Psychological safety and team learning during a problem-solving game for staff at a South African hospital

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Abstract

South Africa's National Health Insurance (NHI) program promises to be the vehicle of universal health coverage for the country by 2030. In public healthcare organizations, which are already challenged by under-resourcing and staff shortages, the demands of NHI place a heavy burden on the healthcare workers tasked with managing the associated system changes and delivering services to program specifications. As teams are the units tasked with driving organizational adaptivity and performance in the healthcare sector globally, effective teams are critical for successful NHI implementation. We explore a cost-effective intervention for promoting teamwork in the public healthcare system. A problem-solving game called the marshmallow challenge was used as an experimental intervention at an NHI pilot site, a provincial district hospital, where staff were already familiar with the impending challenges of change management. A qualitative post-game survey was administered to gather data on the experiences of 100 participating hospital staff. Groups also engaged in a post-game reflective discussion. We examine the individuals' experiences of the game in order to establish how interventions of this kind can empower healthcare workers to practice effective teamwork and team learning and how a psychologically safe environment can be cultivated.

Introduction

In 2005, the World Health Organization (WHO) presented a mandate to all countries to take active steps toward universal health coverage (UHC) and ensure the equitable provision of healthcare for all citizens irrespective of socio-economic standing. This coverage extends to health promotion and preventative, curative, and rehabilitative health interventions (Nevondwe & Odeku, 2014). In 2010, South Africa's National Department of Health (NDH) responded to the WHO's call with the National Health Insurance (NHI) green paper, which announced a plan for instituting health financing reform in South Africa by 2030. Toward these goals, the NHI provides a financial control model, a set of policy goals, and, most critical of all, a service delivery model (Thulare, 2016).

NHI places great expectations and pressure on healthcare workers, who are tasked with managing system changes and delivering healthcare services to achieve the program's goals. The far-ranging changes to health structures and governing infrastructure mandated by the NHI policy shift (Fusheini & Eyles, 2016)however, the paths of countries to UHC have differed. South Africa is currently reforming its health system with UHC through developing a national health insurance (NHI, along with an overall sense of uncertainty about the

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future of healthcare professionals (Delobelle et al., 2011), has left many in the medical and nursing fraternity demotivated. The ideals of the NHI cannot be met without stronger engagement with staff. This study investigates practitioner experiences at an NHI pilot site and explores how interventions at the team level, in the form of team-based problem-solving games, can create environments rich in psychological safety. The study further examines how these environments enhance team learning, in order to engage public healthcare workers in successfully managing the NHI changes and meeting patient needs.

Background and clarification of key concepts

Healthcare in South Africa

The NHI addresses the core challenge in South Africa's healthcare system: the two-tiered structure of private-sector providers and public-sector providers, and the inequity in quality of care that exists between the tiers. According to a 2010 patient survey, the public sector, which serves the majority of the population (65%) scored high marks on accessibility but low on quality, while the private sector, which serves a growing minority (35%), scored high on quality but low on accessibility (van den Heever, 2011). This imbalance is reflected in the country's national health spending, which sits at 8.5% of gross domestic product (GDP); of this, 4.1% is spent on 84% of the population, which primarily uses the public health sector, while 4.4% is spent on the remaining 16% of the population (Fusheini & Eyles, 2016)however, the paths of countries to UHC have differed. South Africa is currently reforming its health system with UHC through developing a national health insurance (NHI).

In 2011, 11 NHI pilot sites were selected across the country and tasked with closing this gap by implementing physical upgrades and meeting patient care expectations. They were also expected to provide meaningful feedback about their challenges and learnings to the NDH to inform the impending national rollout. The pilot site considered in this study, faced a set of organizational dynamics that directly reflected the challenges of NHI changes and the pressures common across the public sector.

Teamwork in hierarchical structures

Public hospitals are characterized by funding shortages, which manifest in inadequate equipment, poor facilities, and a high patient-nurse ratio. These dynamics on their own may influence the individual motivation of healthcare workers and affect the overall quality of work (Schneider et al., 2015). But the combination of under-resourcing and shortages of qualified medical practitioners in the workforce places further strain on public sector workers. Particularly in the nursing field, supply-side staff shortages often lead hospitals to utilizing agency nurses and temporary staff to carry out core operations. This results in an operational staff complement that is constantly changing and inconsistent in its competency, which puts an enormous strain on team dynamics.

