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Social Gamification in Team Sports - Design Concept and Preliminary Evaluation

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Abstract

Gamification, the use of game design elements to increase user engagement and motivation in any activity, has evolved in several areas, including sports. However, while the use of gamification in individual sports and fitness contexts has been extensively studied, the potential of gamification in team sports remains poorly explored. This paper addresses this gap by designing and evaluating social gamification features tailored to support team unity in sports teams. Therefore, a gamification concept was designed, consisting primarily of a virtual team mascot that can be unlocked and enhanced by completing team-based performance challenges, aimed at supporting the social relationship within the team. Subsequently, a within-subjects field experiment was conducted with an amateur women's soccer team over a four-week period to assess whether the presented features would increase social identification within the team. The preliminary evaluation revealed that although team members' participation in the given team challenges was moderate, there was a significant increase in social identity, confirming the hypothesis. This study extends the understanding of gamification in team sports, provides preliminary empirical evidence on the effectiveness of social gamification features in this context, and identifies avenues for future research on social gamification in team sports.

CCS Concepts

• **Human-centered computing** → **Collaborative and social computing systems and tools; Interactive systems and tools; Empirical studies in HCI; Field studies.**

Keywords

Gamification, Sports, Soccer, Group Dynamics

1 Introduction

Gamification, defined as the application of game design elements and principles to enhance user engagement and motivation in any activity, system, service, product, or organizational structure [7], has emerged as an effective strategy across multiple domains including education, healthcare and marketing [18]. In the realm of sports, gamification is frequently employed to effectively motivate individuals to increase their physical activity levels [17]. However,

most gamification approaches in the sports context have predominantly focused on fitness and individual sports. This leaves the domain of team sports relatively unexplored, highlighting the need for further research in gamifying team sports [2].

This is a surprising neglect given the immense popularity of team sports around the world, a phenomenon that is particularly evident during major sporting events such as World Cups in various team disciplines. Team sports have unique characteristics that set them apart from individual sports, such as the prevalence of social interactions and the strong focus on regular competition, requiring a different approach to engaging individuals through gamification of the activity. The inherent social aspects of team sports, including the dynamics of social relationships and team cohesion, present opportunities for tailored gamification strategies that can support and foster these social aspects [3].

The primary objective of this research is to investigate whether the social relationships within a sports team can be improved through the use of gamification, thereby fostering a collaborative environment that enhances both individual and collective performance. This is achieved by focusing on designing and implementing gamification features tailored to team sports.

Traditionally, gamification designs have often relied heavily on the PBL triad — points, badges, and leaderboards. While this approach has been widely adopted in research and practice, it has often been criticized for its lack of innovation and limited effectiveness. To move beyond these conventional methods, it is recommended to explore unusual, innovative gamification elements [18]. In line with this consideration and moving away from the often overvalued PBL triad, this research focuses on the application of social gamification features.

Therefore, this paper presents a concrete design of social gamification features for the team sport soccer as illustrated in Figure 1. Furthermore, the effectiveness of the presented design is evaluated through a field experiment conducted with a soccer team using a within-subjects design. The preliminary results of this evaluation provide insight into the potential of social gamification features to positively impact social relationships within a sports team.

The contribution to the field of gamification is twofold: First, this research extends the understanding of how gamification can be specifically tailored to team sports, addressing the gap in existing research. Second, the paper provides preliminary empirical evidence on the effectiveness of social gamification features in enhancing the team sport experience, with a particular focus on soccer.



