemented in such ways as to instil and improve perceived levels of (inter-) connectedness amongst team members and the team's level of cohesiveness given that it directly contributes to greater GPS and which positively impacts team performance and effectiveness (Greitemeyer & Cox, 2013; Depping et al., 2016). While individuals feeling connected is important, this connectedness could lead to the sharing of

information (Greitemeyer & Cox, 2013; Depping et al., 2016: Edmondson, 1999). This sharing of information could lead to a phenomenon described as team learning (Greitemeyer & Cox, 2013; Depping et al., 2016: Edmondson, 1999).

Team learning is "…an ongoing process of reflection and action, characterised by asking questions, seeking feedback, experimenting, reflecting on results and discussing errors or unexpected outcomes of actions." (Edmondson, 1999, p. 353). Furthermore, Edmondson (1999) described team learning behaviours as being the actions that are taken to achieve the "…process of reflection and action", such as, sharing information (Edmondson, 1999, p. 353). Performing team learning behaviours has further been shown to improve a team's performance through better decision-making quality and a decrease in repeated mistakes (Harvey et al., 2019). However, team learning behaviours are often not performed as individual team members may not be comfortable with admitting that there may have been a mistake (Harvey et al., 2019; Edmondson, 1999; Lukić & Vračar, 2018).

A further key social process in teams, is a team climate that is socially accepting and supportive for team members to 'speak up', in other words, psychologically safe. Team psychological safety is described as "…the shared belief that the team is safe for interpersonal risk-taking…" (Edmondson, 1999, p. 354). Team psychological safety is considered to be a key attitude, as it is positively associated with high levels of innovation and good decision-making abilities (Harvey et al., 2019). Team psychological safety is further believed to be influenced by team members understanding each other's communication styles and practising taking interpersonal risks within a team (Harvey & Edmondson, 2018; Lukić & Vračar, 2018). When team members, however, do not feel comfortable or psychologically safe enough to share their opinions or ideas, i.e. do not perceive the risk of the behaviours as beneficial, it creates a reluctantness to share ideas with the team, which they typically then keep ideas to themselves (Greitemeyer & Cox, 2013; Depping et al., 2016; Harvey et al., 2019). Edmondson (1999) found that a team member needs to feel sufficiently safe to take interpersonal risks before they perform team learning behaviours.

Team building interventions were traditionally developed with face-to-face interaction in mind and to be delivered in brick-and-mortar training rooms. However, the growth of virtual teams globally has led to researchers exploring alternative team-building interventions (Lukić & Vračar, 2018). Lukić and Vračar (2018) have questioned whether the phenomenon that has been described

above concerning face-to-face team building interventions and serious games could be observed similarly during online team-building interventions (Lukić & Vračar, 2018). Moreover, the proponents of the use of gamification and serious games as training methodologies, argue that these more modern approaches are superior to traditional team building methods and activities, and is a way to improve team building interventions (Silic & Lowry, 2020).

Gamification is the use of game-based dynamics/mechanisms in an intervention to improve the delivery of its outcomes (Fleming et al., 2017). Serious games, on the other hand, are described as any video game which is not used for the purpose of pure entertainment, but rather for educational purposes (Keith et al., 2019). In the context of online team building activities, serious games are designed in such a manner as to allow team members to become comfortable with one another without feeling pressures associated with work (Keith et al., 2019; Fleming et al., 2017). Team climate dimensions can be difficult to measure as individuals do not want to have others perceive the team climate as anything other than positive (Schmutz et al., 2018; Hughes et al., 2016; Sitzmann & Weinhardt, 2018; Brown & Benson, 2020). The difficulty of measuring team climate dimensions has often been attributed to the fact that employees struggle to bad mouth other team members as they fear that their work may also be scrutinized and critiqued as well (Schmutz et al., 2018; Hughes et al., 2016; Sitzmann & Weinhardt, 2018; Brown & Benson, 2020). It has been suggested that utilising a serious game in team-building could lessen the pressurised environment that participants experience (Fleming et al., 2017; Keith et al., 2019). Additionally, the non-work, fun environment allows participants to engage in the learning outcomes as they are less likely to perceive that their engagement in the learning outcomes as affecting other's perception of their performance in the team (Fleming et al., 2017; Keith et al., 2019).

Notwithstanding the wide-spread shift to working and learning virtually, as described above, there is a dearth of research studies that have evaluated the utility and effectiveness of online team training and development interventions, as compared to traditional face-to-face interventions. In other words, research studies that address the question asked above as to whether traditional team-based interventions are in fact portable to online platforms and a virtual 'training room' (Lukić & Vračar, 2018). Moreover, few studies could be found that have explicitly compared the efficacy of the two modes of training deliver (i.e. using traditional team building activities or serious games), within the context of team building.

As suggested above, the importance of teams that function optimally and bring about desirable team and organisational outcomes are of even strategic importance for organisations, given the link to organisational performance and success. As a result, the need to effectively develop these characteristics within teams have ensured that team building is a vital organisational process in and of itself, making these questions worth of research attention (Hughes et al., 2016; Gorman et al., 2020). The present research study was an attempt to answer both of these questions and so contribute to addressing a gap which was identified in the current body of training design and delivery literature.

The substantive aim of the present study was, therefore, to investigate whether the use of serious games in team building is a more effective method or approach to bring about higher levels of GPS, team cohesiveness, perceived team psychological safety and team learning behaviours, than doing so using traditional team building activities in a face-to-face context, as well as in a virtual or online context. To achieve this aim, two quasi-experiments were conducted for the purposes of the present study. The research objective of the first quasi-experiment was to evaluate the efficacy of face-to-face serious games versus traditional team building activities, while the research objective of the second quasi-experiment was to further investigate whether there was transferability of team building activities to an online space , and to see whether an online serious game team building activity leads to higher levels of perceived psychological safety and team learning behaviours than an traditional team building activity that is just present virtually.

It is hoped that the findings contribute to the theory and practice of team building given its importance in organisations, as well as providing empirical evidence that using serious games, in both a face-to-face and online team building context, leads to higher levels of GPS, team cohesiveness, perceived team psychological safety and team learning behaviours than using traditional team building approaches that are also delivery in person or virtually. It is further hoped that the present study will contribute to further research into the efficacy of serious games in team building, as well as other training and development interventions.

Conclusion

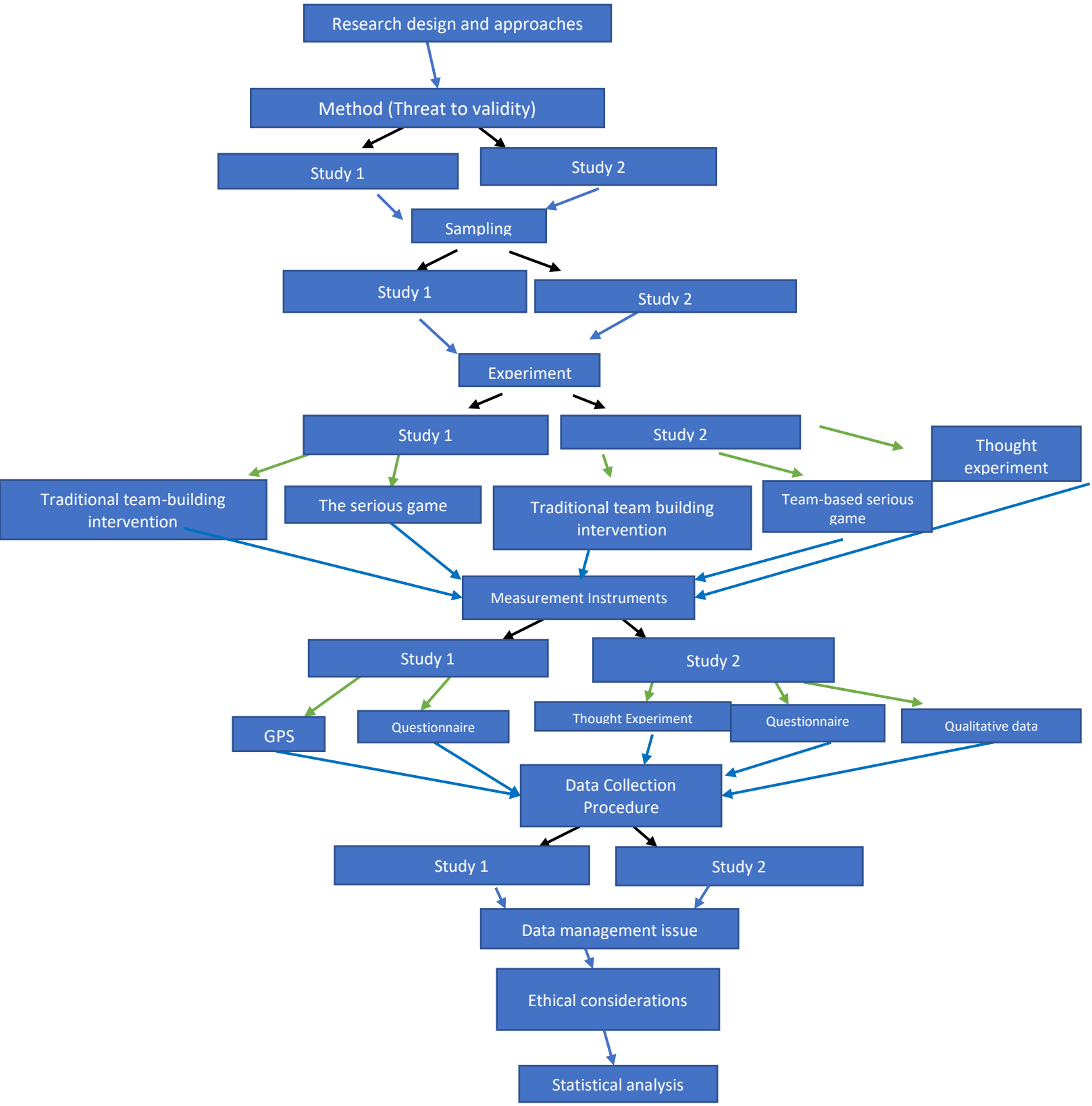
The present chapter was utilised to establish the research aim which was to determine whether or not there was a significant difference between groups that participate either in a traditional team

building activity or a team building activity utilising a serious game. The argument above, described how the utilisation of serious games in a face-to-face or an online team building intervention are more effective in improving three team climate dimensions than traditional team building interventions. These three team climate dimensions were 1) team cohesiveness, 2) team psychological safety and, 3) team learning behaviours. Furthermore, it was argued that the three team climate dimensions above are utilised to support the process of GPS and that team building interventions are supposed to improve all four of the dimensions mentioned. The present study was undertaken over two years and is a combination of two quasi-experimental studies. The design and method of the present study has been demonstrated in figure one below.

The following chapter is a review of the relevant literature concerning the dimensions described in the argument. The present literature review is utilised to expand upon the arguments that were presented in the present introduction chapter.

Figure 1

Study design and method flow chart



Note. Breakdown of present research design and methods.

CHAPTER 2

LITERATURE REVIEW

The present chapter was structured to present the argument for the present study and in order to establish the present hypotheses. Initially, the literature review was utilised to establish a broad understanding of what team building is and what its importance is in training and development. Subsequently, generic indicators that were established through literature to understand what systems and ways of presenting team building are important regardless of the mode of delivery of the intervention.

After the generic indicators were established, the difference between traditional team building interventions and team building interventions that utilise serious games. The different types were defined, design properties of the interventions were established and, finally the advantages and disadvantages were established for both types of interventions. Once an understanding of the difference between the modes of delivery established, an investigation was done to establish evidence for how each mode of deliver of the team building intervention affected the outcome variables.

The four outcome variables were established as variables that were commonly meant to be improved by both modes of training delivery. Ultimately, the literature that was investigated was utilised to formulate four hypotheses about the effects of each mode of training delivery on the four outcome variables.

Team Building

As stated above, team building interventions are important for organisations, given the benefits that working on a problem collaboratively offers over individuals attempting to generate solutions on their own.

Team building activities have often been designed to improve interpersonal skills and team climate (Ciasullo et al., 2017; Klein et al., 2009; Sottilare et al., 2017). Moreover, the development of group processes is also typically embedded in the design of team building activities (Ciasullo et al., 2017; Klein et al., 2009; Sottilare et al., 2017). The group processes that are developed

include goal setting, interpersonal relationship management, and group problem-solving (Ciasullo et al., 2017; Klein et al., 2009; Sottilare et al., 2017). Group problem-solving (GPS) seems to be the dimension most commonly set learning outcome, as mentioned above (Ortega et al., 2010; Lamm et al., 2012). GPS and the other supporting team climate dimensions described above are often observed as antecedents for team, and organisational performance (Ciasullo et al., 2017; Klein et al., 2009; Sottilare et al., 2017; Ortega et al., 2010; Lamm et al., 2012). The statements above have been a motivating factor in exploring the effects of training on the four dimensions of 1) team learning behaviours, 2) team cohesiveness, 3) team perceived psychological safety and, 4) GPS. Subsequently, the four dimensions are utilised benchmarks for measuring the successfulness of team building interventions in the present study.

Team building interventions, such as those described above, were traditionally developed with face-to-face interaction in mind and to be delivered in brick-and-mortar training rooms. With teams increasingly meeting and collaborating virtually, and as team building interventions increasingly are being presented online rather than in the traditional face-to-face mode of delivery, it begs the question whether traditional team-based interventions are portable to online platforms and a virtual context (Lukić & Vračar, 2018).

The Fundamentals of Team Building Interventions

There are, irrespective of the mode and/or context with which the training intervention is delivered, there are certain training and development fundamentals related to adult learning and training design that are key in designing and implementing an effective team building intervention that need to be kept in mind.

When training teams it has been shown that the transfer of knowledge and skills is more likely to occur when the teams are allowed to interact with each other when being taught (Schmutz et al., 2018; Brown & Benson, 2020). Harman et al. (2015) observed that trainees preferred to learn team skills in a practical manner. Moreover, Sitzmann and Weinhardt (2018) observed that team members are more likely to perceive themselves as engaged in the training when the content is clearly linked to the goal of the training. However, while there are often explicit goals for a training course, individuals too have their own goals for being part of training (Sitzmann & Weinhardt, 2018). Individual goals are often within a person's processes and are difficult to influence

externally (Hughes et al., 2016). However, social learning theories can be utilised to show how one could encourage individuals to create training goals (Sitzmann & Weinhardt, 2018). Schmutz et al. (2018), found that if employees observe other team members creating and utilising training goals, especially supervisors, then they are more likely to create and pursue a training goal. Yet, individual motivations are not the only factors that influence how team training is perceived (Schmutz et al., 2018; Hughes et al., 2016).

The perception of team training is often based on social norms and the culture of a team (Harman et al., 2015; Schmutz et al., 2018). Brown and Benson (2020) observed that teams with supervisors who did not perceive training as useful were more likely to not participate or have difficulty learning skills in training sessions. However, utilising team needs analyses and including teams in developing training is likely to create greater buy-in from a team (Schmutz et al., 2018; Hughes et al., 2016). Buy-in and engagement are seen as important influences on the successfulness of team training (Schmutz et al., 2018; Hughes et al., 2016; Sitzmann & Weinhardt, 2018; Brown & Benson, 2020).

When more trainees are engaged in a training activity, the more likely they are to acquire knowledge or skills (for example, Harman et al. 2015; Schmutz et al., 2018; Hughes et al., 2016; Brown & Benson, 2020). Murphy et al. (2015) observed that teams are more engaged in simulation training as they feel it represents closer to their actual work. Due to this, many training courses are designed around a non-pressurized environment that resembles how one would actually work (Brown & Benson, 2020).

Team training seems to become challenging when the outcomes are not to train explicit knowledge, skills and, abilities (KSA), but rather to develop abstract attitudes and sentiments, such as team climate dimensions (Brown & Benson, 2020; Murphy et al., 2015; Sitzmann & Weinhardt, 2018). Team climate dimensions are latent variables that are utilised to show the state of the social interactions within a team (Loeb et al., 2016). Team climate dimensions are, for several reasons, challenging to develop with a training intervention (Schmutz et al., 2018; Hughes et al., 2016; Sitzmann & Weinhardt, 2018; Brown & Benson, 2020). Schmutz et al. (2018) observed that there is a statistically significant amount of team members would lie to make their team be perceived more positive by the administrators of the survey or the organisation's management. Although, it has been suggested to mitigate the negative effects of the above situation and to improve a team's

motivation for training is to create an explicit goal that can be linked to the course material (Sitzmann & Weinhardt, 2018). Having a clear goal that encourages motivation for trainees is one of the most challenging issues when 'training' team climate dimensions (Schmutz et al., 2018; Hughes et al., 2016; Sitzmann & Weinhardt, 2018; Brown & Benson, 2020). Creating explicit goals for team climate dimensions are difficult as the skills and capabilities improved for the teams often are not tangible or obvious (Sitzmann & Weinhardt, 2018). Due to this, many researchers have attempted to find the best method of training for team climate dimensions (for example, Schmutz et al., 2018; Hughes et al., 2016; Brown & Benson, 2020; Sottilare et al., 2017). Sottilare et al. (2017) observed that one of the most successful ways to improve team climate dimensions was through utilising team building activities.

Modes of team building intervention delivery

Team building interventions were traditionally developed with face-to-face interaction in mind and to be delivered in brick-and-mortar training rooms. This mode of delivery is still used in some instances but is quickly being replaced with more modern approaches, such as the gamification of training, of which, the use of serious games is the most common method or approach to do this. These two modes of training delivery are discussed here in further detail.

Traditional team building

Traditional team building activities have been designed to be group process discussions where teams are asked to complete work-related tasks outside the context of work (Sottilare et al., 2017). The traditional team building activities are typically designed to improve interpersonal skills and team climate dimensions, additionally they are also typically designed to improve team member's skills, and change their attitudes and behaviours (Sottilare et al., 2017; Ciasullo et al., 2017). More recently, researchers have argued that traditional team building activities do not affect the skills, attitudes and or behaviours that they are designed to (Sottilare et al., 2017; Ciasullo et al., 2017).

Klein et al. (2009), analysed four key factors that team building is designed to improve. The four key factors were: 1) role clarification, 2) GPS, 3) goal setting skills, and 4) Interpersonal relationship management (Klein et al., 2009). Through their research, Klein et al. (2009) found that although, traditional team building is designed to affect these four factors, it seems that role

clarification and goal setting skills were the two factors that were significantly affected. While GPS and interpersonal relationship management were not significantly affected (Klein et al., 2009). Vallejo et al. (2016), measured the effect of team building activities on project teams and found that all four key factors were all significantly improved after a team building activity. Vallejo et al. (2016), argued that Klein et al. (2009) focused on large teams, teams with over eight members, while the focus of team building activities is on small team (Tuckman & Jensen, 1977). However, Klein et al. (2009), reported in their meta-analysis that they viewed research on both large and small teams and found that while effect sizes varied, goal setting skills and role clarification had the largest effect sizes no matter the size of the team (Ciasullo et al., 2017).

There are at least two reasons why traditional team building activities are not as effective as they are designed to be (for example, Klein et al., 2009; Ciasullo et al., 2017; Armstrong & Jackson-Smith, 2013). One reason is that traditional team building activities are designed to improve as many factors as possible in a single intervention (Klein et al., 2009; Ciasullo et al., 2017; Armstrong & Jackson-Smith, 2013). Sottilare et al. (2017) criticised the unfocused approach by referencing that other team interventions are designed to improve more than a single skill and so traditional team building activities should be able to be designed similarly. However, Klein et al. (2009), argued that due to interpersonal skills and team climate dimensions being developed in traditional team building there is a greater need for buy in from all team members as even a single team member that does not buy in can affect the transfer of these skills, attitudes and behaviours. The unfocused design leads to a second reason traditional team building is not as effective as intended (Ciasullo et al., 2017; Ortega et al., 2010). That is because the delivery of traditional team building activities is through a singular approach and attempts to develop skills as if teams are homogenous groups (Ciasullo et al., 2017; Ortega et al., 2010). Teams are designed to be heterogenous so that teams can come together to share their diverse skills and attributes to creatively solve problems, implement ideas and be innovative (Hoch & Kozlowski, 2014; Sottilare et al., 2017). However, Teams are thought of as a cohesive unit that should be treated as one entity when training them (Hughes et al., 2016; Gorman et al., 2020).

Designing team interventions that are a singular approach to teach homogeneous groups often leads to confusing learning outcomes for team members (Hoch & Kozlowski, 2014). Team members feel that the intervention does not apply to them when the singular approach does not suit their learning style (Hoch & Kozlowski, 2014; Sottilare et al., 2017). The singular approach

leads to team members being unengaged in an intervention (Hoch & Kozlowski, 2014; Sottilare et al., 2017). The reason teams were built was to create a diverse group of people that think differently and therefore can combine their diverse thought processes to achieve complex tasks (Keith et al., 2018; Laitinen & Valo, 2018; Pridmore & Godin, 2020). When traditional team building was conceptualised, it was supposed to improve these heterogeneous groups so that their interpersonal relationships could be improved (Lacerenza et al., 2018; Laitinen & Valo, 2018). However, most traditional team building activities only cater to one specific group (Lacerenza et al., 2018; Pridmore & Godin, 2020). When designing team building activities that are supposed to improve interpersonal skills, change behaviours and attitudes, engagement is important as these areas require buy in from the entire team (Lacerenza et al., 2018; Pridmore & Godin, 2020).

Traditional team building is generally conducted in a face-to-face format (Pridmore & Godin, 2020; Laitinen & Valo, 2018). This is an issue for teams that work online, as they do not usually interact face-to-face (Pridmore & Godin, 2020; Laitinen & Valo, 2018). Pridmore & Godin (2020) suggest that traditional team building for online teams should be taken online. Traditional online team-building activities would be similar to face-to-face traditional team building activities, however, it would be done through the medium of communication that the online teams use, for example voice or video chat (Pridmore & Godin, 2020; Laitinen & Valo, 2018). The use of traditional online team-building allows for online team members to find different and creative ways to communicate through their constricted communication medium (Fapohunda, 2013; Lacerenza et al., 2018). This is in line with experiential learning theory as adults learn through their experiences and so constantly being put in the same context but with different tasks could create learning of how best to interact in that context (McCarthy, 2016). However, traditional online team building still has the same issues as face-to-face traditional team building (Fapohunda, 2013; Lacerenza et al., 2018). It still can be used poorly by trying to improve the same four factors at once instead of focusing the approach (Fapohunda, 2013; Lacerenza et al., 2018).