Teamwork in healthcare is recognized as an important factor contributor to high-quality patient care, and yet it is challenged by certain endemic field dynamics. The professional hierarchy in medicine inhibits open conversation between "high-status" and "low-status" individuals, who fear embarrassment or disruption of the hierarchy (Valentine et al., 2013). The hierarchy culture, typical in governmental organisations, provides for a serious and organised work environment, where members fulfil roles of coordinators and supervisors. Health professionals are highly aware of and compliant with the principles and procedures within these organisations. (Van Huy et al., 2020). The characteristics of medical hierarchy create obstacles to challenging authority and to open communication (Peadon et al., 2020).

The frequent transitions between caregivers because of shift changes or patient transfers, and the changing schedules of temporary workers, serve to further complicate communication and coordination, adding to the essential challenge of teamwork which is to manage human relationships and personalities (Valentine et al., 2013; Rimm-Kaufman, 2016). In public sector hospitals in particular, the absence of strong, healthy teams causes service quality to suffer, increases risk, and degrades employee satisfaction and motivation.

The NHI pilot study requirements have added to the burden on already overloaded public sector workers. In addition to team's core responsibilities at the site of this investigation, new reporting structures were put in place to monitor progress and learn from the experiences of the pilot sites. The reporting channels now included the

Hospital Revitalisation program, the NDH, the Public Works Department and the Western Cape Department of Health each requiring tailored reports and feedback based on their interest. This additional reporting and administrative burden came with the implicit expectation to maintain staff morale within primary healthcare, community health worker programs and relationships with NGOs – and this without additional resources or funding. Given the budgetary constraints of the program, it is the responsibility of decision-makers, managers, and change leaders to explore more creative and economic ways to improve operations (Chaudhry et al., 2011). In the era of NHI and healthcare reform, the expectation on multi-disciplinary teams to provide quality care to patients led to an increased interest on how these teams learn and grow together.

Team learning

Given that healthcare both local and across the globe is increasingly provided by teams (Valentine & Edmondson, 2016), the modern healthcare team is the unit that must address a rapid increase in medical knowledge, increasing specialization of healthcare professionals, and demand for more individualized patient care. Teams need to be able to learn from mistakes. This is particularly important in reducing errors and improving patient care. In healthcare, good teamwork promotes quality care, worker satisfaction and cost improvement - but this may not happen naturally or without some form of training.

Teamwork has been defined as behavioural processes used to accomplish interdependent work, including the affective, cognitive and motivational states that emerge during the course of that work (Valentine et al., 2013). Behavioural processes include communication, coordination, sharing expertise and assisting. These processes are all fundamental to a greater process of team learning, which is a necessary element for successful change management and growth. These processes can also facilitate mutual respect and psychological safety.

Psychological safety

The importance of team learning as a driver to motivate and promote worker satisfaction leads to the concept of psychological safety within teams (Edmondson, 2019). Introduced over 50 years ago as a critical factor to learning new behaviours, fighting complacency, and overcoming defensive routines, the initial goal of psychological safety was change management and fighting entrenched habits (Edmondson et al., 2016). A definition of psychological safety is "a shared belief held by members of a team that the team is safe for interpersonal risk taking" (Edmondson, 1999, p. 355).

In healthcare, psychological safety is regarded today as especially important for enabling learning and change in contexts characterized by high pressure and complex and essential human interactions, such as those found in hospital operating rooms (Edmondson, 2019) and intensive care units (Valentine et al., 2013). Each year, many patients are harmed through errors and process failures (Kohn et al., 2000; Alenezi et al., 2019). Psychological safety has been shown to be crucial in the detection and prevention of such problems (Edmondson, 1996). As much as psychological safety creates an environment where errors can freely and safely be volunteered and shared within the team, it is the central belief that these errors will be used to improve the organization and so motivate team members to fully commit to the communication process.

In environments that are rich in psychological safety, creative ideas can be generated more readily by a more empowered team to aid in producing solutions. Similarly, working environments that can nurture a creative culture will stand a better chance of prevailing under trying circumstances.

