A Playful Way to Promote Team Flow: Evaluation of a Positive Psychological Board Game for Team Building

Leonie Kloep[1,2] · Anna-Lena Helten[3] · Corinna Peifer[1]

Abstract

Modern work in team structures makes team building interventions increasingly important. A phenomenon known to have a positive effect on efficient teamwork, i.e. team performance and team satisfaction, is the experience of flow – on both individual level and team level. Approaches in positive psychology can contribute to efficient teamwork by fostering the existing potentials and resources of team members and thereby increasing individual flow and team flow at work. The present study introduces a newly developed intervention in the form of a board game based on a variety of positive psychological constructs demonstrably associated with individual flow and team flow. The aim of the game is to enhance the players' flow and team flow experiences at work. Twelve teams from different companies with a total of 65 participants played the game. The frequency of flow and team flow at work were assessed at three time points: before playing, two weeks after playing, and four weeks after playing, with 34 participants having completed the questionnaires at all three assessment points. We found a positive effect of the board game on team flow experience at work two weeks after playing. We assume that the game enhanced the team's feeling of togetherness and open communication thereby also enhancing team members' flow experiences.

Keywords Flow experience · Team flow experience · Board game · Team building

1 Introduction

People are sitting with excitement around a colorful board game. They roll the dice, move their game pawns and draw playing cards from the center of the table. The mood is relaxed, there is a lot of conversation and everyone is laughing. However,

---

Extended author information available on the last page of the article

the scene is not a party of friends playing games, but a team-building intervention at the workplace.

Since modern work is often organized in team structures, successful teamwork plays a crucial role in organizations. Teams are expected to use their potential to the maximum and achieve collaborative performance (Comelli, 2002). This makes team building interventions increasingly important: team building activities are among the most popular actions in human resource development (Salas et al., 1999; Saraswat & Shlipi, 2015).

A phenomenon shown to positively affect efficient teamwork, i.e. team performance and team satisfaction, is the experience of flow – on both individual level and on team level. Approaches in positive psychology can contribute to efficient teamwork by fostering the existing potentials and resources of team members and thereby increasing individual flow and team flow at work. The present study introduces a newly developed intervention in the form of a board game based on a variety of positive psychological constructs, which have been shown to be associated with individual flow and team flow. The concepts include, for example, character strengths, positive emotions, social support, and team communication. The aim of the game is to enhance the players' flow and team flow experience at work.

The effects of games in training and human resource development contexts have so far been studied primarily using online games and computer simulations (e.g. Allal-Chérif & Bajard, 2011; Allal-Chérif & Makhlouf, 2016; Pivec et al., 2003). In this study we evaluate the benefits of using a board game for team building that allows direct communication and interaction between the players. The board game therefore uses playful interventions. In addition to the effects of the game on flow and team flow experience, the present study also aims to investigate how employees perceive and evaluate a board game as a team building instrument.

1.1 Teamwork

Teamwork plays a crucial role in the workplace, where the performance of a wide variety of tasks often takes place in groups (Klein et al., 2009; Salas et al., 2008; 2015). This way of working has proven particularly beneficial, both for the organization and for the team members themselves (Klein et al., 2009). In this regard, teams are defined as groups formed with the common goal of accomplishing a specific task sharing responsibility to the organization for the outcome of their work and therefore integrating, structuring, and sharing information in order to cooperate (Salas et al., 2008; Sundstrom et al., 1990). Working together, a team shares unique group dynamics, norms, culture, and communication structures (Salas et al., 1992). As problems within the team are among the most frequently cited reasons for dismissals (Alter, 2019), teams should be developed and strengthened systematically.

1.2 Team building

Since designating several people as a team and working on a common task does not necessarily make a team successful, evidence-based team development interventions should be pursued in order to derive optimal benefit from teamwork and its advan-

tages (Comelli, 2002; Lacerenza et al., 2018). The term 'team building' describes all activities used to maintain and improve the performance of a team and the achievement of team goals or to increase interpersonal relations and satisfaction when working together (Comelli, 2002; Shuffler et al., 2011). Team building interventions can hence be applied to different purposes, e.g., to improve trust, resolve conflicts, or clarify roles within the team (Shuffler et al., 2011). Mediated through different processes, team building constitutes a key determinant of team performance and influences several team-related outcomes. In a meta-analysis, team building was found to have an effect especially on the goal setting and role clarification processes within a team (Klein et al., 2009). While team building is occasionally understood as simply spending time together as a team, psychological team building interventions, in order to be effective, should be designed in an evidence-based way (Lacerenza et al., 2018). However, this does not mean that a team building intervention cannot be fun and/or be designed in the form of a board game.

1.3 Games as team building interventions

There are many different forms of games, which, however, usually have some key features in common. These include that playing a game is a voluntary activity, but at the same time, rules must be followed. Gameplay takes place in a confined setting, provides a break from daily life, and can serve as a means of recreation while fully absorbing the players (Huizinga, 1956). The outcome of a game is variable and influenced by the players' actions that elicit individual reactions (Gobet et al., 2004; Juul, 2003). Furthermore, a game can include competition or be based on cooperation or luck (Gobet et al., 2004). After all, a game is meant to be entertaining for the players (Pivec, 2007).

Serious games, also referred to as educational or instructional games, are a type of game that goes beyond these definitions. The key component that distinguishes them from other games is the combination of learning content with the typical attributes of a game. Thus, serious games are more than mere entertainment and are characterized by a specific learning process and a goal that resides not only within the game but also requires a transfer to the everyday life or work situation outside the game context (Allal-Chérif & Makhlouf, 2016; Hoblitz, 2015). Players report that in serious games concentrating is not perceived to be effortful and there is reportedly a great learning outcome due to a facilitation of the learning process (Pivec, 2007; Pivec et al., 2003; Ricci et al., 1996). As flow experience has been associated with *effortless attention* (Bruya, 2010), serious games are interventions that *per se* create suitable conditions for experiencing a flow while playing (Hoblitz, 2015). Furthermore, serious games promote trying out new behaviors and the formation of role structures within the playing group as well as the reflection of conflicts and the expression of emotions in a delimited context (Pivec, 2007). Players engage creatively, work on realistic problems, try out roles, make decisions, and get immediate feedback from the game itself and from the other players. Stimulated by the game, players interact both during and after playing (Henriksen & Børgesen, 2016).

As a human resource development tool, serious games are used for various purposes by many organizations in a wide range of industries (Allal-Chérif & Makhlouf,

2016). In team building, games are employed especially in interdisciplinary areas, where critical thinking skills, communication, discussion, and decision-making within a group are of great importance (Pivec et al., 2003). In the course of digitization, serious games for team building consist in many cases of virtual realities and computer simulations (e.g., Allal-Chérif & Makhlouf, 2016; Ellis et al., 2008; Pivec, 2007; Pivec et al., 2003). Following an approach, that combines virtual gaming and board games, a recent study by Maresch and Kampman (2022) was able to demonstrate the effects of an online board game with a great variety of positive-psychological tasks for the players. Playing the game for example lead to feelings of self-efficacy and increased resources for resilience. However, conventional board games, too, have various characteristics that can be beneficial for team building. For example, playing a board game can result in increased communication within the team and more collaborative behavior among team members (Berland & Lee, 2011; Zagal et al., 2006). Also, a face-to-face context is more likely to promote trust among team members (Purvanova, 2014). Therefore, in the present study, the effect of a board game on teamwork experiences, namely individual and team flow experience, is examined.

