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## Adult Playfulness in Simulation-based Healthcare Education

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**Abstract:** In many studies, simulation-based healthcare education has been observed to be enjoyable and meaningful. The objectives of simulation-based learning can be multifaceted, such as learning basic resuscitation or more complex crisis resource-management skills. As noted, the goals of simulation-based education can be quite serious although learning should be enjoyable and playful. Simulation-based learning demands playfulness and taking on roles that the learner has not previously studied in simulation-based healthcare education. In previous studies, playfulness has been perceived as a kind of stance towards learning or a certain mood in learning that emerges from interactions with others. In previous research, humour, creativity and teamwork have predicted adult playfulness and are central to successful simulation-based learning as well. Adult playfulness has also been related to higher achievements and motivation.

In this study, we examine adult playfulness in simulation-based healthcare education. The specific research question is as follows: *How does adult playfulness transpire in simulation-based healthcare education?* The study participants are 238 medical students and professionals (89 males, 86 females) at Stanford University in 2010–2016. The data sources include questionnaires and interviews. Playfulness appears in simulation-based learning mainly by emphasising trust and encouraging collaboration, as well as academic curiosity and a playful attitude. However, based on preliminary analysis, a playful attitude is not easy to realise. Emotional, embodied and physical aspects of playful simulation-based learning need further research and effort.

### Introduction

In many studies, simulation-based healthcare education has been observed to be enjoyable and meaningful (e.g., Brewer, 2011; Callagher & Corrado, 2014; Keskitalo, 2015; Keskitalo & Ruokamo, 2017). In this article, we refer simulations to the real-like healthcare context where things are done as if occurring in an actual healthcare environment and situation (Rall & Dieckmann, 2005). Callagher and Corrado (2014) also compare simulations with performances in a theatre, where all participants are referred to as actors. In other words, simulation is a healthcare mini-drama with all the spices (Callagher & Corrado, 2014). Simulation is thus closely connected to play and playful activities. However, simulators involve a certain technology that imitates certain aspects of reality (e.g., patient simulators), which are needed to create the drama. Many other concepts are also used to refer to simulation technology in healthcare, such as part-task trainers. Pedagogically, simulation-based learning resemble of case-based or problem-based learning, where the learning is organised around a certain patient case. Simulation-based healthcare education is typically structured into the following four phases: introduction, simulator and scenario briefing, scenario and debriefing (Keskitalo, 2015; Nyström, Dahlberg, Edelbring, Hult, & Abrandt-Dahlgren, 2016).

The objectives of simulation-based learning can be multifaceted, such as learning basic resuscitation or more complex crisis resource-management skills. Other learning goals can relate to teamwork and creative problem solving that are essential competence areas in the international framework for 21st-century skills (Binkley et al., 2012; Griffin, Care, & McGaw, 2012). As noted, the goals of simulation-based education can be quite serious although learning should be enjoyable and playful (Kangas, 2014). However, playfulness does not mean that learning should be pleasurable all the time. Instead, it indicates how much imagination, creativity and playful exploration are intertwined with learning activities (Bateson & Martin, 2013; Kangas, Siklander, Randolph, & Ruokamo, 2017). Playfulness can be manifested as physical, social and cognitive playfulness, as well as humour and the joy of learning (Lieberman, 1977; Proyer & Jehle, 2013). Simulation-based learning demands playfulness and taking on roles that a learner has not previously studied in simulation-based healthcare education (cf. Callagher & Corrado, 2014). In a previous study, humour, creativity and teamwork have predicted

adult playfulness (Proyer & Ruch, 2011) and are central to successful simulation-based learning as well. As Ziegler (1999) notes, the majority of their medical simulations involve humour, which are believed to reduce stress and increase motivation and rapport among participants, among other benefits. In previous research, adult playfulness has also been related to higher achievements and motivation (Proyer, 2011); thus, we think that it is important to further study adult playfulness in simulation.

In this study, we examine adult playfulness in simulation-based healthcare education, as well as how it can be promoted and enhanced during the learning process. The specific research question is as follows: *How does adult playfulness transpire in simulation-based healthcare education?* The study participants are 239 medical students and professionals (122 males, 116 females) at Stanford University in 2010–2016. The data sources include questionnaires and interviews. This research is still in its infancy, so only the preliminary results will be presented at the EdMedia Conference 2018 in Amsterdam. Next, we present the theoretical framework, the methods and the preliminary findings. Finally, the results are discussed, and some ideas for future studies are suggested.