Games and team learning

Working in teams and utilizing simulations (Whetton, 2007) provide opportunities for learning in an environment that can replicate the complexities of the workplace, with interdependence, feedback and real-time information (Sitzmann, 2011). The purpose of the study is to explore whether an intervention like the marshmallow challenge, a well-known team-building game, is also able to create psychological safety in teams to foster learning behaviour and effective team performance. The marshmallow challenge was developed by product designer Peter Skillman in 2002 (Rietveld, 2014) as a design challenge activity. It has since been adopted and practiced by a wide range of groups interested in team dynamics, from kindergarten classrooms

to corporate executive workshops. It is a simple game where teams of four individuals are tasked with building a structure that can support a marshmallow, using limited raw materials.

One of the proposed levers of psychological safety and teamwork is the brainstorming component of the marshmallow challenge. Based on Osborn's *Applied Imagination* (1953), brainstorming as a practice has been centred around the goal of generating as many ideas as possible. The overriding brainstorming practice is to defer judgement or idea filtering so as to reduce social inhibition among group members. In the design space, this concept would serve to increase creativity. Whether brainstorming is done in the context of a game or an actual work-related task that requires idea generation, the reduction of social inhibition and idea filtering require a high degree of psychological safety.

The underlying premise of the study is that games such as the marshmallow challenge, which is cost-effective and contains vast teaching points, can elicit effective teamwork in the short-term during the activity, and through regular practice can ultimately enhance the quality of care provision in the long-term.

Methods

This study explores how a workplace intervention can create an experience for participants where they gain insights into working together as teams. The goal of exploratory research is to gain a deeper understanding of a particular phenomenon (Edmondson & Mcmanus, 2017).

As an experimental intervention, a well-known team-building game called "the marshmallow challenge" was facilitated in groups using the same parameters designed by Peter Skillman (Rietveld, 2014). A research assistant prepared the environment and gave each team 20 pieces of dry (uncooked) spaghetti, a strip of masking tape, a ball of wool, scissors, and a single marshmallow. The teams were then given 18 minutes to build the tallest structure possible with these items. The rules of the exercise were explained: teams must let go of the structure after 18 minutes and the finished structure must stand on its own; and the whole marshmallow must be positioned at the very top of the structure.

While the marshmallow challenge is commonly used as a competition, with a reward given to the teams that build the tallest structure, in this study, there was no such competition: the goal was for all teams to complete a structure that met the criteria, which is a challenge in itself. Hence no explicit element of competition was introduced. After the exercise, a post-event survey containing qualitative questions was administered to participants to gauge their experiences of the activity. A discussion was also facilitated with groups after the game which allowed them to reflect on the game.

Participant selection

Purposive sampling was applied to select employees from the public hospital. The hospital had a personnel contingent of 180 staff that delivers a comprehensive district hospital package and a 24-hour service to a population of 120 000. For this study, the day shift staff contingent, consisting of 100 employees from different units, was selected to participate on a voluntary basis depending on their interest, their workload and capacity. The formation of multi-disciplinary teams of four provided for the establishment of some teams where staff had not worked together before.

An informed consent form was provided to participants, explaining the participation requirements, voluntary nature of the study, and that there were no penalties for opting out. Ethics approval for the study was obtained from the Human Research Ethics Committee of the University of Cape Town (HREC 701/2017). Due to the large sample size, multiple runs of the experiment were required with the challenge administered to one group every week during office hours.

Data collection

Initially a pilot of the game was run, which included various teams (both clinical and support staff) from different units within the hospital. The pilot study was used to design the formal experiment and develop the testing environment and also informed the survey that was later used. After the pilot, a reflective discussion

was facilitated with hospital managers, who had not participated in the pilot. They observed and commented on the effect of the game on the participants returning to the work environment. They were asked the following questions:

1. How does the marshmallow challenge contribute to teamwork amongst healthcare workers at a district hospital in the public sector?
2. What do the individuals experience when participating in the marshmallow challenge?
3. What are the problems/challenges with this exercise experienced by the participants?

The discussion was recorded and transcribed. Their words are referred to as Manager reflection # (the # referring to the manager number), when quoted.