Traditional online team-building interventions have been found to have higher internal validity when used for online than face-to-face traditional team building activities (Fapohunda, 2013; Lacerenza et al., 2018). However, this is still not high enough to be consider worth using on a regular basis as they are not designed with the diverse team members, that are especially present in online teams, in mind (Fapohunda, 2013; Lacerenza et al., 2018; Lukić & Vračar, 2018; Pridmore & Godin, 2020; Laitinen & Valo, 2018). The lack of diverse training techniques weakens

the growth of an online team's learning abilities (Lukić & Vračar, 2018; Pridmore & Godin, 2020; Laitinen & Valo, 2018). Miller et al. (2018), observed that teams of consultants that were trained in a strictly singular pedagogy seemed to be significantly worse at performing the skills of the training than groups that learnt in a flexible pedagogy.

Finally, in traditional team building interventions, engagement is difficult to enlist (Klein et al., 2009; Aga et al., 2016). Engagement is, however, a vital aspect of learning (Shute et al., 2016). Engagement is often forced on employees through the idea that traditional team building activities are fun – even when they are not (Klein et al., 2009; Aga et al., 2017). Many employees view traditional team building as a waste of time and employees dislike the time taken away from either their work or personal time (Aga et al., 2016; Klein et al., 2009; Ciasullo et al., 2017). It is argued here that the problem does not lie with team building *per se*, but the lack of focus in team building activities. Employees need to know how team building activities will help them in their daily work tasks, before they feel engaged or committed to completing the activity (Klein et al., 2009; Ciasullo et al., 2017). Furthermore, the activities need to be fun– something that is evident when watching people spend hours on end playing games.

Gamification in Team Building Interventions

The gamification of organisational training, i.e., training utilising serious games, is one popular approach that organisations have begun to explore given the way games are designed (Marlow et al., 2017; Klein et al., 2009).

Serious games that are utilised in online team building activities are called team-based serious games (Keith et al., 2018; Pridmore & Godin, 2020). Team-based serious games most commonly ask players to attempt to achieve a common goal by working together (Pridmore & Godin, 2020). Waddell & Peng (2014) observed that respondents that played cooperative video games were more likely to perform cooperative behaviours, like sharing information, than respondents that played competitive video games. The cooperative nature of team-based serious games has been given as a reason for the increased engagement when training using serious games (Pridmore & Godin, 2020). The serious games that are suggested for online team building are games that are designed for players to work together and there is no competitive element to the game only the achievement of a common goal (Smohai et al., 2016; Keith et al., 2018; Pridmore & Godin, 2020).

Research has shown the added benefits of using video games as a medium to teach different KSA (Keith et al., 2018; Coovert et al., 2017; Stettina et al., 2018; Kam & Umar, 2018; Zhang et al., 2018; Wang et al., 2019; Silic & Lowry, 2020). Online team-based video games have led to an even greater use of video games in training, as it now not only can be used as a way to teach individuals but a way to train teams in a more collaborative process (Keith et al., 2018; Coovert et al., 2017; Stettina et al., 2018; Kam & Umar, 2018; Zhang et al., 2018; Wang et al., 2019; Silic & Lowry, 2020).

Online teams often struggle with communication issues due to the technological constraints that are placed in front of them (Hacker et al., 2019; He et al., 2018). The need for practicing their communication skills within the context they usually communicate is important to improve these skills (Hacker et al., 2019; He et al., 2018). Team-based serious games are an opportunity for online teams to practice their communication skills with their team in a less pressured environment so that there are less misunderstandings and interpersonal conflicts due to technological communication (Wang et al., 2019; Silic & Lowry, 2020; Pridmore & Godin, 2020). Individuals that participate more in online video gaming were found to be more comfortable communicating via voice and video call than those that only participated in single player video games (Pridmore & Godin, 2020).

Training interventions to improve Group problem-solving

Problem-solving is defined as cognitive processes that are used to identify a current state and to change this state to its final state, despite the change of states not being clear (Dostál, 2015; Shute et al., 2016). Once a person has perceived a situation to be problematic, they need to be willing and creativily able to deal with the problematic situation (Dostál, 2015; Shute et al., 2016). A useful tool in problem-solving is the ability to take past experiences and apply them to the current situation to solve the current problem (Dostál, 2015; Shute et al., 2015; Lamm et al., 2012).

The typical facets of problem-solving are similar for GPS but one further skill is utilised, i.e. the ability to listen to the ideas of others (Dostál, 2015; Shute et al., 2015; Vijayaratnam, 2012; Lamm et al., 2012). The ability to listen to other people's ideas and combine them with one’s own ideas is a skill that is vital for GPS (Vijayaratnam, 2012; Lamm et al., 2012). A team’s capability to listen to one another; being able to communicate ideas effectively, and criticise ideas fairly are the key differences between GPS and problem-solving (Vijayaratnam, 2012; Lamm et al., 2012).

GPS skills, while complex, can be improved through the development of soft skills (Vijayaratnam, 2012; Lamm et al., 2012). In this context, soft skills are an individual's ability to communicate and positively interact with others (Vijayaratnam, 2012; Lamm et al., 2012).

In order to improve soft skills within a group, communication needs to be improved (Vijayaratnam, 2012; Lamm et al., 2012). Lamm et al. (2012) suggested that in order for groups to effectively problem solve, there needs to be an ability to communicate ideas in an efficient manner. This allows a group to assess all options (Lamm et al., 2012). Groups have different combinations of individual personalities. More homogenous groups generally have fewer issues with communication (Lamm et al., 2012). However, most teams are made up of a vast array of personalities, i.e. are more heterogeneous and as a result are naturally less adept at communicating effectively (Lamm et al., 2012). While homogenous groups have fewer communication issues, individuals can still feel excluded from the group or may dislike some in the group, making communication issues increase (Lamm et al., 2012; Hood et al., 2017; Bozanta et al., 2016; Lvina et al., 2018; Thompson et al., 2015; Wickramasinghe & Nandula, 2015). However, teams that are closer often have less communication issues (Lamm et al., 2012; Hood et al., 2017; Bozanta et al., 2016; Lvina et al., 2018; Thompson et al., 2015; Wickramasinghe & Nandula, 2015). High levels of team cohesiveness seem to indicate teams that are closer (Lamm et al., 2012; Hood et al., 2017; Bozanta et al., 2016; Lvina et al., 2018; Thompson et al., 2015; Wickramasinghe & Nandula, 2015).

Developing GPS: Traditional Team Building Interventions vs Serious Games

GPS was one of the main factors supposed to be improved in many traditional team building activities (Klein et al., 2009). Furthermore, GPS is supposed to improve a team's likelihood of successfulness of a decision (Dostál, 2015; Shute et al., 2016). It was argued above that there is evidence to suggest that traditional team building is not as effective in developing GPS skills (Adachi & Willoughby, 2013; Mayo, 2009; Klein et al., 2009).

Problem-solving is, however, an essential feature of many video games and has an iterative function (Adachi & Willoughby, 2013; Boyle et al., 2016; Mayo, 2009; Sánchez & Olivares, 2011; Marlow et al., 2018; Emsley & Rumeser, 2018). When people play a video game and fail a level, they typically do not give up and leave. They start the level again with a new approach and learn from why they failed the last attempt (Adachi & Willoughby, 2013; Mayo, 2009; Sánchez &

Olivares, 2011). Failure in video games allows players to attempt several different strategies and get immediate feedback on what strategies work and how they can better their teamwork (Smohai et al., 2016). The attempting of different strategies allows for teams to practice taking interpersonal risks like experimenting (Smohai et al., 2016; Edmondson, 1999). Adachi & Willoughby (2013), noted a phenomenon called rage quitting where players in video games would fail to a certain point in a video game and then decide that they could no longer play and abruptly quit the game in an aggressive manner, usually lashing out at their teammates. However, rage quitting was found to occur more frequently in team-based video games where teams were made to play against each other and losing to the other team damaged the pride of the individual (Adachi & Willoughby, 2013; Smohai et al., 2016). When a person fails to solve a problem and then goes back with a new idea or approach to tackle the problem, suggests that they have learnt problem-solving skills (Adachi & Willoughby, 2013; Mayo, 2009; Sánchez & Olivares, 2011).

The mechanics of the game need to be understood in order to create a strategy for the game (Adachi & Willoughby, 2013; Sánchez & Olivares, 2011). This strategy then needs goals so that it can be successful (Adachi & Willoughby, 2013; Sánchez & Olivares, 2011). These activities contribute to people learning problem-solving skills as they have to both create a set of goals for each attempt and learn from their failed attempts (Adachi & Willoughby, 2013; Sánchez & Olivares, 2011). Moreover, video games use various ways to incentivize collaboration in order to learn from these failed attempts (Sánchez & Olivares, 2011).

GPS occurs when group members work together in order to define their roles so that they can complement each other's skills (Sánchez & Olivares, 2011). When presented with a challenge in a team-based video game, the best way to solve challenges is to work together and use suggestions from other team members in an effort to be more successful (Adachi & Willoughby, 2013; Sánchez & Olivares, 2011). This creates a sense of personal value amongst people that have different skills and personalities, and this is what creates a diverse group that works towards a common goal (Adachi & Willoughby, 2013; Sánchez & Olivares, 2011; Lamm et al., 2012). However, if there is low cohesiveness in a group when playing a video game, failure is more likely and often leads to a confrontation (Adachi & Willoughby, 2013; Sánchez & Olivares, 2011). Given the importance of trust in effective group functioning, including dealing effectively with conflict is, therefore, an important factor in problem-solving and team building (Klein et al., 2009; Mayer, 2018).

The immediate feedback from serious games allows teams to understand how well their approaches worked in solving a problem (Wang et al., 2019; Silic & Lowry, 2020; Pridmore & Godin, 2020). Feedback helps team members understand how their communication could have been better and how their implementation process of their decision could have been more efficient (Wang et al., 2019; Silic & Lowry, 2020; Pridmore & Godin, 2020). Stettina et al. (2018), observed that teams that were asked after participating in a serious game to apply what they had learnt to their own work challenges and task, the participants reported learning more from the serious game team building activity than those that only participated in the traditional team building activity. This shows that contextualisation and feedback of these serious games is important for the learning process of the team members (Stettina et al., 2018).

Team cohesiveness

Team cohesiveness is the amount to which team members are attracted to one another and a measure of the team's closeness (Bozanta et al., 2016). Team cohesiveness has been shown to improve a team's performance (Bozanta et al., 2016; Wickramasinghe & Nandula, 2015). Mayer (2018) observed that teams with greater team cohesiveness were more likely to be successful in completing a task than teams with lower team cohesiveness. Furthermore, Lvina et al. (2018) found that teams were less likely to have conflict the greater their team cohesiveness. Researchers believe that the decrease in conflict is due to team members feeling more comfortable with the other members and do not want to break the comfort within the team (Lvina et al., 2018; Mayer, 2018; Bozanta et al., 2016).

Time and experiences seem to be the biggest influences in improving team cohesiveness (Lvina et al., 2018; Bozanta et al., 2016). It has been shown that teams who last longer and more often interact seem to have higher levels of team cohesiveness (Bravo et al., 2019; Wang et al., 2017). However, Wang et al. (2017) noticed that training interventions that allowed teams to have more fun and that were perceived as more engaging lead to a greater improvement in team cohesiveness. This shows that time together is important but having positive interactions with the other team members is also important (Bravo et al., 2019; Wang et al., 2017; Lvina et al., 2018).

Team cohesiveness is developed in many different ways (Wang & Wagner, 2018; Lvina et al., 2018; Riccobono et al., 2016). Bozanta et al. (2016) observed that team training that was enjoyable and seems to be easy to understand seems to improve team cohesiveness significantly more than

team training that was perceived as unenjoyable. However, it was found that team's with already high levels of team cohesiveness seem to find tasks more enjoyable (Wang & Wagner, 2018). Although, Lvina et al. (2018) found that team engagement would increase the more a group's team cohesiveness increased. The more one seems to be engaged the less likely they are to lash out and create conflict within a group (Lvina et al., 2018).

It seems that although there is a decrease in conflict within a team, this could be detrimental to the team's performance if all conflict is avoided (Lvina et al., 2018; Mayer, 2018; Bozanta et al., 2016). Wang and Wagner (2018) observed that teams with team cohesiveness scores in the top 5% of their sample were more likely to also have high levels of groupthink. Groupthink has been shown to create teams that do not attempt new and innovative ideas and they often repeat mistakes (Wang & Wagner, 2018; Lvina et al., 2018). Furthermore, groupthink can cause trust issues in leadership if they disagree with the group (Wang & Wagner, 2018; Lvina et al., 2018). However, high levels of groupthink and team cohesiveness can often lead to a quicker decision (Wang & Wagner, 2018; Lvina et al., 2018; Riccobono et al., 2016).

High levels of team cohesiveness seem to be a problem as teams can develop groupthink behaviours (Wang & Wagner, 2018; Lvina et al., 2018). However, it seems that a team who has high levels of team cohesiveness, but they also believe that taking interpersonal risks is justified within the team, they are less likely to perform groupthink behaviours (Wang & Wagner, 2018; Lvina et al., 2018). Moreover, interpersonal risk taking can also lead to other positive outcomes when the safety for these actions is perceived high within a team (Edmondson, 1999; Harvey et al., 2019; Mehta & Mehta, 2018; Sanner & Bunderson, 2015).

Developing Cohesiveness: Traditional Team Building Interventions vs Serious Games

Traditionally, team building interventions' designs have been utilised to focus on improving interpersonal relationships (Keith et al., 2018; Pridmore & Godin, 2020). Team cohesiveness is one of the dimensions that forms interpersonal relationships (Wang & Wagner, 2018; Lvina et al., 2018). Traditional team building interventions have often been marketed or promoted by supervisors and as others as an enjoyable activity that can help bring teams closer together (Wang & Wagner, 2018; Lvina et al., 2018). As mentioned above, one of the issues of traditional team building has been that they are supposed to be enjoyable and yet many do not find them fun (Bravo et al., 2019; Wang et al., 2017). Alternatively, research has been utilised to show

that utilising serious games in team building interventions is perceived as enjoyable by participants (Keith et al., 2018).

The recent adoption of video games as a pass time for many individuals has meant that many adults are now more aware of the general mechanics that are present across multiple different video games (Mayer, 2018; Bozanta et al., 2016). Keith et al. (2018) observed that teams that participated in team-based serious games perceived their experience was more enjoyable and engaging than those who participated in a traditional team building activity. It has been suggested that due to the uptake in video games as a hobby for many individuals it has become easier to gain buy-in from participants as they do not necessarily have to a learn new training system or technique (Mayer, 2018; Bozanta et al., 2016; Keith et al., 2018).

The reason that this is important for improving team cohesiveness is that unlike in the past, trainees do not need as much guidance on how serious games work, leading to less frustration among trainees as they do not have to struggle understanding the serious game (Mayer, 2018; Bozanta et al., 2016; Keith et al., 2018). Furthermore, it allows for teams to focus on the purpose of many serious games, which is to be fun while also improving team members' skills (Silic & Lowrey, 2020; Mayer, 2018). As described above, team cohesiveness is more likely to improve when the team building intervention is fun (Bravo et al., 2019; Wang et al., 2017; Lvina et al., 2018). Consequentially, many researchers have observed that participants in serious games often rate their enjoyment higher than that of a traditional team building intervention (for example, Keith et al., 2018; Bravo et al., 2019; Mayer, 2018; Silic & Lowrey, 2020).

The enjoyable aspects of serious games are seen to help create the unpressurized environment that could lead to an improvement in team cohesiveness (Keith et al., 2018). However, engagement that seems to occur due to serious games is still thought of as the most important factor in improving the chances of achieving learning outcomes (Keith et al., 2018; Bravo et al., 2019; Mayer, 2018; Silic & Lowrey, 2020). It has been suggested that serious games promotes engagement as there is often a clear link to the goals or learning outcomes of the team building activity (Bravo et al., 2019). The link, from serious games to the learning outcome of greater team cohesiveness, that is often perceived is due to teams' understanding that serious games, or video games, are designed to be fun and give people the opportunity to have fun together (Keith et al., 2018; Bravo et al., 2019; Mayer, 2018; Silic & Lowrey, 2020). It has been argued that traditional team building interventions too elicit fun experiences for participants (Wang &

Wagner, 2018). However, Keith et al (2018) found that individuals often find traditional team building interventions as unenjoyable as they are perceived as an extra task that cuts into employees' free time. Furthermore, the participants in Bravo et al.'s (2019) study described the feeling of unable to choose their preferred which made them feel that the attempt to create closeness between the teammates was disingenuous. This seems to suggest that the perception of video games being more engaging as a factor that could contribute to greater amount of closeness occurring after participating in a team-based serious game.

Team Psychological safety

Edmondson (1999) defined psychological safety as "a shared belief that the team is safe for interpersonal risk taking" (p. 354). Interpersonal risks are described as admitting one's mistake and experimenting (Harvey et al., 2019). Psychological safety is an individual construct but is also examined at the group level (Edmondson & Harvey, 2018; Harvey et al., 2019; Edmondson, 1999). Psychological safety at the group level is characterised as the entire group viewing interpersonal risk taking as a safe action within the group (Harvey et al., 2019; Edmondson, 1999). Psychological safety within face-to-face teams is well documented at increasing team learning and experiential learning (Edmondson, 1999; Sanner & Bunderson, 2015). However, research has shown that it could have similar effects in online teams (Bradley et al., 2012; Ortega et al., 2010).

Ortega et al. (2010), found evidence that when psychological safety is higher in online teams then not only is there greater team learning behaviours, but online team members are more likely to have greater technological adoption rates. This is helpful for long term online teams as technology is evolving constantly (Ortega et al., 2010; Bradley et al., 2012; Mehta & Mehta, 2018). Online teams are likely to constantly need to keep up to date with the latest technology and also feel more comfortable in changing the communication technology they use (Ortega et al., 2010; Mehta & Mehta, 2018). The interchanging of communication technology allows for a greater flow of construct controversy between the different mediums of communication and decreased likelihood of conflict arising from these discussions (Bradley et al., 2012; Ortega et al., 2010).

Edmondson & Lei (2014) argued that teams that feel psychologically safe are more likely to perform team learning behaviours. Sanner & Bunderson (2015), argued that although, a lot of empirical evidence supports psychological safety as an antecedent to team learning behaviours, that the task environment is a factor that is largely ignored in psychological safety research and

could explain the variation in the results. Harvey et al. (2019), contended that the task environment does dictate whether perceived psychological safety is effective. Teams that perform tasks that are on a timetable or are repetitive and mundane could lead to time wasting if there are high levels of psychological safety (Harvey et al., 2019). Whereas Harvey et al. (2019), observed teams that perform knowledge-driven tasks benefit from high levels of perceived psychological safety.

Team leaders are suggested to be the catalysts of the perception of psychological safety (Edmondson, 1999; Sanner & Bunderson, 2015; Harvey et al., 2019). Researchers noted that team leaders who take interpersonal risks and do not punish others that also take interpersonal risks encourages the perception of a psychologically safe environment (Edmondson, 1999; Sanner & Bunderson, 2015; Harvey et al., 2019). However, recently, researchers have argued that the social learning of psychological safety from leaders is not the most effective way to encourage interpersonal risk taking (Alaka et al., 2019; Bradley et al., 2012). Alaka et al. (2019), argued that, although team leaders set the initial perception of the group climate, the continued work within groups should create an atmosphere from each team member that the group climate is psychologically safe. If team leaders are supportive of psychological safety, then team members could only feel psychologically safe with team leaders and not with other members of the group (Bradley et al., 2012; Alaka et al., 2019). Bradley et al. (2012), observed that team interventions that focus on communication skills within a team improved the perception of team psychological safety more than team interventions that focus on goal training. However, organisations have recently been investigating different interventions to improve the perception of psychological safety (Alaka et al., 2019; Harvey et al., 2019; Fleming et al., 2017).

Developing Psychological Safety: Traditional Team Building Interventions vs Serious Games

Online teams' goals are important to specify in order for team member to understand what their functionality is (Ortega et al., 2010; Bradley et al., 2012; He et al., 2018; Hacker et al., 2019). This means that the team member set up for an online team should include individuals that are highly ambitious as they are more willing to work in an innovative workspace like the virtual workspace (Ortega et al., 2010; Bradley et al., 2012; He et al., 2018; Hacker et al., 2019). However, highly ambitious individuals could prioritize their individual goals over the online team's goals (Ortega et al., 2010; Bradley et al., 2012; He et al., 2018; Hacker et al., 2019). This is detrimental

to the online teams as if another individual is seen to prioritise their own individual goals over the online team's goal it will create conflict within the team (Ortega et al., 2010; Bradley et al., 2012; He et al., 2018; Hacker et al., 2019). While this is true, Ortega et al. (2010), found that when an online team had high psychological safety ambitious individuals were more likely to prioritise the online team's goals over their own individual goals. This is reflected in the theory as high levels of perceived psychological safety means that there is greater emotional connection within the online team, therefore, they wish the team to thrive as they understand that the online team's goals will help them in the long run (Ortega et al., 2010; Bradley et al., 2012; He et al., 2018; Hacker et al., 2019).

Many online teams are made up of highly skilled individuals and all team members understand that each member has strengths (Ortega et al., 2010; Bradley et al., 2012; He et al., 2018; Hacker et al., 2019). However, often knowing about these skills does not enable complete interpersonal risk taking (Edmondson, 1999; Ortega et al., 2010; Bradley et al., 2012; He et al., 2018; Hacker et al., 2019). This is because team members do not want to risk creating conflict as they do not feel comfortable that challenging another person's idea or admitting their fault will not lead to anger from the other team members (Edmondson, 1999; Ortega et al., 2010; Bradley et al., 2012; He et al., 2018; Hacker et al., 2019). This is why psychological safety is important as it allows for the application of experiential learning and shows a positive relationship between psychological safety and team learning behaviours (Harvey et al., 2019; Edmondson, 1999; Ortega et al., 2010; Bradley et al., 2012; He et al., 2018; Hacker et al., 2019; McCarthy, 2016).

However, a team should be aware of their decisions that lead to mistake and learn from them (Harvey & Edmondson, 2018; Chen et al., 2010; Mitchell & Boyle, 2015; Edmondson, 1999; Ortega et al., 2010; Bradley et al., 2012). Team members often struggle to utilise all the resources at their disposal (Harvey & Edmondson, 2018; Chen et al., 2010; Mitchell & Boyle, 2015; Edmondson, 1999; Ortega et al., 2010; Bradley et al., 2012). This is why there are often many repeated mistakes within organisations (Edmondson, 1999). Improving perceived team psychological safety may make one take interpersonal risks but one of the main reasons for taking interpersonal risk is so that one can learn (Harvey & Edmondson, 2018; Chen et al., 2010; Mitchell & Boyle, 2015; Edmondson, 1999; Ortega et al., 2010; Bradley et al., 2012). Learning can be seen as a risk in a group and is why one should feel psychologically safe within their team (Harvey & Edmondson, 2018; Chen et al., 2010; Edmondson, 1999; Ortega et al., 2010; Bradley et al., 2012).