## **Theoretical Framework**

In previous research, playfulness has been perceived as a kind of stance towards learning or a certain mood in learning that emerges from interactions with others (Kangas, 2014). Bateson and Martin (2013) even argue that playfulness may be a major influence on how creative a group of people can become. Playfulness is understood as a particular positive mood, and it manifests the quality of learning activities. It is an attitude that feeds the imagination and problem solving and allows mistakes (Bateson & Martin, 2013; Davis, 2009). Playfulness is thus a source of power for learning, aiming to produce the joy of learning (Csikszentmihályi, 1990; Kangas et al., 2017). Adult playfulness is characterised as curiosity, flexibility and creativity (Kangas et al., 2017). Based on all these views, we argue that playfulness may also lead to cognitive flexibility in medical decision making and problem solving (Dreisbach & Goschke, 2004). Being other-directed, lightheartedness, intellectuality and a whimsical nature are other characteristics of the adult learner's playfulness (Proyer, 2015). Previous research has related playfulness to better academic achievement and motivation (Proyer, 2011). Previous studies have also found that playfulness can predict the ability to overcome challenging situations in adulthood (Siviy, 2016), has many positive effects on learning (Kangas, 2014), as well as on overall well-being and quality of life (Proyer, 2012).

There are not only differences but also many similarities between playful and simulation-based learning. Playful learning is based on a climate of trust and safety. It is characterised by learners' activities and experientialism, taking into account the cognitive, emotional and physical qualities of learning. It comprises creativity, narration, collaboration, embodiment, media richness and the joy of learning (Kangas, 2010). It can be observed in learning as increased positivism, decreased tension and joint trust (Kangas, 2014; Ziegler, 1999).

It has been argued that the most important prerequisites for simulation-based healthcare education are trust and safety in the learning environment. In the beginning of the learning process, it is often stated that the learner can make mistakes without adverse consequences on the patient, and what is evaluated is the performance, not the performer (Fanning & Gaba, 2007). Playful and simulation-based learning are united by the learners' activities, experientiality and joy of doing tasks hands-on (Keskitalo, 2015). However, both types of learning also consider the cognitive and the emotional aspects as it targets specific learning goals, and there can be emotional elements in patient cases (Bryson & Levine, 2008; DeMaria et al., 2010), for example, in the form of a patient story (Power et al., 2016). During the scenario phase, the patient cases are usually handled in collaboration with other participants utilising various healthcare technologies, thus expressing co-operation and the media richness of learning. In many studies, the participants have also stated that they value the simulation-based learning experience (e.g., Paige, Arora, Fernandez, & Seymour, 2015), which may imply the joy of learning. Thus, it seems that simulation-based and playful learning involve many similar qualities, including narration, collaboration, media richness and joy of learning. The embodiment and physical nature of learning are also important aspects; however, they have received less attention in simulation-based healthcare education.

## **Research question**

With the previous theoretical framework as a background, we formulate the following research question: *How does adult playfulness transpire in simulation-based healthcare education?*

**Methods**

***Participants***

The data were collected from 238 participants (122 males and 116 females). The learners were mainly medical students ( $n = 100$ ) and junior physicians ( $n = 119$ ), primarily specialising in anaesthesia or emergency medicine. The other participants were healthcare practitioners ( $n = 17$ ). The median age of the respondents was 29 (ranging from 22 to 39 years old). Most of the participants had previously participated in simulation-based activities. Before the study, we applied for research permission, which was granted by the institutional review board. Thereafter, consent was obtained from the participants. It was also emphasised that participation was voluntary and that they could withdraw from the study at any time. However, all the participants decided to join the study. They did not receive any compensation for it.

***Research Context***

The data were collected from three different simulation-based learning environments in 2010, 2013–2014 and 2016. The simulation centre had many different rooms to choose from. An operating room, an intensive care unit, an emergency department or a ward was usually set up for the rehearsal. The learning environment also consisted of various computer-directed patient simulators, including adult, child and infant types. During the courses, all the activities were prepared by the facilitators and carried out collaboratively in a group format. Two to four students were usually assigned to one group. Those students who did not take part in a particular scenario watched the session from a separate room via television. The basic structure of a course included the following: introducing the topic, goals and ground rules; familiarising the students with the environment and scenarios; and conducting the learning discussion (Keskitalo, 2015). The each courses lasted from one to nine hours.

***Data Collection and Analysis***

We collected and analysed the research data, as presented in Table 1.

Table 1. Research methods.