Secondly, the game was run with 100 participants and a survey was administered straight after the game and participants gave written feedback regarding their experience.

The post-experiment survey questionnaire was administered after the intervention. This required participants to reflect on the intervention individually in written form. All questionnaires were completed anonymously. This approach was selected as the study aimed to understand the participants' perceptions of the meaning of the activity and the learnings they had gained.

The survey had two open-ended questions:

1. "What was your experience during the exercise?"
2. "What were your challenges during the exercise?"

The participants completed the surveys anonymously, and their words are denoted as Participant # (the # referring to the participant number), when quoted.

Thirdly, verbal reflective discussions were held with groups after the game. These discussions yielded more detailed insights on how participants felt they could take their learnings into the workplace. Participants spoke about how they could use the learnings in their work at the hospital. Handwritten notes were made of these post-game reflective discussions. These reflective discussions complemented the sentiments expressed in the written responses completed by participants after the game and are denoted as Group reflection # (the # referring to the group number), when quoted.

These reflective discussions contributed to the social learning process of the group, which had been initiated in the intervention, and assisted the researchers in the interpretation of the themes that emerged in the survey data. Confidentiality was guaranteed to participants by the appointment of a research assistant who assisted with the data collection and analysis, and who removed any information identifying individuals prior to analysis. Participants were encouraged to use either English or Afrikaans, whichever language they were most comfortable with. Both authors are fluent in these languages and translated all the Afrikaans quotes to English.

Data analysis

Content analysis was performed on the data gathered. Content analysis is a process of systematic coding and categorization used to explore large amounts of textual information, in order to determine trends and patterns of words and phrases used, including their frequency, their relationships as well as the structure of the communication (Vaismoradi et al., 2013).

Participants' written survey responses, the notes of their verbal reflections, and the pilot transcripts were examined and coded using the words of the participants, to form a set of first order codes. These codes were collapsed into first order categories which represented participants' ideas. Connections across the first order categories were identified, which allowed them to be collapsed and grouped into second-order themes.

The second-order themes were clustered into key dimensions that enabled the development of a framework that linked various concepts that emerged from the data. An additional, objective review of the transcripts and coding was done by the research assistant (Bell & Bryman, 2007).

Results

Figure 1 emerged from our analysis of the data; it shows the first order categories (phrases used by the participants), the second order themes and the key dimensions derived from the participants' written survey responses, and the notes of their verbal reflections and the pilot reflections. Six themes were highlighted through the data analysis and are discussed below: working together; resource use; fun, creativity and learning; lack of time; open communication; and structure and hierarchy.

Working together

The importance of working together as a team was a theme that occurred most frequently in the data. Participants generally spoke of their experiences as an extension of the team and used "we" and "us" language throughout. This concept, referred to as "teamness" (Jenkins et al., 2015), involves more than general team spirit. Healthcare studies on teams in rural settings often refer to the transformation that happens in an individual's mind around understanding team members' passion and celebrating events and achievements for mutual benefit (Jenkins et al., 2015). Examples include:

> *Participant 51: "Working with other people in the hospital and working together."*

> *Participant 85: "We all worked well together to achieve an end result."*

Resource use

The theme "resource use" was often referred to alongside "teamwork". Although fewer respondents mentioned resources, when it was mentioned, it was often linked to teamwork. For example, in a group post-game discussion, the following was mentioned:

> *Group reflection 4: "It certainly makes them recognize that you have to work with what you have, in a limited time, and that there is a specific goal and that you need to work together as a team. If they realize that you have [these] resources, and this is the goal that you need to attain and in this type of timeframe, then they are forced to work together – they need to come together."*

> *Participant 59: "To use the means to the best of our ability."*

> *Participant 84: "To build something out of nothing."*

Some participants identified the limited building materials supplied during the game as the objective challenge of the activity. For them, their awareness of the "insufficient tools" was a cause of both frustration and great concern that they were perhaps being set up to fail. However, some also recognized that the point was to achieve a difficult task with limited resources – "utilising all the given items in such a way as not to waste/run out of anything." These comments reflected an awareness among participants that the process was fair since every team was provided with the same tools and resources, and that the goal was achievable.