Psychological safety is an essential feature in multiplayer video games (Keith et al., 2018; Stettina et al., 2018). Multiplayer video games ask teams to achieve tasks in a group (Keith et al., 2018; Stettina et al., 2018). Each member of the team has a specific function and goal that they need to achieve in order for the entire team to be successful in a multiplayer video game (Keith et al., 2018; Stettina et al., 2018). If issues arise each team member must feel secure enough to admit their fault if their goal is not achieved (Keith et al., 2018; Stettina et al., 2018).

Most successful multiplayer teams understand each team members strengths and weaknesses as they have seen these in action (Keith et al., 2018; Stettina et al., 2018; Freeman & Wohn, 2017). Freeman & Wohn (2017), found that the most successful teams in professional multiplayer video games trusted that their other team members had the best skills available and that if something went wrong, they would feel comfortable admitting their mistakes to the team. Freeman & Wohn (2017), contributed this to these teams constantly playing together. This is linked to trusting one's team, the understanding of each team member's KSAs (Freeman & Wohn, 2017; Keith et al., 2018; Stettina et al., 2018).

Team learning behaviours

Team learning can be defined as both an outcome and a process (Edmondson, 1999). Team learning as an outcome is focused on the change in the collective mental models of a group (Decuyper et al., 2010). Team learning as a process is focused on the interpersonal behaviours that are conducive to creating a change in knowledge, for example asking for feedback (Decuyper et al., 2010). Team learning as an outcome is argued to be useful in showing how team learning influences a team's performance (Decuyper et al., 2010). However, researchers have found that team learning curves within organisations differ and researchers surmised that the differentiation in the team learning curves are due to differences in interpersonal behaviours (Sanner & Bunderson, 2015). Therefore, the focus on process and the interpersonal behaviours is important in influencing the outcomes associated with team learning (Sanner & Bunderson, 2015).

During the forming stages of a team, setting a goal of learning creates teams that are more likely to perform behaviours that are orientated towards learning (Harvey et al., 2019; Sanner & Bunderson, 2015; Tuckman & Jensen, 1977; Edmondson, 1999). However, empirical evidence showed that teams with learning goals often intend to learn but do not follow the process of performing team learning behaviours (Edmondson, 1999). Edmondson (1999) suggested that

teams with learning goals have the propensity to learn (Edmondson, 1999; Decuyper et al., 2010; Harvey et al., 2019). The propensity to learn was described as team learning orientation (Edmondson, 1999; Decuyper et al., 2010; Harvey et al., 2019). Team learning orientation is the shared belief in the emphasis of learning goals, however, it does not always lead to team learning behaviours as sometimes there is not a perception of support for these learning behaviours (Edmondson, 1999; Harvey et al., 2019). Furthermore, the perception of lack of support for learning behaviours has been connected to the perception of lack of psychological safety (Edmondson, 1999; Harvey et al., 2019).

Researchers describe the transfer from team learning orientation to team learning behaviours occurs when the group climate is perceived to be supportive of these learning behaviours, e.g., feel psychologically safe (Harvey et al., 2019). Although, Gardner et al. (2017), argued that if individual goals are set to improve one's performance and not to further team or organisation goals then team goals set to create team learning are rejected in favour of achieving individual goals. Harvey et al. (2019), agrees that individual goals that are not expressed lead to a decrease in learning behaviour. However, Harvey et al. (2019), observed that if group climate is perceived as supportive and accepting of individuals then individual goals should be expressed and groups attempt to behave in a manner that achieves the groups' goal of learning (Edmondson, 1999). Teams also attempt to promote individuals in groups to achieve individual goals (Edmondson, 1999). Examples of team learning behaviours are the asking for feedback and the debating of ideas (Edmondson, 1999). Team learning behaviours have been associated with increased quality of decision making and less frequent repetition of mistakes (Edmondson, 1999). Team learning behaviours are often promoted through practicing the behaviours within a safe environment (Edmondson, 1999). While there are many that are often promoted, due to the iterative function of serious games, they have become increasingly popular in being utilised to improve team learning behaviours (Fleming et al., 2017; Landers, 2014).

Developing Team Learning Behaviours: Traditional Team Building Interventions vs Serious Games

Online team-building interventions that aim to develop effective team learning behaviours are typically interventions which allow team members to discuss theoretical concepts of team learning behaviour and understand how their team implements or can implement more

team learning behaviours when working together (Harvey et al., 2019). There is, however, some evidence to suggest that such online team building activities have little effect on improving team learning behaviours (for example, Klein et al., 2009; Keith et al., 2019). One reason for the failure of online team building activities to improve and team learning behaviours is that team members are not willing to take interpersonal risks during online team building activities that too closely approximate or simulate the work environment (Klein et al., 2009). Researchers have suggested that a way to reduce the apparent association of online team building activities to work conditions is to make use of serious games in online team building (Fleming et al., 2017; Keith et al., 2019).

As mentioned above, it has been observed that participants in online team-based serious games seem to feel less pressure during the intervention compared to those that take part in traditional online team building intervention (Fleming et al., 2017; Keith et al., 2019). It has been suggested that the reason the environment in online team-based serious games seems that serious games tasks while connected to work-related task they are less obvious while still connecting to a useful learning outcome (Fleming et al., 2017; Keith et al., 2019). Moreover, participants seem to feel less pressure to be right and so seem more willingly to conduct behaviours such as experimenting and admitting a mistake (Fleming et al., 2017; Keith et al., 2019; Edmondson, 1999). According to Edmondson (1999), the behaviours described above are team learning behaviours. As is stated in adult learning theory, experiential learning for adults is more likely to lead to the learning outcome that is designed (McCarthy, 2016). It has been suggested that the experiences of performing team learning behaviours while participating in team-based serious games could improve the chances of utilising those behaviours in the workplace (Fleming et al., 2017). The reason suggested for why participants carry over team learning behaviours from team-based serious games is that the experience of the behaviours being successful in a context that is similar to work could show that those skills may be useful within the workplace mistake (Fleming et al., 2017; Keith et al., 2019; Edmondson, 1999).

It seems that team-based serious games having a less pressurised context where one can practice team learning behaviours leads to trainees being more likely to perform those behaviours within the workplace.

Hypotheses

The separation of the present study into study 1 and study 2 has meant that hypotheses for each study were designed. These hypotheses are based on the arguments above.

Study 1

Based on the above arguments presented above, it was suggest that the utilisation of a serious game in a face-to-face environment should improve a team's GPS and team cohesiveness more than a traditional team building activity. The following hypotheses were formulated based on this assertion and the arguments that were given above:

H_1: Team building that makes use of a serious game or technology-based activity to develop group problem-solving, produces a team with statistically significantly higher scores on group problem-solving than a traditional (non-technology based) team building activity.

H_2: Team building that makes use of a serious game or technology-based activity, produces a team with statistically significantly higher scores in team cohesiveness than a traditional (non-technology based) team building activity.

Study 2

Furthermore, based on the arguments and evidence that has been presented above, it was suggested that for online teams, an online team-based serious game may be more effective at improving the perception of team psychological safety and team learning behaviours, than a traditional online team-building activity that is designed using traditional team building approaches. The following hypotheses were formulated based on this assertion and the arguments presented above:

H_3: Completing an online team-based serious game leads to statistically significantly higher levels of perceived team psychological safety than completing a traditional online team-building activity.

H_4: Completing an online team-based serious games leads to statistically significantly higher levels of team learning behaviours than completing a traditional online team-building activity.

Conclusion

The present literature review was conducted to establish whether there was past empirical evidence to support to the research aim described in the previous chapter. Moreover, four hypotheses were established through the present chapter. In order to determine whether there is evidence to support the above four hypotheses, two different quasi-experiments were conducted. The first quasi-experiment was utilised to determine whether or not there was supporting evidence for the first two hypotheses. The second quasi-experiment was utilised to determine whether or not there was supporting evidence for the third and fourth hypotheses.

Further details of how the present study and the two quasi-experiments were designed can be seen in Chapter 3.

CHAPTER 3

METHOD

The following chapter was written to describe the processes and procedures that were used in order to manipulate the independent variables and measure the dependent variable. As has been described above, the aim of the present study was to investigate whether there was a difference in the teams' perceived levels of team learning behaviour, team psychological safety, group problem-solving (GPS), and team cohesiveness after they had participated in either a team building intervention that utilised a serious game or a traditional team building intervention. There were two post-test only quasi-experiments conducted. A post-test only design was utilised to negate a testing or maturation effect, i.e. where respondents who were assessed multiple times using the same measures get to know the questions (Rowland, 2014). The first quasi-experiment was conducted to measure the effects of a traditional team building activity and a team building activity that utilised a serious game on different teams' GPS and team cohesiveness in a face-to-face medium. The second quasi-experiment was conducted to measure the effects of a traditional online team building intervention and an online team-based serious game on different teams' team learning behaviours and perceived psychological safety. The first and second quasi-experiment were referred to as study 1 and two respectively going forward in the present dissertation.

As mentioned above, the details of the specific design and method for the present study are represented in Figure one.

Research design and approaches

The method utilised was a quasi-experiment as having a control group would probably have given little information as the group would not have experienced any difference in GPS, team cohesiveness, perceived team psychology safety and perceived team learning behaviours. Primary quantitative and qualitative data were collected cross-sectionally, i.e. at a given point in time. The data was collected utilising a pen and paper survey, an online survey and, through a semi-structured interview.

Threats to validity

There were a number of threats that needed to be accounted for so that validity could be insured. Randomisation or random assignment was utilised in an attempt to mitigate for confounding variables for both studies. The random assignment of respondents to one of the conditions helped ensure that no systematic bias between the two groups from the beginning and that the two interventions were the influencing factors for both studies. For each study, the interventions were chosen as they seemed influenced the same dependent variables for the respective quasi-experiments. In other words, both the face-to-face traditional team building intervention and the face-to-face team building intervention utilising a serious games seem to be designed to improve team cohesiveness and GPS. While the traditional online team building intervention and the team-based serious game were designed to improve team learning behaviours and perceived team psychological safety. If the interventions were not designed for the same purpose, this could have threatened the validity of the quasi-experiments as different variables could have influenced the outcomes of the interventions. The post-test questionnaires for both quasi-experiments were the same in order to ensure that the same dimensions were being measured so that there could be comparison between the different intervention groups. Both quasi-experiments' threat to validity were explained below in separate sections.

Study 1

Randomisation or random assignment was utilised in an attempt to mitigate for confounding variables in study 1. Two team-building activities were designed: 1) A traditional team building activity and, 2) a team building activity utilising a serious game. It was ensured that both the traditional team building activity and the serious game were designed to affect the same development areas. Both the traditional team building activity and the serious game were designed to help improve the interpersonal skills and team climate dimension of the teams, more specifically, to improve GPS and team cohesiveness for each group. The interventions were designed to be the same for the same reasons as given above. The post-test questionnaires were the same as mentioned above.

Both groups were given pizza at the end of the team building activities. This could be seen as a threat to validity as the respondents may be more motivated to respond favourably as they were getting an award at the end of the activity. However, due to normal team building activities

having food and drinks at the end of their events. It felt appropriate to have pizza and that it would not present as a threat to validity. The interventions and the tasks at the end lasted two-hours and so this was deemed as further reasoning for pizzas as the respondents were giving us a large amount of their time.

To ensure that the groups of the respondents were not systematically different, data was collected on their personality, computer proficiency and other demographic details through the questionnaire. The reason the groups should not be systematically different was because if they were it could mean that the comparison between the team building interventions mode of delivery as those factors may have been the reason for the dependent variable were as they were. The personality traits of the respondents were measured using the Big Five Inventory. These five personality traits were; 1) extraversion, 2) agreeableness, 3) openness, 4) conscientiousness and, 5) neuroticism. The respondents' computer proficiency was measured using the Computer Proficiency Questionnaire. Specific demographic details, for example age, race, gender, and, faculty in the university were used and, were collected through the questionnaire.

Study 2

Randomisation or random assignment was utilised as described above. There were two online team building activities that were utilised. The two online team building activities were: 1) a traditional online team building activity and, 2) an online team building activity that utilised an online team-based serious game. The online team building and the online team-based serious game were designed to affect the same interpersonal dimensions for the same reasons as given above. They were both designed to make the group members feel more psychologically safe so that the group members can perform more team learning behaviour. The online Zoom meetings could have been recorded. However, it was decided that the meeting should not be recorded so that the participants did not feel pressured to act a certain way if they believed they were being recorded. The same post-test questionnaires were utilised for the second study due to the reasons given above. To ensure that the groups of the respondents were not systematically different, demographic data was collected for the same reasons as mentioned above.

Sampling

Sampling is recruiting of respondents to participate in a study (Sahoo & Sia, 2015). These respondents are utilised to create a small group of people that are supposed to be representative of a larger population (Sahoo & Sia, 2015). For both of the studies, convenient or non-probable sample was sought. This was due to time and cost constraints. The Department of Student Affairs (DSA) was contacted and recruitment was pursued for both studies through an email sent to the entire university. This was done as it was the most cost efficient way to promote the participation in both studies. The respondents for both studies were required to be above the age of 18 years old. This criteria was due to this being the average age that individuals can begin their working career.

Realised sample- Study 1

A convenient or non-probable sample was sought due to the reasons presented above. All respondents were University of Cape Town (UCT) students. Respondents were randomly assigned to one of four groups. Two groups were part of the traditional team building activity while the other two groups were part of the serious game team building activity. Small work teams are often between five and fifteen people. However, due to low response rates, groups of three or four were utilised.

The realised sample for study 1 was 15 respondents. Of those 15 respondents, all of them were students at the University of Cape Town, of which seven were in the traditional team building groups and eight were in the serious game team building group. The majority of respondents were male, with 53% of the respondents being male and 47% of the respondents being female. The mean age of the respondents was 23 years old, while the age ranged from 19 to 27. The most frequent race was white (46.7%), and most respondents were in the Commerce Faculty of the University of Cape Town (27%). Table 1 was utilised to show the demographic dimensions of both intervention groups for the first study.

Realised sample- Study 2

A convenient or non-probable sample was sought due to the same reason as above. A target sample of at least 20 respondents was sought in order for them to be randomly assigned to one of two conditions of at least 10 per condition, with two groups per condition. In other words, there were four teams of at least five respondents each and two teams received the team-based serious

game intervention and two teams received the online team building intervention. Small work teams on average have between five and eight members so five respondents to a team is required to be considered an average small work team. The random assignment was done to ensure that there was no systematic bias with placing respondents in certain teams.

To participate in the research study, respondents needed to have access to a laptop, computer or tablet, internet and the platform Zoom so that they can communicate. Zoom was chosen as it was the communication software used by UCT to produce online lectures.

The realised sample for Study 2 was participated in by 30 respondents. The respondents were mainly male with 17 respondents in both groups (57% of the respondents) and the second biggest group was females with 11 respondents in both groups (37% of respondents). The most frequent race was white with 18 respondents in both groups (60% of respondents). The second most frequent racial group was African with six respondents in both groups (20% of respondents). For further details of the demographic variables for Study 2 is below in Table 2.

Table 1

Realised sample for Study 1

	Group			
	1	2	3	4
Gender				
Male	3	2	2	1
Female	1	1	2	3
Race				
Asian	0	0	0	1
African	1	1	1	2
Coloured	1	0	1	0
Indian	0	0	0	0
White	2	2	2	1
Faculty				
Engineering and the built environment	0	0	2	1
Health sciences	0	0	1	0
Science	0	1	0	1
Commerce	1	2	1	0
Law	1	0	0	0
Humanities	2	0	0	1

Note. Demographic details collected for realised sample in study 1.

Table 2

Realised sample for Study 2

	Groups	
	Traditional online team-building activity	Online team-based serious game
Gender		
Female	7	4
Male	8	9
Gender non-variant/ non-gender conforming	0	1
Prefer not to answer	1	0
Language		
Afrikaans	2	1
English	13	9
IsiNdebele	0	0
IsiXhosa	1	1
Sesotho	0	1
Setswana	0	0
SiSwati	0	1
Other? Please specify:	0	1
Race		
Asian	2	1
African	2	4
Coloured	1	0
Indian	2	0
White	9	9

Note. Demographic details collected for realised sample in study 2

Experiments

The first quasi-experiment was conducted face-to-face. The second quasi-experiment was conducted online.

Study 1

Both the serious game and the online team building activities were chosen as interventions that aim to improve a team's GPS and team cohesiveness. Both groups were then required to participate in a Lego-building contest for them to practice the skills and behaviours they had learnt during the serious game or traditional team building activity depending in which condition they were assigned to. Finally, respondents were requested to respond to a self-report questionnaire

which was designed to measure the dependent variables, i.e. team cohesiveness and demographic details. Figure 2 below, is utilised to describe the flow of study 1.

Traditional team building intervention.

Two groups were asked to participate in a blind obstacle course. The blind obstacle course was designed so that one member was in blindfolded and the other members in the group had to guide the other through the course with only their words. Once the one member had made it through the obstacle course they then swapped the blindfolded person and repeated. The groups were attempting to improve soft skills, like communication and experimenting, in order to improve their group's team cohesiveness and GPS.

The serious game.

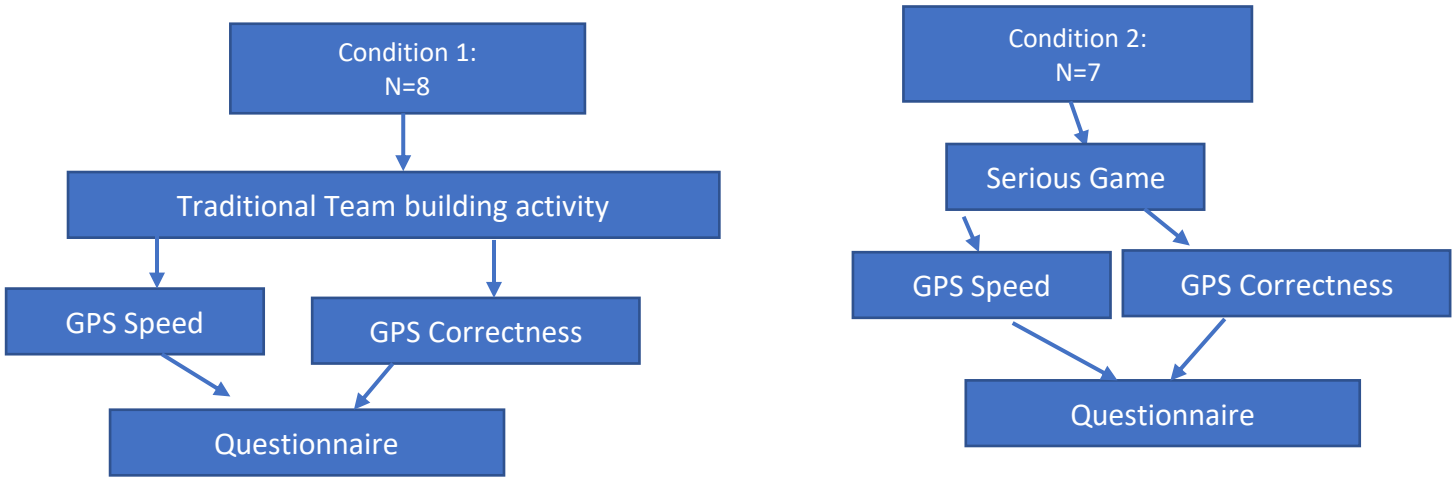
The other two groups were asked to participate in a mobile scavenger hunt. Each group was given a phone and asked to complete a list of tasks by either taking a photo or video. Each task was given a different point total and the groups participated against each other in order to gain the most points. The groups did not have to complete the list of tasks in order. The serious game was designed to improve the groups' soft skills and decision-making skills by deciding on a strategy to complete the tasks to get the most points. These skills were supposed to improve a team's team cohesiveness and GPS.

Study 2

Both the serious game and the online team building activities were chosen as interventions that aim to improve a team's perceived level of psychological safety and team learning behaviour. Random assignment was employed to assign respondents into one of two conditions, i.e. one group of respondents participated in an online team building activity, while the other group of respondents participated in a team-based serious game activity. Both groups were then required to participate in a thought experiment for them to practice the skills and behaviours they had learnt during the team-based serious game or online team building activity depending on which condition they were assigned to. Finally, respondents were requested to respond to a self-report questionnaire which was designed to measure the dependent variables, i.e. perceived psychological safety and team learning behaviours. Figure 3 was utilised to show the flow of study 2.

Figure 2

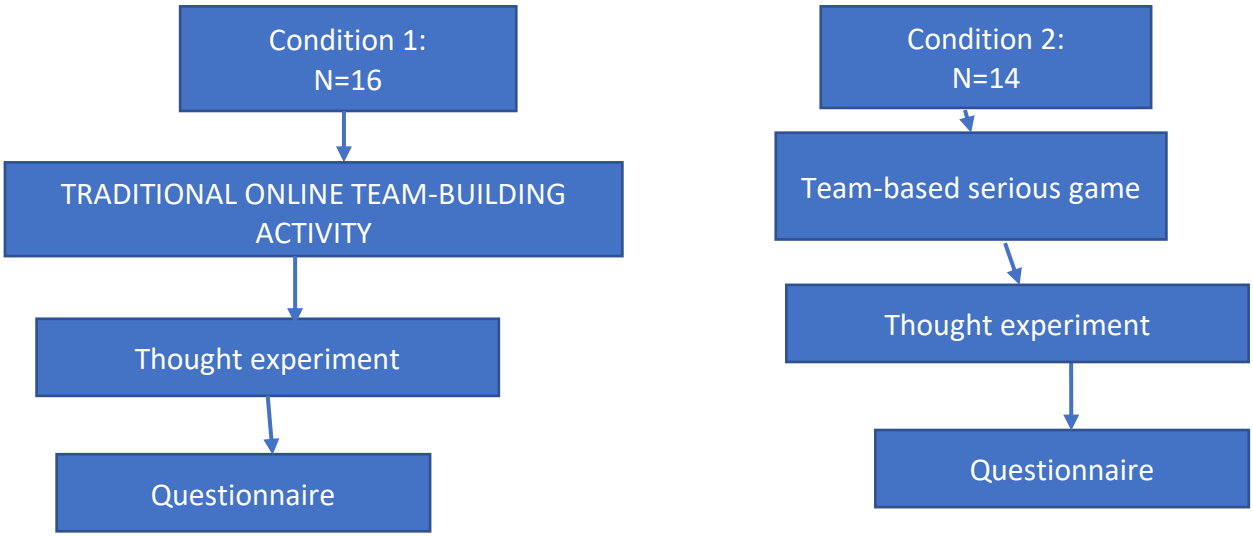
Flow chart of study 1



Note. Flow chart of team building activities for each condition for study 1.