1.4 The broaden-and-build theory of positive emotions

While negative emotions concentrate attention and cause a narrowing of focus and ways of thinking, positive emotions lead to a broadening of focus. The broaden-and-build theory described by Fredrickson (2001) depicts this as an upward spiral of positive emotions that amplify and result in positive effects. The theory postulates the broadening of attention and thinking as well as social skills through positive emotions. Thus, experiencing positive emotions promotes an expansion of cognitive functions as well as behavioral repertoires (Fredrickson, 2013). Positive emotions can have a positive effect on the long-term building of individual resources at the cognitive, physical, and social levels (Fredrickson, 2001). In addition, they can provide a basis for social relationships and can lead to an increased sense of trust (Dunn & Schweitzer, 2005; Fredrickson, 2013). Especially in teamwork and team development, the broaden-and-build theory can therefore play a decisive role. Experiencing positive emotions in the team can moreover lead to an upward spiral of positive effects at the team level (Vacharkulksemsuk & Fredrickson, 2013). In addition, Fredrickson claims that play is closely related to experiencing positive emotions. Thus, it could be assumed that positive interaction in the team could evoke positive emotions, which in turn benefit changes in team-related outcomes.

1.5 Flow and team flow experience

Flow experience is defined as a state of complete absorption and self-forgetting when performing a task if perceived to be optimally demanding (Csikszentmihalyi, 1975; Nakamura & Csikszentmihalyi, 2014). Csikszentmihalyi (1975) describes the flow experience as a state of a perceived merging of an individual with their activity, feeling an optimal control of the process without much effort. The entire attention is focused on the task and the thoughts do not wander. At the same time, the process-

ing of the task is described as fluid and smooth, with one step effortlessly following another. In addition, the perception of time is accelerated and the activity performed has an intrinsically rewarding effect during flow experience (Csikszentmihalyi, 1975; Nakamura & Csikszentmihalyi, 2014). Flow is associated with positive outcomes, for example, with a person's well-being (Csikszentmihalyi & LeFevre, 1989; Fullagar & Kelloway, 2009) and improved performance (Christandl et al., 2018; Engeser & Rheinberg, 2008). Moreover, flow was found to have other positive consequences, which in turn can improve performance measures (Peifer & Wolters, 2021), such as commitment (Smith et al., 2012) and greater engagement (Plester & Hutchison, 2016).

Besides the flow experienced individually when performing certain tasks alone, flow can occur in social situations, then called social flow, collective flow, or team flow (Walker, 2021). Team flow is defined as a shared positive experience, in which team members simultaneously experience flow while working on interdependent tasks and thus on achieving common team goals (van den Hout et al., 2016; 2018). In team flow, the team experiences itself as a unit and perceives a shared control over the processes and the achievement of the common goals (van den Hout et al., 2018). Similar to individual flow, team flow is associated with desirable consequences, such as a better mood (Zumeta et al., 2016), and can also foster collective efficacy beliefs (Salanova et al., 2014). Furthermore, a positive relationship between team flow and team performance has been reported (Aubé et al., 2014; Keith et al., 2014).

1.5.1 Factors promoting flow and team flow

Research has identified many factors showing the beneficial effect on flow and team flow at work (for an overview see Peifer & Wolters, 2021). These results inspired the development of the board game of the present study, and have been incorporated in the form of tasks. In the following, we describe the factors conducive to flow and team flow which have been incorporated, grouped into the three spheres of flow-promoting factors as suggested by Peifer and Wolters (2021), i.e. the individual, social, and task-related sphere.

In the individual sphere, a positive relationship between the use of character strengths - a key element of the game intervention in the present study - and flow experience at work was found in a longitudinal study with school employees (Ignjatovic et al., 2021). In line with this, the strength *love of learning* was shown to predict students' flow in learning tasks (Wagner et al., 2020). Also in the individual sphere, psychological capital (PsyCap), consisting of hope, optimism, resilience, and self-efficacy, was found to be positively related to flow at work (Zubair & Kamal, 2015a, b). In addition, the components of PsyCap can have a positive effect on flow: Self-efficacy was found to facilitate flow at work, which in turn promoted self-efficacy, leading to a positive upward spiral (Salanova et al., 2006). A similar reciprocal relationship was observed between a person's optimism and flow experience (Beard & Hoy, 2010). Mindfulness was also found to enhance flow: As Kuo and Ho (2010) showed, employees who practice meditation as a mindfulness exercise experience higher levels of flow at work. Moreover, the physiological patterns observable in mindfulness meditation suggest a positive relationship with flow experience (Krygier

et al., 2013; Peifer & Tan, 2021). Further factors in the individual sphere are well-being and positive emotions. For example, a positive relationship between well-being and shared flow has been reported (Zumeta et al., 2016) and students' positive emotions while playing a virtual game have been found to be positively related to their flow experience (Kiili et al., 2018).

In the social sphere, social support among team members has been defined as a prerequisite for team flow (van den Hout et al., 2016). In addition, social support promotes the perception of a balance between the demands of a task and the personal resources to accomplish it, which in turn enhances the experience of flow (Bakker, 2005). An upward spiral may also occur in this process with social support promoting flow and flow in turn exerting a positive influence on organizational factors like social support (Salanova et al., 2006). Furthermore, a shared goal and the team members' commitment are also described as prerequisites for team flow, likewise increased trust among team members, open communication, and cohesion (van den Hout et al., 2018). A positive relationship between the information exchange within a team and the team members' flow experience has been observed (Aubé et al., 2014). Moreover, Zumeta et al. (2016) found a positive relationship between the cohesion, i.e. identity fusion and social integration in a group, and a shared flow experience of the participants.

In the task sphere, our board game is designed to promote factors that can enhance flow and team flow. First of all, games in general are likely to provide optimal conditions for experiencing flow (Csikszentmihalyi, 1975). According to Garris et al. (2002), a suitable combination of game characteristics and content to be learned can lead to a motivating cycle in which the game participants can experience flow. The occurrence of flow in gameplay has already been empirically confirmed (e.g. Hoblitz, 2015; Khan & Pearce, 2015). In addition, having fun with colleagues at work is positively related to flow. While playing the newly developed board game the team members are likely to have fun together, which can support a positive organizational and team culture and have a positive effect on future teamwork experiences (Plester & Hutchison, 2016).

In order to create a team-building activity that benefits flow and team flow, the game was designed with a focus on the variables that have a positive relationship with flow and team flow. The aspects explained above were integrated into the content of the game in the form of activities on the playing cards aiming at establishing conversations about relevant topics within the team and training strengths and skills that foster flow. This means that various promoting factors such as character strengths, PsyCap, mindfulness, positive emotions, social support, team communication and cohesion have been incorporated into the game, by translating them into game-tasks. The participants were intended to reflect on their use of their personal strengths and teamwork and were to become aware of their individual and team-related flow experiences. We suppose that engaging with character strengths during the game could increase the players' awareness of their own strengths and the use of these at work. Therefore, we propose the following hypotheses:

Hypothesis 1) *Playing the positive psychological board game within the team increases the frequency of flow experiences at work (a) two weeks after playing / (b) four weeks after playing.*

Hypothesis 2) *Playing the positive psychological board game within the team increases the team flow at work (a) two weeks after playing / (b) four weeks after playing.*

2 Method

2.1 Participants and design

The present study was conducted between October 2019 and February 2020 with 65 participants in 12 teams from various German companies in different industries, namely advertising, food industry, sanitary and heating, insurance, editorial, and chemical industry, which worked together in this team in their everyday work. The participating teams ranged from four to seven team members, and the average team size was 5.4 members. The teams were recruited via social media (LinkedIn) and played the game as a team building activity during their working hours. Data were collected by means of online questionnaires. Participation was voluntary, i.e. not all members of a team needed to take part if they did not want to, and anonymous for all team members and was not rewarded. The teams were free to play with or without their team leader, whichever way they felt was best suited to their individual team structure. If team leaders or supervisors participated in playing, they were a regular part of the game and study, assuming no special role within the game context or research process. The first questionnaire was sent to the participants one week before the intervention date (T1). Further questionnaires were conducted two (T2) and four weeks (T3) after playing the game in order to assess the long-term effects of playing on the frequency of flow and team flow at work. Of the 65 participants, 59 completed the T1 questionnaire, 46 completed the T2 questionnaire, and 38 participants completed the T3 questionnaire. A total of 34 participants completed the questionnaires at all assessment points.