Fun, creativity and learning

"Fun, creativity and learning" were referred to frequently (by more than half of all participants), especially when related to team learning.

Participants noted that the game itself brought about a positive "new", "nice" or "great" experience for individuals; it gave them an opportunity to be "creative"; the challenge brought about nervousness and excitement that was enjoyable; and the circumstances led to a great deal of laughter while playing. Some participants even found it stress-relieving, relaxing, a break from their normal work, and a time to "refresh the mind." Examples include:

> *Participant 20: "It was fun and entertaining, and you got to know a bit of the people that [were] on your team."*

> *Participant 26: "It was fun and exciting to work as a team with ward staff."*

Manager reflection 10: "My experience with it has been, that my staff all went into it with apprehension and anxiety and fear of the unknown, and all of them, without fail came out of it with a different vibe. They just had energy … it changed them. I don't know how in 20 minutes, but they definitely came out with a positive outlook."

Lack of time

The theme regarding fun and learning was often referred to with the theme alluding to "lack of time". As the game is unfamiliar to participants, there is a high need to for teams to learn, and because of the set time, they need to learn quickly.

Manager reflection 2: "I think they experience pressure and tension. I think the time factor makes a big difference. And then it is also unfamiliar. One learns as one goes along." (translation from Afrikaans)

Multiple participants reported the team's decision-making and time pressure as a challenge:

Participant 52: "We took time to deliberate which used up valuable time."

Several participants reported their observation about how much time was required to think through the problem, and the pressure this placed on completing the task and "doing work properly." For some participants the time pressure was negative. It was however acknowledged as being a reality they face in healthcare work.

Open communication

Participants drew clear connections between good communication practices, sharing ideas for achieving the task, and effective teamwork. Lack of communication was repeatedly used as a reason for problems and a cause of poor performance. Conversely, for teams that communicated well, the task felt easy. This concept was extended to the practice of being "honest" with each other, "listening to others" and showing respect. Participants also linked good communication, sharing ideas for achieving the task, and effective teamwork. Participants mentioned the need "to listen" and "to speak up" and how this was important to the working of the team.

Structure and hierarchy

Participants expressed an awareness of structure and hierarchy at the hospital, for example:

Group reflection 6: "Depending on your approach, to say 'look here…' from an authority kind of role, or from a teamwork type of role, depending on the department you are in."

There was also an acknowledgement that within healthcare one operates in diverse groups.

Group reflection 3: "I think the problem is that there are different personalities, and people think differently." (translation from Afrikaans)

The game created a space where people could think differently. The post-game discussion reflections allowed participants to think about the space created by the game, and to ponder on how structure and hierarchy may have influenced participants to communicate.

Group reflection 3: "It is to get the balance right, between who speaks the loudest – who leads and who follows." (translation from Afrikaans)

Comparisons between the game and work were elicited from the participants in the post-game discussions. Comparison were found in: "pressure from top" (comparing the marshmallow to the manager or management), "poor resources" (comparing the quality of materials in the game to hospital infrastructure and staff shortages as provided by management), "underestimated weight of the marshmallow" (compared to how managers underestimate the demands of their goals) and "must keep the marshmallow up" (comparing the questionable game rules to questionable demands of the job). Some comments were more direct and required