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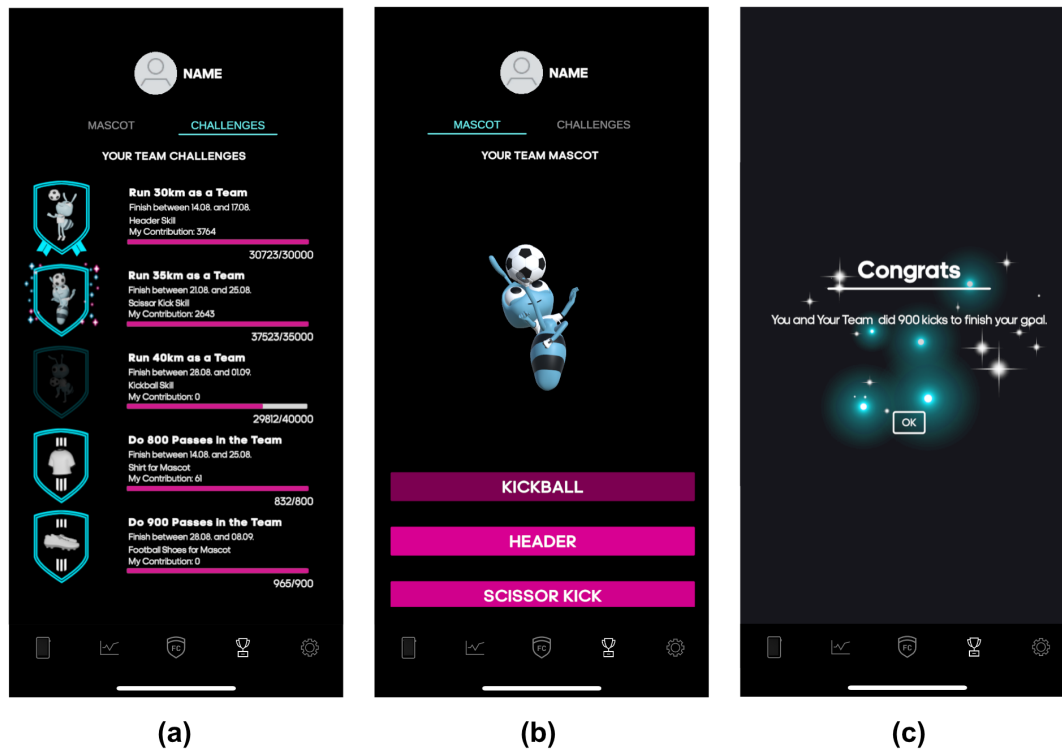


Figure 1: Screenshots of the social gamification features developed. (a) presents the team challenge feature, (b) presents the virtual mascot feature, and (c) presents a popup celebrating the team’s goal attainment.

2 Gamification Design

In order to explore social gamification in team sports, data on which to build gamification features on was required. Thus, I used and extended the self-performance tracking product called adidas TEAM FX [1], which enables soccer players to track, view and analyze their personal soccer performance data. This product consists of a sensor, specialized insoles, and a dedicated mobile application available on major app stores. The sensor is designed to be inserted into the designated pocket of the insole of the user’s dominant foot as illustrated in Figure 2. Once the sensor-equipped insoles are placed in soccer shoes and worn during training and matches, the device effectively captures and records motion data. As a result, the sensor records various performance metrics, which are subsequently accessible through the synchronized app interface, providing users with a comprehensive overview of their athletic performance. One’s own performance statistics can be visualized on a dashboard as shown in Figure 2. A simple goal-setting feature for individual weekly performance goals is also included.

To add social gamification features to the app, a beta version of the app is designed and implemented. In this gamified version of the app, the gamification features are accessible via the trophy icon in the tab bar, as shown in Figure 1.

2.1 Team Challenges

By setting challenging goals and providing immediate positive feedback on goal attainment, which is often implemented in games

[15, 16], goals provide motivational opportunities to experience competence and mastery [9]. According to goal-setting theory [13], setting challenging yet achievable goals can significantly influence motivation and behavior, provided users accept and commit to the challenge [12]. In cooperative games, challenges often revolve around goals that are shared among players. Those can have a profound impact on enjoyment, excitement, cooperative behavior [6] and even influence group dynamics [21]. Therefore, the gamified version of the app incorporates performance-based team challenges, which are essentially system-defined shared group goals.