The demographic data of the sample, collected in the first online questionnaire, are as follows: On T1 ages ranged between 20 and 61 years with a mean age of M=39.44 (SD=11.42) years (T3: M=41,73, SD=10,55). There were 29 female and 30 male participants at assessment point T1 (T3: 25 female, 13 male). Most participants (N=18 at T1, N=10 at T3) reported having a master's degree or diploma as their highest educational qualification. The second most common qualification reported (N=13 at T1, N=10 at T3) was vocational training. Membership in the current team averaged 3.9 years and ranged from two weeks to 20 years. Eighteen (T1) participants reported holding leadership positions (T3: 10).

The game intervention itself started with a character strengths test, which was evaluated by the participants themselves.[1] Using these results, participants next started to play the board game for 90 min. It was played independently by the participants with the help of an accompanying manual. However, one of the authors was present during the intervention to explain the procedure and to answer questions in case of uncertainties. Immediately after playing, a paper-pencil questionnaire was completed to assess flow and team flow during gameplay and the evaluation of the game in general.

2.2 The positive psychological board game

As a serious game, the board game of the present study is characterized by learning objectives at the cognitive, affective, and behavioral level (Garris et al., 2002). On a cognitive level, participants gain knowledge about positive psychological concepts that are reflected individually and discussed together as a team. In addition, the key element of the game is the interaction among the team members, going beyond topics related to the daily work context, e.g. learning about the character strengths of the other team members as well as about their own character strengths, which can encourage future conversations and using each other's strengths. On a behavioral level, skills are honed, such as mindfulness or team communication skills. On the affective level, players discuss their personal experiences and attitudes. In this way, the game encourages an interpersonal exchange intended to strengthen the team members' trust in each other and consolidate their relationships. The game focuses on open communication within the team and encourages discussion on and mutual understanding of attitudes, norms and values.

The material of the game consists of the colorfully designed game board (Fig. 1), a scoreboard, colored game pawns, a dice, 75 playing cards with questions and activities, and per player 24 strength cards. All players received strength cards to place openly on the table, labeled with their personal character strengths (as assessed during the a-priori test), and a joker. In addition, personal memo cards on which a player's own character strengths as well as important learning and ideas can be noted during the game are handed out and can be retained after playing, which contributes to further team development in the long term.

The game includes three categories of game cards: reflection, discussion, and action cards that determine the course of the game (Table 1). When a player is invited to draw a game card by entering a corresponding field on the game board, the activity explained on the card is processed by the player or the entire team. Reflection cards encourage participants to reflect on a particular issue on their own and share their thoughts and experiences with the team. Discussion cards provide an open question or controversial statement for a discussion, which is carried out together. Action cards call for an active performance of an activity. Examples of game cards are shown in

---

[1] Character strengths were assessed with the Character Strengths Rating Form (CSRF). Each item on the scale describes in detail one of the 24 character strengths and records the self-assessment of how well the strengths apply on a 9-point Likert scale from "completely unfitting" to "completely fitting" (Ruch et al., 2014).
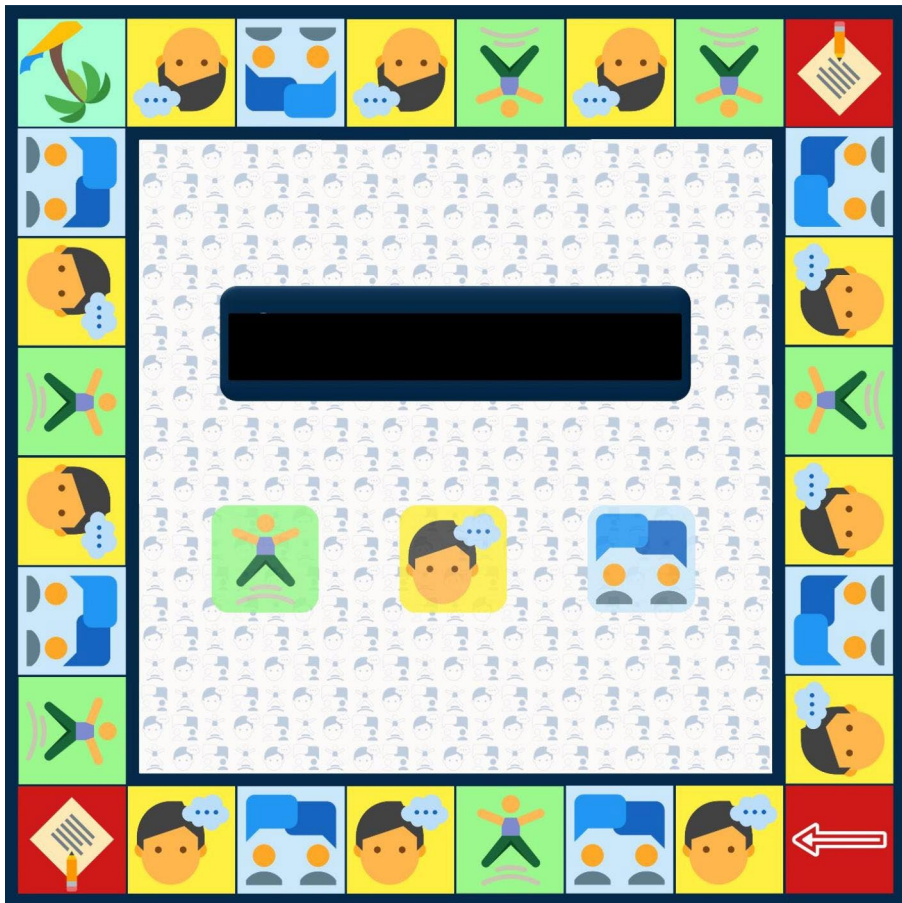
Fig. 1 The game board

Fig. 2. The strength cards with the individual's most important character strengths are visible to all players during the game and can thus be a help and reference point when addressing the tasks of the playing cards during gameplay. The joker cards can be used at any moment by the players and provide an opportunity to not answer a question or perform an activity of a game card if not desired and to continue with another card instead.

2.3 Measures

Online questionnaires were used to assess different individual and team-related aspects. In the present study, we focus on the participants' flow and team flow experiences.

The *frequency of individual flow experiences at work* was assessed with a scale developed by Bartzik and Peifer (in preparation). The scale uses eleven items on a 6-point rating scale from "never" to "most of the time" to assess the frequency of

Table 1 Examples of tasks on the game cards

Positive psychological / team-related constructs	Task examples of reflection, discussion, and action cards in the board game
Character strengths	Reflection: What strength(s) do you already intentionally use at work and what strength would you like to use more?
PsyCap	Reflection: When was the last time you thought about giving up on something and how did you manage not to?
Mindfulness	Action: Take a minute for a small mindfulness exercise. Close your eyes and try to note all the sensations of your body (relaxation/ tension, warmth/ cold, discomfort/ well-being, etc.).
Positive emotions	Action: Be curious. Ask a team member in the room what the highlight of today was so far for him or her.
Social support	Reflection: Think about the last time you helped someone else. How did it make you feel?
Team communication	Reflection: Sometimes things don't work. In which areas are you currently having difficulties and how can your team help you?
Cohesion	Discussion: What roles do the different members of your team fulfill? And how does that help in your daily work?

