

Analyzing Video Game Design Elements in Mental Health Interventions

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Research Questions

- Which design principle (DP) classes and engagement types characterize games used in randomized controlled trial (RCT) studies to alleviate anxiety and depression?
- Are some DP classes and engagement types more likely to co-occur?

Background

Video games are increasingly used as mental health interventions:

- + support accessibility and scalability and reduce stigma
- + increase adherence and engagement for low-motivation users

5 main categories of RCT using games:

Cognitive Behavioral Therapy, Casual, Cognitive training, Physical, Psycho-educational.
→ Yet, no agreement on how to design these games for impact.

Goal: A combined framework to characterize the design–engagement profile of RCT games for anxiety/depression: Case study of Casual games.

Proposed combined framework

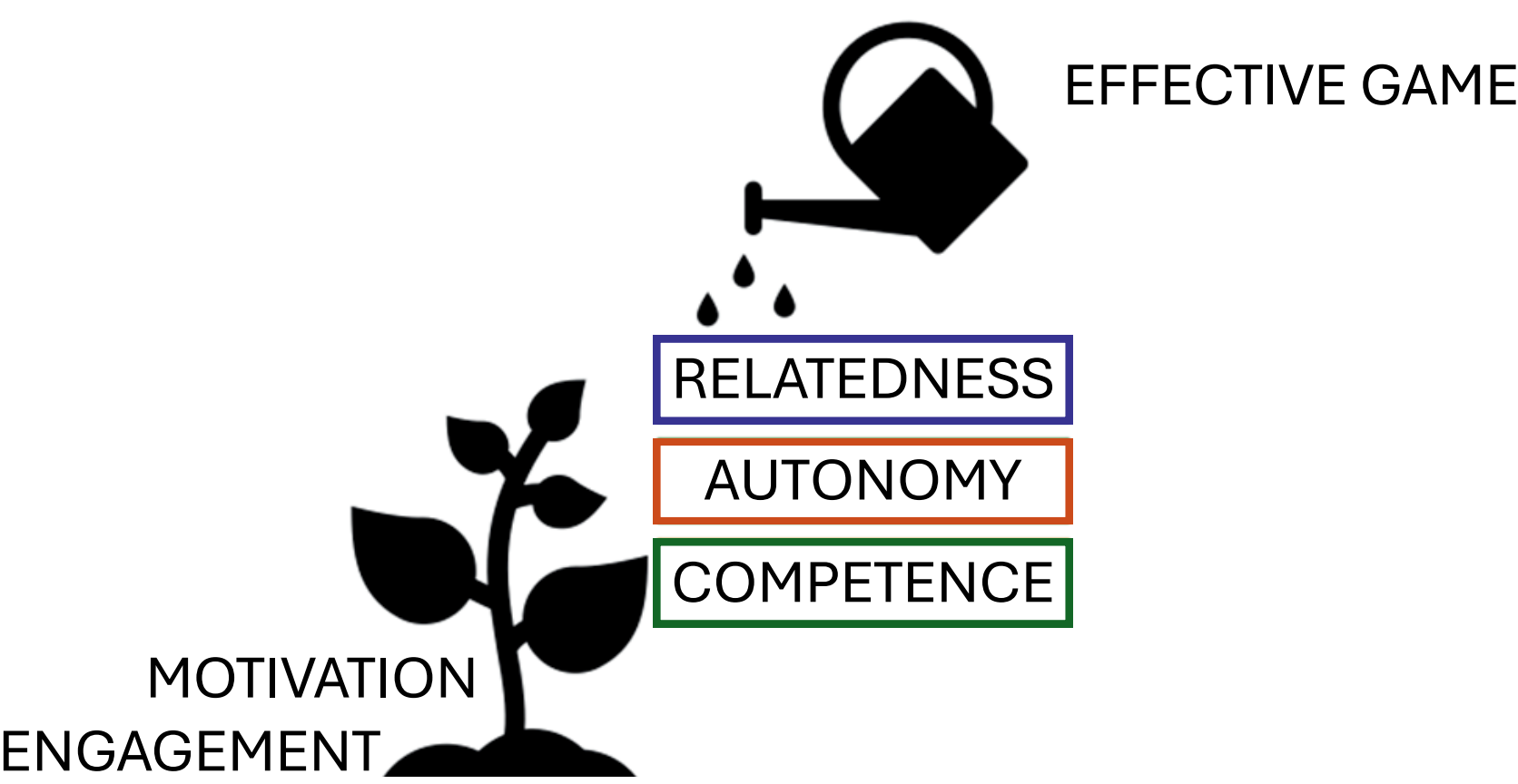
Design Principle Classes (Laine and Lindberg 2020)

- **Challenge:** Design challenges aiming to engage diverse skill level players
- **Control:** How players input actions and make gameplay choices.
- **Creativity:** Supporting players in expressing ideas and creating content.
- **Exploration:** Enabling players to freely discover and navigate worlds.
- **Feedback:** Information the game gives about player actions.
- **Goals:** Clear objectives that guide and structure player progress.
- **Profile and ownership:** Representing the player and tracking their persistent achievements.
- **Relevance and relatedness:** Linking game content to players' real-life contexts.
- **Resources and economy:** Managing virtual items, points, and their strategic use.
- **Social play:** Supporting interaction, cooperation, and competition between players.
- **Storytelling and fantasy:** Using narrative and imaginary worlds to structure experience.