Figure 3

Flow chart of study 2



Note. Flow chart of team building activities for each condition for study 2.

Traditional online team-building activity.

The online team building activity that was used was a typical online team building activity that was designed to improve a team's communication skills. Teams first went through a ten-minute presentation by the researcher where the concepts of team learning, team learning

orientation, team learning behaviours and psychological safety were explained and how each of those concepts occurs within teams and how to perform them. This was to ensure that the participants understood the learning goals of the team building activity but also to see the benefits of utilising these behaviours. Next teams were asked to participate in a spectrum mapping activity where ten topics about work and online learning were presented and respondents were asked to write down a short opinion about the topic. These opinions were then presented to the team, and they were asked to discuss the opinions and place them along a spectrum from most popular to least popular opinion. The objective of spectrum mapping was to create a shared understanding of the safety to have discussions around workplace decisions and to practice communicating with one another their ideas and ask for feedback about these ideas.

Team-based serious game.

The team-based serious game was an online escape room based on a Harry Potter™ theme. An online escape room is a team-based serious game where team members are given a scenario where they have to solve several problems, riddles and different brain teasers in order to escape the room and win the game. The riddles and brain teaser were supposed to force the participants to utilise the knowledge of the individuals around them and to understand that asking questions and using each other's experiences can help solve problems. This online escape room was designed to be a fun activity that gave teams the opportunity to collaborate and attempt to solve the problems presented. It was also designed to teach team members communication skills necessary to learn from their mistakes when they get an answer wrong and experiment together on how to solve the problems, which are examples of interpersonal risks (Edmondson, 1999).

Thought experiment.

The thought experiment that followed the online team building activities was for them to imagine that they were stuck in an average office and they had to decide on ten items that will help them survive a zombie apocalypse. The objective of this thought experiment was for the respondents to practice the skills they had learnt within their different interventions. This thought experiment was designed to help team members understand more about what their feelings were about the team as well as practice more team learning behaviours.

Measurement instrument

A composite self-report questionnaire was designed for the purposes of study 1 and 2 and comprised of six sections, i.e. four sub-scales measuring computer literacy, Big five personality inventory, team psychological safety, team learning behaviour and, open-ended questions, as well as a demographics section.

Study 1

Data was collected with two different methods for each dimension. GPS was measured through a task that asked respondents to utilised the skills they had learnt in their team building activities to complete the task. Team cohesiveness and the demographic dimensions were measured utilising a self-report questionnaire.

Group Problem Solving.

At the conclusion of both team building activities, each group's problem-solving capability, i.e. the dependent variable was measured. The group problem-solving measure consisted of two dimensions: 1) speed; and 2) accuracy.

The researcher built a random structure out of Lego© bricks. Each group was provided with enough Lego© bricks to complete the same structure and also extra bricks in order to make them search for the correct bricks. Each group had the exact same bricks in order to have given them the same chances at completing the structure correctly. The groups needed to replicate the structure as fast as possible. The structure that needed to be replicated was hidden from the group's sight. Only one group member at a time was allowed to go to the structure and view what the structure looked like. They then needed to go back to their team and describe what they saw in order to complete the structure. Each group had a timer on their table. The clocks were started once the researcher had explained the rules and said to begin. Once a group believed they had finished their structure correctly, they then stopped their clock and called over the researcher. The researcher had a timer to check that the time on the clock the researcher possessed was the same to the time on the clock when the group stopped it.

Once the group had finished building their structure, they were assessed on how long it took for them to complete the structure; and the number of incorrect blocks they had in their structure. The groups were timed in order to see how fast they could work under pressure and how

well they worked together to decrease the time it took to finish the structure. Assessing accuracy was used to see whether they could, despite the time pressure, collaboratively produce accurate work. To assess accuracy, the structures were marked out of 20. Each group started with 20 points, and for every brick that was in an incorrect position in their structure, the group lost half a mark. For example, if a group had 40 bricks out of place, then their final score would have been zero. Their score could only go down to zero, and if they had more than 40 bricks out of place, their score stayed zero.

Measuring instruments.

At the conclusion of the team-building activity, respondents were requested to complete a self-report questionnaire, which consisted of five sections; 1) Short form Computer Proficiency Questionnaire, 2) CATME-B, 3) Big Five Inventory, 4) Open-ended questions, 5) Demographics. The questionnaire for Study 1 can be seen in Appendix C.

Short form Computer Proficiency Questionnaire (CPQ-12).

Respondents were asked to complete the CPQ-12 on their usage of mobile devices (Roque & Boot, 2018). This was the shortened version, and the 16 items were on a five-point Likert-type response scale. It was broken down into eight sections that asked the ability of the respondents based on these defined sections, 1) mobile device basics; 2) communication; 3) data and file storage; 4) internet; 5) calendar; 6) entertainment; 7) privacy; and 8) troubleshooting and software management. According to Boot et al. (2015), the CPQ-12 had a satisfactory reliability with a high Cronbach's Alpha score (α=.98). This was in order to check if the two groups of respondents' mobile device skills were not significantly different. An example item for the CPQ-12 is "With a computer/laptop I am able to… use a keyboard to type".

CATME-B.

Respondents were asked to complete the CATME-B sub-scale, which is designed to assess team effectiveness (Ohland et al., 2012). The CATME-B scale is a five-point Likert-type that ranges between one and five behaviourally anchored scale and required respondents to rate themselves and each of their team members on how effective they were throughout the intervention and the group problem-solving skills test. Respondents were required to rate their own and each

of their teammates on four categories or types of contribution, including 1) contributing to the team's work; 2) interacting with teammates; 3) keeping the team on track; and 4) having relevant knowledge, skills and abilities (KSAs). There originally were five categories, however, one category, expecting quality, was not relevant to the study and therefore taken out as the teams had no prior interaction with one another so had no expectations for how the group would perform. Descriptors for each level of rating, were provided in the sub-scale. This scale was completed in order to measure how they would rate the team members' effectiveness.

Big Five Inventory (BFI).

Section three contained a questionnaire that asked respondents to describe their personality within a work-related task. This was based on the BFI (Rammstedt & John, 2007). The BFI was utilised to determine whether there was a significant difference between the personality types that were determined through the BFI. This was utilised to try to ensure that other factors, like personality, were not confounding variables that could have affected the outcome of the present study. The BFI was based on a Likert-type response scale. This shortened version consists of 10-items (Rammstedt & John, 2017). The BFI test-retest reliability (r=.75; p<.05; n=235) was considered adequate (Rammstedt & John, 2007). The BFI convergent validity (r=.67; p<.05; n=235) was too consider adequate. It was used to ensure there was no significant difference between groups. An example of an item would be "I see myself as someone who… is generally trusting".

Open-ended questions.

Respondents were asked how they felt about their experience participating in the group they were a part of. This was an open-ended question where respondents commented on how they perceived the helpfulness of the intervention that they participated in. They were also posed the question on whether or not they felt the other intervention, the one they did not participate in, would have been more or less useful and why. This was to gather the respondents' insights and whether they believed these interventions had any influence in developing their GPS skills.

Demographics.

Demographic data of the respondents was further collected, including race, gender, year of study and faculty currently a part of. The demographic data was analysed to ascertain if the two groups systematically differed from one another based on selected variables.

Study 2

The second study was conducted to investigate whether there was a difference between the perceived team psychological safety and team learning behaviours after respondents participated in either a traditional online team-building or an online team-based serious game. The measurements instruments below are utilised in order to measure the above two dimensions.

Questionnaire

The questionnaire was utilised in order to collect the quantitative data. An online questionnaire was utilised as both team building activities were conducted online and so an online questionnaire was deemed as appropriate for the respondents. The questionnaire for Study 2 can be seen in Appendix D.

Short form Computer Proficiency Questionnaire (CPQ-12).

In section one, Boot et al.'s (2015) shortened CPQ-12 was utilised in the second study. As mentioned above, CPQ-12 was utilised to make sure there was no significant difference between the groups.

Big Five Inventory (BFI).

Rammstedt and John's (2007) shortened BFI was utilised as section two of the questionnaire. The same information mentioned above is applicable to the utilisation of the BFI for Study 2.

Team psychological safety.

The third section of the questionnaire was Edmondson's (1999) short version team psychological safety scale. This scale consisted of seven items which were responded to on a five-point Likert-type response scale. Edmondson (1999) reported team psychological safety scale had

an adequate internal consistency (Cronbach's α=.73). An example item is "I believe that… if you made and/or were to a mistake in this group, it would be held against you."

Team learning behaviour.

In section four, respondents were asked to rate how well they predicted their team would perform team learning behaviours if they worked together. The researcher used Van Offenbeek's (2001) team learning process scale. This has three sections; 1. distributing information, 2. convergent aspects of sensemaking and, 3. divergent aspects of sensemaking. It consists of 11 items. The questionnaire had an adequate internal consistency (Cronbach α=.97). This was based on a five-point Likert scale. An example item is "During tasks… your group would and/or did listen well to each other."

Open-ended questions.

Open-ended questions were also utilised in Study 2 similar to the utilisation in Study 1.

Demographic details.

Finally, as mentioned above, demographic details were utilised in the second study.

Qualitative data.

The qualitative data that was collected was interview data. The interviewee was a respondent who participated in both the traditional online team building activity and the online team-based serious game.

Interview with field researcher.

An interview was conducted with a field researcher who participated in both the online team building activity and the online team-based serious game. The interview was done in order to understand whether there was a reason we would or would not have seen differences across the conditions for the dependent variables. Furthermore, the interview could be used as supporting evidence for the findings from the quantitative data. The interviewee was a master's student in

organisational/industrial psychology. They were thought to have a good understanding of the concepts of psychological safety and team learning behaviours and so it was thought they would be able to give key insight after participating in both activities. After they participated in both activities, they were interviewed by the researcher about their experiences in both activities and then an analysis of the transcription was done by the researcher to find key insights from the interviewee.

Data collection procedure

Data collection occurred differently in both quasi-experiments. The present section was utilised to describe how all the data was collected during both quasi-experiments.

Study 1

The team cohesiveness data was collected utilising a paper-and-pencil survey. The GPS data was collected through a mark given to the correctness of each team's statue and time was taken on a phone. All demographic details were collected via the paper-and-pencil survey.

Study 2

The team learning behaviours, perceived team psychological safety, open-ended questions and the demographic details were all collected via an online survey utilising a website called Qualtrics. The interview with the field researcher was conducted via Zoom and was transcribed by the researcher.

Data management issues

Data management is important, and to mitigate any issues that could have arisen from the management of this data, the following was performed for both quasi-experiments' data:

In order to mitigate the loss of data, all data was uploaded onto the laptop of the researcher immediately after the experiment. The data was also duplicated onto a separate hard drive to mitigate any issue of loss of data through corruption on the researcher's laptop. Once the study had been completed, the data was given to UCT for long-term holding and was stored on their preferred platform.

Ethical considerations

The use of human respondents requires one to consider ethical codes. These considerations are expounded upon below.

Informed consent is a crucial part of conducting research and so to comply with ethical requirements, respondents were asked to read and sign an informed consent form (Wassenaar & Slack, 2016; Lord et al., 2017). The informed consent form for the present study had a description of the aim of the research for each respective quasi-experiment and also the rights the respondents had. The respondents' rights were communicated in non-technical terms so that all respondents could be aware of the meanings. Before the start of the interventions, the researcher reiterated the research aim and the rights of the respondents so that there was little doubt that the respondents did not know their rights (Lord et al., 2017).

The informed consent forms and the researcher's explanations had the time that the entire quasi-experiments would last. As being part of this quasi-experiments requires a large time commitment, it was made apparent that the respondents were required to participate in the quasi-experiment for two hours. The informed consent form and the researcher's explanation also detailed that the respondents have the right at any time to revoke their participation in the quasi-experiment (Lord et al., 2017; Wassenaar & Slack, 2016). Respondents must feel comfortable that their ending of participations in the quasi-experiments need not be explained and they could just leave if they felt they wanted to (Lord et al., 2017; Wassenaar & Slack, 2016). It was further explained that no data that was collected in the quasi-experiments were connected to them personally so that they could not be identified by the information that they gave to the researcher (Lord et al., 2017; Wassenaar & Slack, 2016). Respondents must feel comfortable that no identifying information will be collected and so they will not be asked to provide their names or any other information that could be considered linked to them personally (Lord et al., 2017; Wassenaar & Slack, 2016).

Statistical analysis

Descriptive statistics were calculated. Independent sample t-tests were used to assess whether there was a significant difference between the selected descriptive statistics, BFI and CPQ-12. Further independent sample t-tests were done to assess whether there was a statistically significant difference between perceived team psychological safety, team learning behaviour, GPS and, team cohesiveness for the different groups. The data collected from the open-ended questions

were analysed through a thematic analysis. Common themes were collated from each answer that was given. Themes were identified and analysed for the interview data that was collected.

Conclusion

The present chapter was a description of the method that was utilised to achieve the aim of the present study. The method was supposed to be utilised to establish that there was as much bias mitigated for as possible in order to attempt to understand whether there was a significant difference in the score for each of the dependent variables described above after respondents participated in either a traditional team building activity or a team building activity that utilised a serious games.

CHAPTER 4

RESULTS

Initially the data analysis was conducted for the first quasi-experiment. There were two main variables that were utilised. These two variables were group problem solving (GPS) and team cohesiveness. Both quantitative and qualitative data were analysed to attempt to find more information from a wider range of data types. The utilisation of different data types allows for the quantitative data to be utilised to show the phenomenon that was occurring, and the qualitative data was utilised to show why the phenomenon may have been occurring. The data analysis conducted for the second quasi-experiment was conducted for the same reason as above, as both quantitative and qualitative data was utilised. The present results section for each quasi-experiment were separated below. Study 1 was described first and following Study 1, Study 2 was described.

Study 1

The dimensions: 1) correctness, 2) time and, 3) team cohesiveness were compared utilising independent sample t-tests and assessed whether there was a significant difference between the intervention groups. Below are the present findings that were understood utilising the independent sample t-test.

Preliminary analysis

To ensure as much bias was mitigated for, random assignment was utilised by the researcher by conducted t-tests with the demographic variables, the MDPQ-16 and the BFI scores. There was no significant difference between the age, CPQ-12, extraversion, agreeableness, conscientiousness, neuroticism and openness for the two intervention groups. See table 3 for more details.

Reliability

To assess the internal consistency of the team cohesiveness dimensions, Cronbach alpha was calculated. The Cronbach alpha was found to be satisfactory (i.e. *Cronbach's* $\alpha > .6$; Pallant, 2001) and did not increase once an item was removed. The Cronbach alpha coefficient and the mean score for each dimension per the intervention can be seen in table 4.

Table 3

Mean scores, standard deviation, t-statistics, degrees of freedom and p-values for demographic variables

	M_{SG}	M_{TTB}	SD_{SG}	SD_{TTB}	*t*	*df*	*p*-value
Age	22	23	1.67	2.71	.783	12	.45
CPQ-12	4.91	4.54	.13	.35	-2.4	6.08	.053
Extraversion	7.13	5.14	2.03	2.54	-1.68	13	.117
Agreeableness	5.5	6.7	1.41	2.14	1.31	13	.211
Conscientiousness	6.13	8.86	2.23	1.35	.75	13	.464
Neuroticism	5.25	6.57	2.12	1.99	1.24	13	.237
Openness	7.14	7.86	1.77	1.21	.88	10.62	.40

Note. SG= serious game intervention; TTB= traditional team building intervention.

Table 4

Team cohesiveness Mean scores for interventions, Cronbach alpha coefficient, t-statistics and p-values

	M_{SG}	M_{TTB}	SD_{SG}	SD_{TTB}	*Cronbach's* α	*t*	*df*	*p*-value
Team cohesiveness	4.43	3.84	.53	.03	.964	-2.97	7.05	.015
Contributing to the team's work	4.5	3.98	.53	.19		-2.58	13	.071
Interacting with teammates	4.41	3.77	.72	.23		-2.22	8.59	.044
Keeping the team on track	4.34	3.68	.69	.33		-2.42	13	.038
Having relevant KSAs	4.44	3.92	.5	.2		-2.72	13	.023

Note. SG= serious game team building intervention; TTB= traditional team building intervention.

Confidence Intervals

The confidence intervals for the mean team cohesiveness dimensions and overall team cohesiveness mean for each intervention are in Figure 4. As can be seen the confidence intervals for the serious game groups for each dimension and the mean team cohesiveness score are higher than the traditional team building groups were.

Independent sample t-test

An independent sample t-test was conducted and was utilised to compare the means of the time, correctness and team cohesiveness scores between the two interventions. The kurtosis and skewness were tested for the time, correctness and team cohesiveness and none were greater than positive or negative one. The Levene's test was utilised to ensure that the assumptions of independent sample t-tests would not be violated. If Levene's tests were significant then equal variance was not assumed.

Correctness.

The Levene's test was significant for the correctness measure so equal variance was not assumed ($f(6.25)=236.48$, $p<.05$). The mean of the correctness score for the serious game team building intervention groups was significantly higher than the mean correctness for the traditional team building intervention groups. See table 3 for more details.

Time.

The Levene's test was not significant so equal variance for the time score was not assumed ($f(13)=1.59$, $p>.05$). The mean time score for the serious game team building intervention groups was not significantly more or less than the mean time for the traditional team building intervention groups. See Table 5 for more details.

Team Cohesiveness.

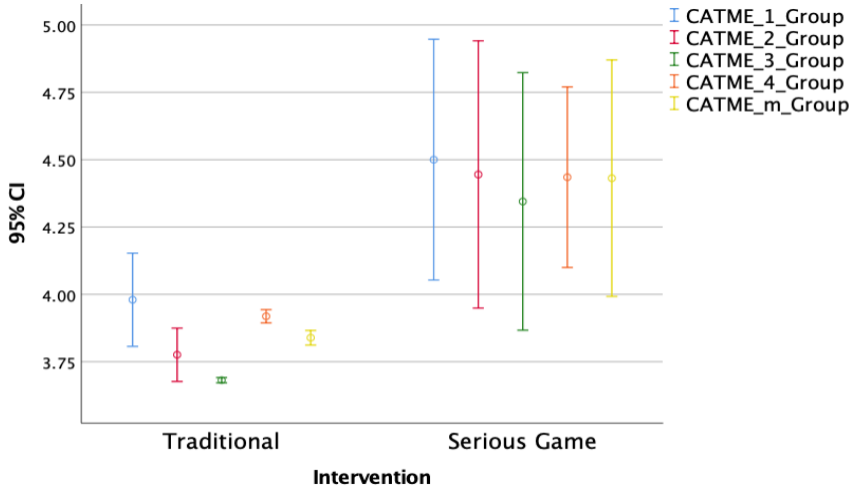
Independent sample t-tests were performed on the team cohesiveness dimensions in order to check if there was a significant difference between each interventions' team effectiveness. A Levene's test was performed on the mean scores for the dimension contributing to the team's work and was not significant. Therefore, equal variance was assumed ($f(13)= 3.05$, $p>.05$). There was no significant difference between the mean contributing to the team's work scores for the serious game team building intervention and the mean scores for the traditional team building intervention. See in more detail in Table 4.

A Levene's test was performed on the mean scores for the dimension interacting with teammates and was significant this meant that equal variance was not assumed ($f(8.59)= 9.13$, $p<.05$). The mean interacting with teammates scores for the serious game team building

intervention was significantly higher than the mean scores for the traditional team building intervention. See Table 4 for more details. This difference can be interpreted in the qualitative data, provided by respondents, where five respondents from both interventions commented on the access the serious game intervention allowed them to create better communication pathways. This quote is utilised to further understand the phenomenon of the use of the smartphone as a way to create a more focused ability to communicate, "…(traditional team building intervention) there is perhaps a bit more chaos as there is no one "holding the conch" to use a Lord of the Flies reference." Within the book Lord of the Flies, the conch was utilised by the children in the story as a way to indicate who could talk in the meeting. If you were holding the conch then you could speak.

Figure 4

Confidence intervals of mean scores for each of the team cohesiveness measures of the experimental groups



Note. Confidence intervals for CATME-B scale, separated by condition.

Table 5

Time and correctness mean scores and standard deviations for interventions, t-statistics and p-values

	M_{SG}	M_{TTB}	SD_{SG}	SD_{TTB}	t	p-value
Correctness	87.5	71.43	2.67	17.37	-2.42	.049
Time	1236.4	1058.02	248.14	89.55	-1.58	.138

Note. SG= serious game team building intervention; TTB= traditional team building intervention. Time is measured in second. The correctness is a percentage.

A Levene's test was performed to assess the mean scores for the dimension keeping the team on track and was not significant this meant that equal variance was assumed ($f(13)= 2.60$, $p>.05$). The mean keeping the team on track scores for the serious game team building intervention was significantly higher than the mean scores for the traditional team building intervention. See Table 4 for more details. This is noted through respondents commenting on the serious game's instantaneous live feedback function, "…it was a live feedback that allows us to see how we were doing immediately."

For the mean scores for the dimension having relevant KSAs, a Levene's test was performed, it was significant, and equal variance was not assumed ($f(7.07)=68173.3$, $p<.05$). The mean having relevant KSAs scores for the serious game team building intervention was significantly higher than the mean scores for the traditional team building intervention, see Table 4 for more details. The creativity and the skill of utilising creativity was commented on by four respondents in the serious game groups, "You also had to come up with creative ideas which was great."

An independent sample t-test was performed on each groups' team cohesiveness mean scores. A Levene's test was performed and was significant and equal variance was not assumed ($f(7.05)=98865.78$, $p<.05$). The mean team cohesiveness score for the serious game team building intervention groups was significantly higher than the mean score for the traditional team building intervention groups, see Table 4 for more details. This team cohesiveness score difference is supported by six respondents' answers about the serious game intervention being enjoyable. "It was also fun which brought us together and created a good group dynamic."

The comparisons above are able to be used to suggest that there is a difference between the intervention groups. The team cohesiveness, time and correctness vary a larger amount between the serious game intervention groups and the traditional team building intervention groups. These different dimensions can be seen to be significantly different in the present findings. The findings of Study 1 were expanded upon below in chapter 5. The findings in study 1, can be utilised to show that there is a need for more study of the growing of group dynamics utilising different mediums. The findings presented below for study 2 show how the medium of communication can alter how one can improve group dynamics utilising online traditional team-building activities and team-based serious games.