A team is given a total of five challenges to complete, all of which are visible in the app from the moment they start using it. However, each challenge is designed to be completed within a specific timeframe of one to two weeks, coordinated with the team’s training schedule. Thus, each challenge requires two to four training sessions to complete, with a team having two regular team training sessions per week. A screenshot of this feature is presented in Figure 1 (a). Below each challenge’s title and associated time constraints, the app displays individual contributions to the goal, accompanied by a dynamic progress bar illustrating the team’s progress and supporting instant feedback concerning goal attainment. Upon successful completion of a challenge, not only does the progress bar fill up, but users also receive a pop-up notification celebrating their achievement, as visualized in Figure 1 (c). In addition, each team member is rewarded with a badge that is prominently displayed next to the completed challenge, visualizing the success.

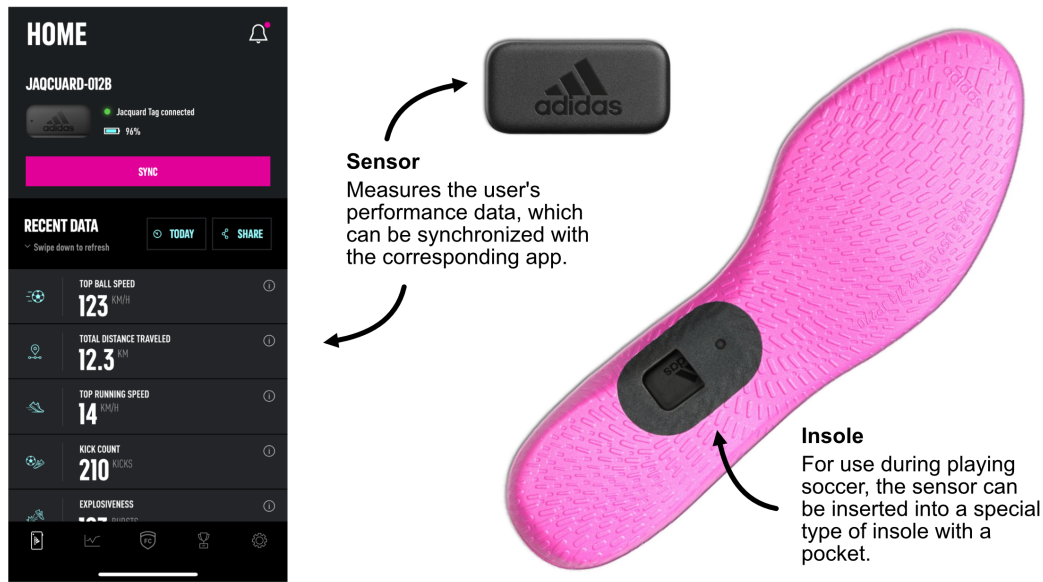


Figure 2: The adidas TEAM FX product [1]. The figure includes a screenshot of the app interface and an illustration of the sensor application.

2.2 Virtual Mascot

Affecting various aspects of group dynamics and individual behavior, social identification plays a crucial role in sports teams. Social identity refers to the extent to which an individual group member identifies with the group [26]. Strong identification with one's team not only enhances athletes' perceptions of the team [28], but also promotes prosocial behaviors toward other team members [4].

To support users' team identification, it is beneficial to incorporate features that foster a strong group affiliation [21], such as virtual goods, which have been identified as effective tools in influencing a user's social identity [8]. In sports, where the removal of a long-standing mascot can even pose a threat to social identity, mascots play a critical role in team branding and cultivating lasting social connections across generations [25]. Inspired by the world of sports, this paper introduces the concept of a virtual mascot, which is meant to represent the team's identity and help participants feel a sense of belonging. Thus, the gamified version of the app, in addition to presenting challenges, features a virtual mascot - a 3D model of a stylized ant presented in Figure 1 (b). The choice of an ant as a mascot is grounded in its symbolic representation of teamwork and social cohesion [14], making it an ideal emblem for team sports. To support shared goals in a collaborative environment, adding features that provide motivational rewards for goal attainment is advisable, thereby reinforcing the expected emotional responses to the collaborative success [21]. Thus, the virtual mascot is not merely a static representation. It serves as an interactive entity that can be outfitted with accessories and acquire new skills by successfully completing team challenges, making it a relevant and rewarding element of the application. In this way, the badges earned for achieving goals represent accessories or skills that serve as virtual goods to equip the virtual mascot, enhancing the overall gamified experience for participants. Thus, the mascot feature can

