Board games on emotional competences for school-age children

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Supplementary Data

Game Description

Settings and possible benefits for the development of emotional competences

The three emotional competences (EC) board games developed in the current project (Recognition Game, Differentiation Game, and Reappraisal Game) are designed for children aged 8–12 years and can be played in the classroom, with peers or family, in therapeutic settings, as a team-building activity, or in interventions such as EC groups. They aim to contribute to players' EC (emotion recognition, differentiation, and reappraisal) not only through their explicit topic on EC but also through the game mechanics (e.g., feedback, skills required) and the inherent social interactions. The current study did not examine the efficacy of the games to promote these EC in the players, but future studies should do so in intervention designs.

Fun, engagement, and immersion

To increase immersion and players' engagement, each game includes a synopsis with an imaginary story. Players have different roles, as described in Table 4. The competition games (Recognition and Differentiation games) engage players in the pursuit of a common goal (i.e., winning against the other team, winning as many points as possible). The progress made by the rival team and the suspense of finding out if the team's guess is correct contribute to players' motivation and immersion. In the Recognition Game, the ''fun'' aspect also resides in the potential incongruence between the expressed emotion and the sentence, as well as the potential discrepancy between the intended and actually expressed emotion. Moreover, the challenge of performing in front of peers can be both exciting and rewarding for children.

The collaborative game (Reappraisal Game) stimulates players' imagination and curiosity during storytelling. The constraints imposed by the cards require players to become creative and to sometimes take unexpected turns in the story. The more engaged the players are as a group, the more complete and immersive their story becomes.

Flow and difficulty levels

Currently, the board games have no explicit difficulty levels and thus do not adapt to the player's changing abilities. However, the Recognition Game contains emotion lists of varying difficulty levels, starting at short lists with basic and distinct emotions (e.g., happy, angry) and moving on to longer lists with more complex and similar emotions (e.g., frustrated, disappointed, jealous, awed). For the other two games, modifications are planned to adapt to the player's ability level and thus enhance flow.

Game feedback to players

The two competitive games (Recognition and Differentiation games) provide feedback of group progress through points and praise, as well as through group discussion. In addition, players can see their progress in the Differentiation game by the proportion of event cards already guessed. In the Reappraisal Game, both the evolution of the story and the number of remaining cards inform players about their progress. Praise and statements from peers are also a core feedback element in this collaborative game.

Publication

Since the games are still in the early stages of development, they require several adaptations and improvement; therefore, they are not yet available for sale.

Board Game Experience Questionnaire

The postgame questions about the game experience have been adapted from the Game Experience Questionnaire (GEQ) of IJsselsteijn et al.[S1] First, the items were translated from English to French and back translated. Second, difficult items were taken out to keep the questionnaire suited for children, as well as items irrelevant for board games. Two new items (22, 26) were added for this study. Supplementary Table S1 presents the correspondence of the Board Game Experience Questionnaire (BGEQ) items with the original GEQ.

Data about game experience were collected during the study from 174 children over three play sessions. These data were used in an exploratory factor analysis (EFA) in IBM SPSS Statistics (version 25) to explore factor structure. Maximum likelihood was used as extraction method. A Promax rotation was applied to the factors, allowing them to correlate. This decision was justified by nonnegligible correlations between items as well as several high correlations between factors (e.g., positive affect and negative affect: $r = -0.79$). Loadings >0.30 were considered salient.

Five factors with an eigenvalue >1 were retained in the EFA in accordance with the Kaiser-Guttmann criteria. Together, they explain 56.40% of the variance. Supplementary Table S2 presents factor loadings of the core items with a Promax rotation. Items 19, 16, and 5 had no salient loadings on any of the five factors and were excluded from subsequent analyses. A possible reason is that children often asked for explanations for those items and the questions might therefore have been misunderstood. Another reason is that they might not be relevant for board games.

Next, the structure from the EFA was compared to the original structure from the GEQ and verified for theoretical meaning. It was used in a confirmatory factor analysis (CFA) in IBM SPSS AMOS Graphics (version 25) to evaluate adjustment. Alternative models were compared in terms of adjustment. First, nonsignificant factor regression weights and correlations were removed, then, additional regression weights suggested by modification indices were added in the alternative models. Loadings from items on more than one factor were kept if adjustment of the model was superior to

alternative models with only one loading. As the factors correlate with each other, this decision was theoretically justified. These comparisons resulted in the final model used for analyses ($\chi^2 = 451.678$, df = 177, $P < 0.001$). Indicators of fit from the CFA were satisfactory: RMSEA = 0.059 (root mean square error of approximation; values <0.08 or <0.05 indicate good fit), SRMR = 0.0494 (standardized root mean residual; values <0.08 or <0.05 indicate good fit), and CFI = 0.927 (comparative fit index; values >0.90 or >0.95 indicate good fit).

In comparison with the original GEQ structure, the first three factors seem roughly to correspond to positive affect, flow and immersion combined, and negative affect. No distinction was found between flow and immersion—although this distinction is reasonable for digital games, it seems superficial for board games. Merging flow and immersion items on a single factor might therefore be justified. The last two factors are less comparable to the original structure from the GEQ, as they contain more newly created items and do not include several items from the GEQ. They were named difficulty and effort, respectively.

Thus, scores from the BGEQ were calculated based on the above obtained five factors: positive affect ($\alpha = 0.90$), negative affect ($\alpha = 0.75$), flow-immersion ($\alpha = 0.76$), difficulty ($\alpha = 0.63$), and effort ($\alpha = 0.72$). Reliability calculated with Cronbach's alphas was satisfactory.

Supplementary Reference

S1. IJsselsteijn WA, de Kort YAW, Poels K. The Game Experience Questionnaire. Eindhoven: Technische Universiteit Eindhoven. 2013:1–9.