less interpretation, like the comment from one of the participants that, "Without the right foundation, the department will not do well."
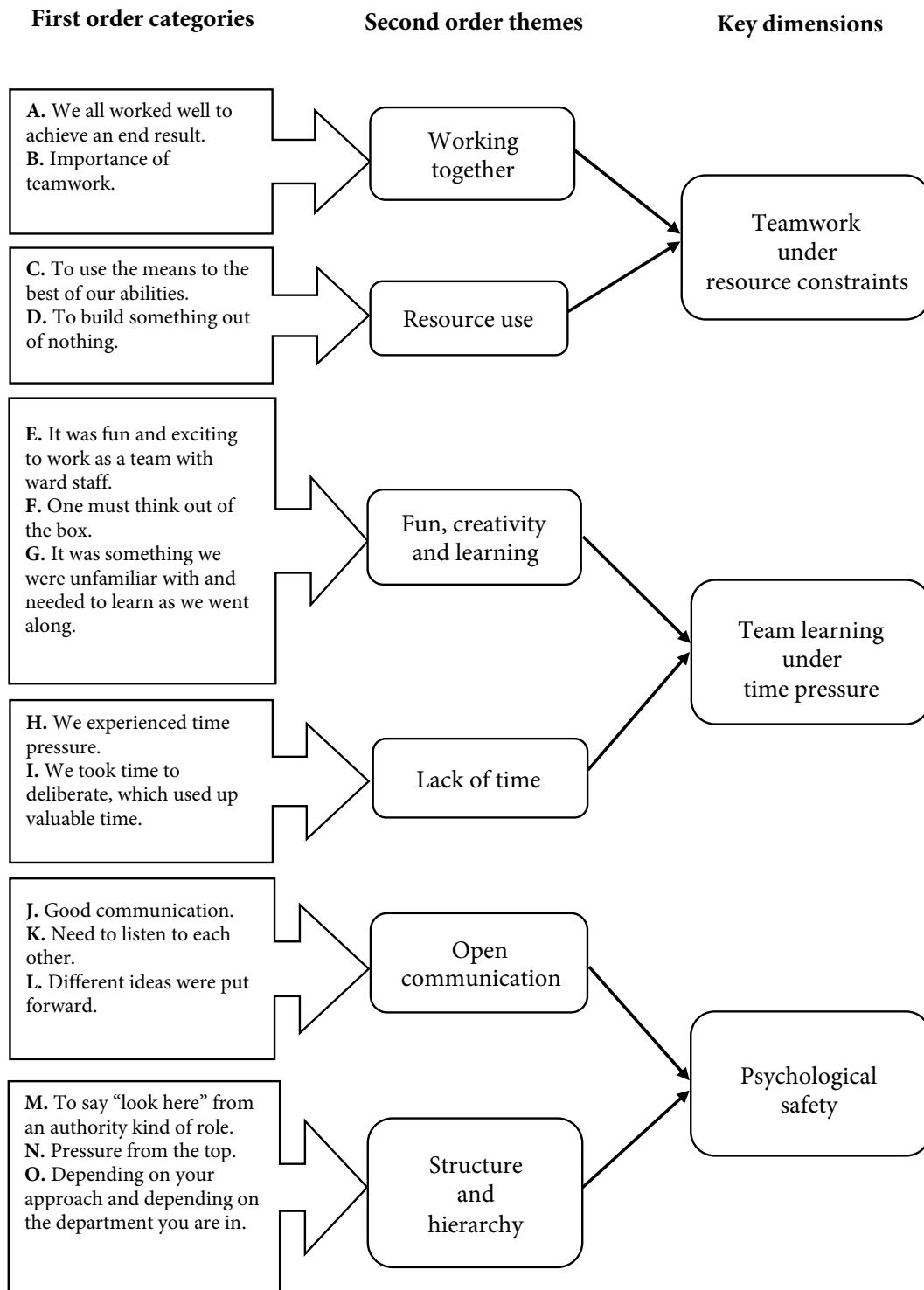
First order categories	Second order themes	Key dimensions

A. We all worked well to achieve an end result.
B. Importance of teamwork.

→ Working together

C. To use the means to the best of our abilities.
D. To build something out of nothing.

→ Resource use

→ Teamwork under resource constraints

E. It was fun and exciting to work as a team with ward staff.
F. One must think out of the box.
G. It was something we were unfamiliar with and needed to learn as we went along.

→ Fun, creativity and learning

H. We experienced time pressure.
I. We took time to deliberate, which used up valuable time.

→ Lack of time

→ Team learning under time pressure

J. Good communication.
K. Need to listen to each other.
L. Different ideas were put forward.

→ Open communication

M. To say "look here" from an authority kind of role.
N. Pressure from the top.
O. Depending on your approach and depending on the department you are in.

→ Structure and hierarchy

→ Psychological safety

Figure 1: Data structure

Discussion

At a surface level, the emergent themes of the participant feedback suggest that the game design established an environment that was conducive to information sharing, collaboration, and enjoyment among participants. Even for teams that were unsuccessful in terms of achieving the objective, or felt their process needed improvement,

the game facilitated awareness of these elements as aspirational states (such as fun, good communication, working well together). In this way, the game was an effective device for the teams to learn about teamwork. This pattern is consistent with a form of game-based learning in which the design of the game fosters learning about a skill set or subject area (Kapp, 2012).