be seen as a driving element for the overall effect of the gamification implementation. The virtual mascot is introduced through an idle animation, and as users accomplish new skills, they can activate corresponding animations by clicking the appropriate buttons. In addition, as teams succeed in certain challenges, the mascot is automatically equipped with the appropriate accessories, such as a jersey or soccer cleats, enhancing the visual representation of the team's collective achievements.

Thus, the designed gamification features, especially the engaging virtual mascot that visualizes the success in the implemented team challenges, can help to improve the social identification with the team. Therefore, I propose the following hypothesis:

H1: Using the proposed social gamification features increases the social identity in a sports team.

3 Method

An experiment is conducted to determine whether the implemented social gamification features for team sports strengthen the social identity of sports teams. Therefore, a field experiment is conducted in which a soccer team uses the developed gamification features for four weeks and evaluates the app using a questionnaire before and after the intervention period. To reduce the effect of possible technical uncertainties and to resolve technical issues before the experiment, the team uses the app without the gamification features (as found in the app stores) for one week prior to the experimental period and then switches to the gamified version for the planned four-week intervention period.

3.1 Measures

As the dependent variable, a measurement for social identity is included in both the pre- and post-questionnaire. Additionally, the pre-questionnaire incorporates demographic questions, while the

post-questionnaire includes a measure of goal commitment. Furthermore, beyond the questionnaire, goal attainment is assessed as a potential influencing factor. This results in the following measures:

3.1.1 Demography. To gain an overview of the demographics of the study participants, I included variables such as age, length of time participants had been involved in soccer, when they joined their current team, and an exploration of their role as a starter or substitute in the pre-questionnaire. In addition, the post-questionnaire includes a question about the average number of sessions attended per week during the experimental period.

3.1.2 Social Identity. The Four Item Measure of Social Identification (FISI) based on Postmes et al. [22, 23], which is an adaptation of the scale reported by Doosje et al. [5], is applied to assess the social identity of the team. It consists of four items to be answered on a Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). Higher scores indicate a higher level of social identity. To analyze social identity, a mean score of the items is calculated. For a detailed list of the items used in the questionnaire, please refer to Table 3 in the Appendix.

3.1.3 Goal Commitment. Commitment to the challenges set in the gamified version of the app is a fundamental requirement for the effectiveness of the social gamification design, as it provides the necessary motivation for individuals to work on the goals [12] and thus serves as a relevant control variable for the experiment. To assess the commitment regarding the implemented challenges, the Goal Commitment Scale [10] is added to the post-questionnaire. The questionnaire consists of five questions to be answered on a Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). For the analysis, a mean score of the items is calculated. See Table 3 in the Appendix for a detailed list of the items used in the questionnaire.

3.1.4 Goal Attainment. For the social gamification design to be effective, it is essential that participants complete the challenges set. Only by completing these challenges can they observe the mascot's progress and actively engage with the rewards, such as new accessories or animations. Therefore, to control the goal attainment status, I measure goal attainment, i.e. the number of challenges completed, by accessing the application's database. This also allows for tracking of each team member's contribution to the team's goals, calculated as the percentage of team members who contributed to goal attainment.

3.2 Procedure

First, an informational document is distributed to all members of the participating soccer team. In addition, a meeting is held to answer any questions regarding the experiment and to obtain written consent from all participants. Next, the team members are assisted in installing and setting up the adidas TEAM FX product, which is available in the app stores without the social gamification features.

After the meeting, participants are provided with a link to the pre-questionnaire, which they are instructed to complete individually in a distraction-free environment, such as at home. This marks the beginning of the pre-experiment week, during which participants

familiarize themselves with the basic functionalities of the product, including tracking soccer data using the sensor, synchronizing the data with the app, and analyzing their personal data as shown in Figure 2. After this first week, the entire team moves to the gamified version of the app described in section 2.

