

DEVELOPMENT OF EXERGAME TO RESOLVE DECONDITIONING IN CHILDREN WITH ORTHOSTATIC DYSREGULATION



SIGGRAPH 2022
VANCOUVER+ 8-11 AUG



TOKYO
METROPOLITAN
UNIVERSITY

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PROBLEM

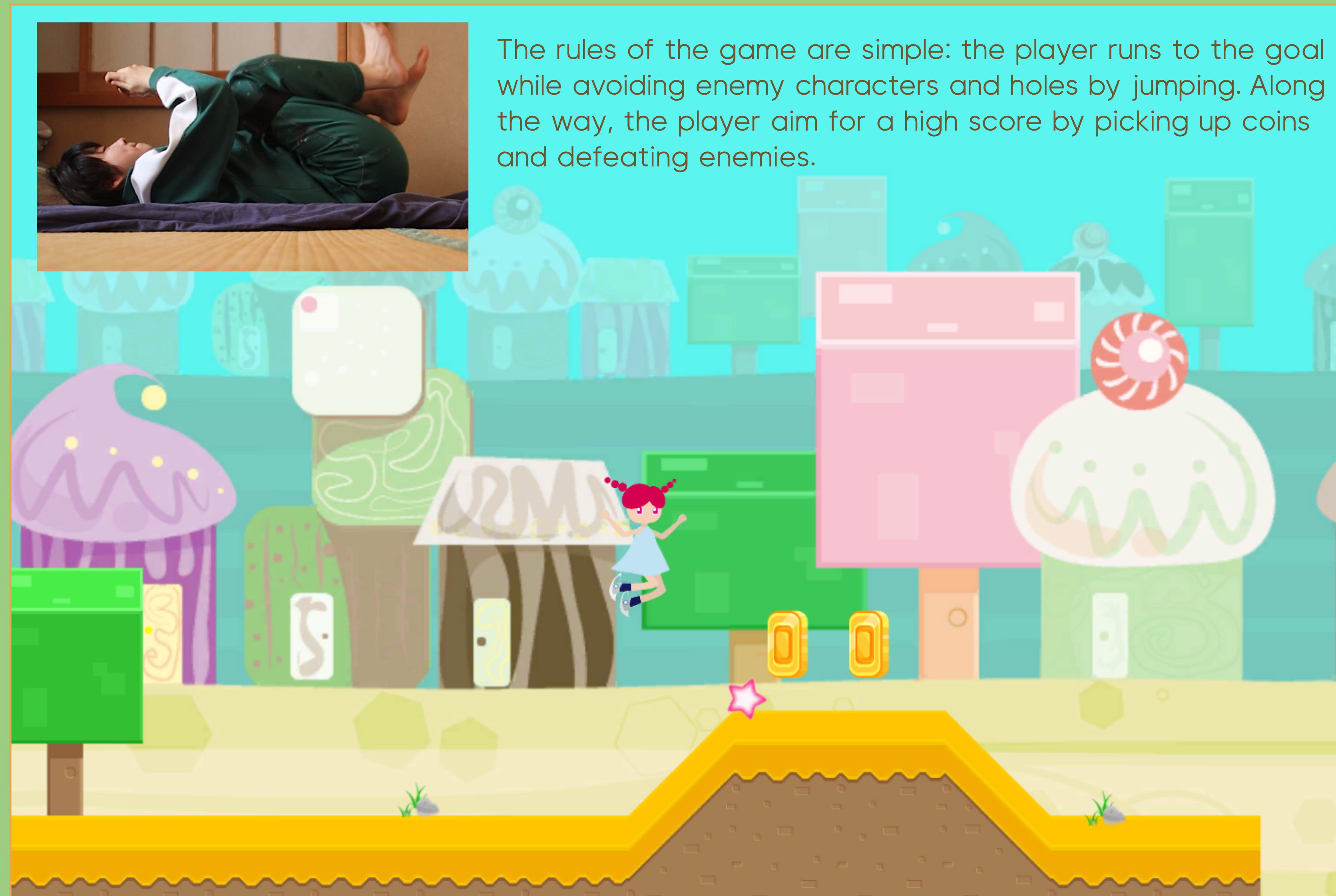
In recent years, serious and prolonged cases of orthostatic dysregulation (OD), an autonomic nervous system disorder that causes dizziness and palpitations upon standing up, have been increasing, and the number of adolescents with serious conditions resulting in school absence has been increasing. One of the reasons for this is deconditioning, i.e., declining physical function due to long periods of inactivity. Therefore, exercise therapy is considered an effective treatment method.

RELATED WORK

Ishizaki showed in a experiment on students that healthy young people who do not move their bodies for 10 days fall into a state of deconditioning that leads to orthostatic intolerance (the adult version of OD) [1]. Given this result, children with OD who are in bed at home require rehabilitation. About exercise therapy for OD, Yanagimoto [2] introduces leg exercises in the lying, semi-lying, or sitting position, and notes that there are challenges in maintaining motivation for patients to exercise. Khan et al. have shown that exergames are effective in stroke rehabilitation in terms of motivation and enjoyment [3].