Reflection

What are you passionate about at the moment?

2 points

Discussion

What makes a really good team for you? How can you become such a team?

Each team member who participates receives 1 point

Action

Shared laugher is healthy and good for team climate. Try to make your team laugh.

1 laugher = 1 point, up to 3 points

Fig. 2 Reflection card on positive emotions, discussion card on cohesion, action card on the character strength humor

flow experiences at work in the past two weeks. Along with the instruction "How often in the last two weeks at work have you experienced that…" a sample item is "… you were completely absorbed in an activity". All items are presented in Table A1, Appendix A. In the present study, Cronbach's alpha was $\alpha=0.911$ at T1, $\alpha=0.891$ at T2, and $\alpha=0.932$ at T3.

Moreover, participants' *individual flow experiences while playing* were assessed using the Flow Short Scale (Rheinberg et al., 2003) with a total of ten items on a 7-point rating scale ranging from "strongly disagree" to "strongly agree,". A sample item is "I am completely absorbed in what I am doing". In the present study, a reliability of $\alpha=0.868$ resulted.

Team flow at work was assessed with an adapted version of the Flow Short Scale (Rheinberg et al., 2003), using seven items on a 7-point rating scale ranging from "strongly disagree" to "strongly agree". A sample item is "When working as a team, we feel optimally challenged". All items are shown in Table A2, Appendix A. A reliability of $\alpha=0.889$ at T1, $\alpha=0.936$ at T2 and $\alpha=0.942$ at T3 resulted.

The *team flow experience during gameplay* was assessed using the scale presented above, based on the Flow Short Scale (Rheinberg et al., 2003). The only difference was the instruction in which participants were asked to think back to the playing session when answering the items. Again, responses were made on a 7-point rating scale ranging from "strongly disagree" to "strongly agree." There was a reliability of $\alpha=0.894$ on the team flow scale was seen after playing the game.

To assess the participants' evaluation of the game on different outcome and design dimensions, we used ten items from the Training Evaluation Inventory - one or two items per subscale respectively. The outcome dimensions (6 items) covered subjective enjoyment, perceived usefulness of the game, difficulty, knowledge gain, and attitude towards the game, and the design dimensions (4 items) problem-based learning, activation, application, and integration (Ritzmann et al., 2014). Data were collected immediately after playing the game on a 5-point rating scale ranging from "strongly disagree" to "strongly agree". A sample item is "investing time in this game was useful". Since it is a short version of a longer questionnaire, no Cronbach's alpha is reported for the subscales, from which too few items were taken to make calculation feasible. The reliability of the 10-item questionnaire was $\alpha=0.861$. For the outcome dimensions taken together (items 1–6) a reliability of $\alpha=0.850$ resulted, while the design dimensions (items 7–10) showed a reliability of $\alpha=0.676$.

2.4 Data analysis

For the statistical analyses, IBM SPSS Statistics 27 was used. The required sample size was calculated a priori with G*Power. To reveal an existing medium effect of $f=0.25$ for Hypotheses 1 and 2, a sample size of $n=28$ was required for repeated measures ANOVAs, assuming $\alpha=0.05$ and $1-\beta=0.8$. The assumptions for the application of ANOVA, i.e. normal distribution and sphericity were examined and confirmed. There were two outliers in the data on differences in team flow, but these were not excluded from the analysis as they did not affect the results. Data is provided in a repository, the link can be found in Appendix B.

3 Results

3.1 Flow and team flow during gameplay

Means, standard deviations, and correlations of the questionnaires assessed immediately after playing are presented in Table 2. Significant positive correlations between the participants' evaluation of the game and the flow and team flow scales were found. Intercorrelations of flow, team flow, and all dimensions of the evaluation of the game are shown in Table C1, Appendix C.

Table 2 Means, standard deviations, and intercorrelations for all variables assessed directly after playing

	M	SD	(1)	(2)	(3)	(4)
(1) Flow	5.01	0.97	1			
(2) Team flow	5.26	1.07	0.64**	1		
(3) Participants' evaluation of the game: outcome	3.77	0.65	0.63**	0.48**	1	
(4) Participants' evaluation of the game: design	3.28	0.69	0.66**	0.46**	0.66**	1

Note: *p<.05 (two-tailed); **p<.01 (two-tailed). Flow and team flow experience were rated on a 7-point rating scale (*N* = 65). The participants' evaluation of the game was rated on a 5-point rating scale (*N* = 64).

Table 3 Means and standard deviations of the participants' evaluation of the game

Note: The participants' evaluation of the game was rated on a 5-point rating scale with 1 = "strongly disagree" and 5 = "strongly agree"; high values for the subscale *perceived difficulty* indicate that the difficulty was rated as low.

Subscale of the participants' evaluation of the game		N	M	SD
Outcome	Subjective enjoyment	64	4.20	0.74
	Perceived usefulness	64	3.48	0.80
	Perceived difficulty	63	4.63	0.60
	Subjective knowledge gain	64	3.47	1.02
	Attitude towards training	63	3.37	0.92
Design	Problem-based learning	64	2.56	0.81
	Activation	64	3.98	0.88
	Application	64	3.36	1.21
	Integration	64	3.20	0.91

3.2 Participants' evaluation of the game

To evaluate the outcome and the design of the game, the participants' subjective enjoyment, the perceived usefulness of the game, its difficulty, knowledge gain, attitude towards the game, problem-based learning, activation, application, and integration were assessed. The results showed that except for problem-based learning all dimensions were rated higher than the mean value of the scale. For example, perceived difficulty of playing the game was rated low (*M*=4.63, *SD*=0.60; high values indicate low difficulty) and subjective enjoyment (*M*=4.20 *SD*=0.74) and activation were rated high (*M*=3.98 *SD*=0.88). Means and standard deviations of all scales are presented in Table 3.

3.3 Effects of the game on the frequency of flow and team flow at work

Table 4 shows means and standard deviations of the participants' flow and team flow experiences assessed by online questionnaires one week before (T1) and two (T2) and four weeks after (T3) playing.

The participants' flow and team flow before and after playing were compared using repeated-measures ANOVAs. Contrary to our hypothesis, there was no effect of playing the game on individual flow experience, $F(2, 66)=0.559$, $p=.574$, $\eta^2=0.017$. However, the game significantly affected team flow, $F(2, 66)=4.151$, $p=.020$, $\eta^2 = 0.112$. Post-hoc comparisons with Bonferroni correction showed that the effect consisted of a significant increase from the first to the second assessment point ($p=.023$),

Table 4 Means and standard deviations of the variables flow and team flow experience at T1, T2, and T3

	T1		T2		T3	
	M	SD	M	SD	M	SD
Flow	4.01	0.91	3.96	0.80	3.99	0.92
Team flow	4.92	1.03	5.22	1.04	5.08	1.12

Note: N = 59 at T1, N = 46 at T2, N = 38 at T3. Flow was rated on a 6-point rating scale, team flow on a 7-point rating scale.

Fig. 3 Changes in the means on the team flow scale, error bars represent standard errors (N=34)
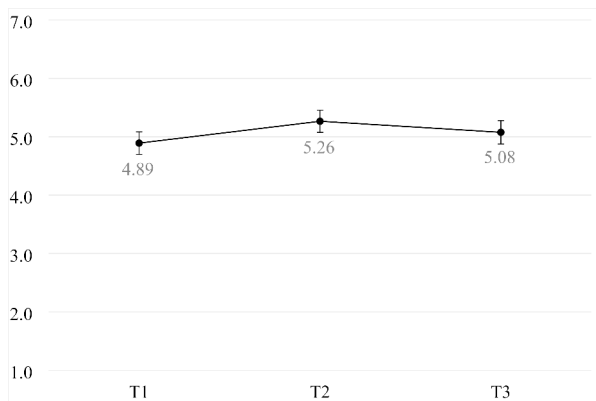
thereby supporting Hypothesis 2a (Fig. 3). This result is in line with our assumption that participants' team flow experience at work increases as an effect of playing the positive psychological board game. However, this effect was only found for T2 (i.e. 2 weeks after playing the game), but not for T3, (i.e. 4 weeks after playing the game), where the difference to T1 was no longer significant ($p=.342$).

