

Real enough: A virtual classroom can induce an increase in anxiety and speech disfluencies in adolescents

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Virtual reality (VR)

- Computer-generated 3D world
- Immersive environment that enables to navigate and interact with the virtual environment in real time
- Increasing number of studies showing the interest of using VR in the treatment of anxiety disorders

Wiederhold & Bouchard, 2014

VR and social anxiety

- Social anxiety disorder (SAD): fear of negative evaluation
- Virtual audiences can induce an increase in subjective anxiety in people with SAD and controls (Parrish et al., 2016)
- Efficacy of the cognitive behavior therapy using VR for public speaking anxiety (Wallach et al., 2009)

What about stuttering?

- Stuttering : childhood-onset fluency disorder (ASHA, 2017)
 - Part- or whole-word repetitions, prolongations and blocks produced with tension
 - Frequency and severity fluctuate in relation to the speaking situation
 - Avoidance behaviors : approximately 50% of people who stutter (PWS) may be suffering from social anxiety disorder (Menzies et al., 2009)

What about stuttering?

- Due to avoidance behaviors, current therapy approaches that target speech fluency show a propensity for relapse
- *'The most crucial component to any therapy is the transfer to and maintenance of treatment gains in the 'real world' ' (Hearne et al., 2008, p.92)*
- A cognitive behavior therapy combined to the speech therapy is associated with significant and sustained improvements in psychological functioning in PWS (Menzies et al., 2009)
- Assessment and treatment should include the exposure to a hierarchy of low-fear to more challenging situations (ASHA, 2017)

VR and stuttering

- Feasibility of using VR with adults who stutter
 - Subjective ratings of distress were significantly higher in a virtual audience condition compared to a virtual empty room (Brundage et al., 2016)
 - Virtual audiences create similar anticipatory apprehension in PWS that live audience do (Brundage & Hancock, 2015)
 - PWS spoke less and stuttered more in a virtual challenging job interview than in a virtual supportive job interview (Brundage et al., 2006)
- What about adolescents?

The aim of the study

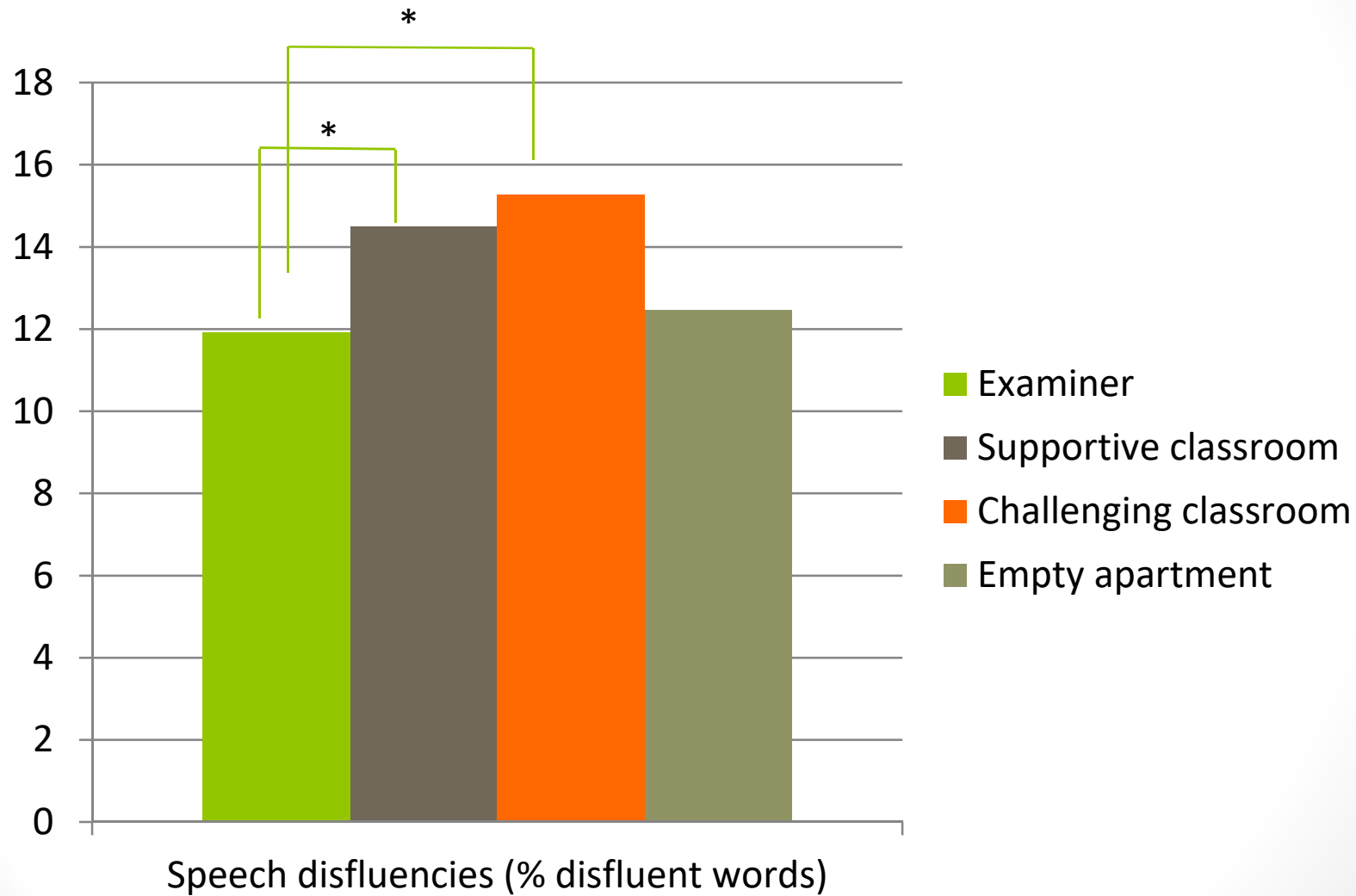
- Validate a virtual classroom to be used with adolescents who stutter
- The first step: validating this environment with adolescents who do not stutter
- ➔ A virtual classroom should create higher levels of anxiety and speech disfluencies than a virtual neutral environment