During the four-week experimental period, participants use the gamified version of the app in their training sessions. At the end of the experimental period, all participants receive a link to the post-questionnaire, which they complete again individually. At the end of the experiment and after completing the questionnaire, participants returned the TEAM FX product.

3.3 Participants

Fifteen female amateur soccer players from a German Bezirksliga (district league level) soccer team participated in the experiment. Table 1 provides an overview of the participant demographics, indicating that the team has a consistent group of members who have attended their training sessions on a regular basis during the experimental period.

4 Results

Goal commitment and goal attainment concerning the challenges in the app are analyzed descriptively. In addition, I analyzed the development of social identity within the team over the course of the experiment using a paired sample t-test.

4.1 Social Identity

To compute a paired sample t-test, I first verified that the data did not have significant outliers and conducted a Shapiro-Wilk test, which revealed that the assumption of normal distribution for the data could be accepted ($p = .640$).

For the t-test, in accordance with the stated hypothesis, I assume that the measurement of social identity should increase over the course of the experiment. Therefore, I used a directional hypothesis test and tested with an α -level of .05. The result of the test revealed that social identity indeed significantly increased from the pre-measurement ($M = 5.25, SD = 0.73$) to the post-measurement ($M = 5.60, SD = 0.66$), with a medium effect size ($t(14) = -2.27, p = .02, d = 0.59$). Descriptive statistics for this measurement are visually displayed in Figure 3.

4.2 Goal Commitment

The team members' goal commitment to the challenges presented in the gamified version of the app was reported as an average of 3.36 ($SD = 0.79$) on a five-point Likert scale. Thus, the commitment to the goal was moderate.

4.3 Goal Attainment

Among the challenges set in the gamified app, the soccer team jointly completed four out of five challenges, as documented in Table 2. Five to six team members contributed to each challenge. In total, seven team members worked on the challenges, while the total number of participating team members in the experiment was 15. This means that 47% of the participants contributed to the team challenges, while the remaining team members did not contribute at all.

Table 1: Demographic statistics of participants (N = 15).

Age <i>M (SD)</i>	Soccer experience	Part of the current team	Status in matches	Trainings per week
26.47 (4.21)	< 1 year: 0 %	< 1 month: 0 %	starter: 67 %	< 1 training: 7 %
	2-3 years: 0 %	1 - 6 months: 7 %		1-2 trainings: 27 %
	> 3 years: 100 %	6 - 12 months: 13 %	substitute: 33 %	2 trainings: 67 %
		> 12 months: 80 %		> 2 trainings: 0 %

Table 2: Goal attainment of the five challenges implemented in the gamified version of the app.

Challenge	Contributors	Completed?	Reward
Run Challenge 1 (Run 30km)	5	Yes	Header skill
Run Challenge 2 (Run 35km)	6	Yes	Scissor kick skill
Run Challenge 3 (Run 40km)	5	No	Kickball Skill
Kick Challenge 1 (800 passes)	6	Yes	Shirt (accessory)
Kick Challenge 2 (900 passes)	5	Yes	Shoes (accessory)
Total number of individual contributors	7		

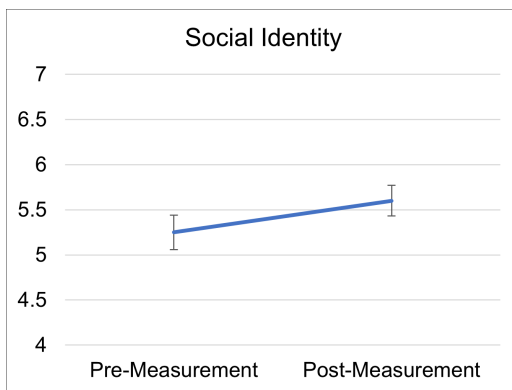


Figure 3: Descriptive statistics for the measurement of social identity. The error bars indicate SE.