Additionally, we tested whether the evaluation of the game had an effect on the change in flow and team flow. For this purpose, regression analyses were conducted in which flow and team flow after the game (T2) were taken as the dependent variable and flow / team flow at T1 as the independent variable. The evaluation of the game served as a moderator.

In none of the computed models was the moderation significant (β = -0.521, $p=.556$ for the interaction of flow and game evaluation and $\beta=0.290$, $p=.746$ for the interaction of team flow and game evaluation).

4 Discussion

In this study we investigated the effects of a positive psychological board game on flow and team flow experience. Contrary to our Hypothesis 1, participants' individual flow experiences at work did not significantly increase in the weeks after playing the game. The various positive psychological constructs honed during the game have in the past been shown to have a positive effect on flow experience, hence we had expected to find an increase in flow. However, flow experience is influenced by a variety of other factors present in the work context (Peifer & Wolters, 2017), which

may have masked the effect. Further, it is possible that playing the game affects flow but only in terms of a small effect size that could not be revealed in the present study. For example, to detect a small effect of $f = 0.1$, a sample size of $N = 163$ will be needed in future studies.

Regarding the effect of the game on team flow, an increase in team flow from the first assessment point, before playing, to the second assessment point, two weeks after playing, was shown. At the third assessment point, four weeks after playing, there was no significant difference compared to before playing. This result can support Hypothesis 2 at least partially. A potential explanation for the increased team flow between T1 and T2 could be that playing positive psychological game strengthened team-related factors such as a feeling of togetherness and social integration, which have been found to be positively related to shared flow experiences (Zumeta et al., 2016). In addition, the open communication stimulated in the game may have increased team flow (Aubé et al., 2014; van den Hout et al., 2018). However, at T3 the increase compared to T1 was only present on a descriptive level, but no longer significant. Over a longer time period other factors at work may have become active and masked the effect of a one-time 90-minute playing session. Furthermore, the effect of the game may have diminished over time, which means that a larger sample size will be needed to detect it in future studies. Another way to reveal its possible effects is to play the game several times as part of a team development process, which could enhance the intensity and sustainability of its effects on flow and team flow.

The players' flow and team flow observed on a descriptive level during gameplay corroborate the description of games as optimal conditions for experiencing flow (Csikszentmihalyi, 1975). Games are characterized by taking place in a space separate from everyday life, which has its own boundaries and clear, voluntarily adopted rules (Huizinga, 1956). Thus, they provide a flow-conducive context (Hoblitz, 2015). The high values of flow and team flow the participants reported immediately after playing are in line with the results of Khan and Pearce (2015), who also found that flow experience is typical when playing board games.

Many dimensions of the subjective evaluation of the game were rated high, suggesting that the participants liked the game and enjoyed playing it as a team. This can also help explain the reported flow and team flow while playing, which show positive correlations with various aspects of the evaluation of the game. As the high values of knowledge gain in the evaluation of the game suggest, the board game offers an opportunity to learn new things. This may be accompanied by a flow experience which can, in turn, lead to increased satisfaction with the learning content (Shin, 2006). Also, the difficulty of the game was evaluated as easy and its usefulness was rated as high, thus going in line with the findings of Culbertson et al. (2015) that the interest and comprehension of the material to be learned are positively related to an increased flow experience. The participants' perceived enjoyment while playing the positive psychological game was high, showing that they had fun playing it. Fun can also function as a predictor of flow experience (Plester & Hutchison, 2016). Likewise, the perceived usefulness of the game was rated as high. This is in contrast to the assumption of Allal-Cherif and Bajard (2011), who describe games as entertainment elements rarely considered to be serious or useful instruments in organizations.

4.1 Implications for practice

The present study provides support for our hypothesis that a positive psychological board game could be a beneficial intervention for team building, as the effect on team flow after two weeks suggests. The absence of effects after four weeks may be due to the small sample size or because the game intervention was only applied once. Team building frequently involves the repeated use of interventions over extended periods of time. Hence, playing the game multiple times may achieve a more intense engagement with the issues addressed and this should be examined in future applications. In this case, the frequency with which teams play the board game as well as the situation in which team members meet to play can also be coordinated with the individual needs of a given team.

Moreover, the game developed in the present study could be used for different purposes depending on the team. For example, it is suitable for newly formed teams to get to know each other in a fun way, while for teams that have been working together for a long time it could help clarify team roles and intensify relationships. To adapt the game to the needs and goals of an individual team the composition of the playing cards can be modified. It is possible to specifically include only the playing cards deemed appropriate and to exclude those whose topics are not relevant for a certain team.

Furthermore, we suggest that the game is not used as a stand-alone intervention, but rather embedded in a team building process. Part of this process can also be transfer-enhancing actions to help intensify the effects of the game, such as follow-up meetings, for example, in which the team reflects on the findings and ideas resulting from the game. Some elements of the game, such as the personal memo cards which participants retain after playing, served specifically to transfer what was learnt from the game to the work context. However, there was a lack of other actions for increased transfer assurance during and after the game. Garris et al. (2002) also report that games alone may not be sufficient for learning. Instead, they contain elements that help to enhance a learning process stimulated while playing. This suggests an increased impact of the board game when embedded in a team building process with further transfer activities to facilitate learning.

As part of a team building process, the teams' individual needs concerning the interventions should be met (Shuffler et al., 2011). The positive psychological game may therefore have affected the teams differently depending on their needs and expectations. At all times during gameplay, participants had the flexibility to decide for themselves the depth at which they worked on the tasks and what they revealed about themselves. They thus dealt with the topics addressed in the game with varying intensity and, depending on the level of trust and openness in the team concerned, exchange took place at different levels. This may have influenced the effects of the game in the different teams. In order to benefit even more from the game in the future, it could be helpful to ascertain a team's expectations and to conduct a more detailed introduction before commencing play.

These assumptions should be considered in greater detail in future research and when applying the positive psychological board game of the present study as a team-building intervention in organizations.

4.2 Strengths and limitations

Our board game is, to the best of our knowledge, the first board game to specifically address flow and team flow at work. Thus, it represents a new form of team intervention that utilizes the positive effects that flow and team flow experiences can provide. The results of the present study, conducted as a field study with different work teams, serve as preliminary evidence that team flow can be increased through a team building intervention in the form of a board game.

However, the sample size was small and there was no control group against which to compare the results and control for confounding variables. While we found effects on team flow at T2, the impact of a single intervention of 90 min may have been too weak to show the expected effect also at T3 and also for individual flow. Furthermore, despite the nested data structure, we decided not to apply multi-level modeling due to the small sample size since according to Maas & Hox (2005) this might bias the possible results. However, the structure of the data provides the possibility of multi-level modeling, which could be applied in the future. Accordingly, future research with the board game should use larger sample sizes and implement a more intense intervention, e.g. using repeated sessions of gameplay embedded in a team building process, into which further transfer activities could also be incorporated.

In future studies, individual playfulness should also be taken in to account and assessed, as it may differ between individuals (Proyer, 2017). The way in which one may engage with the game situation and experience it as entertaining and interesting could have an impact on the effects of the game.