Study 2

Study 2's data analyse was performed on two main dimensions. These dimensions were: 1. Perceived team psychological safety and, 2. Team learning behaviours. The aim of study 2 was to investigate whether a team-based serious game would lead to significantly higher levels of perceived team psychological safety and team learning behaviors than a traditional online team building activity. Both qualitative and quantitative data were analysed to gain a greater understanding of the experiences of an individual that participated in both interventions. While utilising the quantitative data to understand if there was a consistent trend on the effects of the interventions on the respondents. Due to the utilisation of interview data, a reflexive stance was taken throughout the quasi-experiment. The reflexive stance was utilised to ensure that the researcher's bias was mitigated for and that the researcher understood that others should be able to understand the researcher's point of view (Konradt et al., 2016).

Preliminary Analysis

In order to determine if randomisation of the groups was successful, independent sample t-tests were utilised to assess if there was a significant different for the following variables: age, race, language, extraversion, openness to experience, agreeableness, conscientiousness, neuroticism, average gaming and, Short form Computer Proficiency Questionnaire (CPQ-12). There was no significant difference for any of the variables above between the intervention groups. Further details can be seen below in Table 6.

Internal consistency

To assess the internal consistency for the team learning behaviours and perceived team psychological safety, the Cronbach Alphas were assessed for both. The Cronbach alphas for team learning behaviour and perceived team psychological safety were satisfactory (i.e. $\alpha > .6$; Pallant, 2001). For more details see Table 7 below.

Independent sample t-tests

Independent sample t-tests were conducted to measure whether a team-based serious game would lead to significantly higher levels of TLB and perceived team psychological safety than a traditional online team building activity. Both the overall scores and the individual scores for the

items were measured to assess whether there were any differences between the conditions. See table 7 for more details.

Table 6

Mean scores, standard deviation, t-statistics, degrees of freedom and p-values for demographic variables

	M_{TBSG}	M_{TOTB}	SD_{TBSG}	SD_{TOTB}	*t*	*df*	*p*-value
Age	22.93	22.75	4.39	2.91	.133	28	.90
Computer basics	4.92	4.91	.18	.27	.26	28	.80
Extraversion	3.32	3.84	.77	1.33	-1.34	24.66	.19
Agreeableness	4	4.31	.88	.77	-1.04	28	.31
Conscientiousness	4.39	3.91	.90	.86	1.51	28	.13
Neuroticism	3.04	3.75	1.17	1.32	-1.56	28	.13
Openness to experience	5.00	4.44	.83	.91	1.76	28	.09
Average hours gaming (Mins)	56.43	45.94	60.43	44.99	.54	28	.59

Note. TBSG= team-based serious game intervention; TTB= traditional online team-building intervention.

Perceived team psychological safety.

There was sufficient evidence to suggest that one of the six mean items score or the overall mean score were significantly different between the two groups. The Levene's test for the mean score of perceived team psychological safety item 3 was not significant ($f(13)=.01$, $p<.05$). Therefore, equal variance was not assumed. The mean score for perceived team psychological safety item 3 for the team-based serious game intervention groups was significantly higher than the mean score for perceived team psychological safety item 3 for the Traditional online team-building intervention groups. The other five mean scores for perceived psychological safety were not significantly different. See table 7 for more details.

Table 7

Team learning behaviours and perceived team psychological safety Mean scores for interventions, Cronbach alpha coefficient, t-statistics and p-values

	M_{TBSG}	M_{TOTB}	SD_{TBSG}	SD_{TOTB}	α	t	df	p-value
Team learning behaviours	4.52	4.38	.52	0.38	.85	.86	28	.20
TLB item 1	4.57	4.50	.51	0.52		0.38	28	.36
TLB item 2	4.43	4.31	.76	0.48		0.49	21.44	.32
TLB item 3	4.21	4.56	1.25	0.51		-1.02	28	.16
TLB item 4	4.64	4.50	.50	0.52		0.77	28	.28
TLB item 5	4.14	4.75	1.23	0.45		-1.75	15.99	.19
TLB item 6	4.43	4.31	0.65	0.60		0.51	28	.31
TLB item 7	4.50	4.13	0.85	0.50		1.49	28	.00
TLB item 8	4.64	4.31	0.63	0.70		1.34	28	.09
TLB item 9	4.64	4.44	0.50	0.51		1.11	28	.14
TLB item 10	4.57	4.44	0.51	0.51		0.71	28	.24
TLB item 11	4.57	4.38	0.65	0.50		0.94	28	.18
Psyc Safety	4.26	4.30	0.50	0.43	.60	-0.25	28	.40
Psyc safety item 4	3.93	4.06	0.83	0.77		-0.46	28	.34
Psyc safety item 7	4.00	4.25	0.78	0.45		-1.09	28	.15
Psyc safety item 8	4.43	4.44	0.65	0.63		-0.04	28	.49
Psyc safety item 3	4.79	4.75	0.43	0.45		0.22	13	.04
Psyc safety item 5	4.14	4.00	1.03	1.15		0.36	28	.27

Note. TBSG= team-based serious game; TOTB= traditional team online building intervention; TLB= Team learning behaviour

Team learning behaviour.

There was sufficient evidence to suggest that one of the 11 mean items score or the overall mean score were significantly different between the two groups. The mean score for TLB item 7 had a significant Levene's test ($f(28)=.76$, $p<.05$). Therefore, equal variance was assumed. The mean score for TLB item 7 for the team-based serious game intervention groups was significantly higher than the mean score for TLB item 7 for the Traditional online team-building intervention groups. The other mean scores for TLB were not significantly different. For more information view table 7 above.

Confidence intervals

The confidence intervals for the means of TLB are seen below in Figure 5. As can be seen in Figure 5, TLB mean confidence interval for the team-based serious game was slightly higher than the TLB mean confidence interval for the traditional online team building activity. Furthermore it seems that TLB items 6, 7, 8, 9, 10 and, 11 had higher mean confidence intervals for the team-based serious game than the mean confidence intervals for the traditional online team building activity. However, as can be seen in Figure 6 there was only a small difference between the conditions' mean confidence intervals for perceived team psychological safety.

There was no significant difference between the means of TLB of the conditions and there was no a significant difference between the means of the perceived team psychological safety of the conditions. The difference in mean confidence intervals for each TLB item could be linked to the open-ended questions that the respondents answered. A number were able to explain the nuanced reasons for why there did not seem to be a significant difference between each condition based on the variables TLB and perceived team psychological safety.

Open-ended questions

The open-ended questions were utilised to gain an understanding of why respondents felt their groups did or did not perceive an improvement in their psychological safety and team learning behaviour. The open-ended questions were also utilised to understand what part of the interventions the respondents felt lead to or did not lead to the outcome of improved psychological safety and team learning behaviours. The two questions that were asked were; 1. "We would like to better understand how online team-building activities, such as the one you just completed, are able to develop team learning behaviours (i.e. the group process of looking for, gathering, and combining information as a group) and psychological safety (i.e. the shared belief that it is safe to take interpersonal risks within a group) within in a team. Do you have comments as to whether the approach you followed, and which you were a part of, was useful or not in developing team learning capabilities within a group?" and, 2. "The purpose of the study was further to compare two types of online team-building activities. The aim is to show which is the better approach to developing team learning behaviours and team psychological safety. You would have either been part of a traditional classroom-based online team-building activity, or part of a team-based serious games online team-building activity. Do you have comments regarding your perceived usefulness,

or not, of the other approach, i.e. the approach you were not a part of to develop team learning behaviours and team psychological safety?"

Each condition group was asked to answer the above questions. The traditional online team-building intervention groups had a number of interesting insights that can be utilised to elucidate why there are certain differences between the different items of TLB and there was no significant difference between the condition groups' means for each TLB item.

Traditional online team-building activity

Respondents in the traditional online team building activity seemed to feel that the knowing of the others opinions on certain subjects helped them to better understand and scrutinize that person's decision. Three individuals commented on how effective the activity was as it allowed their groups to feel comfortable in debating the other's opinion. This was further elaborated on by a quote from one of the respondents, "This process of information gathering and sharing made it easier to understand each members justification for their decision - which made it easier to share ideas and reconcile individual conclusions with group conclusions." Item 5 of the TLB scale has a higher mean for the traditional online team-building groups than the team-based serious game groups. When viewing the above comment this is understandable as item 5 asks if one would debate the other members.

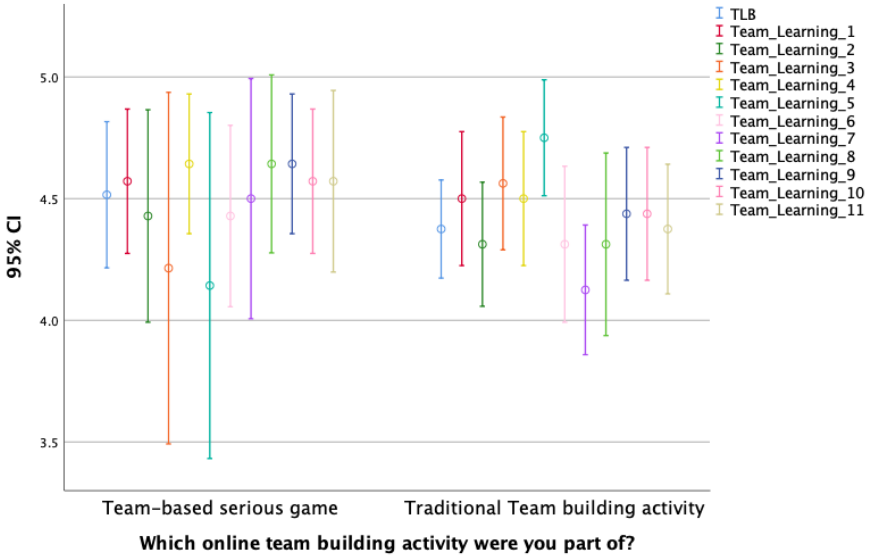
The mean item 3 for the TLB scale was higher for the traditional online team-building groups than the team-based serious game. Item 3 was "your group would and/or did listen well to each other" Two respondents from the traditional online team-building groups shared the idea that the traditional online team building activity was helpful in improving their building on each other's ideas. Building on ideas requires one to listen. One respondent relayed the idea of understanding the others' perspectives helped allow listening and comprehension skills, "We communicated as a group and seeing that everyone has different perception over different concepts, we put everyone's knowledge together and built as a team and were able to understand the perspectives of others and add to the understanding when they are speaking."

Three respondents mentioned the informal setting being comforting. Respondents felt that the setting of the traditional online team building activity contributed to the ease in which the respondents became comfortable in taking interpersonal risks. extremely useful. One respondent

further this point in the following quote, “The informal nature of the activity (Traditional online team-building activity) we were required to complete were great for taking pressure off.”

Figure 5

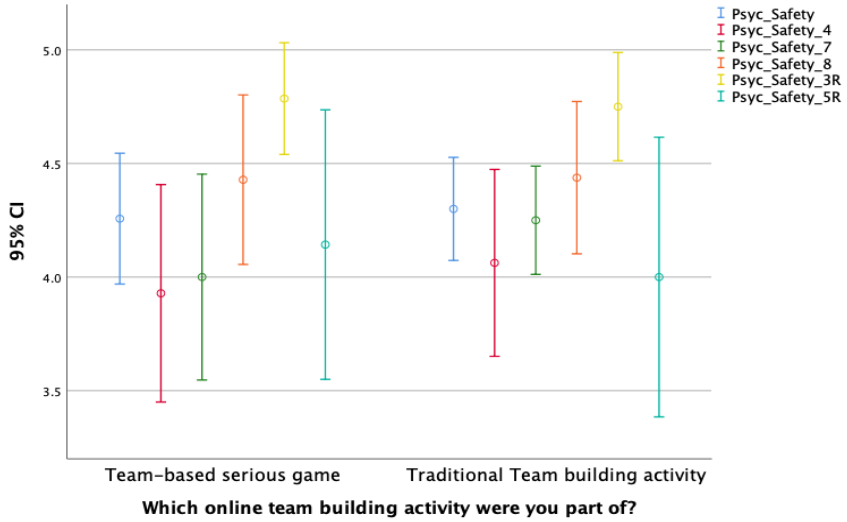
Confidence intervals of mean scores for each of the team learning behaviour measures of the conditions



Note. Confidence intervals for team learning behaviour scale, separated by condition.

Figure 6

Confidence intervals of mean scores for each of the perceived team psychological safety measures of the conditions



Note. Confidence intervals for team psychological safety scale, separated by condition.

Team-based serious game

Item 6 on the TLB scale read as follows, "your group would and/or did spend time finding the right processes." Four respondents in the team-based serious game groups made comments that established a theme of team-based serious games allowing for the ability to establish how the group was going to function. One respondent mentioned how the interactions helped to establish a process in the following quote, "It was useful. By doing an icebreaker, we were able to establish rapport. Then, doing the team building activity, we were able to understand diverse perspectives and at the same time and were also able to find a common understanding - which helped foster a sense of team spirit. This enabled people to freely share their opinions, and in turn, everyone was able to recognise the merits in what every person was saying."

The team-based serious game condition had a higher mean score for item 4 from the TLB scale than the Traditional online team-building condition. While the team-based serious game also had a higher confidence interval, as can be seen in Table 7. Item four read as follows, "your group would and/or did work together to form evidence-based decisions?" Three respondents mentioned the theme of reserving judgement. Some respondents found that during the serious game they were able to work with their group without judging them and listening to their ideas and see if it was backed up with facts. This was further established in the following quote, "It was useful. Everyone listened to each other and asked questions to better understand. We questioned each other and sought explanations where we did not understand which led to increased understanding by all members. The serious game allowed us to focus on the evidence the person brought rather than our opinions of them dictating our decisions."

Four of the team-based serious game respondents established a theme of enjoyment as a way to improve psychological safety. Furthermore they established that due to the fun of the serious game that groups would become closer faster and feel more psychologically safe with their group. This can be seen in the following quote, "It was nice social interaction with people I didn't know but we became very comfortable with one another and had fun while doing it. I think this was important for building group relations rather than purely team work."

Four respondents from both the traditional online team building activity and the team-based serious game activity conditions shared a common sentiment about serious games. These respondents had established a theme of change and shared experience. The following quote is utilised to emphasise the feelings of an individual who participated in the online traditional team-

building activity, “The serious game exercise seems a more viable way of developing the group and allowing for a safer environment because is not the traditional method and is therefore a newer experience for each individual which creates a shared learning experience that allows for the group to immediately relate to one another.”

All themes that were established can be seen below in Table 8.

Table 8

Themes established from open-ended questions

Theme	Group	Number of quotes
Build ideas/opinions	1	3
Informal nature decreases pressure	1	3
Sharing opinions lead to understanding	1	3
Establishing a process	2	4
Enjoyment	2	4
Reserved judgement	2	3
Shared experience	1+2	4

Reflexivity

During research one should not forget that one may have biases when interpreting someone else’s words. My field researcher was an Asian female born in South Africa while I am a white male born in the United Kingdom. Our language and terminology are different. There will often be areas of speech that I will not understand. I should make sure to remind myself that I am subjectively reading my field researcher’s words and interpreting them. While I write I am currently collecting data to remind myself of my position in the field of research. I should not be biased and sway respondent’s opinions when answering my survey. I understand that I must remain objective. My argument will support whatever outcome after the present study. The data does not change or lie. I am the one who can change how the data is seen. In order to mitigate for misinterpretations of the data collected, my data will be freely available for others to run inferential statistics on. This will ensure that my subjectivity does not destroy the inference made within my

study. I will also ask that the study is repeated in other countries so that there can be supporting empirical evidence for the recommendations made in the present study.

I am finally writing this as I analyse the transcription from the interview with my field researcher. The interview guide and transcript is be provided in the appendices (Appendix E). I understand that my positionality may change my opinions, however, I understand that others can follow my instructions of the experiments confirming the understanding I have brought forward.

Field researcher interview

The reflexivity that was practiced above allowed the researcher to ensure that when analysing the interview data, there was as much bias that could be mitigated for. The present section was an analysis of the interview that was performed by the researcher with an individual that was part of both conditions. The interviewee was a 23 year old female that studied a masters in industrial and organisational psychology. She was chosen due to her knowledge in the subject area of organisational psychology and it was hoped that her knowledge in the subject area would be useful in her understanding of the dependent variables and how the different conditions may have affected the dependent variables. There were two major themes that were noticed in the interview with the field researcher. The two themes were: 1. goals and, 2. repetition. The first theme to be assessed was the theme of goals. The interview transcript can be found in Appendix E.

Goals.

The goal theme was characterised by the need for a focus in each of the conditions. The theme showed that it was often the shared experience of having a direction to follow that allowed for improvement in team learning behaviours and perceived team psychological safety. The theme was further elaborated on by interviewee when she described how the goal affected their capability as a group to feel comfortable as they had an objective that gave them all the same understanding of the context. This can be seen in the following quote from the interviewee,

> *And that seems because you all going towards the same goal. And because of the same goal, you know that at least there's that so you feel safe in knowing that. That's the one thing that makes you belong. And then you feel safe. In that sense. Where you are working towards the same goal.*

The interviewee further described how the goal made there be a pragmatic mindset when attempting to perform the serious game,

> *We all aiming for this, and we all taking our roles in this. And that's what we really need to do to get to the end.*

Another part of the goal theme that was shown to be important was that the goal allowed for more experimentation as one could attempt something and then measured whether it moved the group closer to a goal. The use of experimentation showed that the goal could be influential in promoting team learning behaviours. The interviewee explained the above phenomenon in the following quote,

> *So that difference makes you aware that you doing something and then it will kind of push you to be like, Okay, let me do something different. Let me ask for your opinion. What do you think? And then like, it goes, like that kind of thing.*

The quote further shows another important part of TLB and psychological safety as the interviewee described the behaviour of asking for feedback on an idea which was described as an interpersonal risk (Edmondson, 1999). However, the interviewee did have some negative feedback about the team-based serious game and how it affected psychological safety. She further explained how the issue that was apparent with the goal orientation of the team-based serious game was actually resolved in the traditional online team building activity.

> *In the traditional game, if there's someone who would be willing to be like, what about you? Tell me a little bit more. It'll be easier for the conversation to come about. But in a serious game, because usually there's a time limit, like you kind of on a gogogo kind of vibe, there isn't really that space to be like, okay, pause. I want to hear everyone's opinions right now…*

She furthered described how the development of roles in the traditional online team building activity were due to the timeframe allowing for them to establish a rapport. The building of rapport for the team-based serious game seemed to be the shared experience. However, it seems that the building of rapport in the traditional online team building activity was due to the less pressurised timeframe that allowed for more discussion. This can be seen in the following quote by the interviewee,

> *And in the traditional game, it automatically happens like that. Because you are having conversation with everyone. So if one person doesn't say something, you'll automatically*

be like we are. We are six people here or something. I'm feel like I'm missing someone's voice. Okay, so it's, there's more time for you to react that someone isn't partaking in the like, game.

While both activities lasted 90 minutes, the feeling of pressure within the serious game may have hindered the connections that were being built. However, the interviewee described another theme in a number of quotes that may show how the goal orientation of a serious game may allow for more long term value of the team-based serious game rather than the traditional online team building activity

Repetition.

The theme of repetition was broken down into two parts. The first is that the team-based serious game had more appeal to be participated in again whereas the traditional online team building activity was described as an activity that a group should only do once. The second part of the theme of repetition was that there was a flaw in the design of the team-based serious game as there was a need to play multiple rounds of the team-based serious game.

The interviewee had described that she felt that there was a lack of motivation to take part in the traditional online team building activity again. She explained how there is only so much a group of people can discuss their opinions until it become uninteresting. Whereas the iterative nature of a team-based serious game, would have been enjoyable to part take in multiple times. The above information can be seen in the following quote from the interviewee,

…you play multiple different rounds… (of a team-based serious game). And then if you acting in the same sort of round, you sort of can see Oh, no, I'm doing this now.

She further described how the multiple different rounds was something that was missing as she perceived that the game was shorter, even though, it was not. There could be multiple reasons for this but the interviewee described the reason she felt that there needed to be more rounds in the following quote,

It's almost like one game wouldn't have been enough. Like you would have to go through the serious game a couple of times. We were having fun and wanted more.

The above quote shows that the repetition that the interviewee desired was due to the fact that the group was enjoying themselves. She furthered her point by describing how she felt that the time

period of the team-based serious game should have been longer as they were developing certain behaviours but they needed more time. She described this in the following quote,

> *So there was, towards the end, I could feel like we could have developed some behaviours. But I think the game was a bit short for that…*

The theme of repetition was described as an area that could help to improve the design of the team-based serious game. However, it also may show that the team-based serious game had an enjoyable aspect to it that may make individuals want to continue participating in the team-building activity.

Conclusion

The present chapter was written to provide a description of the results obtained throughout both studies. Both descriptive and inferential statistics were utilised within the results. Furthermore, both qualitative data and quantitative data were analysed. The biases inherent in the analyses of data were attempted to be mitigated for. The results described above, were analysed to attempt to achieve the aim of the study. The aim of study 1 was to investigate whether a serious game would lead to significantly higher levels of GPS and team cohesiveness than a traditional team-building activity. The aim of study 2 was to investigate whether an online team-based serious game would lead to significantly higher levels of TLB and perceived team psychological safety than a traditional online team building activity .

CHAPTER 5

DISCUSSION

The results above were utilised to answer the research questions that were established in Chapter 1 and 2. As has been described, the aim of the present study was to investigate whether there was a difference in the perceived levels of team learning behaviour (TBL), team psychological safety, group problem-solving (GPS), and team cohesiveness after participating in either a traditional team building intervention or a team building intervention utilising a serious game. The results above indicate that participating in the serious game led to a significantly higher level of GPS and team cohesiveness than participating in a traditional team building activity. However, there does not seem to be a significant difference between TBL and perceived team psychological safety after participating in either the traditional online team building or the team-based serious game. To discuss the presents results in more detail, the inferences were initially described under the theoretical implications, the limitations for the present study were described, recommendations were made for future research and practical contributions were discussed under the managerial implications. Finally, a conclusion was written to provide an overview of what has been observed throughout the present study.

Theoretical implications

Traditional team building was designed to be used to improve a team's GPS, TLB and, team climate dimensions. However, many have argued that the utilisation of serious games in team building is a more effective way to improve a team's GPS, TLB and, team climate dimensions than through traditional team building (Klein et al., 2009; Mayer, 2018; Emsley & Rumeser, 2018). The present theoretical implications were separated into four sections. Each section is a common theme that have been infer as reasons that there were or were not significant differences between the experimental group's GPS, TLB, perceived team psychological safety and, team cohesiveness. The first theoretical contribution is that a common, easy to understand goal seems to be an advantage of utilising a serious game in team building interventions.

