

Does Virtual Reality Motivate Children to do Exposure ?

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Introduction

- Anxiety disorders are among the most often diagnosed mental disorder in children and adolescents (*Albano, Chorpita, & Barlow, 1996*).
- Specific phobia is prevalent at an average of 5% (*Muris, Schmidt, & Merckelbach, 1999*).
- The most frequent fears reported are those related to animals.
- *In vivo* exposure has already showed it's efficacy in the treatment of specific phobia (*Kendall, 1992*).

Context

- Lack of motivation and compliance are often an issue with children who undergo exposure therapy treatment.
 - As Garcia-Palacios et al. study (2001) suggested concerning adults and their higher interest towards VR therapy , children might show more interest towards VR exposure (*in virtuo*) therapy than in traditional *in vivo* exposure therapy.
- *In virtuo* exposure might increase children's motivation towards therapy, make it appear less aversive, increase compliance and decrease drop-out rate.

Context

- Deci and Ryan's self-determination theory is the dominant model in the field of motivation and will be used in this study.
- This model posits different types of motivation characterized by the level of self-determination that underlies a behavior:
 - Intrinsic motivation
 - Extrinsic motivation
 - Amotivation.
- Extrinsic motivation is itself divided:
 - external regulation
 - introjected regulation
 - identified regulation
 - integrated regulation.

Main hypothesis

- A treatment consisting of mostly *in virtuo* exposure will be more motivating for children than a treatment consisting of only *in vivo* exposure.
- Sub-hypothesis 1a:
 - general motivation will be higher for *in virtuo* exposure.
- Sub-hypothesis 1b:
 - integrated extrinsic motivation will be higher for *in virtuo* exposure.
- Sub-hypothesis 1c:
 - interest will be higher for *in virtuo* exposure.
- Sub-hypothesis 1d:
 - amotivation will be higher for *in vivo* exposure.

Secondary objective

- On a purely exploratory basis, we also tested whether a treatment with mostly *in virtuo* exposure could be as efficient as a treatment with *in vivo* exposure only.

Participants



- The sample consisted of 31 children suffering from arachnophobia (diagnosed with the ADIS-C).
- Gender : 5 male / 26 female participants.
- The participants were aged between 8 and 15 years old (mean age: 10.2).
- Inclusion criteria : suffering from arachnophobia or from an important fear of spider.
- Exclusion criteria : suffering from another mental disorder that requires more urgent treatment; suffering from a significant physical handicap or impairment to the vestibular system;

Research protocol

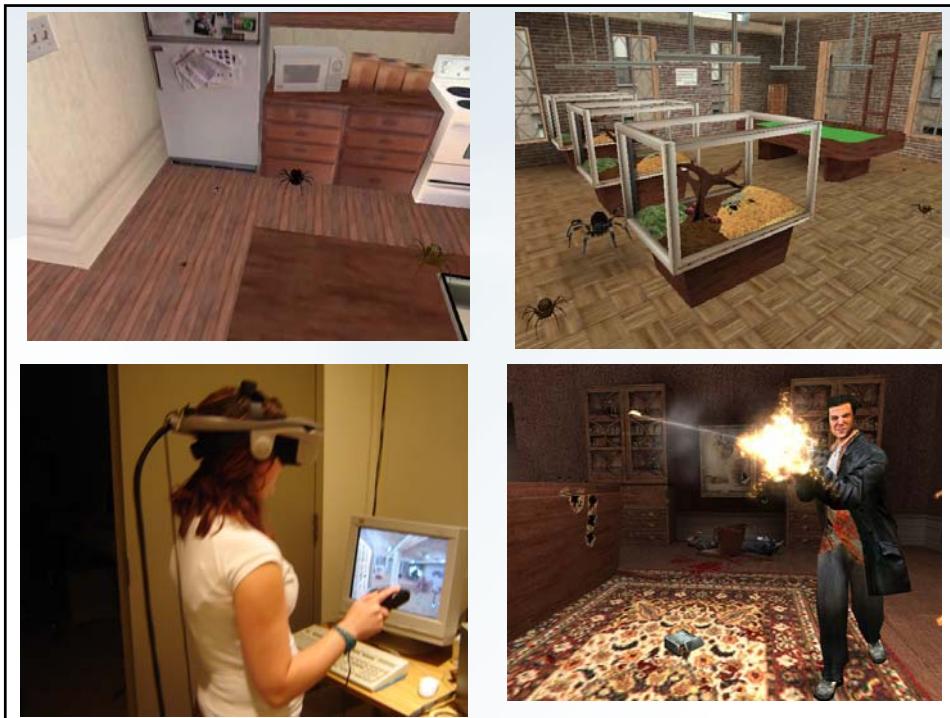
- Following initial calls, children were randomly assigned to one of two conditions:
 - 4 *in virtuo* exposure sessions combined with 1 *in vivo* exposure (*in virtuo* condition) or;
 - 5 *in vivo* exposure sessions only (*in vivo* condition).
- 17 participants were assigned to the *in vivo* condition and 14 to the *in virtuo* condition

Method

- After a pre-selecting phone interview, participants and their parents were met separately for an interview specifically designed to assess the presence of arachnophobia.
- Before the beginning of the treatment, participants received information about their treatment.
- Treatment itself was divided in two parts : 4 sessions of either *in vivo* or *in virtuo* exposure, and one session of *in vivo* exposure for everyone.