With regard to the assessment of flow and team flow, it should be noted that they show a large overlap as indicated by the high correlation of the two. It is possible that participants were not aware of the difference between the states or that they confused them in their subjective retrospective evaluation.

5 Conclusions

Games are often seen as fun activities and simply spending time together is perceived to constitute team building. However, team building interventions should be evidence-based in order to have a measurable effect (Lacerenza et al., 2018). The team building board game tested combines both aspects and can support the assumption that fun and usefulness in a team building intervention can indeed run together. The game presents itself as an intervention requiring only modest resources and applicable flexibly for different purposes. As such, it might offer potential as a team building instrument that could enhance team flow as a part of a team building process.

Appendix A: Items assessing the frequency of flow and team flow

Table A1 Original (German) and translated items of the frequency of individual flow experience at work scale (Bartzik & Peifer, in preparation)

Im Folgenden finden Sie eine Reihe von Fragen zu Ihrem täglichen Erleben bei der Arbeit.	Below are a series of questions about your daily experience at work.
Bitte geben Sie an, wie häufig oder selten Sie das jeweilige Erleben in den letzten zwei Wochen hatten.	Please indicate how often or rarely you had each experience in the last two weeks.
Wie häufig erlebten Sie es in den letzten zwei Wochen, …	How often in the last two weeks at work have you experienced that…
(1) … klare Ziele vor Augen zu haben.	(1) … you had clear goals in mind.
(2) … das richtige Maß an Feedback zu erhalten.	(2) … you received the right amount of feedback.
(3) … optimal gefordert zu sein.	(3) … you were optimally challenged.
(4) … vollständig konzentriert zu sein.	(4) … you were completely concentrated.
(5) … dass eine Tätigkeit flüssig und glatt verläuft.	(5) … an activity went smoothly and fluently.
(6) … dass ein Schritt ganz automatisch den nächsten ergibt.	(6) … one step automatically resulted in the next.
(7) … dass Sie alles unter Kontrolle haben.	(7) … you had everything under control.
(8) … dass Sie überrascht sind, wie schnell die Zeit vergangen ist.	(8) … you were surprised at how quickly time had passed.
(9) … dass Sie ganz in einer Tätigkeit aufgehen.	(9) … you were completely absorbed in an activity.
(10) … dass Sie mit einer Tätigkeit „eins" werden.	(10) … you became "one" with an activity.
(11) … dass Sie mit einer Tätigkeit "verschmelzen".	(11) … you merged with an activity.

Table A2 Original (German) and translated items of the team flow scale

Im Folgenden sehen Sie eine Reihe von Aussagen. Das Wichtigste ist Ihre eigene Meinung. Daher gibt es keine "richtigen" oder "falschen" Antworten. Beantworten Sie die Fragen so, wie sie am besten Ihrer Einschätzung entsprechen. Denken Sie bei Beantwortung an die Arbeit in Ihrem Team.	Below you will see a number of statements. The most important thing is your own opinion. Therefore, there are no "right" or "wrong" answers. Answer the questions in the way that best fits your opinion. When answering, think about the work in your team.
(1) Durch die Arbeit im Team fühlen wir uns optimal gefordert.	(1) When working as a team, we feel optimally challenged.
(2) Die Zusammenarbeit im Team verläuft flüssig und glatt.	(2) The teamwork is fluent and smooth.
(3) Das Team hat keine Mühe sich auf die Aufgabe zu konzentrieren.	(3) The team has no difficulty focusing on the task at hand.
(4) Das Team ist ganz vertieft bei der Erledigung der Aufgabe.	(4) The team is completely absorbed in completing the task.
(5) Die richtigen Handlungen, in der Zusammenarbeit mit dem Team, kommen wie von selbst.	(5) The right actions, when working with the team, come naturally.
(6) Jeder im Team weiß jederzeit was zu tun ist.	(6) Every member of the team knows what to do at any time.
(7) Das Team hat das Gefühl, die Zusammenarbeit unter Kontrolle zu haben.	(7) The team feels in control of the process of working together.

Appendix B: Link to data repository

https://osf.io/e4vkx/?view_only=4b8d6e9fb2fe497096bec9f281713108

Appendix C: Intercorrelations of all variables assessed directly after playing the game

Table C1 Intercorrelations of flow, team flow, and all dimensions of the participants' evaluation of the game

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Flow	1										
(2) Team flow	0.64**	1									
(3) Subj. enjoyment	0.34**	0.15	1								
(4) Perceived usefulness	0.51**	0.32**	0.52**	1							
(5) Perceived difficulty	0.34**	0.34**	0.16	0.39	1						
(6) Subj. knowledge gain	0.58**	0.59**	0.38**	0.60**	0.40**	1					
(7) Attitude towards training	0.59**	0.39**	0.38**	0.69**	0.41**	0.65**	1				
(8) Problem-based learning	0.38**	0.36**	0.28*	0.51**	0.07	0.52**	0.47**	1			
(9) Activation	0.47**	0.48**	0.10	0.36**	0.07	0.54**	0.43**	0.48**	1		
(10) Application	0.52**	0.26*	0.11	0.35**	0.23	0.37**	0.43**	0.23	0.35**	1	
(11) Integration	0.52**	0.24	0.22	0.52**	0.24	0.49**	0.52**	0.40**	0.30*	0.41**	1

Note: *p<.05 (two-tailed); **p<.01 (two-tailed). Flow and team flow experience were rated on a 7-point rating scale ($N = 65$). The participants' evaluation of the game was rated on a 5-point rating scale ($N = 62$).

Code Availability The codes for analyzing the data are available: https://osf.io/e4vkx/?view_only=4b8d6 e9fb2fe497096bec9f281713108

Consent to Participate

Conflicts of interest/Competing Interests The paper deals with a first version of the game, which has since undergone a complete redesign by the authors LK and ALH under the brand name Characteam as part of a six-month start-up sponsorship. However, by the time of the submission, no start-up had been founded and the game is not available as a product on the market. The authors declare that there are no further conflicts of interest.

Ethics Approval All procedures in the study were performed in accordance with the ethical standards of the German Psychological Society.

Informed Consent was obtained from all participants.

References

Allal-Chérif, O., & Bajard, A. (2011). Serious Games as a Basis for Human Resource Management: Examples from the Banking Sector. *MCIS 2011 Proceedings.*

Allal-Chérif, O., & Makhlouf, M. (2016). Using Serious Games for Human Resource Management: Lessons from France's top 40 companies. *Global Business and Organizational Excellence*, *35*(3), 27–36. https://doi.org/10.1002/joe.21668.

Alter, U. (2019). *Teamentwicklung und Führung: Wir-Gefühl am Arbeitsplatz ermöglichen - das Potenzial des Teams nutzen*. Springer.

Aubé, C., Brunelle, E., & Rousseau, V. (2014). Flow experience and team performance: The role of team goal commitment and information exchange. *Motivation and Emotion*, *38*(1), 120–130. https://doi.org/10.1007/s11031-013-9365-2.

Bakker, A. B. (2005). Flow among music teachers and their students: The crossover of peak experiences. *Journal of Vocational Behavior*, *66*(1), 26–44. https://doi.org/10.1016/j.jvb.2003.11.001.

Beard, K. S., & Hoy, W. K. (2010). The Nature, Meaning, and Measure of Teacher Flow in Elementary Schools: A Test of Rival Hypotheses. *Educational Administration Quarterly*, *46*(3), 426–458. https://doi.org/10.1177/0013161X10375294.

Berland, M., & Lee, V. R. (2011). Collaborative Strategic Board Games as a Site for Distributed Computational Thinking. *International Journal of Game-Based Learning*, *1*(2), 65–81. https://doi.org/10.4018/ijgbl.2011040105.