Common goal

Rumeser and Emsley (2018) and Adachi and Willoughby (2013) suggested that the use of video games are more effective at increasing GPS skills than that of non-technology-based tools.

When solving a problem, goals need to be set to achieve the solution (Mayo, 2009; Sánchez & Olivares, 2011). The creation of these common goals can help to speed up a group's problem-solving process (Mayo, 2009; Sánchez & Olivares, 2011). Sánchez and Olivares (2011) proposed that teams that play video games can create these common goals faster than groups that do not play video games together. While speed was named as a dimension of GPS, within the present results it is shown that the difference in speed in completing tasks between the interventions is not significant. Therefore, one can infer from the present results that teams that participate in a serious game together do not create the common goals faster than teams that participate in traditional team building (Sánchez & Olivares, 2011).

While teams completing tasks faster is important, the main function of team building is to improve a team's organisational performance and/or social, interpersonal relational issues (Klein et al., 2009; Marlow et al., 2017; Mayer, 2018). Teams in organisations are normally heterogeneous this makes it difficult to create a team that can work effectively towards a common goal (Lamm et al., 2012). Traditional team building is supposed to create a sense of togetherness within a group and teach team members to understand the other members' thought processes (Klein et al., 2009; Landon et al., 2017; Mayer, 2018; Emsley & Rumeser, 2018).

Mayo (2009) suggested that multiplayer video games force players to work collaboratively and take suggestions from the other players to reach their overall goal. This leads to a greater perception of value in other team members (Mayo, 2009). This was seen in study 1 as team members involved in the serious game intervention rated themselves and the other teammates as significantly higher when they interacted with one another and their relevant KSAs than the traditional team-building teams. This was also demonstrated in how team members were given immediate feedback from the application and could, therefore, adjust their strategy. This builds on the theoretical ideas of Greitemeyer and Cox (2013) and Depping et al. (2016) that the understanding of a common goal that is created by a video game helps to build a team's ability to work together. Furthermore, a common goal could make it easier to communicate and share relevant information (Keith et al., 2018).

The field researcher suggested that due to the common goal of completing the team-based serious game further allowed everyone to feel safe divulging information. Researchers have suggested that the clear objectives and goals within team-based serious games makes it easier for individuals to share information as they understand what information is needed to complete the

goals (Keith et al., 2018; Stettina et al., 2018; Hacker et al., 2019; Pridmore & Godin, 2020). It has been suggested that the iterative process of serious game makes it easier for individuals to understand that common goal (Adachi & Willoughby, 2013).

Iterative process

The iterative process of video games means that each attempt teaches the team the different and creative approaches needed to accomplish their task (Adachi & Willoughby, 2013; Mayo, 2009; Sánchez & Olivares, 2011). This is seen through the answer from the team member, in the serious game intervention, that they gave in the present results,

> *The phone was useful Feedback, could press replay. Change perception. Pause, so you can see mid action.*

The quote above strengthened the idea that the ability to retry the same activity multiple times and have live updates allowed for more creative ideas that could then be translated into their GPS skills. Many researchers have posited that the reason serious games are likely better than traditional online team-building activities is that the iterative function of a serious game allows for participants to perceive the serious game as being something they might enjoy participating again (for example, Ciasullo et al., 2017; Keith et al., 2018; Pridmore & Godin, 2020). While the interviewee spoke of wanting to repeat the team-based serious game but little desire to participate in the traditional online team building activity again, other respondents had a similar view. The following quote expands on the respondent's feeling about the enjoyable nature of the team-based serious game,

> *It was nice social interaction with people I didn't know but we became very comfortable with one another and had fun while doing it. I think this was important for building group relations rather than purely teamwork.*

Mayo (2009), and Sánchez and Olivares (2011) argued that the use of a serious game is a more effective way of teaching accuracy in GPS and create a sense of synergy. This is due to the iterative process that helps teams to see each task from a different perspective and helps teams work out how the different personalities within their team function together (Adachi & Willoughby, 2013; Mayo, 2009; Sánchez & Olivares, 2011). This is seen in the present results where the serious game teams were more effective and accurate at solving the task than the traditional team-building teams. They were also seen to be able to communicate better which

meant that there was greater team cohesiveness. Team cohesiveness is also seen to be stronger as team members can understand the ideas given by other members and trust their ideas (Greitemeyer & Cox, 2013; Depping et al., 2016). Additionally, some participants suggested that they found the iterative process of the serious games more interesting as they could engage in the problem from many different approaches.

Engagement

Enlisting engagement from participants in team-building activities is difficult (Shute et al., 2016). The theme of repetition was extrapolated from the field researcher interview. The interviewee described how they enjoyed both team-building interventions but found the serious game more enjoyable and they felt more likely to participate in the team-based serious game rather than the traditional online team building activity. This can be seen in the following quote

> *It's almost like one game wouldn't have been enough. Like you would have to go through the serious game a couple of times. We were having fun and wanted more.*

A problem for traditional team building is that many employees feel that team building is forced onto them, therefore, they are less engaged (Klein et al., 2009; Aga et al., 2016). The respondents in study 1 described a greater enjoyment in the serious game team building and described this as a factor for why they believed they performed better. While the respondents in the traditional team building described the issue of the traditional team building was that it was confusing as to what the overall objective was of the exercise. This indicates that the greater performance of the teams in the serious game intervention could be attributed to the fact that they were more engaged and had a greater understanding of the overall goal of the team-building exercise, therefore, learnt more from the serious game intervention (Klein et al., 2009; Aga et al., 2016; Shute et al., 2016). Furthermore, respondents in the serious games' groups found that they did not perceive pressure during the activities.

Pressure

The present results can be shown to suggest that the team-based serious game groups felt statistically significantly more comfortable being different within their groups than the traditional online team building activity groups. The following quote given by a respondent who was part of the team-based serious game group elucidates more on the above point,

> *I think the serious game approach was more relaxed and less 'competitive' so people felt more comfortable taking risks and discussing different opinions etc- it didn't risk the group's outcome.*

The less pressurised environment may lead to individuals feeling more comfortable with their group and so could lead to more information sharing as mentioned in the above quote (Keith et al., 2018).

Smohai et al. (2016), suggested that team-based serious games were likely to improve a team's sharing of information more than a traditional online team building activity. Keith et al. (2018), further proposed that the reason team-based serious games lead to greater sharing of information was due to the fact that there was less pressurised environment as the serious game was supposed to be more enjoyable. The sharing of information has been categorised as a TBL (Edmondson, 1999). As can be seen in the present results, the sharing of information within the team-based serious game groups was statistically significantly greater than the sharing of information within the traditional online team building activity groups. The interviewee suggested that the reason information was more freely shared in the team-based serious game groups was due to the fact that the respondents felt less pressure as the serious game was enjoyable.

Researchers have proposed that the learning outcomes of online team-building activities may be hindered if there is any form of pressure (For example, Keith et al., 2018; Stettina et al., 2018; Hacker et al., 2019; Pridmore & Godin, 2020). While there was less pressure experienced in the team-based serious game as it was seen as more enjoyable, the interviewee did describe how the pressure within the serious game affected the learning outcomes of the team-based serious game. The interviewee suggested that there seemed to be a perceived time pressure within the team-based serious game. The following quote from the interviewee elaborates on the issue stated previously,

> *In the traditional game, if there's someone who would be willing to be like, what about you? Tell me a little bit more. It'll be easier for the conversation to come about. But in a serious game, because usually there's a time limit, like you kind of on a gogogo kind of vibe, there isn't really that space to be like, okay, pause. I want to hear everyone's opinions right now…*

Ciasullo et al. (2017) argued that if team members feel under time pressure, during a team-building activity, could lead to learning outcomes of the team-building activity not being reached (Keith et al., 2018; Pridmore & Godin, 2020).

The interviewee's suggestion of time pressure and Ciasullo et al. (2017) describing its detrimental effects on the learning outcomes, seems to be a reason why there was little difference between the outcomes of the traditional online team building activity and the team-based serious games. Both activities were the same amount of time, however, the perception of time pressure in the team-based serious game likely changed the outcomes of the team-building activities (Ciasullo et al., 2017; Keith et al., 2018; Pridmore & Godin, 2020). However, the time pressure did not seem to affect the enjoyment of the team-based serious game.

The present results support the conclusion that serious games in a face-to-face medium are a better teaching tool for a team to learn GPS skills (Emsley & Rumeser, 2018; Adachi & Willoughby, 2013). The use of serious games in team building supports the theory that video games create a more cohesive bond between heterogeneous teams as supported by the present results (Lamm et al., 2012; Greitemeyer & Cox, 2013; Depping et al., 2016). However, there does not seem to be a statistically significant difference between participating in a team-based serious game or a traditional online team building activity and their effects on overall perceived team psychological safety and TBL. There are a number of reasons this could be. One of the most prominent has been mentioned above that the participants in the team-based serious game enjoyed the game and wanted more time to participate in the game. This could suggest that there is more opportunity to repeat the team-based serious game whereas the traditional online team building activity seemed to only be enjoyable for a short time period.

Limitations and future research

There are certain limitations in the present study that could be addressed in future studies of this subject. The respondents were all university students and were not established teams before the experiment. Future studies should make use of established teams within organisations in order to get a more accurate representation of the effects of serious games on team cohesiveness, GPS, perceived team psychological safety and, TLB. Due to limited resources and time both studies were cross-sectional quasi-experimental designs. Future studies should view the effect of serious

games in team building over multiple tests to fully understand the effect a serious game has on the GPS and the TLB of a group over its entire lifespan.

Both studies were not random or probable sample. This means that there was a limit to the generalisability of the present studies. Future studies should use a random or probable sample in order to have greater generalisability to the population. The low response rates meant that teams were only made up of three or four team members in the first study. This is not in line with Tuckman's stages of small group development that a typical team is made up of five to fifteen members (Tuckman & Jensen, 1977). To more accurately describe the effect a serious game has on GPS in team building, future studies should have teams made up of at least five members (Tuckman & Jensen, 1977).

While all four activities were chosen as they were supposedly designed to improve the four key dimensions in this current study. Future studies should utilise activities that have been scientifically designed and empirically tested for the explicit purpose of improving the four key dimensions in this present study.

The present sample in study one was comprised of mainly young university students. These individuals may not be as representative of the general work population as most working individuals are finished university and may not be as versed in serious games (Roque & Boot, 2018). As such, to have a more generalisable sample, future research should ensure that their sample's age range is more representative of members in teams of all ages. This will ensure that confounding variables such as age and technological experience can be mitigated for (Roque & Boot, 2018).

The present studies did not research the effects of serious games on the other three primary areas required to be improved in team building (Klein et al., 2009; Landon et al., 2017; Mayer, 2018; Emsley & Rumeser, 2018). Future studies should be done to see the effect of serious games in team building could have on 1) clarifying or defining team roles; 2) enhancing social or interpersonal relationships between team members, and 3) setting goals for a team.

Edmondson (1999) and Harvey et al. (2019) argued that open-mindedness may be a mediating factor within the relationship between perceived team psychological safety and TBL. The present research did not collect data on the open-mindedness dimension. Therefore, future researchers should attempt to see if open-mindedness affects the relationship between perceived team psychological safety and TBL.

Managerial Implications

Managers that are dealing with newly formed teams may be struggling to get the new team members to interact in a way that is conducive to work. These new teams may likely benefit from the use of a team-building exercise through the medium of a serious game as a way to increase the overall synergy and cohesiveness. The evidence above is used to display that it is likely that these newly formed teams will benefit from these serious games more than traditional team building as it is seen as more enjoyable and has a clearer goal for the team members to see. These new teams or teams that are struggling to come up with new ideas or solve problems may likely benefit from the serious game approach to team building. This is likely due to the tool being more engaging and gives constant feedback that provides an understanding of why the certain ways these teams come up with ideas may or may not work. The teams are also likely to be able to think more creatively on how they can best utilise each team member in decision making processes.

Additionally, Managers that have teams that are struggling to feel comfortable with each other or there are repeated mistakes that occur, should utilise team building as an intervention to improve those areas. Furthermore, while there is not sufficient evidence to support the third and fourth hypotheses, managers should utilise a team-based serious game as there is sufficient evidence to show that there is a slight difference in the transferring of KSAs. If a manager wishes to conduct more than one team-building activity in order to improve a team's climate, they should consider utilising a team-based serious game. It seems that there is more motivation from the participants to take part in the team-based serious game intervention again rather than participate in the traditional online team building activity again.

Conclusion

The rapid improvement of online communication technology has led to many organisations opting to utilise online teams (Tseng & Yeh, 2013). The increase in the utilisation of online teams has increased the need for more research into how best to train them (Tseng & Yeh, 2013). However, researchers have suggested that the traditional methods of team building may not be the most effective method in training online teams (Tseng & Yeh, 2013; Lukić & Vračar, 2018). The present study was conducted in order to compare the effectiveness of traditional team-building interventions and team-building interventions that utilise serious games. More specifically, the aim

of the present study was to investigate whether the use of serious games in team building will lead to higher levels of GPS, team cohesiveness, perceived team psychological safety and TLB, than typical/traditional team building activities that aim to do the same. It seems that a team-building intervention that utilises a serious game does improve GPS and team cohesiveness statistically significantly more than a traditional team-building intervention. However, it does not seem that a team-based serious game improves perceived team psychological safety and team learning behaviours statistically significantly more or less than a traditional online team-building intervention. Yet, there does seem to be evidence that serious games could be developed more to become more effective within the team-building context.

There seems to be promising findings from the data that can be utilised to motivate further research into serious games and their utilisation within team building. Serious games seem to have the advantage over traditional team-building interventions as the instant feedback and constant iteration allows teams to experiment more with decision-making tactics. However, one of the main factors that still seems to change the transfer of the learning outcomes for an intervention is the engagement and enjoyment level of the intervention. It seems that the non-pressurised, fun environment that is built within serious games may improve the chances that learning goals are achieved. Furthermore, it seems that repeat participation in serious games activities is more often desired by participants than if they participated in the traditional team-building interventions. There is still a large amount of researched needed in order to determine the effectiveness of serious games in team building. However, the evidence provided within the present study is promising. The findings seem to suggest that serious games should be adopted more within the context of team-building interventions.

REFERENCES

Adachi, P. J. C., & Willoughby, T. (2013). More than just fun and games: The longitudinal relationships between strategic video games, self-reported problem-solving skills, and academic grades. *Youth Adolescence, 42*, 1041- 1052.

Aga, D. A., Noorderhaven, N., & Vallejo, B. (2016). Transformational leadership and project success: The mediating role of team-building. *International Journal of Project Management, 34*(5), 806-818.

Alaka, S., Cunha, M. L., Vermeer, J., Salamon, N. Z., Balint, J. T., & Bidarra, R. (2019). Stimulating ideation in new teams with the mobile game Grapplenauts. *International Journal of Serious Games*, *6*(4), 87-101.

Armstrong, A., & Jackson-Smith, D. (2013). Forms and levels of integration: Evaluation of interdisciplinary team-building project. *Journal of Research Practice*, *9*(1), 1-20.

Boyle, E. A., Hainey, T., Connolly, T. M., Gray, G., Earp, J., Ott, M., Lim, T., Ninaus, M., Ribeiro, C., & Pereira, J. (2016). An update to the systematic literature review of empirical evidence of the impacts and outcomes of computer games and serious games. *Computers & Education*, *94*, 178-192.

Bozanta, A., Kutlu, B., Nowlan, N., & Shirmohammadi, S. (2016). Effects of serious games on perceived team cohesiveness in a multiuser virtual environment. *Computers in Human Behavior*, *59*, 380-388.

Bradley, B. H., Postlethwaite, B. E., Klotz, A. C., Hamdani, M. R., & Brown, K. G. (2012). Reaping the benefits of task conflict in teams: The critical role of team psychological safety climate. *Journal of Applied Psychology*, *97*(1), 151-158.

Bravo, R., Catalan, S., & Pina, J. M. (2019). Analysing teamwork in higher education: an empirical study on the antecedents and consequences of team cohesiveness. *Studies in Higher Education*, *44*(7), 1153-1165.

Brown, D. K., & Benson, S. N. K. (2020). Does Time in Team Training Matter? Evaluation of Team-Level Attitudes With Interprofessional Education. *Clinical Simulation in Nursing*, *48*, 38-45.

Chen, C., Liao, J., & Wen, P. (2010). Why does formal mentoring matter? The mediating role of psychological safety and the moderating role of power distance orientation in the Chinese context. *The International Journal of Human Resource Management, 25*, 1112-1113

Ciasullo, M. V., Cosimato, S., Gaeta, M., & Palumbo, R. (2017). Comparing two approaches to team building: A performance measurement evaluation. *Team Performance Management: An International Journal, 23*(7), 333-351.

Coovert, M. D., Winner, J., Bennett Jr., W., & Howard, D. J. (2017). Serious Games are a Serious Tool for Team Research. *International Journal of Serious Games*, *4*(1), 41-55.

Decuyper, S., Dochy, F., & Van den Bossche, P. (2010). Grasping the dynamic complexity of team learning: An integrative model for effective team learning in organisations. *Educational Research Review*, *5*, 111-133.

Depping, A. E., Mandryk, R. L., Johanson, C., Bowey, J. T., Thomson, S. C. (2016). Trust Me: Social Games are Better than Social Icebreakers at Building Trust. *Chi Play.* 116-129.

Dostál, J. (2015). Theory of problem solving. *Procedia - Social and Behavioral Sciences*, *174*, 2798-2805.

Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, *44*, 350-383.

Edmondson, A. C., & Harvey, J. (2018). Cross-boundary teaming for innovation: Integrating research on teams and knowledge in organisations. *Human Resource Management Review*, *28*, 347-360.

Edmondson, A. C., & Lei, Z. (2014) Psychological safety: The history, renaissance, and future of an interpersonal construct. *Annual Review of Organizational Psychology and Organizational Behavior*, *1*, 23-43.

Emsley, M., & Rumeser, D. (2018) A systematic review of project management serious games: Identifying gaps, trends, and directions for future research. *The Journal of Modern Project Management*, *6*(1), 48-59.

Fapohunda, T. (2013). Towards Effective Team Building in the Workplace. *International Journal of Education and Research*, *1*(4).

Fleming, T. M., Bavin, L., Stasiak, K., Hermansson-Webb, E., Merry, S. N., Cheek, C., Lucassen, M., Lau, H. M., Pollmuller, B., & Hetrick, S. (2017). Serious games and gamification for mental health: Current status and promising direction. *Frontiers in Psychology*, *7*(215), 1-7.

Gardner, A. K., Kosemund, M., Hogg, D., Heymann, A., & Martinez, A. (2017). Setting goals, not just rules: Improving teamwork through goal-focused debriefing. *The American Journal of Surgery*, *213*, 249-252.

Greitemeyer, T., & Cox, C. (2013). There's no "I" in team: Effects of cooperative video games on cooperative behavior. *European Journal of Social Psychology*, *43*(3), 224-228.

Gorman, J. C., David A. Grimm D., A., Ronald H. Stevens, R. H., Galloway, T., Willemsen-Dunlap, A. M., & Halpin, D. J. (2020). Measuring Real-Time Team Cognition During Team Training. *Human Factors*, *62*(5), 825-860.

Hacker, J., Johnson, M., Saunders, C., & Thayer, A. L. (2019). Trust in Virtual Teams: A Multidisciplinary Review and Integration. *Australasian Journal of Information Systems*, *23*, 1-36.

Harman, R. P., Ellington, J. K., Surface, E. A., & Thompson, L. F. (2015). Exploring qualitative training reactions: Individual and contextual influences on trainee commenting. *Journal of Applied Psychology*, *100*(3), 894–916.

Harvey, J., Johnson, K. J., Roloff, K. S., & Edmondson, A. C. (2019). From orientation to behavior: The interplay between learning orientation, open-mindedness, and psychological safety in team learning. *Human Relations*, *72*(11), 1726-1751.

He, F., Paul, S., & Dennis, A. R. (2018). Group Atmosphere, Shared Understanding, and Team Conflict in Short Duration Virtual Teams Proceedings of the 51st Hawaii International Conference on System Sciences.

Hoch, J. E., & Kozlowski, S. W. J. (2014). Leading virtual teams: Hierarchical leadership, structural supports and share team leadership. *Journal of Applied Psychology*, *99*(3), 390-403.

Hood, A. C., Cruz, K. S., & Bachrach, D. G. (2017). Conflicts with Friends: A Multiplex View of Friendship and Conflict and Its Association with Performance in Teams. *Journal of Business Psychology*, *32*, 73-86.

Hughes, A. M., Gregory, M. E., Joseph, D. L., Sonesh, S. C., Marlow, S. L., Lacerenza, C. N., Benishek, L. E., King, H. B., & Salas, E. (2016). Saving lives: A meta-analysis of team training in healthcare. *Journal of Applied Psychology*, *101*(9), 1266–1304.

Kam, A. H. T., & Umar, I. N. (2018). Fostering Authentic Learning Motivations Through Gamification: A Self-Determination Theory (SDT) Approach. *Journal of Engineering Science and Technology, Special Issue*, 1-9.

Keith, M. J., Anderson, G., Gaskin, J. E., & Dean, D. L. (2018). Team video gaming for team building: Effects on team performance. *Transactions on Human-computer Interaction*, *10*(4), 205-231.

Klein, C., DiazGranados, D., Salas, E., Le, H., Burke, C. S., Lyons, R., & Goodwin, G. F. (2009). Does team building work? *Small Group Research, 40*(2), 181-222.

Konradt, U., Otte, K., Schippers, M. C., & Steenfatt, C. (2016). Reflexivity in Teams: A Review and New Perspectives. *The Journal of Psychology*, 150:2, 153-174, DOI: 10.1080/00223980.2015.1050977.

Lacerenza, C. N., Marlow, S. L., Tannenbaum, S. I., & Salas, E. (2018). Team development interventions: Evidence-based approaches for improving teamwork. American Psychologist, 73(4), 517–531.

Lamm, A. J., Shoulders, C., Roberts, T. G., Irani, T., A., Snyder, L. J., Unruh Brendemuhl, J. (2012). The Influence of Cognitive Diversity on Group Problem Solving Strategy. *Journal of Agricultural Education*, *53*(1), 18-30.

Laitinen, K., & Valo, M. (2018). Meanings of communication technology in virtual team meetings: Framing technology-related interaction. *International Journal of Human-Computer Studies*, *111*, 12-22.

Launders, R. N. (2014). Developing a Theory of Gamified Learning: Linking Serious Games and Gamification of Learning. *Simulation & Gaming*, *45*(6), 752-768.

Loeb, C., Stempel, C., & Isaksson, K. (2016). Social and emotional self-efficacy at work. *Scandinavian Journal of Psychology*, *57*, 152-161.