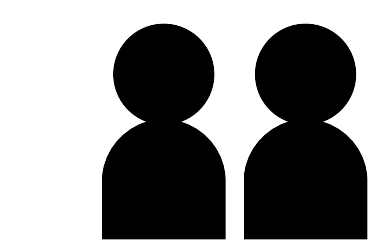
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Types of Engagement (Plass et al. 2020)

- **Cognitive:** cognitive processing of game information.
- **Affective:** emotional responses elicited by game elements
- **Behavioral:** physical actions while interacting with the game.
- **Socio-cultural:** social interaction or specific cultural context.



Method

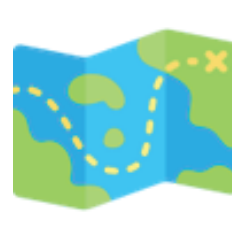


Game analysts



Step 1

Identify
design features



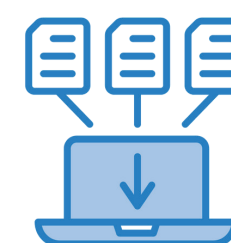
Step 2

Map to
design principles



Step 3

Link to
engagement



Step 4

Aggregate tables
across games and
game analysts for
analysis

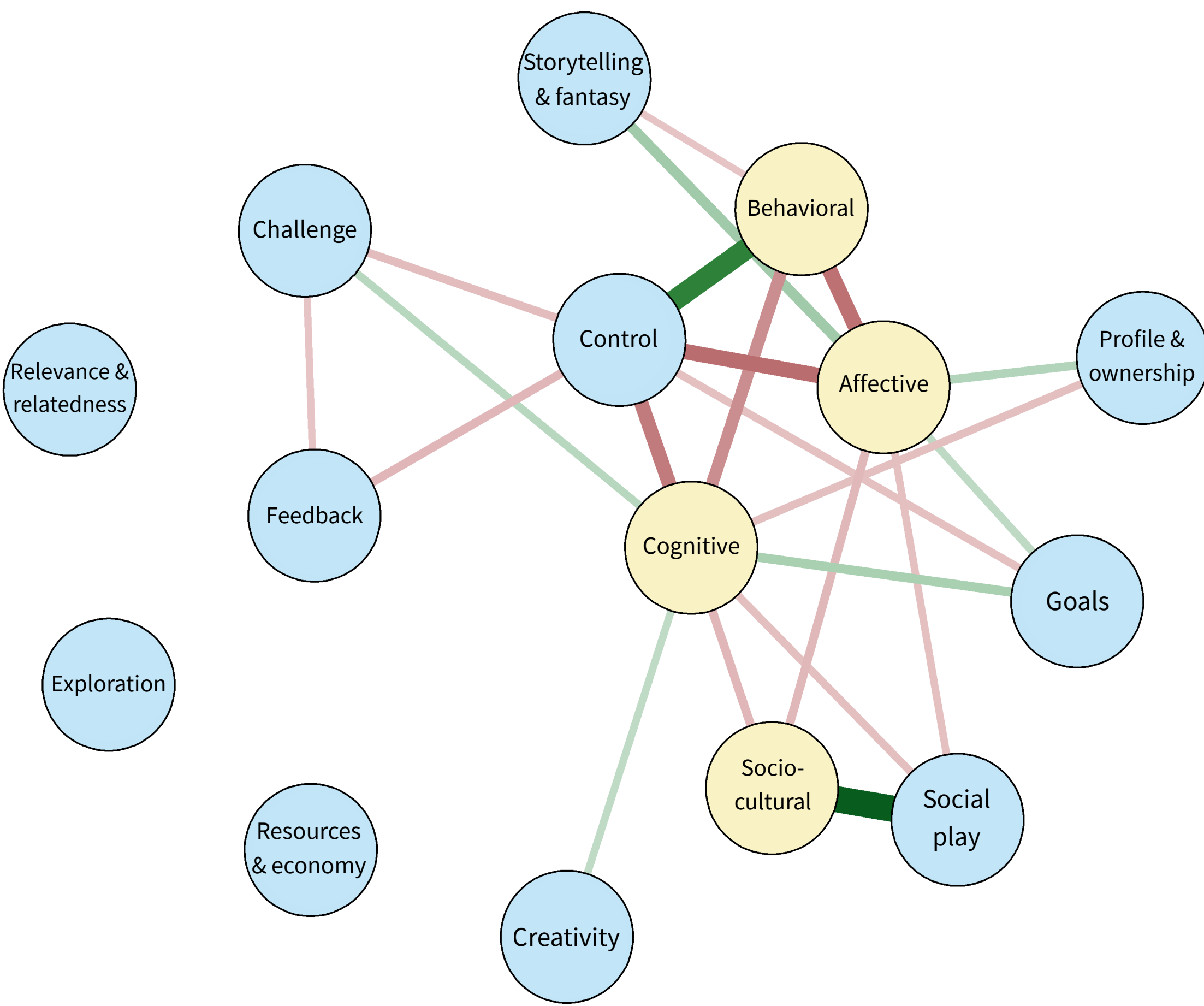
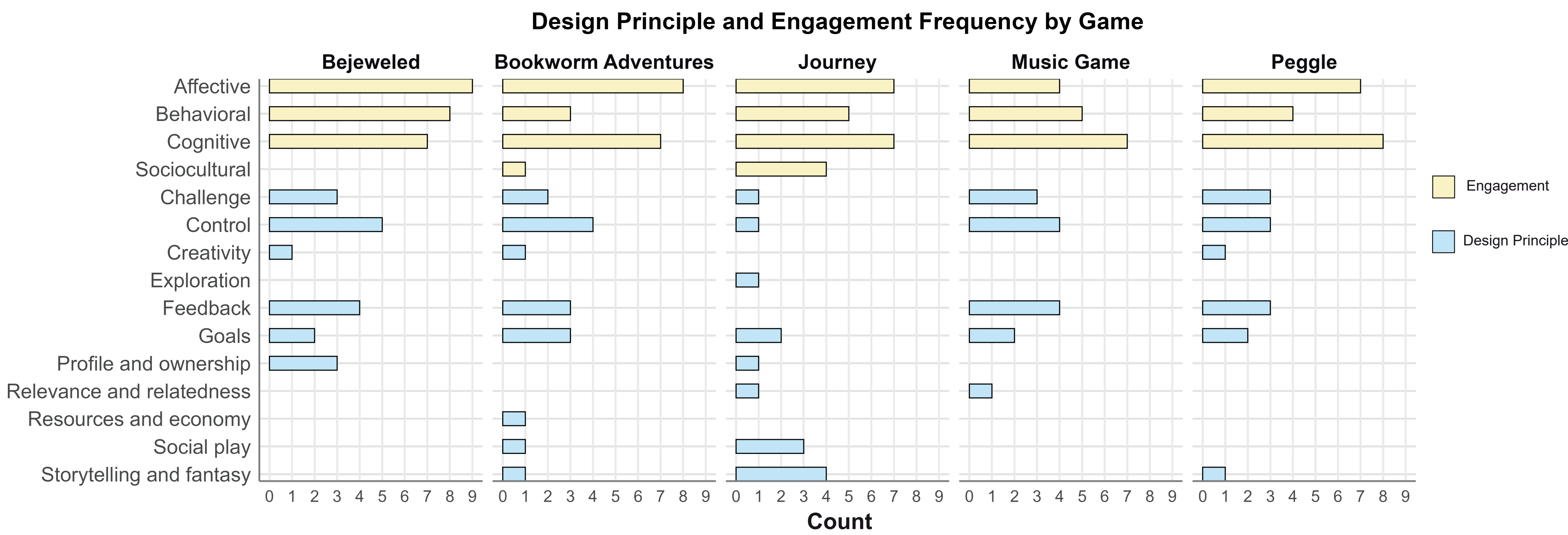
Example:

"Bejeweled 3 includes different game modes players can discover freely at their own pace."

Control DP12: Freedom of choice and control in gameplay

Behavioral Affective

Descriptive results of 5 Casual games



Psychometric Network of Design Principle × Engagement correlations (Spearman)

Strong positive correlations:

Socio-c. - Social P.
Behavioral - Control

Moderate negative correlations:

Affective - Control
Cognitive - Control

Moderate positive correlations:

Affective - Storytelling
Cognitive - Goals
Affective - Profile
Cognitive - Challenge

Conclusion

This methodology aims to:

- provide a systematic framework to analyze design features and types of engagement applied in games for impact
- allow comparison of the different categories of video games used for mental health interventions (here only Casual games have been shown).
- develop guidelines for designing or selecting intervention game.

Focus on RCTs to build the foundation for future systematic reviews and meta-analyses work to assess the impact of game design elements and engagement on anxiety and depression outcomes.

Limitations

- Repetitive, and time-consuming process
- High variability in game descriptions in source papers complexifies analyses
- DPs and engagements remain qualitative concepts with at times ambiguous interpretations

Next steps

- (On-going) Systematic review applying this methodology: Protocol available on Prospero
- Use AI agents to semi-automate DP–engagement coding analysis.



PROTOCOL
PROSPERO LINK