5 Discussion

This paper presents social gamification features specifically tailored for the team sports context and the evaluation of these features through a within-subjects field experiment with a women’s amateur soccer team. The hypothesis centered on the designed mascot feature, which could be enabled and extended through the completion of team challenges, as a means to support team identification [8, 21]. Specifically, this study aimed to determine whether the proposed social gamification features, namely the combination of team challenges and a virtual mascot, would positively impact social identification within a sports team.

The results of this study reveal that the social identity within the participating soccer team increased significantly over the four-week experimental period, demonstrating the effectiveness of the social gamification design and supporting our hypothesis. Although the team was well-established, with most members having been a part of the team for over a year and thus already possessing a certain

level of social identity, the social gamification features were able to further enhance this social identity. This finding is notable because it suggests that social gamification can increase identification even in groups that already have a sense of unity. Increased engagement and interaction among team members through shared challenges and rewards in the form of a virtual mascot within the app used are likely the mechanisms through which this could be obtained.

This result is particularly noteworthy given the moderate participation rate in the implemented challenges observed during the experiment, even though the majority of team members reported attending all training sessions. The analysis of goal attainment related to the team challenges showed that only 47% of the team members participated in at least one challenge, while the remaining team members did not contribute at all. However, it is important to note that five out of the six challenges were jointly completed by the team, resulting in the mascot acquiring two new skills, which were implemented in the form of animations and accessories, such as a shirt and shoes, as shown in Figure 1 and documented in Table 2. These achievements likely contributed to a positive experience with the mascot, even for those team members who did not actively participate, and may have contributed to an improved social identity within the team.

In addition, I examined goal commitment, a critical factor in goal attainment because it captures the necessary motivation for individuals to pursue their goals [12]. The analysis revealed a moderate level of goal commitment among the team members, which may explain the low participation rate in the team challenges.

One possible reason for this moderate commitment may be the specific design of the mascot as an ant. While ants symbolize teamwork and cohesion, making them an ideal mascot for sports teams [14], their appearance is unconventional for such a context. It is possible that team members did not grasp the symbolic meaning of the mascot or simply did not resonate with its representation of the team’s identity. To address this, adding the ability to customize

the mascot could increase its relevance and appeal, potentially increasing the team's engagement and commitment to the system, which could be explored in future studies.

Another explanation for moderate participation and goal commitment could be social loafing, where individuals exert less effort in a group setting due to a lack of social control and trust in others to fulfill responsibilities [24]. Addressing social loafing by encouraging more team members to participate could not only improve goal commitment and attainment, but also further strengthen social relationships and identification within the team. Since social loafing is a well-known phenomenon in cooperative settings, it seems valuable to enhance the purely cooperative gamification concept with competitive features [27]. For instance, the inclusion of a leaderboard that provides transparency on individual performance, thereby establishing interpersonal competition within the team, or incorporating inter-team competitions, such as challenges against other teams, could be beneficial. These are strategies that could be explored in future research studies.

The observed moderate commitment could also be attributed to the varied motivational needs of team members. Not everyone is motivated by the same features, making it essential to tailor gamification to users' motivations and needs [20]. While soccer players are often motivated by both achievements and social factors, theoretically making team challenges a good fit [3, 11], it is possible that other motivations may be more prevalent among the participating team members. Tailoring gamification features to better match specific user needs and motivations could have engaged and motivated the team more effectively.

However, even if the presented gamification design theoretically aligns with the motivations of the team members, other features targeting these motivations might have been better suited to this particular team. For instance, incorporating social networking features that allow team members to appraise each other's performance could potentially better engage the team members to strengthen social relationships within the team. Inter-team challenges that involve sports teams competing against each other could reflect the competitive nature of the sport itself, also potentially increasing engagement and commitment, and thereby strengthening a team's social relationships through shared goals. There are numerous possibilities that could be explored and evaluated in future research in terms of meeting user needs and motivational fit.

In summary, these findings demonstrate that while social gamification features can significantly enhance social identity within a sports team, achieving high levels of participation and goal commitment, and thus even higher levels of social identity, remains a challenge. Future research could focus on identifying and mitigating factors that contribute to social loafing and exploring additional motivational strategies to increase active participation. By addressing these issues, gamification strategies can be further optimized to help foster stronger social relationships within a sports team.