Lord, R. G., Day, D. V., Zaccaro, S. J., Avolio, B. J., & Eagly A. H. (2017). Leadership in Applied Psychology: Three waves of theory and research. *Journal of Applied Psychology*, *102*(3), 434-451.

Lukić, J. M., & Vračar, M. M. (2018). Building and nurturing trust among members in a virtual project team. *Strategic Management*, *23*(3), 16-20.

Lvina, E., Johns, G., & Vandenberghe, C. (2015). Team Political Skill Composition as a Determinant of Team Cohesiveness and Performance. *Journal of Management*, *44*(3), 1001-10028.

Mehta, A., & Mehta, N. (2018). Knowledge Integration and Team Effectiveness: A Team Goal Orientation Approach. *Decision Sciences*, *49*(3), 445-486.

Marlow, S. L., Lacerenza, C. N., & Salas, E. (2017). Communication in virtual teams: a conceptual framework and research agenda. *Human Resource Management Review*, *27*(4), 575-589.

Marlow, S. L., Lacerenza, C. N., Paolettia, J., Burke, S., & Salas, E. (2018). Does team communication represent a one-size-fits-all approach?: A meta-analysis of team communication and performance. *Organizational Behavior and Human Decision Processes*, *144*, 145-170.

Mayer, I. (2018). Assessment of Teams in a Digital Game Environment. *Simulation & Gaming*, *49*(6), 602-619.

Mayo, M. J. (2009). Video Games: A Route to Large-Scale STEM Education? *Science*, *323*(5910), 79-82.

McCarthy, M. (2016). Experiential Learning Theory: From Theory To Practice. *Journal of Business & Economics Research*, *14*(3), 91-100.

Miller, C. J., Kim, B., Silverman, A., & Bauer, M. S. (2018). A systematic review of team-building interventions in non-acute healthcare settings. *BMC Health Services Research*, *18*(146), 1-21.

Mitchell, R., & Boyle, B. (2015). Professional diversity, identity salience and team innovation: The moderating role of openmindedness norms. *Journal of Organizational Behavior*, *36*, 873-894.

Murphy, M., Curtis, K., & McCloughen, A. (2015). What is the impact of multidisciplinary team simulation training on team performance and efficiency of patient care? An integrative review. *Australasian Emergency Nursing Journal*, *19*, 44-53.

Ortega, A., Sánchez-Manzanares, M., Gil, F., & Rico, R. (2010). Team learning and effectiveness in virtual project teams: The roles of beliefs about interpersonal context. *The Spanish Journal of Psychology*, *13*(1), 267-276.

Pridmore, J., & Godin, J. (2020). Investigation of virtual teams and serious games. *Journal of Computer Information Systems*, *60*(2), 194-200.

Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. *Journal of Research in Personality*, *41*, 203-212.

Riccobono, F., Bruccolori, M., & Größler, A. (2016). Groupthink and Project Performance: The Influence of Personal Traits and Interpersonal Ties. *Production And Operations Management*, *25*(4), 609-629.

Rowland, C. A. (2014). The effect of testing versus restudy on retention: A meta-analytic review of the testing effect. *Psychological Bulletin*, 1-32.

Sahoo, B. C., & Sia, S. K. (2015). Psychological capital and organisational commitment: Nature, structure and relationship in an Indian sample. *Asia-Pacific Journal of Management Research and Innovation*, *11*(3), 230-244.

Sánchez, J., & Olivares, R. (2011). Problem solving and collaboration using mobile serious games. *Computers & Education*, *57*(3), 1943-1952.

Sanner, B., & Bunderson, J. S. (2015). When feeling safe isn't enough: Contextualising models of safety and learning in teams. *Organisational Psychology Review*, *5*(3), 224-243.

Schmutz, S., Sauer, J., Sonderegger A., & Messerli, N. (2018). Social stress and performance in human-machine interaction: a neglected research field. *Ergonomics*, *62*(11), 1377-1391.

Silic, M., & Lowry, P. B. (2020). Using design-science based gamification to improve organisational security training and compliance. *Journal of Management Information Systems*, *37*(1), 129-161.

Sitzmann, T., & Weinhardt, J. M. (2018). Training Engagement Theory: A Multilevel Perspective on the Effectiveness of Work-Related Training. *Journal of Management*, *44*(2), 732-756.

Smohai, M., Urbán, R., Griffiths, M. D., Király, O., Mirnics, Z., Vargha, A., & Demetrovics, Z. (2016). Online and offline video game use in adolescences: Measurement invariance and problem severity. *American Journal of Drug and Alcohol Abuse*, 1-13.

Sottilare, R. A., Burke, C. S., Salas, E., Sinatra, A. M., Johnston, J. H., & Gilbert, S. B. (2017). Designing adaptive instruction for teams: A meta-analysis. *International Journal of Artificial Intelligence Education*, *28*, 225-264.

Stettina, C. J., Offerman, T., de Mooij, B., & Sidhu, I. (2018). Gaming for agility: Using serious games to enable agile project and portfolio management capabilities in practice. *Paper presented at Engineering, Technology, and Innovation and IEE International Technology Management Conference*, Stuttgart, Germany.

Thompson, B. M., Haidet, P., Borges, N. J., Carchedi, L. R., Roman, B. J., Townsend, M. H., Butler, A. P., Swanson, D. B., Anderson, M. P., & Levine, R. E. (2015). Team cohesiveness, team size and team performance in team-based learning teams. *Medical Education, 49*, 379-385.

Tseng, H. W., & Yeh, H. (2013). Team members' perceptions of online teamwork learning experiences and building teamwork trust: A qualitative study. *Computers & Education*, *63*, 1-9.

Tuckman, B. W., & Jensen, M. A. C. (1977). Stages of small-group development revisited. *Group & Organisation Studies, 2*(4), 419-427.

Vallejo, B., Aga, D. A., & Noorderhaven, N. (2016). Transformational leadership and project success: The mediating role of team-building. *International Journal of Project Management*, 34*(5), 806-818.*

van Offenbeek, M. (2001). Processes and outcomes of team learning. *European Journal of Work and Organizational Psychology*, *10*(3), 303-217.

Vijayaratnam, P. (2012). Developing Higher Order Thinking Skills and Team Commitment via Group Problem Solving: A Bridge to the Real World. *Procedia - Social and Behavioral Sciences, 66*(7), 53-63.

Waddell, J. C., & Peng, W. (2014). Does it matter with whom you slay? The effects of competition, cooperation and relationship type among video game players. *Computers in Human Behavior*, *38*, 331-338.

Wang, Y., Sun, J., & Liu, L. (2019). Effects of applying virtual reality to adventure athletic education on students' self-efficacy and team cohesiveness. *Journal of Interdisciplinary Mathematics*, *20*(3), 895-908.

Wang, Y., & Wagner, S. (2018). On groupthink in safety analysis: An industrial case study. 40th *International Conference on Software Engineering: Software Engineering in Practice*.

Wassenaar, D. R., & Slack, C. M. (2016). How to learn to love your research ethics committee: Recommendations for psychologists. *South African Journal of Psychology*, *46*(3), 306-315.

Wickramasinghe, V., & Nandula, S. (2015). Diversity in team composition, relationship conflict and team leader support on globally distributed virtual software development team performance. *Strategic Outsourcing: An International Journal*, *8*(2), 138-155.

Zhang, J., Wu, W. & Li, H. (2018). Enhancing Building Information Modeling Competency among Civil Engineering and Management Students with Team-Based Learning. *Journal of Professional Issues in Engineering Education and Practice*, *144*(2), 1-13.

Appendices

Appendix A: Research consent form

Dear Respondent

My name is Matthew Sellier and I am collecting data. I want to invite you to participate in a research study with the title *An Experimental Study Comparing the Effect of a Team-based Serious Game vs Online Team Building Intervention on Psychological Safety and Team Learning Behaviour.* You will be presented with information relevant to this topic and asked to answer some questions about it. Please take some time to familiarise yourself with the information about the study we have provided below. You are welcome to ask us any question(s) and/or request further clarification regarding any aspect of the research study and/or the information provided here.

It is envisaged that new knowledge will be gleaned from the data that is collected, which will contribute to our better understanding of whether a team-based serious game or a online team building activity is better at developing team learning behaviours and team psychological safety. The findings of the research study may, at the discretion of the researchers, be used in future studies, disseminated by means of typical research output channels, including conference presentations, published conference papers, journal articles, popular articles, textbooks, and books. When doing so, your personal anonymity and confidentiality will always be maintained and no identifiable information will ever be disclosed.

Your participation in this research study is completely voluntary. You have the right to withdraw at any point during the study, for any reason, and without any negative or adverse consequence to you. You are not required to disclose your name or any other personal identifier that will connect you to the study anywhere in the questionnaire. All responses, even though collected anonymously, will be treated confidentially. Data will be stored in accordance with best practice guidelines and privacy legislation, including always being kept securely and password protected.

There would be no inherent or implicit risks in participating in the study – nor associated with withdrawing from it at any time, even if you had initially agreed to be part of the study. All that we ask of you is that you give us your time. If you agree to participate in the research study, it would take around two (2) hours to complete the team building activity and complete the survey provided. We will be grateful if you participate in the research study. Participation in this study may provide you with benefits, such as improving your communication skills and understanding of team learning behaviour through either of the activities you participate in.

The UCT Commerce Research in Ethics Committee has approved this research study.

If you have any questions and would like to contact the principal investigators to discuss any aspect of this research study and/or your participation therein, please e-mail Matthew Sellier at sllmat002@myuct.ac.za and/or Professor Anton Schlechter at anton.schlechter@uct.ac.za.

By ticking "Yes" and providing your signature below, you declare that you:

- are 18 years of age or older;
- agree to participate in the research study;
- acknowledge that your participation in the research study is voluntary and that you are under no pressure to take part in it;
- are aware that you may choose to terminate your participation in the study at any time and for any reason with no adverse impact for you at all; and
- are satisfied with the issues of risk, privacy, confidentiality and the use of the information you share with us as described above.

Tick on of the options below:

- **Yes.** I give my consent to participate in the study, given the information above.

- **No.** I do not give my consent and do not wish to participate in the study.

If **yes** is chosen, proceed to the questionnaire starting on the next page.

If **no** is chosen, do not proceed to the questionnaire. Informed consent is required to participate in this research study.

_____ _____

Signature Date

Thank you in advance for your participation and contribution.

Appendix B: Serious Games Indemnity and consent form

INDEMNITY AND CONSENT BY PARTICIPANTS

Game: _____ Date: _____ Client: _____

I, the undersigned, hereby agree and acknowledge that I am fully aware of the inherent hazards and risks associated with my participation in the event ("**the Event**") to be conducted by The Gallivanting Goose (Pty) Ltd ("**TGG**"), with registration number 2015/441208/07. These hazards and risks include but are not limited to –

(a) risk of injury from the Event and equipment utilized, including the death or potential for permanent disability;

(b) risks associated with exposure to the elements, excessive heat, hypothermia, and/or encountering objects either natural or man-made;

(c) my own negligence and/or the negligence of others, including but not limited to decision making including misjudging terrain, bad driving, weather, trails and/or route location;

(d) attack by or encounter with poisonous and non-poisonous plants, insects, reptiles, and/or animals;

(e) accidents or illness occurring in remote places where there are no immediate medical facilities; and/or

(f) fatigue, chill, and/or dizziness, which may diminish my reaction time and increase the risk of accident.

I hereby agree that should I have a pre-existing medical condition I have made this known to TGG and will carry any necessary medication that may be required during the Event.

I agree that I may be required to submit to TGG an original medical certificate from a medical practitioner confirming that I am fit and able to complete the Event should TGG be concerned about my ability to participate in a game.

Should TGG or its representative consider me unsuitable for the Event, it shall be entitled, at its sole and absolute discretion, to refuse my participation in the Event.

I hereby agree to release and hold TGG, its officers, directors, employees, representatives, agents and volunteers, harmless with respect to any and all injury, disability, death, claims, loss or damage to person or property howsoever caused in respect of the aforementioned activities.

I hereby acknowledge and agree that whilst every care has been taken by TGG to ensure the safety of the participants for the duration of the Event, TGG does not accept any liability in the event that any loss or damage to persons or property is suffered.

I further agree that should TGG suffer any loss or damage as a result of an act or omission by me, then I agree to indemnify TGG for any damages suffered by TGG, which shall include any damage to the Property of TGG.

I hereby record and accept that I am joining the Event at my own risk and I further bind my dependents, heirs, executors, administrators and assigns to the terms and conditions of this Indemnity.

This release shall be binding to the fullest extent permitted by law. If any provision of this Indemnity is found to be unenforceable, the remaining terms shall be enforceable.

I, the undersigned, have read the aforementioned indemnity and confirm that I am fully aware and understand the contents thereof and agree to participate in the Event entirely at my own risk.

	Name:	Signature:
1.		

Appendix C: Questionnaire Study 1

Which team building exercise were you part of?

- o Serious game or the technology-based team building activity
- o Traditional team building activity

Section 1

Consider each of the statements below and rate your experience on a response scale where "1 = Never tried" and "5 = Very Easily". Please answer each question by placing an X in the box that is most appropriate.

If you have not tried to perform a task with a mobile device or do not know what a task is, please mark "NEVER TRIED," regardless of whether or not you think you may be able to perform the task. Remember, you are rating your ability to perform each of these tasks specifically using a mobile device, i.e. a tablet or smartphone.

Using a mobile device I can …	**1 Never tried**	**2 Not at all**	**3 Not very easily**	**4 Somewhat easily**	**5 Very easily**
navigate on-screen menus using the touchscreen	O	O	O	O	O
use the on-screen keyboard to type	O	O	O	O	O
send e-mails	O	O	O	O	O
send pictures by e-mail	O	O	O	O	O
transfer information (files such as music, pictures, documents) on my computer to my mobile device	O	O	O	O	O
transfer information (files such as music, pictures, documents) on my mobile device to my computer	O	O	O	O	O
find information about my hobbies and interests on the internet	O	O	O	O	O
find health information on the internet	O	O	O	O	O
enter events and appointments into a calendar	O	O	O	O	O
check the date and time of upcoming and prior appointments	O	O	O	O	O
use the device's online "store" to find games and other forms of entertainment (e.g., using Apple App Store or Google Play Store)	O	O	O	O	O

set up a password to lock/ unlock the device	O	O	O	O	O
erase all the internet browsing history and temporary files	O	O	O	O	O
listen to music	O	O	O	O	O
update games and other applications	O	O	O	O	O
delete games and other applications	O	O	O	O	O

Section 2

Think about your own personality characteristics.

Consider each of the statements below and rate the extent to which you believe the statements describe your personality on a response scale where "1 = Strongly Disagree" and "5 = Strongly Agree".

We are all able to portray different personality characteristics when we want or need to. We are, however, interested in your typical personality characteristics, i.e. those that come naturally when you are just being yourself. Do not think too long about your answers. **There are no right or wrong answers.**

I see myself as someone who…	**1 = Strongly Disagree**	**2 = Disagree**	**3 = Neutral**	**4 = Agree**	**5 = Strongly Agree**
is reserved	O	O	O	O	O
is generally trusting	O	O	O	O	O
tends to be lazy	O	O	O	O	O
is relaxed, handles stress well	O	O	O	O	O
has few artistic interests	O	O	O	O	O
is outgoing, sociable	O	O	O	O	O
tends to find fault with others	O	O	O	O	O
does a thorough job	O	O	O	O	O
gets nervous easily	O	O	O	O	O
has an active imagination	O	O	O	O	O

APPENDIX B

Comprehensive Assessment of Team Member Effectiveness—Behaviorally Anchored Rating Scale (BARS) Version

	Your name					← Write the names of the people on your team including your own name. This self and peer evaluation asks about how you and each of your teammates contributed to the team during the time period you are evaluating. For each way of contributing, please read the behaviors that describe a "1", "3," and "5" rating. Then confidentially rate yourself and your teammates.
Contributing to the Team's Work	5	5	5	5	5	• Does more or higher-quality work than expected. • Makes important contributions that improve the team's work. • Helps to complete the work of teammates who are having difficulty.
	4	4	4	4	4	Demonstrates behaviors described in both 3 and 5.
	3	3	3	3	3	• Completes a fair share of the team's work with acceptable quality. • Keeps commitments and completes assignments on time. • Fills in for teammates when it is easy or important.
	2	2	2	2	2	Demonstrates behaviors described in both 1 and 3.
	1	1	1	1	1	• Does not do a fair share of the team's work. Delivers sloppy or incomplete work. • Misses deadlines. Is late, unprepared, or absent for team meetings. • Does not assist teammates. Quits if the work becomes difficult.
Interacting with Teammates	5	5	5	5	5	• Asks for and shows an interest in teammates' ideas and contributions. • Improves communication among teammates. Provides encouragement or enthusiasm to the team. • Asks teammates for feedback and uses their suggestions to improve.
	4	4	4	4	4	Demonstrates behaviors described in both 3 and 5.
	3	3	3	3	3	• Listens to teammates and respects their contributions. • Communicates clearly. Shares information with teammates. Participates fully in team activities. • Respects and responds to feedback from teammates.
	2	2	2	2	2	Demonstrates behaviors described in both 1 and 3.
	1	1	1	1	1	• Interrupts, ignores, bosses, or makes fun of teammates. • Takes actions that affect teammates without their input. Does not share information. • Complains, makes excuses, or does not interact with teammates. Accepts no help or advice.
Keeping the Team on Track	5	5	5	5	5	• Watches conditions affecting the team and monitors the team's progress. • Makes sure that teammates are making appropriate progress. • Gives teammates specific, timely, and constructive feedback.
	4	4	4	4	4	Demonstrates behaviors described in both 3 and 5.
	3	3	3	3	3	• Notices changes that influence the team's success. • Knows what everyone on the team should be doing and notices problems. • Alerts teammates or suggests solutions when the team's success is threatened.
	2	2	2	2	2	Demonstrates behaviors described in both 1 and 3.
	1	1	1	1	1	• Is unaware of whether the team is meeting its goals. • Does not pay attention to teammates' progress. • Avoids discussing team problems, even when they are obvious.

	Your name					← Write the names of the people on your team including your own name. This self and peer evaluation asks about how you and each of your teammates contributed to the team during the time period you are evaluating. For each way of contributing, please read the behaviors that describe a "1", "3," and "5" rating. Then confidentially rate yourself and your teammates.
ing to Work	5	5	5	5	5	• Does more or higher-quality work than expected. • Makes important contributions that improve the team's work. • Helps to complete the work of teammates who are having difficulty.
	4	4	4	4	4	Demonstrates behaviors described in both 3 and 5.
						• Completes a fair share of the team's work with acceptable quality.

Section 4

We would like to better understand how team-building activities, such as the one you just completed, are able to develop group problem-solving skills. Do you have comments regarding the usefulness, or not, of the approach that was followed and which you were part of to develop this capability within a group?

_____

_____

_____

_____

_____

_____

_____

_____

The purpose of the study was further to compare two types of team-building activities with the aim of showing which is the better approach to develop group problem-solving skills. You would have either been part of a traditional classroom-based team-building activity, or part of a technology-based team-building activity. Do you have comments regarding your perceived usefulness, or not, of the other approach that was followed, i.e. which you were not part of to develop this capability within a group?

_____

_____

_____

_____

_____

_____

_____

_____

_____

Section 5

These demographic questions will only be used for statistical purposes and to describe the sample of individuals that participated in the research study.

What is your current academic year of study?

- 1st year
- 2nd year
- 3rd year i.e. final year of an undergraduate degree
- 4th year i.e. Honours/Honours equivalent/postgraduate diploma
- Masters
- PhD
- Other? Please specify:
- Prefer not to answer

What faculty are you currently enrolled in?

- Engineering and the built environment
- Health Sciences
- Science
- Commerce
- Law
- Humanities
- Other? Please specify:
- Prefer not to answer

What language/s do you speak at home?

- Afrikaans
- English
- IsiNdebele
- IsiXhosa
- IsiZulu
- Sepedi
- Sesotho
- Setswana

- SiSwati
- Tshivenda
- Xitsonga
- Other? Please specify: [ ]
- Prefer not to answer

In what year were you born? (only for statistical purposes)

[ ]

Please specify your race (only for statistical purposes):

- Asian
- African
- Coloured
- Indian
- White
- Other? please specify: [ ]
- Prefer not to answer

Please specify the gender that you identify with (only for statistical purposes):

- Female
- Male
- Transgender
- Other? Please specify: [ ]
- Prefer not to answer

THE END

Appendix D: Questionnaire Study 2

Section 1

Consider each of the statements below and rate your experience/proficiency on a response scale where "1 = Never Tried" and "5 = Very Easily".

If you have not tried to perform a task with a computer or laptop or do not know what the task referred to in the item is, please mark "NEVER TRIED," regardless of whether or not you think you may be able to perform the task. **There are no right or wrong responses.**

With a computer/laptop I am able to …	**Never Tried (1)**	**Not at All (2)**	**Not Very Easily (3)**	**Somewhat Easily (4)**	**Very Easily (5)**
use a keyboard to type	O	O	O	O	O
use a mouse/ trackpad to navigate	O	O	O	O	O
load ink into a printer and fix a printer when paper is jammed	O	O	O	O	O
open, read and respond to emails	O	O	O	O	O
find information on the internet relevant to my needs	O	O	O	O	O
enter and keep track events and appointments on an online calendar	O	O	O	O	O
stream movies, videos and music	O	O	O	O	O

Section 2

Think about your own personality characteristics.

Consider each of the statements below and rate the extent to which you believe the statements describe your personality on a response scale where "1 = Strongly Disagree" and "5 = Strongly Agree".

