The Virtual Schoolyard
Attention Training in Virtual Reality for Children with Attentional Disorders

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PROBLEM
Developing novel effective means of treatment for children with attentional disorders is one of the main goals and challenges in child psychology. Virtual reality (VR) technologies provide possibilities to assess and train cognitive abilities, as well as cognitive and behavioral impairments or disorders, in a controlled virtual environment (VE).

CHALLENGES
We identified the following key requirements for providing an effective training environment and propose the listed solutions:

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APPROACH
Four attention domain modules are used to train different cognitive abilities:

Working Memory: Hopscotch
Users train their working memory by memorizing and repeating a certain sequence of fields, which either glow or are recited by audio.

Focused Attention: Card Sorting
Users learn to focus their attention on the cards and reduce their distractability by training to ignore distractions (e.g. a paper plane).

Vigilance: Catching Butterflies
Users train their ability to sustain attention over a longer period of time (watching a swarm of butterflies), while waiting for a rare target stimulus (the red butterfly which has to be caught).

Response Inhibition: Whack a Mole
Users train their ability to control their impulses and resist a certain temptation or urge by only hitting green logs and inhibiting the impulse to hit red logs.

RESULTS
We evaluated the feasibility of our training tool with 6 adolescents (50% females, age 15 - 18), suffering from somatization as well as from obsessive-compulsive and depressive symptoms. Except for one participant, all subjects reported to have had a strong sense of immersion in the VE (Md = 6, range: 3 - 7). Similarly, all except for one participant rated the application as very usable on a Visual Analogue Scale (Usability: Md = 75.50, range: 35 - 90) and indicated that they would mostly like to use the technology. Finally, five out of six participants wished to have access to the application. These preliminary results show that our tool is immersive, motivating and engaging and therefore feasible for studies with children and adolescents with attentional disorders.

FUTURE WORK
An ongoing study at the Medical University of Vienna/Vienna General Hospital led by clinical psychologists uses our four training modules in a series of therapy sessions with children and adolescents suffering from ADHD. Measurements before, during and after the treatment will show whether the therapy with our tool has a positive and – if so – lasting effect on specific attentional abilities in affected children and adolescents.