<b><i>Research Data</i></b>	<b><i>Analysis Method</i></b>	<b><i>Participants</i></b>
Pre- and post-questionnaires	Descriptive statistics, factor analysis, Cronbach's alpha, paired sample <i>t</i> -test	Learners, $n = 238$
Interviews	Qualitative content analysis	Facilitators, $n = 37$ Learners, $n = 37$

Pre- and post-questionnaires were used to measure the participants' expectations of and experiences in the beginning and at the end of the simulations. For a detailed description of the questionnaires, see Keskitalo (2012). Additionally, 29 Likert-type questions (from 0 = not at all to 5 = to a great extent) focused on the emotions that the students experienced during the course. They were asked to evaluate the degree to which they felt a given emotion (e.g., enjoyment in studying, boredom, a sense of community) before and after the course. In this study, we focused on the questions that measured the learners' emotions and playfulness. In the questionnaires, five questions were intended to collect the students' background information, and one open question gave the students space to write other comments. The post-questionnaire items were similar to those in the pre-questionnaire, but they dealt with the students' experiences right after the course. For this study, the data were analysed using descriptive statistics, factor analysis and Cronbach's alpha. A paired-sample *t*-test was used to compare the differences between the participants' emotions before and after the simulations. To count the difference between the means, we conducted subtractions between the means before and after the simulation sessions. The asterisk is used to indicate how statistically significant the difference is.

We also conducted individual, paired and group interviews after each simulation session. The facilitators were mainly interviewed as pairs or individually, whereas the learners were interviewed mainly in groups to save time. The interviews were semi-structured and included several questions, such as the following: *Describe how your group of participants worked together. What promotes learning in a simulation-based learning environment?* The qualitative data were analysed using qualitative content analysis (e.g., Attride-Stirling, 2001).

The analysis process started with transcribing the interview data verbatim, followed by reading the transcripts once. The analysis process involved a comparison between theory and data, looking for similarities and differences among the categories, as well as the negotiation between the researchers about the categorisation. In this study, several sentences constituted the unit of analysis that somehow reflected the study's research question (Chi, 1997). However, it should be borne in mind that qualitative data analysis is still in its infancy, and the interview data are used here mostly as supporting the quantitative data analysis.

## Preliminary Results

In Table 2, we present the participants' emotions related to playfulness in simulation-based learning in the beginning and at the end of the sessions. During the analysis process, their emotions were further categorised into four themes, according to the theoretical framework presented above, as well as the data analysis. The themes were as follows: 1) academic curiosity and playful attitude, 2) positivity and joy of learning, 3) collaboration and teamwork and 4) trust and safety of learning. For the first two themes, we also formed the sum variables, and the Cronbach's alpha coefficients were acceptable for these subscales (0.68–0.80) (Nunnally, 1978). Because the last two themes each involved a single variable, we were unable to form their sum variables.

Table 2. Participants' emotions before and after the simulation-based learning sessions.

<i>Emotions before the course (pre-questionnaire)</i>	<i>M (SD)</i>	<i>Emotions after the course (post-questionnaire)</i>	<i>M (SD)</i>	<i>Difference</i>
<b><i>Academic curiosity and playful attitude</i></b>	<b>3.61 (0.65)</b>		<b>3.92 (0.68)</b>	<b>0.31***</b>
<i>Interest</i>	4.05 (0.82)	<i>Interest</i>	4.32 (0.77)	0.27***
<i>Enjoyment in studying</i>	3.76 (0.95)	<i>Enjoyment in studying</i>	4.29 (0.84)	0.53***
<i>Feelings of challenge</i>	3.55 (1.06)	<i>Feelings of challenge</i>	3.81 (1.07)	0.26**
<i>Activity</i>	2.96 (1.12)	<i>Activity</i>	3.36 (1.21)	0.4***
<i>Enthusiasm</i>	3.72 (0.87)	<i>Enthusiasm</i>	3.89 (1.00)	0.17 *
<b><i>Positivity and joy of learning</i></b>	<b>3.36 (0.75)</b>		<b>3.66 (0.84)</b>	<b>0.30***</b>
<i>Hopefulness</i>	3.72 (0.97)	<i>Hopefulness</i>	3.89 (1.11)	0.17*
<i>Cheerfulness</i>	3.33 (0.91)	<i>Cheerfulness</i>	3.55 (1.04)	0.22**
<i>Satisfaction</i>	3.24 (1.01)	<i>Satisfaction</i>	3.82 (1.00)	0.58***
<i>Happiness</i>	3.12 (0.98)	<i>Happiness</i>	3.43 (1.09)	0.31***
<b><i>Collaboration and teamwork</i></b>				
<i>Sense of community</i>	3.69 (0.95)	<i>Sense of community</i>	4.19 (0.85)	0.5***
<b><i>Trust and safety of learning</i></b>				
<i>Ingenuousness</i>	1.91 (1.00)	<i>Ingenuousness</i>	1.94 (1.13)	0.03
* $p < 0.05$ ; ** $p < 0.01$ ; *** $p < 0.001$ <b>bold numbers = negative emotions</b> ; <i>italic numbers = positive emotions</i>				