We are all able to portray different personality characteristics when we want or need to. We are, however, interested in your typical personality characteristics, i.e. those that come naturally when you are just being yourself. Do not think too long about your answers. **There are no right or wrong responses.**

I see myself as someone who…	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Somewhat Agree (4)	Agree (5)	Strongly Agree (6)
is reserved	O	O	O	O	O	O
is generally trusting	O	O	O	O	O	O
tends to be lazy	O	O	O	O	O	O
handles stress well	O	O	O	O	O	O
has few creative interests	O	O	O	O	O	O
is outgoing	O	O	O	O	O	O
tends to find fault with others	O	O	O	O	O	O
does a thorough job	O	O	O	O	O	O
gets nervous easily	O	O	O	O	O	O
has an active imagination	O	O	O	O	O	O

Section 3

Think about the experience you had participating in the activity

All group members are individuals with their own thoughts, feelings and would all react differently to every situation. However, we are looking for how you feel the group as a whole reacted or would have reacted if faced with the following experiences. Rate how you believe your group would react in these situations. The responses range from "1=Extremely Unlikely" and "5=Extremely Likely". **There are no right or wrong responses.**

I believe that…	Extremely Unlikely (1)	Unlikely (2)	Neutral (3)	Likely (4)	Extremely Likely (5)
if you made and/or were to a mistake in this group, it would be held against you.	O	O	O	O	O
members of this group are and/or would be able to bring up problems and tough issues.	O	O	O	O	O

members of this group did and/or would reject others for being different.	O	O	O	O	O
it was and/or would be 'safe' to take a risk in this group.	O	O	O	O	O
It was and/or would be difficult to ask other members of this group for help.	O	O	O	O	O
no one in this group did and/or would deliberately act in a way that would undermine my efforts.	O	O	O	O	O
working with members of this group, my unique skills and talents were and/or would be valued and utilised.	O	O	O	O	O
I would and/or did feel psychologically safe within the group	O	O	O	O	O

Section 4

Think about the experience you had during participating in the activity

Individually we all have different techniques in learning and how we react to situations. However, groups can often have group reaction towards a situation and the following statements are asking you if it occurred during the activity how the group reacted or to imagine how your group would react to the following situations. The responses range "1= Extremely Unlikely" and"5= Extremely Likely". **There are no right or wrong responses.**

During tasks…	**Extremely Unlikely (1)**	**Unlikely (2)**	**Neutral (3)**	**Likely (4)**	**Extremely Likely (5)**
I would and/or did receive information from other group members	O	O	O	O	O
I would and/or did distribute information to other group members	O	O	O	O	O

your group would and/or did listen well to each other	O	O	O	O	O
your group would and/or did work together to form evidence-based decisions	O	O	O	O	O
your group would and/or did debate other member's interpretation of information	O	O	O	O	O
your group would and/or did spend time finding the right processes	O	O	O	O	O
your group would and/or did look for substantiated information	O	O	O	O	O
your group would and/or did try to improve the group's shared knowledge	O	O	O	O	O
your group would and/or did act upon ideas being brought forward	O	O	O	O	O
your group would and/or did share information and knowledge	O	O	O	O	O
your group would and/or did perform team learning behaviours	O	O	O	O	O

Section 5

Think about the experience you had during participating in the activity

All group members have individual thoughts and feelings about old and new ideas. However, as a group there can be a collective understanding of the value of new ideas. Please respond to the following statements on how you believe the group you personal worked with would react to the following statements. The responses range "1= Extremely Unlikely" and"5= Extremely Likely". **There are no right or wrong responses.**

	Extremely Unlikely (1)	**Unlikely (2)**	**Neutral (3)**	**Likely (4)**	**Extremely Likely (5)**
In this group, people value new ideas	O	O	O	O	O
Unless an idea has been around for a long time, no one in this group wants to hear it	O	O	O	O	O
In this group, people are interested in better ways to do thing	O	O	O	O	O
In this group, people often resist untried approaches	O	O	O	O	O
This group responses are open-minded	O	O	O	O	O

Section 6

Read the table below for definitions and examples of key terms. Then answer the following open-ended questions.

Table for the following section:

Term	**Serious game**	**Team Psychological Safety**	**Team Learning Behaviour**
Definition	A game that is not used for the pure purpose of entertainment (e.g. using a video to train an individual in a certain skill)	The shared belief that it is safe to take interpersonal risks within a group	The group process of looking for, gathering, and combining information as a group.
Examples	Virtual reality training using flight simulator; playing a game that teaches children maths; putting a team through	Asking for feedback from other group members; Admitting one's mistakes; giving one's own idea in a group discussion	Asking questions; looking for lessons in past failures; using the groups experiences to make a decision

	a scavenger hunt to improve their relationships		

We would like to better understand how online team-building activities, such as the one you just completed, are able to develop team learning behaviours (i.e. the group process of looking for, gathering, and combining information as a group) and psychological safety (i.e. the shared belief that it is safe to take interpersonal risks within a group) within in a team. Do you have comments as to whether the approach you followed, and which you were a part of, was useful or not in developing team learning capabilities within a group?

The purpose of the study was further to compare two types of online team-building activities. The aim is to show which is the better approach to developing team learning behaviours and team psychological safety. You would have either been part of a traditional classroom-based online team-building activity, or part of a team-based serious games online team-building activity. Do you have comments regarding your perceived usefulness, or not, of the other approach, i.e. the approach you were not a part of to develop team learning behaviours and team psychological safety?

Section 7

These demographic questions will only be used for statistical purposes and to describe the sample of individuals that participated in the research study.

What is your current academic year of study?

- 1st year
- 2nd year
- 3rd year i.e. final year of an undergraduate degree
- 4th year i.e. Honours/Honours equivalent/postgraduate diploma
- Masters
- PhD
- Other? Please specify:
- Prefer not to answer

What language/s do you speak at home?

- Afrikaans
- English
- IsiNdebele
- IsiXhosa
- IsiZulu
- Sepedi
- Sesotho
- Setswana
- SiSwati
- Tshivenda
- Xitsonga
- Other? Please specify:
- Prefer not to answer

In what year were you born? (only for statistical purposes)

Please specify your race (only for statistical purposes):

- Asian
- African
- Coloured
- Indian
- White
- Other? please specify:
- Prefer not to answer

Please specify the gender that you identify with (only for statistical purposes):

- Female
- Male
- Transgender male
- Transgender female
- Gender variant/ non-gender conforming
- Other? Please specify:
- Prefer not to answer

Please specify how long (in minutes) on average you play video games a day

Please specify how much you identify with this statement, "I consider myself a gamer"

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

THE END

Appendix E: Interview transcript

Interviewer: on this computer, it is now recording. And I, I have actually ended up writing down some questions because I was just thinking, having some structure for me is good. Yes. But in terms of actual like, you know, we might not do all the questions, we might just skip some of your answers stuff. And I'm like, cool. I've got enough input. But first of all, how are you doing today?

Interviewee: I'm doing good.

Interviewer: Anyway, so the niceties we're well acquainted, we both know each other very well. And, yeah, so let's get this thing started. So that, you know, we can kind of get out of here. So I want to start with kind of the positives. So you understand the difference between what the traditional one was and what the serious game one was? Right?

Interviewee: You know, the funny thing was, when I was doing it, I didn't actually realise (Laughs). So when I did the serious game, and then we did the forced… what was it called again? the zombie one,

Interviewer: Oh the thought experiments.

Interviewee: The thought experiment, and then I was like, why are we doing this again? And then I realised that that was actually the whole point.

Interviewer: Yeah, it was kind of like, Okay, this is like, a barometer to see. How do you work? You know? Yeah. So the thought experiment was kind of, like, supposed to be my kind of post-test thing. I couldn't honestly measure anything from from the thought experiment, unfortunately. And like I did last year, I was able to do like a Lego Building Challenge. And I was able to look at time and accuracy. So I only got survey data.

Interviewee: Yeah. But from, from my experience, like it felt so different during the thought experiment, like, I don't know, I feel like some of your maybe if you directed it, like more

specifically to how did you feel like after. Like during that thought experiment, you would see that the results would be different, because I did feel very different between the traditional and serious game I think just the way we conversed.

Interviewer: Okay.

Interviewee: so yeah. So in the traditional game, we had more of a space to talk. But there was this or that thing where it is so heavily depends on the people within the group.

Interviewer: Yes.

Interviewee: because there was one person who would, like, guide the conversation, and would always, like asked questions, just to get like, I think that he was just a curious person in general. And we were a whole bunch of strangers. So they kind of had this, thought, that was just like, never gonna see you again, might as well just be like this and asked whatever I want no barriers or anything like that. But like it helped break that barrier that we would have had between everyone.

Interviewer: Yeah.

Interviewee: And then like, in the serious game, it was like there wasn't really a space to converse, outside the game, but even within the game that we were playing… umm… There wasn't really space either because it was almost like it's just this, this is the right or wrong thing. And it wasn't like we can discuss whether it's right or wrong, which is like it is what it is.

Interviewer: Okay. So there was an issue of kind of design basically, in trying to in just trying to kind of piece it together. So you saying basically, the design of the traditional was better because it gave you the freedom, there was no right answer.

Interviewee: You really to get to know the person more. And I've, I've done a I've done one of the escape rooms like the real one, like, and it's, and it's very similar to the online one. Like, that's how it feels like, like, I felt the same.

Interviewer: Okay, well, that's at least good. At least the the, there was a similar feeling or experience, because that's kind of obviously what we what you want with the online thing you want people to not feel disconnected and like their online.

Interviewee: Yeah, cool.

Interviewer: So then, just kind of to to, to take it to a positive note, what's kind of both the traditional and the serious game, what was the thing you enjoyed most about the activities? Not the people or the groups, we'll get into those, but just the actual activities from both of them.

Interviewee: Um, for the traditional one, I liked how there was like, it gave you space to see people from a different angle, like, I remember, someone said that, like, normally you make friends with the same people. So the kind of conversations you have are similar experience experiences to your own. And being in a like a team with different people, you kind of get like this whole bunch of knowledge of like people's different experiences, and their whole life that like isn't the same as yours, and like, you get a new perspective of things. So that was really nice. For the serious game, it was just nice... to look at things from like, a different angle. I don't know how to explain that nicely but it's almost like nothing is gonna ever be, like, straightforward in life. So in that sense, it was nice that there was a goal that you were going towards, and like finding out things and piecing two pieces together, basically. Okay, I'm using a lot of hand gestures (Laughs) and you can’t even see me? (Laughs)

Interviewer: I'll imagine it, I'll imagine them and they are glorious.

Interviewee: Does that make sense?

Interviewer: That makes complete sense, because that was kind of the goal of the, and they both had the goal of getting to a point where people felt comfortable together. But the idea was that the openness of the traditional, that, you know, the openness of that was kind of like more closely to like real world of it's just opinions. Whereas the serious game was supposed to be like, okay, we're working together for a goal, and it gave you a better, you know, it made the solutions and the problems clearer to you. So the kind of goal was then, well, now, How does our dynamic develop? When we know, okay, this is where we're going. Because often in organisations and teams, you know, what your end goal is, it's not as clear how you're getting there. But, you know, there's the end goal of, we want to learn together or we, you know, we want to maximise profits, or whatever your goal is, as a team. So that's good, that's actually really helpful for me.

Interviewee: When you say like this, I just realised that if I were in a group of people that I didn't like, I would go for the serious game, because its more structured and there's less, like, you don't really need a like person, you don't really need to get to know the person, you kind of just focus on the goal. But if I wanted to really get to know my, like, teammates, and like having like conversation outside of just the work experience. I would go with traditional.

Interviewer: Okay, okay, that's also really helpful. That makes sense. What so what do you think it's an now kind of focusing more on the people within the groups? What was the greatest challenge that you saw between the group in the groups in traditional and in serious game?

Interviewee: Um, well, I don't know what to call it. Like, I don't like using the word introvert because I technically am one but not. So people who are more introverted, who don't really like to speak up, they more of a listener type of person. It would be harder to voice out their opinions or even asked for their opinions during a serious game than during the traditional game, so in the traditional game, if there's someone who would be willing to be like, what about you? Tell me a little bit more. It'll be easier for the conversation to come about. But in a serious game, because usually there's a time limit, like you kind of on a gogogo kind of vibe, there isn't really that space to be like, okay, pause. I want to hear everyone's opinions right now. But definitely that. Yeah.

Interviewer: Okay. And then. Okay…

Interviewee: I forgot what the question was (laughs).

Interviewer: So the question was, it was to do with the greatest challenges for both groups.

Interviewee: Oh!

Interviewer: Yeah. And you answered that very well. What do you what do you think the differences are that you noticed between the groups like what was like, and this is actual individual, the individual group interaction, this doesn't have to necessarily be Oh, well, the serious game did this. And the traditional didn't do that. Yeah. The group's like just the group of people. How did you feel they were different?

Interviewee: So what's so funny is that I have a clear image on how everyone was like, each individual person was like, in the traditional game, compared to the serious game. Okay, like I have a clearer visual image of how they are like, vibe wise, okay, we didn't see everyone but like, just that vibe of like, getting to speak to them getting to know them more than in the serious game. I already forgot the question. Can you repeat that?

Interviewer: So so that that's kind of what was what was the difference between the groups that you noticed? And that makes sense. So you feel just to kind of reiterate, you feel that you were able to, to get to know the personalities better in the traditional? That was the main thing, okay. Then, a pretty mundane question, but one I think needs asking, were the icebreakers useful in helping you to get to know your fellow group members.

Interviewee: Can you remind me what the icebreakers were?

Interviewer: It was two truths and a lie.

Interviewee: Oh, yes. Um, I love how it was funny that you do icebreakers with people that you already don't know sometimes? Yeah, it's almost like you already don't know them. So you don't

know whether it's a lie or not. But I think this sort of conversation of like, why did you choose it? And what, lie did you even come up with was interesting, and people who guessed right? Like would feel accomplished. Be like, Oh, my God, I guess. So in a sense, in that sense, I think it was a nice icebreaker. But in, in a perspective, where you're the one doing it, like coming up with the two truths, and one lie, it was like very hard.

Interviewer: Slightly stressful, in a sense.

Interviewee: Yeah, I don't know if you were there for the serious game one. But we all had a lot of difficulty coming up with what you say.

Interviewer: Yeah, I had my earphones in. So I was kind of like, walking off and kind of so if there was a question, I could come back and speak. But yeah, just kind of half listening. Half not. Okay, so how now kind of looking at both of them, How do you think each one could be improved each activity? How do you think they could be improved?

Interviewee: for the traditional one, I feel like there were too many questions. Like, we didn't even go through all of them. We just stuck on like, I think maybe did like three, because in each one, we had like the longest conversation about everything. And we would like bring in like different sort of stories here and there. So I think it was nice to have like a starting point. But not too many questions, because it would end up being like, are we supposed to rush to get to the end of it? Yeah. Are these just like questions for us to explore from the beginning? Okay. And then for the serious game? How do you improve a serious game?

Interviewer: Well, I mean, even even through through design of of, of like, how I presented it even was there something that could have been improved on there. Because, as you said, the game is not really going to change, but there are the factors that contribute to getting to the game. So yeah.

Interviewee: I can't really think about anything. Normally, I think the nice thing about games is that for a serious game, at least, everyone's usually responsible for something different, right? So

everyone's obviously gonna want to take on a role because if there's no role to take on, you kind of just in the background, and then one person will just take on all the roles and it's not really a team building exercise at the end of the day. You just sort of a one player game with, you know, some psychics at the back watching you. I think, in that sense. Normally, if you will, going to choose a serious game, you would want a game where there's multiple different characters or roles to play with so that people can kind of like grab onto something that they might feel comfortable with and actually partake in the game. I can't really think of anything else.

Interviewer: Okay. Well, that's great. Now kind of looking at my my DVs. Which which of the the activities do you think made you feel more psychologically safe and take interpersonal risks? And then just why?

Interviewee: Definitely the traditional game. Okay, I think just having that space. But you see this also dependent on the people in the group?

Interviewer: Mm hmm.

Interviewee: So the people in the group, we, from the beginning, we already established like that sort of, I want to get to know every single one of you. And yeah, it's a safe space to get to know every single one of you. And even if you are different, it's not about oh you are different? It's why are you different? How are you different? How are you different from me? This is my perspective, this is your perspective. And there was no judgement in that sense. So that was really nice. We didn't really get that sort of opportunity for the serious game. Okay, like during it, there wasn't really that opportunity. There was some sort of. But it was very, like quick because like, yeah, the game itself, it's like, go, go, go. So like, you'll be like, one moment would be like, okay, we're all on the same page. What about you, but it will be like, oh, but this is already the end. It's just like, Huh, yes, yes. Okay, go, go. Go. Yeah.

Interviewer: Okay. And then just looking at kind of my next DV, which worked better and helping you perform behaviours that helped your team learn? And then again, why?

Interviewee: What are some team learning behaviours, again?

Interviewer: So experimenting, asking for feedback. Admitting your mistakes, they kind of interlinked, but it's like, it's more kind of the idea of experimenting and looking at new ideas.

Interviewee: To be honest, sort of both because I think so I would say the traditional game, but what the serious game is that as you go on, you sort of realise how you are like, as an individual, how you acting, and how you may be different from a person because like, you play multiple different rounds. And then if you acting in the same sort of round, you sort of can see Oh, no, I'm doing this now. Yeah. And then someone else is doing that. So that difference makes you aware that you doing something and then it will kind of push you to be like, Okay, let me do something different. Let me ask for your opinion. What do you think? And then like, it goes, like that kind of thing.

Interviewer: And that was the serious game?

Interviewee: For the serious game. And in the traditional game, it automatically happens like that. Because you are having conversation with everyone. So if one person doesn't say something, you'll automatically be like we are. We are six people here or something. I'm feel like I'm missing someone's voice. Okay, so it's, there's more time for you to react that someone isn't partaking in the like, game.

Interviewer: Okay. And then do you think. This is kind of just a broader taking a completely away from the the design and the games and everything? Do you think there is a link between feeling psychologically safe and performing team learning behaviours?

Interviewee: Definitely. Because I told you in the beginning for the traditional game, the nice thing was that there was someone there that didn't care about anything, and they just wanted everyone to participate. And that in itself, helped make it… help to make that atmosphere like you felt psychologically safe just because of that. And in the serious game, I think it's also in that similar. And that seems because you all going towards the same goal. And because of the same

goal, you know that at least there's that so you feel safe in knowing that. That's the one thing that makes you belong. And then you feel safe. In that sense. Where you are working towards the same goal.

Interviewer: Cool. Okay. And then going on to teams, do you think that this would these types of games so these traditional and serious games would only work for for new teams? Or could it be you to utilise for like established teams that have been together for a year already? and have established certain roles?

Interviewee: For both?

Interviewer: Yeah, for both for both.

Interviewee: Hmm. Hmm, I definitely think so. Okay, I'm trying to like picture like, you can picture it both in different like time. So for the traditional one, I think there's always so much that happens in a person's life. So people change over time. And the way that you answer the questions would change depending on like, the circumstance that you're currently in. So I think even if You had an old team that's been together for like two years, there's so much that could happen in between those two years that you can still find the space to discuss. And at least you know that the space is open and like, suddenly you realise, oh, there's so much I don't know about a person. So it can like help in that sense, and with a serious game, it remember the goal. That goal is so important. And it really does help that it kind of makes you see that no matter who you are, and how you are. As long as you have the same goal, you can always work together, and just like, aim for a kinda thing.

Interviewer: Well, that's, that's great, because I mean, one of the biggest, like, for team building, one of the like, kind of four main things, like, changes that it's supposed to do is goal setting skills. It's supposed to improve goal setting skills. So that's, although I didn't measure that, that's something that I can definitely make a comment on. And because you've brought up goals multiple times now, yeah. Okay. And now with the final question, and this is the exciting one, because you're gonna answer my hypothesis now. Do you think serious games could be a better option in

training interpersonal behaviours, in general, in the traditional way, we train for interpersonal growth?

Interviewee: Can you explain more about this interpersonal growth?

Interviewer: So interpersonal growth is kind of it's these interpersonal behaviours, like feeling psychologically safe, and understanding that I can say certain things, and I act certain ways to improve the environment and the climate that someone works in. So understanding that, Okay, I need to get to know so and so better. So then I know how to approach them and ask them questions and use their expertise. It's kind of improving soft skills is kind of the essence of the question.

Interviewee: Thinking back on the game. Um, you know, the interesting thing is that everyone's role in the game is so different, that I feel like the, the answer would be different depending on like, what role you taken in each game. And if that makes sense, but like, for me, I think. I don't remember really participating that fully in the game. I was one of the people that was just watching it basically happen. Um, I think there is room, but the game was very quick, remember? So there was, towards the end, I could feel like we could have developed some behaviours. But I think the game was a bit short for that to like, fully for me to fully say, yes.

Interviewer: Okay. So basically, what I'm understanding, and this is actually a design for, which is a good thing to know, but multiple rounds of a game for you, for example.

Interviewee: Yeah.

Interviewer: I mean, basically giving you more time, because they were both about an hour and a half, both things took about an hour and a half. So actually, there wasn't a difference in time. Interestingly enough, but that may, that makes sense to me. Because I think that you're just feeling like you're establishing these roles in the game, and then it's done. And you're like, Oh, yeah, but I could have done more. So that makes sense. And that's something I can comment on and kind of show why certain data points aren't coming through.

Interviewee: It's almost like one game wouldn't have been enough. Like you would have to go through the serious game a couple of times. We were having fun and wanted more.

Interviewer: Well think about it. I mean, when you when like, people play games together, they don't just play once together. Like every you know, every day or every weekend, they're playing with the same group building camaraderie. So that that that makes sense. So basically, what I think I'm getting is, it's a slower process in the serious game, but I think the end result is better and correct me if I'm wrong. I think it's a slower process in the serious game, but I think the end result is better. But I think if you wanted to quickly get your team in just an hour and a half space, just get them to be a point of more comfortable with each other. You go the traditional routes. Does that make sense?

Interviewee: Yeah. Yeah, yeah. Cuz like so with the psychological safety, right? If you if you care about people, accepting your opinions, like outside of the workspace, like outside of this game that we play, then traditional is easier because you have that space. But if, like if you don't need to worry as much about whether someone's going to accept you because of how you are. What you like and your dislikes. Stuff like that. The serious game is nice, because it's just like this. We all going towards this goal thing again. We all aiming for this, and we all taking our roles in this. And that's what we really need to do to get to the end.

Interviewer: So final thing, final final thing. Anything else you want to kind of make comments on think we've missed out on that you think is kind of vital information?

Interviewee: It’s only been half an hour.

Interviewer: I know. I know. I didn't need to be long. I just needed a little bit of information. But is there anything that you kind of you think that we've not touched on? Basically, that was something that you noticed?

Interviewee: I think a combination, but like isn't to two truths and one lie technically a traditional game?

Interviewer: No. So that's technically an icebreaker.

Interviewee: So just an icebreaker.

Interviewer: Yeah, it's not long enough. And it doesn't meet the definition of basically the group a discussion of group process. So it needs to be like a what introduced in the traditional sense of team building. It's the idea that it's outside of the workplace, but you're kind of developing an understanding of the group's processes, icebreakers don't do that they're just kind of getting to know each other. Yeah. I literally was writing that question and wasn't sure how to phrase it nicely. Do you think the icebreakers broke the ice?

Interviewee: Yeah, that's basically what it is. Um, cuz to be very honest, I would have liked a combination of both a traditional and a serious game. I mean, this depends obviously on whether you would like to get to know your teammates, then the traditional game would be nice. And to know that you guys can all aim for the same goal and work towards that. The serious game is nice.

Interviewer: Okay. Okay. So, I mean, that's great, too, because that means that actually, it should be a combination of both. Interesting. Next time I do this study, which will be never in fire.