Bruya, B. (2010). Effortless Attention: A New Perspective in the Cognitive Science of Attention and Action. In *Effortless Attention*. Bradford Books. https://doi.org/10.7551/mitpress/9780262013840.001.0001

Christandl, F., Mierke, K., & Peifer, C. (2018). Time flows: Manipulations of subjective time progression affect recalled flow and performance in a subsequent task. *Journal of Experimental Social Psychology*, *74*, 246–256. https://doi.org/10.1016/j.jesp.2017.09.015.

Comelli, G. (2002). Anlässe und Ziele von Teamentwicklungsprozessen. In S. Stumpf, & A. Thomas (Eds.), *Teamarbeit und Teamentwicklung* (pp. 169–189). Hogrefe.

Csikszentmihalyi, M. (1975). *Beyond Boredom and Anxiety.* Jossey-Bass Publishers.

Csikszentmihalyi, M., & LeFevre, J. (1989). Optimal experience in work and leisure. *Journal of Personality and Social Psychology*, *56*(5), 815–822. https://doi.org/10.1037/0022-3514.56.5.815.

Culbertson, S. S., Fullagar, C. J., Simmons, M. J., & Zhu, M. (2015). Contagious Flow: Antecedents and Consequences of Optimal Experience in the Classroom. *Journal of Management Education*, *39*(3), 319–349. https://doi.org/10.1177/1052562914545336.

Dunn, J. R., & Schweitzer, M. E. (2005). Feeling and believing: The influence of emotion on trust. *Journal of Personality and Social Psychology*, *88*(5), 736–748. https://doi.org/10.1037/0022-3514.88.5.736.

Ellis, J. B., Luther, K., Bessiere, K., & Kellogg, W. A. (2008). Games for Virtual Team Building. *Proceedings of the Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques, DIS*, 295–304. https://doi.org/10.1145/1394445.1394477

Engeser, S., & Rheinberg, F. (2008). Flow, performance and moderators of challenge-skill balance. *Motivation and Emotion*, *32*(3), 158–172. https://doi.org/10.1007/s11031-008-9102-4.

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*, *56*(3), 218–226. https://doi.org/10.1037/0003-066X.56.3.218.

Fredrickson, B. L. (2013). Positive Emotions Broaden and Build. In *Advances in Experimental Social Psychology* (Vol. 47, pp.1-51). https://doi.org/10.1016/B978-0-12-407236-7.00001-2

Fullagar, C. J., & Kelloway, E. K. (2009). Flow at work: An experience sampling approach. *Journal of Occupational and Organizational Psychology*, *82*(3), 595–615. https://doi.org/10.1348/096317908X357903.

Garris, R., Ahlers, R., & Driskell, J. E. (2002). Games, Motivation, and Learning: A Research and Practice Model. *Simulation and Gaming*, *33*(4), 441–467. https://doi.org/10.1177/1046878102238607.

Gobet, F., Retschitzki, J., & de Voogt, A. (2004). *Moves in Mind - The Psychology of Board Games*. Psychology Press.

Henriksen, T. D., & Børgesen, K. (2016). Can good leadership be learned through business games? *Human Resource Development International*, *19*(5), 388–405. https://doi.org/10.1080/13678868.2016.1203638.

Hoblitz, A. (2015). *Spielend Lernen im Flow: Die motivationale Wirkung von Serious Games im Schulunterricht*. Springer. https://doi.org/10.1007/978-3-658-11376-6.

Huizinga, J. (1956). *Homo ludens: vom Ursprung der Kultur im Spiel*. Rowohlt.

Ignjatovic, C., Kern, M. L., & Oades, L. G. (2021). Flow Support at Work: Examining the Relationship Between Strengths Use and Flow at Work Among School Staff over a Three–Year Period. *Journal of Happiness Studies*. https://doi.org/10.1007/s10902-021-00409-x.

Juul, J. (2003). The Game, the Player, the World: Looking for a Heart of Gameness. *Level Up: Digital Games Research Conference Proceedings*, 30–45.

Keith, M., Anderson, G., Dean, D. L., & Gaskin, J. (2014). The Effects of Team Flow on Performance: A Video Game Experiment. *SIGHCI 2014 Proceedings*, *13*, 1–5.

Khan, A., & Pearce, G. (2015). A study into the effects of a board game on flow in undergraduate business students. *International Journal of Management Education*, *13*(3), 193–201. https://doi.org/10.1016/j.ijme.2015.05.002.

Kiili, K., Lindstedt, A., & Ninaus, M. (2018). Exploring characteristics of students' emotions, flow and motivation in a math game competition. *GamiFIN Conference*, 20–29.

Klein, C., DiazGranados, D., Salas, E., Le, H., Burke, C. S., Lyons, R., & Goodwin, G. F. (2009). Does team building work? *Small Group Research*, *40*(2), 181–222. https://doi.org/10.1177/1046496408328821.

Krygier, J. R., Heathers, J. A. J., Shahrestani, S., Abbott, M., Gross, J. J., & Kemp, A. H. (2013). Mindfulness meditation, well-being, and heart rate variability: A preliminary investigation into the impact of intensive vipassana meditation. *International Journal of Psychophysiology*, *89*(3), 305–313. https://doi.org/10.1016/j.ijpsycho.2013.06.017.

Kuo, T. H., & Ho, L. A. (2010). Individual difference and job performance: The relationships among personal factors, job characteristics, flow experience, and service quality. *Social Behavior and Personality*, *38*(4), 531–552. https://doi.org/10.2224/sbp.2010.38.4.531.

Lacerenza, C., Marlow, S. L., Tannenbaum, S. I., & Salas, E. (2018). Team Development Interventions: Evidence-Based Approaches for Improving Teamwork. *American Psychologist*, *73*(4), 517–531. https://doi.org/10.1037/amp0000295.

Maas, C. J. M., & Hox, J. J. (2005). Sufficient sample sizes for multilevel modeling. *Methodology*, *1*(3), 86–92. https://doi.org/10.1027/1614-2241.1.3.86.

Maresch, I., & Kampman, H. (2022). Playing for Resilience in a Pandemic; Exploring the Role of an Online Board Game in Recognising Resources. *International Journal of Applied Positive Psychology*. https://doi.org/10.1007/s41042-022-00069-z.

Nakamura, J., & Csikszentmihalyi, M. (2014). The Concept of Flow. In *Flow and the Foundations of Positive Psychology: The Collected Works of Mihaly Csikszentmihalyi* (pp. 239–263). Springer. https://doi.org/10.1007/978-94-017-9088-8_16

Peifer, C., & Tan, J. (2021). The Psychophysiology of Flow Experience. In C. Peifer & S. Engeser (Eds.), *Advances in Flow Research* (2. ed., pp. 191–230). Springer. https://doi.org/10.1007/978-3-030-53468-4

Peifer, C., & Wolters, G. (2017). Bei der Arbeit im Fluss sein: Konsequenzen und Voraussetzungen von Flow-Erleben am Arbeitsplatz. *Wirtschaftspsychologie*, *3*(19), 6–22.

Peifer, C., & Wolters, G. (2021). Flow in the Context of Work. In C. Peifer & S. Engeser (Eds.), Advances in Flow Research (2. ed., pp. 287–322). Springer. https://doi.org/10.1007/978-3-030-53468-4

Pivec, M., Dziabenko, O., & Schinnerl, I. (2003). Aspects of Game-Based Learning. *Proceedings of I-KNOW '03,* 216–225.

Pivec, M. (2007). Editorial: Play and learn: Potentials of game-based learning. *British Journal of Educational Technology*, *38*(3), 387–393. https://doi.org/10.1111/j.1467-8535.2007.00722.x.