The contribution to the field of gamification is twofold: First, this paper expands the understanding of how gamification can be specifically tailored to team sports, addressing the gap in existing research. By focusing on the unique social dynamics and collaborative nature of team sports, insights into the design and implementation of gamification elements specifically tailored to this context

are provided. Second, preliminary empirical evidence on the effectiveness of social gamification features in enhancing the team sport experience, with a particular focus on soccer, is presented. These contributions not only advance theoretical understanding but also offer practical design ideas for sports organizations and developers seeking to enhance a team's social relationships through gamification.

5.1 Limitations

This preliminary evaluation of the proposed social gamification features for team sports has several limitations. First, the experiment was conducted with a small sample size, involving only a single female amateur soccer team. The limited number of participants may affect the generalizability of the findings, as the results might not be representative of other teams or sports contexts.

Second, it is unclear whether the observed increase in social identity can be solely attributed to the designed social gamification features. The experimental design did not isolate the effects of the gamification elements from the effects of regular team training and interactions. Consequently, the improvements in social identity might also be influenced by the natural bonding and cohesion that occur through regular training sessions and team activities. In addition, the measured effect may have been influenced by the Hawthorne effect, which means that participants' behavior may have been influenced simply because they were aware that they were participating in a study [19]. This awareness and resulting behavioral adoption may have contributed to the increased social identity, making it difficult to determine the specific impact of the intervention.

Third, I did not assess whether participants found the challenges appropriately challenging or too easy. Effective goal setting requires that goals be challenging yet attainable to motivate and engage participants [13]. However, we did not assess the perceived difficulty of the challenges. Given that only six team members were sufficient to complete most of the challenges, it is possible that the remaining participants found the tasks too easy or boring, resulting in lower engagement and contribution, potentially affecting the effectiveness of the evaluated gamification design.

To address these limitations, more extensive and controlled experiments are needed. Future studies should involve larger and more diverse samples. Additionally, experiments should be designed to better isolate the effects of the gamification features from other variables, possibly by including a control group, longer observation periods and controlling for influencing factors such as perceived goal difficulty. These steps will help validate the findings and provide a clearer understanding of the impact of social gamification on sports teams.

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A Questionnaire Items

Table 3: This table presents the questionnaire items used in this study. The German items used are accompanied by their English translations for international accessibility. Items marked with an 'R' were reverse scored prior to analysis.

Construct	Item	German	English translation	Source
Social identity	SI1	Ich identifiziere mich mit meiner Fußballmannschaft.	I identify with my soccer team.	Postmes et al. [22]
	SI2	Ich fühle mich in dem, was meine Fußballmannschaft betrifft, involviert.	I feel committed to my soccer team.	
	SI3	Ich bin froh, dass ich eine Spielerin in meiner Fußballmannschaft bin.	I am glad to be a player in my soccer team.	
	SI4	In meiner Mannschaft zu sein ist ein wichtiger Teil dessen, wie ich mich selbst sehe.	Being part of my soccer team is an important part of how I see myself.	
Goal commitment	C1	Es war schwer, die Teamziele ernst zu nehmen. (R)	It's hard to take the team goals seriously. (R)	Klein et al. [10]
	C2	Mir war es egal, ob wir die Teamziele erreichen oder nicht. (R)	Quite frankly, I didn't care if we achieved the team goals or not. (R)	
	C3	Ich fühlte mich stark dazu verpflichtet, bei dem Erreichen der Ziele beizutragen.	I was strongly committed to pursuing the goals.	
	C4	Es hätte nicht viel gebraucht, mich dazu zu bringen, keinen Beitrag zu den Teamzielen zu leisten. (R)	It wouldn't have taken much to make me abandon the team goals. (R)	
	C5	Ich glaubte, dass es sich lohnt, die Ziele zu erreichen.	I thought these are good goals to shoot for.	