Overall, the four-person teams became close-knit during the exercise and had a strong sense of their common goal. The objective was challenging enough to be stimulating to participants, but not so serious as to inhibit fun. The constraints of time pressure and difficult materials introduced sufficient stress to encourage creative problem solving without being defeating. Indeed, there is great interest in using game-based learning as a more effective way to train employees in various skillsets, and across industries, compared with more traditional knowledge transfer pedagogies (Sousa & Rocha, 2019).

Psychological safety

In addition to the specific challenge of change management for the NHI rollout, the more common challenges of creative problem solving and continuous operational improvement require an environment that is safe for inter-personal risk taking (Kessel et al., 2012). These risks include asking questions, voicing concerns, sharing ideas, and trying new things. Psychological safety alleviates the risk of embarrassment or threat from members of the direct or extended team within an organization in order for members to take these risks (Edmondson et al., 2016); it is the underpinning mechanism that enables teams to be adaptive (Edmondson, 2019).

Many factors can contribute to members' perception of psychological safety within the team, including environmental factors. The challenges of time constraints and insufficient resources voiced by so many participants in this study demonstrate how the perception of negative environmental conditions can cause team members to feel unsafe – as if the goal is impossible to achieve – and externalize their problem. As one participant verbally expressed: "If you wanted a tall structure, you would have supplied better equipment". However, since the resource constraints within the activity (and within the workplace) are inherent in the task, the goal of healthcare organizations should be to create an environment conducive to team creativity and the exchange of ideas (Kessel et al., 2012), irrespective of the external conditions.

Many of the participants recognized this relationship in their reflection on the game. They saw how the external pressures – which were beyond their control – required them to practice effective communication, listen to one another, and use teamwork to accomplish their tasks. Those who were successful at the task in terms of both the objective outcome and the positive team experience, described the positive interpersonal dynamics on their team related to fun and communication: open idea sharing, enjoying the game, and respecting one another. These experiences are indicators of a psychologically safe environment.

By contrast, teams that reported negative experiences or failed at the task, attributed this to poor communication and did not enjoy the game. One such participant described a case where one team member took over the entire process and left no room for others to get involved. This was a team lacking in psychological safety. This leadership dynamic has implications for team success in both the simulation and in the working environment. During the game, teams with positional leaders may have been subject to totally different baselines for psychological safety compared with teams of individuals of the same position, rank, or job type.

For teams that either were not subject to a dominant leader, or had a positive leadership experience in the game, psychological safety within the team was taken for granted. They described in a matter-of-fact manner the positive nature of teamwork implicit in the game. "It was about teamwork, so it feels good," said one participant. From responses like this, it is clear that when psychological safety is present, it facilitates positive team outcomes, including learning behaviour.

Team learning under time pressure

The feedback system established by the NHI pilot study, and the iterative nature of change deployment anticipated for the rollout, requires teams to adopt learning behaviour. More generally, the process of team learning is fundamental for teams to consistently and sustainably achieve high levels of performance (Edmondson, 2019). Key parts of this process include members regularly and actively asking questions, discussing errors, and engaging in experimentation and reflection. The marshmallow challenge facilitated an opportunity for a

kind of team learning in the condensed team-building and problem-solving space. Participants on teams rich in psychological safety described the learning processes they adopted to achieve their goal: getting to know their team members, listening to one another's design ideas, and consolidating them into a single design. The experience of having fun playing the game, lubricated these learning processes.

However, the aim of game interventions such as this is not to create design competencies, but transferrable teamwork competencies. The survey and reflection may have played a role in fostering individual contemplation about the learnings derived from the game about teams, which participants might not have explored otherwise.