Methods

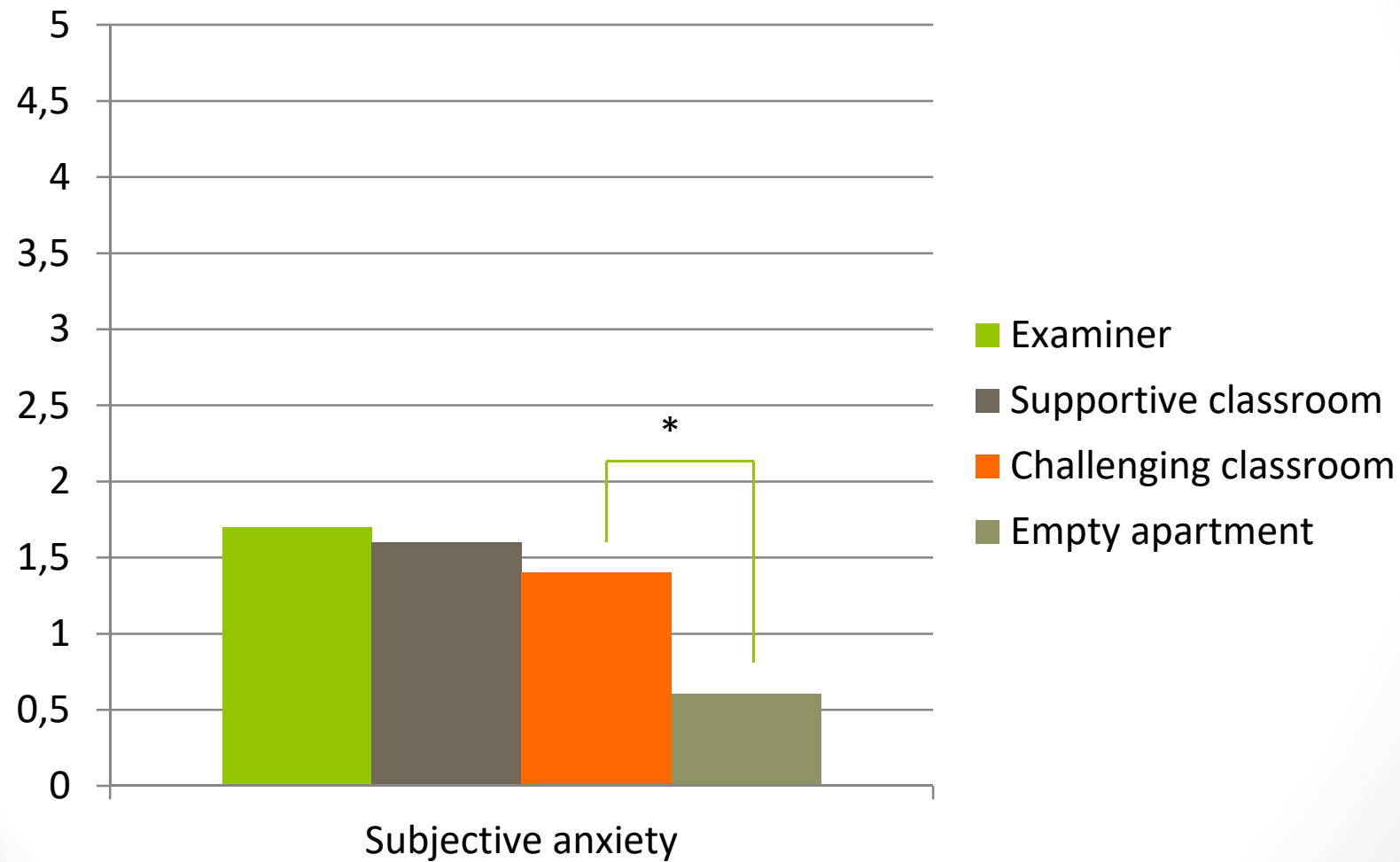
- Participants
 - 20 adolescents who do not stutter (9 boys, age range: 10 – 17 years)
- Procedure
 - Social anxiety scales
 - Fear of Negative Evaluation
 - Personal Report of Confidence as a Speaker
 - Liewobitz Social Anxiety Scale
 - Speech disfluencies and subjective anxiety (0-10)



Results: Speech disfluencies



Results: Anxiety



Results: Anxiety

- Subjective anxiety correlates with the performance - and social anxiety scores in the Liebowitz social anxiety scale

	Subjective anxiety in the supportive classroom	Subjective anxiety in the challenging classroom
Liebowitz Performance anxiety	$r_s = .48, p = .03$	$r_s = .54, p = .02$
Liebowitz Social anxiety	$r_s = .47, p = .04$	$r_s = .59, p = .01$

Conclusions

- The virtual classroom developed by *InVirtuo, Inc.* can induce an increase in speech disfluencies and anxiety in adolescents who do not stutter
- The subjective anxiety induced by the VR classrooms accurately reflects the global social anxiety level

Limits

- The order of the VR classrooms was not counterbalanced
- Very low levels of self-reported subjective anxiety (adolescents without social anxiety disorder)
- Challenging classroom: sporadic reactions → not challenging enough?



InVirtuo, Inc.

- To be validated in adolescents who stutter !

Thank you !



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