Plester, B., & Hutchison, A. (2016). Fun times: The relationship between fun and workplace engagement. *Employee Relations*, *38*(3), 332–350. https://doi.org/10.1108/ER-03-2014-0027.

Proyer, R. T. (2017). A new structural model for the study of adult playfulness: Assessment and exploration of an understudied individual differences variable. *Personality and Individual Differences*, *108*, 113–122.

Purvanova, R. K. (2014). Face-to-face Versus Virtual Teams: What Have We Really Learned? *Psychologist-Manager Journal*, *17*(1), 2–29. https://doi.org/10.1037/mgr0000009.

Rheinberg, F., Vollmeyer, R., & Engeser, S. (2003). Die Erfassung des Flow-Erlebens [The assessment of flow experience]. In J. Stiensmeier-Pelster, & F. Rheinberg (Eds.), *Diagnostik von Motivation und Selbstkonzept [Diagnosis of motivation and self-concept]* (pp. 261–279). Hogrefe.

Ricci, K. E., Salas, E., & Cannon-Bowers, J. A. (1996). Do Computer-Based Games Facilitate Knowledge Acquisition and Retention? *Military Psychology*, *8*(4), 295–307. https://doi.org/10.1207/s15327876mp0804_3.

Ritzmann, S., Hagemann, V., & Kluge, A. (2014). The Training Evaluation Inventory (TEI) - Evaluation of Training Design and Measurement of Training Outcomes for Predicting Training Success. *Vocations and Learning*, *7*(1), 41–73. https://doi.org/10.1007/s12186-013-9106-4.

Ruch, W., Martínez-Martí, M. L., Proyer, R. T., & Harzer, C. (2014). The Character Strengths Rating Form (CSRF): Development and initial assessment of a 24-item rating scale to assess character strengths. *Personality and Individual Differences*, *68*, 53–58. https://doi.org/10.1016/j.paid.2014.03.042.

Salanova, M., Bakker, A. B., & Llorens, S. (2006). Flow at Work: Evidence for an Upward Spiral of Personal and Organizational Resources. *Journal of Happiness Studies*, *7*(1), 1–22. https://doi.org/10.1007/s10902-005-8854-8.

Salanova, M., Rodríguez-Sánchez, A. M., Schaufeli, W. B., & Cifre, E. (2014). Flowing Together: A Longitudinal Study of Collective Efficacy and Collective Flow Among Workgroups. *The Journal of Psychology*, *148*(4), 435–455. https://doi.org/10.1080/00223980.2013.806290.

Salas, E., Dickinson, T. L., Converse, S. A., & Tannenbaum, S. I. (1992). Toward an understanding of team performance and training. In R. W. Swezey & E. Salas (Eds.), *Teams: Their training and performance* (pp. 3–29). Ablex.

Salas, E., Rozell, D., Mullen, B., & Driskell, J. E. (1999). The Effect of Team Building on Performance: An Integration. *Small Group Research*, *30*(3), 309–329. https://doi.org/10.1177/104649649903000303.

Salas, E., Shuffler, M. L., Thayer, A. L., Bedwell, W. L., & Lazzara, E. H. (2015). Understanding and improving teamwork in organizations: A scientifically based practical guide. *Human Resource Management*, *54*(4), 599–622. https://doi.org/10.1002/hrm.21

Salas, E., Cooke, N. J., & Rosen, M. A. (2008). On Teams, Teamwork, and Team Performance: Discoveries and Developments. *Human Factors*, *50*(3), 540–547. https://doi.org/10.1518/001872008X288457.

Saraswat, N., & Shlipi, K. (2015). Impact of Team Building Exercises on Team Effectivenes. *International Journal of Marketing and Human Resource Management (IJMHRM)*, *6*(3), 89–97.

Shin, N. (2006). Online learner's 'flow' experience: An empirical study. *British Journal of Educational Technology*, *27*(5), 705–720. https://doi.org/10.1111/j.1467-8535.2006.00641.x.

Shuffler, M. L., DiazGranados, D., & Salas, E. (2011). There's a Science for That: Team Development Interventions in Organizations. *Current Directions in Psychological Science*, *20*(6), 365–372. https://doi.org/10.1177/0963721411422054.

Smith, M. B., Bryan, K., L., & Vodanovich, S. J. (2012). The counter-intuitive effects of flow on positive leadership and employee attitudes: Incorporating positive psychology into the management of organizations. *The Psychologist-Manager Journal*, *15*(3), 174–198. https://doi.org/10.1080/10887156.2012.701129.

Sundstrom, E., De Meuse, K. P., & Futrell, D. (1990). Work teams: Applications and effectiveness. *American Psychologist*, *45*(2), 120–133. https://doi.org/10.1037/0003-066X.45.2.120.

Vacharkulksemsuk, T., & Fredrickson, B. L. (2013). Looking Back and Glimpsing Forward: The Broaden-and-Build Theory of Positive Emotions as Applied to Organizations. *Advances in Positive Organizational Psychology*, *1*, 45–60. https://doi.org/10.1108/S2046-410X(2013)0000001005.

van den Hout, J. J. J., Davis, O. C., & Walrave, B. (2016). The Application of Team Flow Theory. In L. Harmat, F. Ørsted Andersen, F. Ullén, J. Wright, & G. Sadlo (Eds.), *Flow Experience: Empirical Research and Applications* (pp. 233–247). Springer. https://doi.org/10.1007/978-3-319-28634-1

van den Hout, J. J. J., Davis, O. C., & Weggeman, M. C. D. P. (2018). The Conceptualization of Team Flow. *Journal of Psychology*, *152*(6), 388–423. https://doi.org/10.1080/00223980.2018.1449729.

Wagner, L., Holenstein, M., Wepf, H., & Ruch, W. (2020). Character Strengths Are Related to Students' Achievement, Flow Experiences, and Enjoyment in Teacher-Centered Learning, Individual, and Group Work Beyond Cognitive Ability. *Frontiers in Psychology*, *11*, 1–13. https://doi.org/10.3389/fpsyg.2020.01324.

Walker, C. J. (2021). Social Flow. In C. Peifer & S. Engeser (Eds.), *Advances in Flow Research* (2. ed., pp. 263–286). Springer. https://doi.org/10.1007/978-3-030-53468-4

Zagal, J. P., Rick, J., & Hsi, I. (2006). Collaborative games: Lessons learned from board games. *Simulation and Gaming*, *37*(1), 24–40. https://doi.org/10.1177/1046878105282279.

Zubair, A., & Kamal, A. (2015a). Authentic Leadership and Creativity: Mediating Role of Work-Related Flow and Psychological Capital. *Journal of Behavioural Sciences*, *25*(1), 150–171.

Zubair, A., & Kamal, A. (2015b). Work Related Flow, Psychological Capital, and Creativity Among Employees of Software Houses. *Psychological Studies*, *60*(3), 321–331. https://doi.org/10.1007/s12646-015-0330-x.

Zumeta, L. N., Basabe, N., Wlodarczyk, A., Bobowik, M., & Páez, D. (2016). Shared flow and positive collective gatherings. *Anales de Psicologia*, *32*(3), 717–727. https://doi.org/10.6018/analesps.32.3.261651.

Authors and Affiliations

Leonie Kloep[1,2] · Anna-Lena Helten[3] · Corinna Peifer[1]

✉ Leonie Kloep
  leonie.kloep@student.uni-luebeck.de

  Anna-Lena Helten
  anna.helten@live.de

  Corinna Peifer
  corinna.peifer@uni-luebeck.de

1   Department of Psychology, Research Group Work and Health, University of Lübeck, Lübeck, Germany

2   Institute for Innovation Research and Management, Westphalian University of Applied Sciences, Bochum, Germany

3   Essen, Germany