### ***Academic Curiosity and Playful Attitude***

Based on the preliminary analysis of the questionnaire data, we could assume that the participants had the right mindset for learning, as *academic curiosity and playful attitude* were high in the beginning ( $M = 3.61$ ;  $SD = 0.65$ ) and at the end of the simulation sessions ( $M = 3.92$ ;  $SD = 0.68$ ). When examining the individual emotion variables, interest ( $M = 4.05$ ;  $SD = 0.82$ ), enjoyment in studying ( $M = 3.76$ ;  $SD = 0.95$ ), feelings of challenge ( $M = 3.55$ ;  $SD = 1.06$ ) and enthusiasm ( $M = 3.72$ ;  $SD = 0.87$ ) were high in the beginning of the sessions, and these emotional statements were even higher at the end of the course. The increase was statistically

significant in all of these variables. Activity ( $M = 2.96$ ;  $SD = 1.12$ ) was quite low in the beginning but increased towards the end of the sessions ( $M = 3.36$ ;  $SD = 1.21$ ). The interviews also supported the quantitative analysis, indicating that simulation-based learning was a pleasurable experience after all, as described by a student:

*“I think it’s a great programme. I think before, like the day before, I was kind of stressed out, thinking, oh God. Now [that] I’m in the second year, they expect more of me. I can’t [interposing]. But then, once it’s over, I think it’s a great experience. I still think like now, I want to do it again in like a couple months. And I’d like to do it more often”* (Learner 3).

Although the participants seemed to be academically curious, it would sometimes overcome their playful attitude, as a facilitator and a learner explained:

*“I think the buy-in of reality from the students, oftentimes, if they’re uncomfortable, they’ll then say it’s just a mannequin; it’s a dummy; it’s a piece of plastic. And unless they agree to – that there’s some fiction portion of it or that some of the – the mannequin’s not going to get up and walk off the bed. Until you get that buy-in from the student, a lot of times, it’s a barrier; it’s a wall to their learning; it’s a wall to, I think, creating the simulation experience for them. So I think that the biggest barrier is somebody that doesn’t want to play”* (Facilitator 20).

*“First, you have to get into the role. It’s like they say. You have to suspend disbelief and believe that – like make yourself believe this is real, what I’m learning. Forget it’s a plastic mannequin. Pretend it’s a real person. If people aren’t really able to do that, then they can just have a harder time getting into it. That could prevent them from focusing on the learning”* (Learner 37).

As revealed by the preceding excerpts, the facilitator tried to have the participants play with a plastic mannequin in order to accomplish the learning goals. However, as the learner described, that was not easy because somehow, it felt ridiculous to pretend and imagine that the mannequin was a real patient. Callagher and Corrado (2014) observed this same issue in their teaching. The learners also described that what they basically did to achieve the learning goals was to forget the things that did not feel real or made them feel ridiculous, whereas the facilitator did his or her best to create a valuable learning experience for them.

### **Positivity and Joy of Learning**

The *positivity and joy of learning* theme was constructed from the following emotions: hopefulness, cheerfulness, satisfaction and happiness. Positivity and joy of learning was quite high among the participants ( $M = 3.36$ – $3.66$ ;  $SD = 0.75$ – $0.84$ ), and the increase towards the end of the sessions was also statistically significant ( $0.30^{***}$ ). The means for hopefulness ( $M = 3.72$ ;  $SD = 0.97$ ), cheerfulness ( $M = 3.33$ ;  $SD = 0.91$ ), satisfaction ( $M = 3.24$ ;  $SD = 1.01$ ) and happiness ( $M = 3.12$ ;  $SD = 0.98$ ) were high in the beginning, and all had a statistically significant increase towards the end of the sessions as well. The interviews also revealed the presence of joy in the learning experience, as described by one student:

*“Speaker 2: Mm-hmm. Usually. Later in the day it grows – Eric was making jokes in there. [interposing]”* (Learner 2).

The excerpt indicated that the joy of learning manifested in simulation-based healthcare education could take the form of jokes among the learners (see also Callagher & Corrado, 2014). The quote also showed that the positivity and joy of learning grew during the day, thus supporting the quantitative data analysis.