During inter-disciplinary teamwork in healthcare, and particularly in rural settings, members joining work groups quickly develop a sense of "we" and "us" and use the term "team" as an extension of the self (Jenkins et al., 2015). This sense of belonging is expanded to a broader support group or team, by focusing on a common goal. Participants described their sense of shared purpose during the game, and regularly compared it to the structures in their working environment. The communities of practice theory, as captured by Wegner (2000) is prevalent in the healthcare sector (Kezar & Gehrke, 2017) and demonstrates the positive intents of participants to engage in effective teamwork as an outcome, which many equated with team learning.

Healthcare workers face challenges where they are forced to problem-solve under intense time pressures on a daily basis. It is in these moments that creative problem solving at the team level is not just useful, but a necessity (Kessel et al., 2012). In this study, participants who experienced their team as successful acknowledged a collaborative creative approach: "Different opinions were put together to attain a goal, which was achieved," said one participant. Beyond the presence of psychological safety and learning behaviour, other factors may contribute to team creativity. Kessel et al. (2012) performed a survey analysis on 73 healthcare teams and found that team diversity is a significant contributor to the sharing of skills and know-how sharing, and directly contributes to team performance. Participants in this study observed similar value in team diversity. One participant described their team's process as, "taking different ideas, all with their own merit, and combining into single solution". Participants who described similar processes seem to be describing a brainstorming approach to problem-solving. This is notable as, from Osborne's definition (1953), brainstorming links the presence of psychological safety (that is, the requirement to generate a high volume of out-of-the box ideas) with team performance (the development of the best possible solution).

Teamwork under resource constraints

Objective measures of team performance are common in the overall goal to provide quality healthcare, including satisfying patients, adopting new techniques, cost saving, and increasing patient safety. Team performance is therefore typically operationalized as task performance, completion or proficiency (DeChurch & Mesmer-Magnus, 2010). In a high performance team, the success of the team is equal to the success of the individual and is shared as a mutual benefit (Jenkins et al., 2015). Participants in this study recognized this view of performance, with one describing the game as "individual tasks for collective purpose". And indeed, across the board, participants recognized the legitimacy of their task, except when resource and time constraints caused them to question the achievability of the outcome. Due the constraints of the game, the objective performance metric (a compliant structure) should be linked to the more subjective performance metric of creative team problem solving practices.

Conclusion

This study set out to explore the use of team-based game interventions as driver of teamwork in a South African public healthcare organization. The need for cost-effective approaches to team development is particularly dire given the high performance requirements of the impending NHI program. The findings of an experimental game intervention conducted with the staff of an NHI pilot site hospital suggest that team-building games with a creative problem-solving goal can promote good teamwork that, in turn, promotes team learning.

Participants find the game fun and exciting, when the teams can establish a degree of psychological safety. The particular design elements of the marshmallow challenge made it an effective intervention for demonstrating to participants the importance of collaboration, communication, idea sharing, getting to know their colleagues, and economic use of resources.

The outstanding question following these findings is whether the learnings and experience from the game do, indeed, carry over into participants' working teams. Related to this point is the role that the study survey played in prompting reflection and learning that might not have occurred from the game on its own. Furthermore, the existence of reliable inventories for the constructs of team learning and psychological behaviour, and other metrics of teamwork (Valentine et al., 2013) make it possible to quantitatively assess the impact of the game on participants' team behaviour. Future research on the topic of game interventions could therefore focus on the following areas: variations of the game design or intervention plan in order to maximize learning outcomes; quantitative analysis of participants' psychological safety and team behaviour; and a longitudinal study of participants to track the influence of the intervention in the healthcare organisation.

This study contributes to the understanding of how games and interventions can help organisations to cultivate an environment of psychological safety, and develop teamwork and team learning skills in their staff. Participants were given an opportunity to experience how the environment they created as a team helped to engage team members to support one another and learn together.

Implications of this study are that a relatively inexpensive and simple game, such as the one used in this study, can be used to create an awareness of the factors that are impeding effective teamwork and team learning, and the development of a psychological safe environment. The reflections of participants from different levels within the hospital show that by using their game experience as a lens, they could easily identify barriers to teamwork. It is often difficult to create this kind of awareness, however the experiential learning opportunity provided by the game enabled this awareness to develop in an innovative way.

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Author contributions

EdP and HP were responsible for conceptualisation, project design, development and methodology, and writing and editing. EdP was responsible for data collection, curation and analysis, and project management.

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