Material

- Computer: Pentium IV (Intel) , 3.20 GHz ;
- RAM: 2,00 meg;
- Video card : NVIDIA (GeForce FX 5900 XT) 256 meg;
- Head Mounted Display: nVisor SX (stéréoscopic; 1280x1024/eye resolution; 60° diagonal fov; 24 bit color)
- Tracker: InertiaCube-2 Pro (3 dof);
- Microsoft Gyration mouse;
- Modified game used for virtual environment: Max Payne.



Instruments

- Questionnaire related to motivation filled-out at pre-treatment, 2/3 treatment, and post-treatment :
 - *Why are you in therapy?* (questionnaire based on Deci and Ryan's self-determination theory which allows assessing intrinsic motivation, extrinsic motivation and amotivation)
- Other measures related to motivation and filled-out at different moments of the treatment:
 - General motivation (single/one-item question)
 - Interest (single/one-item question)
 - Discomfort (behaviors rating scale)

Instruments

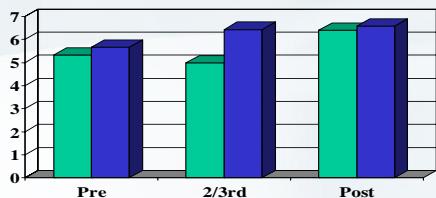
- Questionnaires related to treatment efficacy filled-out at pre-treatment, 2/3 treatment, post-treatment, and six month follow-up:
 - The Fear of Spider Questionnaire
 - The Spider Beliefs Questionnaire
- A Behavior Avoidance Test was administered at pre-treatment, 2/3 treatment, and post-treatment.

Results

- Sub-hypothesis 1a: general motivation didn't differ significantly between the two conditions.
- Sub-hypothesis 1b: integrated extrinsic motivation didn't differ significantly between the two conditions.
- Sub-hypothesis 1d: Amotivation scores were about the same in both conditions.

Results

General motivation towards therapy



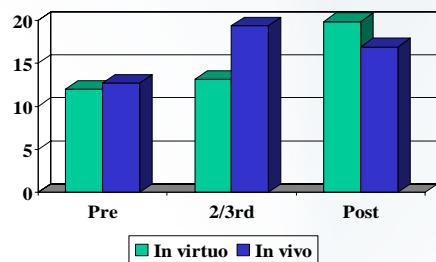
Main effect for Time (pre, 2/3, post):

5.40, $p < .01$

Main effect for Condition (in virtuo VS in vivo): 1.39, ns

Time X Condition interaction: 2.34, ns

Integrated extrinsic motivation



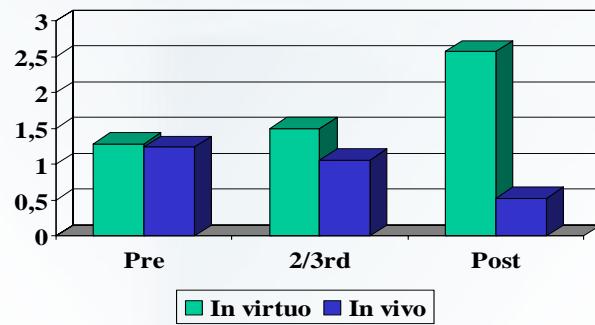
Main effect for Time (pre, 2/3, post): 16.31, $p < .01$

Main effect for Condition (in virtuo VS in vivo): 0.734, ns

Time X Condition interaction: 9.17, $p < .01$

Results

Amotivation



Main effect for Time (pre, 2/3, post): 0.17, ns

Main effect for Condition (in virtuo VS in vivo): 1.06, ns

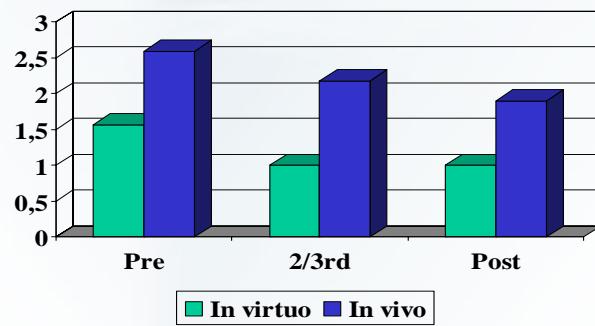
Time X Condition interaction: 0.001, ns

Results

- Sub-hypothesis 1c: Interest towards the treatment was significantly lower in the *in virtuo* condition.