APPROACH

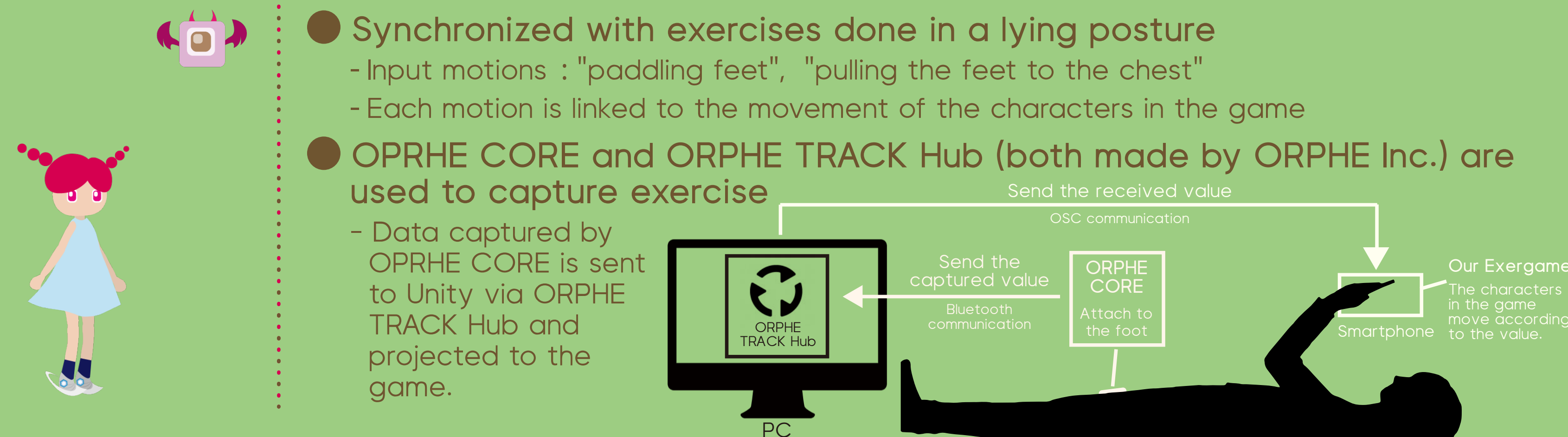
This study develops an exergame to maintain motivation for exercise in children with OD. The game uses leg movements (bending and paddling) that can be done in bed as input to accommodate patients with difficulties exercising while standing due to OD symptoms.



The rules of the game are simple: the player runs to the goal while avoiding enemy characters and holes by jumping. Along the way, the player aim for a high score by picking up coins and defeating enemies.

METHOD

- 2D side-scrolling action game to be played on smartphones
- Created in Unity
- Synchronized with exercises done in a lying posture
 - Input motions : "paddling feet", "pulling the feet to the chest"
 - Each motion is linked to the movement of the characters in the game
- ORPHE CORE and ORPHE TRACK Hub (both made by ORPHE Inc.) are used to capture exercise
 - Data captured by ORPHE CORE is sent to Unity via ORPHE TRACK Hub and projected to the game.



EXPERIMENT/RESULTS

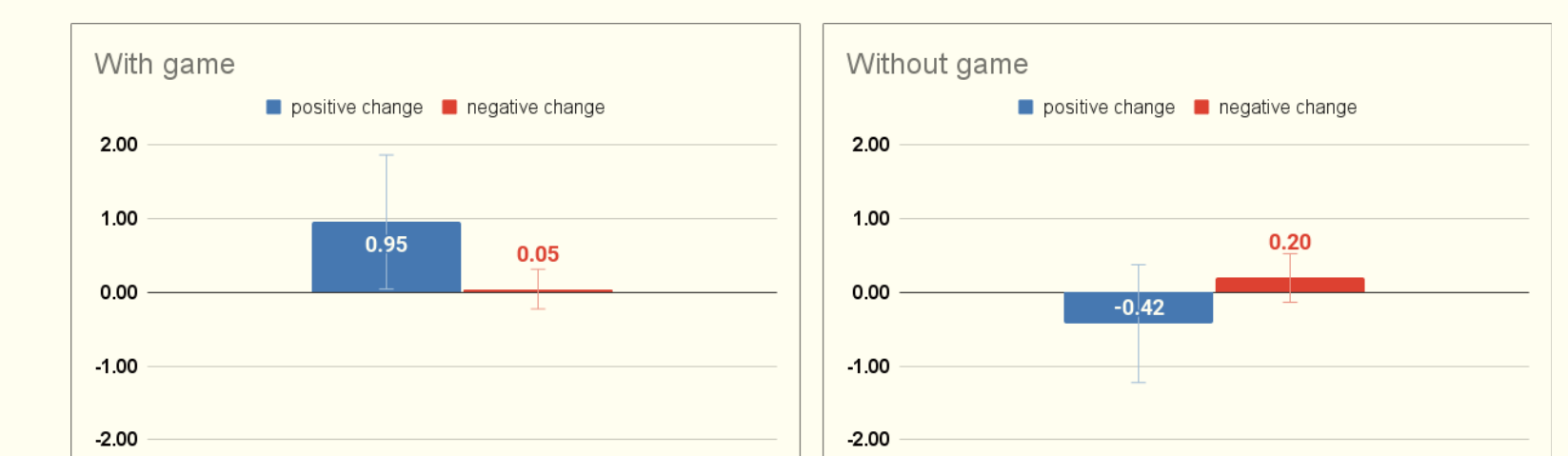
[Purpose] To verify the effectiveness of the implemented game in maintaining motivation.

[Participants] healthy university students(1 male and 5 females).

[Experiment Flow]

- Participants exercised "paddle their legs in a lying posture" with and without the game.
- Positive and negative levels before and after each exercise were measured using Clark's J-PANAS method [4], and the emotion changes compared.

[Results] Positive emotion levels tended to increase for exercise with the exergame, while tending to decrease for exercise without the game. The increase in negative emotion levels was slightly lowered for exercise with the game.



- Exergame use has a positive effect on exercise.
- In practice, it is necessary to design a game that people will want to play continuously.

REFERENCES

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- [4] Clark, L. A., Watson, D.B. 1989. The Japanese Positive and Negative Affect Scales : Factor-based scales for the assessment of mood. University of Iowa.