### **Collaborative Learning and Teamwork**

The sense of community was quite high in the beginning of the sessions ( $M = 3.69$ ;  $SD = 0.95$ ), with a statistically significant increase towards the end of the course ( $M = 4.19$ ;  $SD = 0.85$ ). The collaboration was also valued by both facilitators and learners, as revealed by the following excerpts:

*“Having everyone involved is helpful”* (Facilitator 25).

*“They’re quite helpful; you know you can count on these guys, and they’ll be there to help you out”* (Learner 2).

Collaboration is a prerequisite for simulation-based learning, as it helps learners solve the patient case more efficiently, as shown by the preceding excerpts. However, how playfulness transpires in this collaboration requires a deeper examination.

### ***Trust and Safety of Learning***

Ingenuousness was not particularly high in the beginning ( $M = 1.99$ ;  $SD = 1.11$ ) or at the end of the session ( $M = 1.94$ ;  $SD = 1.13$ ). However, the interviews indicated that the facilitators really tried to support this aspect of learning, for example:

*“You try and be as supportive as possible and really make them feel like no matter what happens, there’s no way to fail”* (Facilitator 25).

*“Having a non-threatening environment where the learners do not feel that they’re being tested or judged”* (Facilitator 22).

Furthermore, the learners valued this aspect of learning, as revealed in the following excerpts:

*“I think it’s pretty low stress; even though you’re worried about looking [like] an idiot, you’re not worried about actually hurting a patient”* (Learner 33).

*“So, it has to be a very safe environment!”* (Learner 3).

The reason for the low mean might be elsewhere than that this aspect of learning has been ignored as it is considered an essential element in simulation-based learning (e.g., Callagher & Corrado, 2014; Fanning & Gaba, 2007). For example, the learners were possibly evaluating how much they trusted their own skills and knowledge rather than how trustworthy and safe they thought the learning environment was.

### **Discussion and Concluding Remarks**

Playfulness appears in simulation-based learning mainly by emphasising trust and encouraging collaboration, as well as academic curiosity and a playful attitude. A playful attitude plays an important role in the success of simulation-based healthcare education (Ziegler, 1999). Simulation-based learning requires a playful mindset that helps participants settle into their roles and suspend disbelief (Callagher & Corrado, 2014; Fanning & Gaba, 2007). However, as the preliminary results suggest, it is neither easy for the instructor to support the playful mindset of the learner, nor is it an easy task for the learner to be immersed in simulation-based learning. According to Callagher and Corrado (2014), sometimes, the difficulty can be due to disinterest, stress or just embarrassment. Therefore, future studies could concentrate on finding pedagogical methods that help support learners’ playful attitude, in addition to using humour (see Callagher & Corrado, 2014), which is just one aspect of playfulness (Lieberman, 1977; Proyer & Jehle, 2013). In this task, a closer examination of our video data, which we have not yet analysed, will help us answer the question of how playfulness emerges from the simulation participants’ collaboration and interaction.

The preliminary findings also indicate that in simulation-based education, scholars should emphasise other aspects of playful learning that are known to enhance learning and may also benefit simulation-based learning. These are the emotional (Keskitalo & Ruokamo, 2017), as well as the embodied and physical aspects of learning (cf. Kangas, 2010). Thus far, the emotional facet of simulation-based learning has been studied in relation to stress and anxiety (Andreatta, Hillard, & Krain, 2010) or to increasing the realism of the patient cases (Bryson & Levine, 2008; DeMaria et al., 2010). However, in future studies, researchers should also concentrate on the positive aspects of emotions, for example, how to increase a playful attitude and joy in simulation-based learning without ignoring the cognitive dimension. This point is especially important since simulation-based learning is sometimes considered quite stressful (Andreatta et al., 2010). Recently, the socio-material perspective has emerged in order to study the physical aspect of the learning environment and how it all relates to learning (e.g., Nytsröm et al., 2016). Similarly, in future studies, scholars could investigate how the physical learning environment either supports or hinders playful simulation-based learning.

The main limitation of this study is that the questionnaires and the interviews were not exactly designed to measure playful simulation-based learning. For example, both quantitative and qualitative data showed mixed results about trust and the safety of simulation-based learning. The descriptive statistics that measured ingenuousness were quite low although the interviews revealed the extra effort in creating the right atmosphere

for learning. Many previous studies also confirm this aspect as important for the success of simulation-based learning (e.g., Fanning & Gaba, 2007). Thus, in future research, scholars must also carefully design their questionnaires to meet the goals of their studies. However, we believe that our study is a good starting point since to our best knowledge, there are no other current studies related to playful simulation-based learning.



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