Results

Interest towards therapy



Main effect for Time (pre, 2/3, post): 3.74, $p < .05$

Main effect for Condition (in virtuo VS in vivo): 7.94, $p < .01$

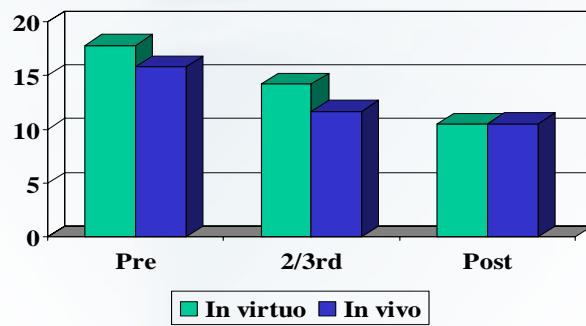
Time X Condition interaction: 0.167, ns

Results

- Secondary hypothesis: *In vivo* exposure is more efficient than *in virtuo* exposure (as measured during the first part of the treatment).
- *In virtuo* condition shows *in vivo*'s efficacy at the end of the second part: the adding of one *in vivo* exposure session seems important.

Results

Fear of Spider Questionnaire



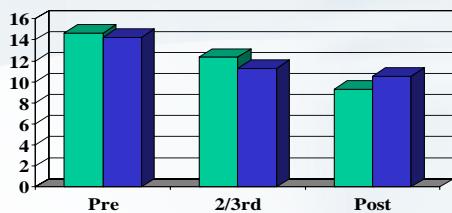
Main effect for Time (pre, 2/3, post): 32.04, $p < .01$

Main effect for Conditions (in virtuo VS in vivo): 0.861, ns

Time X Condition interaction: 1.42, ns

Results

Spider Beliefs Questionnaire-towards spiders behaviors



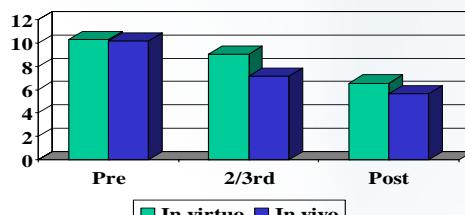
Main effect for Time (pre, 2/3, post):

11.35, $p < .01$

Main effect for Condition (in virtuo VS in vivo): 0.002, ns

Time X Condition interaction: 0.775, ns

Spider Beliefs Questionnaire-towards participants behaviors



Main effect for Time (pre, 2/3, post):

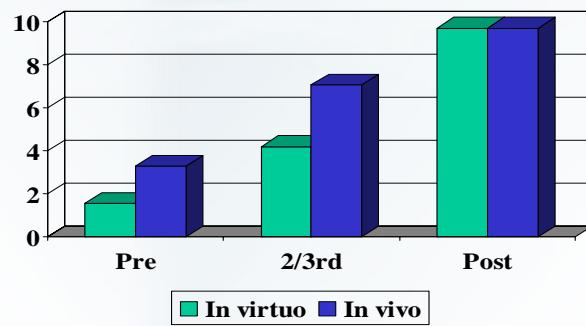
20.69, $p < .01$

Main effect for Condition (in virtuo VS in vivo): 0.631, ns

Time X Condition interaction: 0.973, ns

Results

Behavioral Avoidance Test



Main effect for Time (pre, 2/3, post): 90.96, $p < .01$

Main effect for Condition (in virtuo VS in vivo): 5.28, $p < .05$

Time X Condition interaction: 3.53, $p < .05$

Conclusions

- There is no significant or meaningful difference in motivation towards *in virtuo* and *in vivo* exposure among children.
- Moreover, children of the *in vivo* condition presented a significantly higher interest in their treatment modality than children of the *in virtuo* condition;
 - However, certain facts may explain our results...
 - Children seemed to be more apprehensive towards the VR scenarios than in the *in vivo* exposure therapy.

Clinical implications

- About motivation:
 - In this study, children presented all motivation types along the therapy;
 - A motivation profile has been drawn from the data analysis, and identification subtype of extrinsic motivation appeared to dominate;
 - It is in concordance with Green-Demers & Pelletier (2003) data about school motivation;
 - This imply that even if children don't see therapy as a central part of their life, they really value the fact of working to overcome a difficulty;
 - Children may be less engaged in therapy than some adults, but they are willing to work consciously to reach their goal.
 - To increase children's motivation towards therapy, detailed steps of what to expect in VR need to be available for them.

Clinical implications

- VR alone, as measured after two-thirds of the treatment, appears to be insufficient to overcome arachnophobia.
- As already studied (Öst et al.2001), short-term therapy with children is easily feasible;
- About therapy:
 - VR therapy with children can't be conducted the same way it is with adults;
 - Children beliefs towards therapy need to be address in order to be corrected;
 - *In virtuo* exposure with children should be followed by an *in vivo* session;
 - Parents should be implied at some point in the therapy in order to assist their child with real-life exposure situations.

General recommandations

- Future studies should:
 - Elaborate general models of all the factors that can contribute to increase children's motivation.
 - Include qualitative measures when working with children.
 - Develop specific VR therapy programs for children that derive from the above.
 - Assess the efficacy of *in virtuo* exposure for children with a larger sample, a control condition and different therapists.

