

Virtual reality exposure therapy for school phobia*

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School phobia is characterized by fear to diverse events associated to school such as being beaten by a classmate, bullied or criticised in front of the class, having to speak in public, doing exams, getting undressed to practice sports, etc. and can frequently cause young children to a chronic school refusal leading to significant social and academic difficulties. In older children and adolescents, the risk of a low school performance and an early school dropout is increased. Diverse techniques of graded and non-graded exposure have been used in the treatment of this problem. In vivo exposure alone or preceded by imagery exposure is the treatment more frequently applied.

Clinical practice with children suggests the use of behavioural procedures requires a considerable amount of flexibility and creativity and procedures that warrantee their comprehension and cooperation. Techniques based on virtual reality address these requirements and are capable of increasing the motivation of children to participate in treatment. In line with this, our group of research has developed a series of virtual environments that can be integrated to a treatment program for children and adolescents with school phobia. To study its efficacy, 18 participants with high scores on school phobia measures were randomly assigned to a group of treatment whereas other 18 participants were assigned to a waiting list group. A specific treatment effect on school-related fears was found suggesting that exposure by means of virtual environments might be an effective treatment for school phobia.

Key words: school phobia, school refusal, school avoidance, virtual reality, psychological treatment, virtual exposure.

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Tratamiento de la fobia escolar mediante exposición con realidad virtual

La fobia escolar se caracteriza por el miedo a diversos eventos relacionados con la escuela, tales como ser golpeado por un compañero, ser objeto de burlas, ser criticado en clase, hablar delante del resto de la clase, hacer exámenes, desvestirse a la hora del deporte, etc. y lleva con frecuencia en niños pequeños a un rechazo crónico, que desemboca en una significativa dificultad social y académica. En niños mayores y adolescentes se incrementa el riesgo de un bajo aprovechamiento escolar y/o un abandono escolar prematuro. Para el tratamiento de este problema se han empleado diversas técnicas de exposición, graduada o no. Lo más frecuente ha sido emplear exposición en vivo sola o precedida por exposición con imaginación.

Trabajando con niños, se ha encontrado que el uso de procedimientos conductuales requiere de una considerable flexibilidad y creatividad, así como procedimientos que garanticen su comprensión y cooperación. Las técnicas basadas en realidad virtual pueden cumplir con esos requisitos e incrementar la motivación del niño para participar en el tratamiento. Con ese objetivo, nuestro grupo ha desarrollado una serie de entornos virtuales que pueden ser integrados en un programa de tratamiento de niños y adolescentes con fobia escolar. Para estudiar su eficacia, se asignaron aleatoriamente 18 niños con puntuaciones altas en instrumentos empleados para evaluar la fobia escolar a un grupo de tratamiento y 18 a un grupo en lista de espera. Se encontró un efecto específico del tratamiento sobre los miedos escolares, que hace pensar que la exposición mediante entornos virtuales es un tratamiento probablemente eficaz para la fobia escolar.

Palabras clave: fobia escolar, rechazo escolar, evitación escolar, realidad virtual, tratamiento psicológico, exposición virtual.

The term “school refusal” is found to be used as equivalent to school phobia, although the significance of the two expressions is different. Both expressions are referred to refusal to school attendance or the difficulty to stay at school based on emotional disorders, although the term “school refusal” has a more spread use that “school phobia” for it comprises not only the causes of school phobia but all different causes of school refusal. Some factors that may cause school refusal are: fear of being separated from parents (i.e.: a possible diagnosis of childhood separation anxiety disorder), fear related to diverse events associated to school (i.e. to be beaten by a classmate, to be bullied, to be criticised in front of the class, to speak in public, to do exams, to get undressed to practice sports, etc.), and generalized anxiety or depression (a possible diagnosis of generalized anxiety disorder or mood disorders). Among these three subtypes, school phobia can be categorized in the second group and thus, be closely related to specific phobias and social phobia. Differential diagnosis between separation anxiety and school phobia is not complex. If a child displays anxious behaviour when being separated from their mother, only to attend school, a school phobia can be then identified; on the other hand, if anxious behaviour is displayed on any type of separation (i.e.: when going to school,

on a day trip, camping, holidays, or even when going to bed alone), a separation anxiety disorder diagnosis is more accurate. According to some American studies, separation anxiety disorder shows a sooner onset, a higher frequency compared to school phobia, with middle-low class girls being overrepresented, a higher rate of obsessive compulsive disorder, and a higher proportion of psychological problems found in children and their mothers (Last, Francis, Hersen, Kazdin & Strauss, 1987). This suggests separation anxiety disorder to be a more serious disorder than school related phobia.

Distinction of the three primary clinical groups of “school-avoiders” (the separation anxiety type, the phobia type and the anxious/depressive type) was originally proposed by King, Ollendick & Tonge (1995). Years ago, some of the first school phobia definitions had appeared, for example the definition suggested by Falstein, Szurek & Svendsen (1941) describing school phobia as the enduring refusal to school attendance observed in children and adolescents who, for irrational reasons, develop active reactions of anxiety or panic in line with fears associated to a school distressing situation. The problem often begins with an undefined complain related to school or poor motivation for school attendance which progresses to a total refusal, in which permanence at school can only be achieved by parental persuasion, begs, or punishment as well as pressure from teachers. Avoiding behaviour can also be accompanied by clear symptoms of anxiety or even generalized panic at the time to go to school. Many children may return home at only half way of the school as others may leave school in an anxious state. Children might insist to express their desire to go to school and may even be ready to do it, however, they can not overcome the fear they experience at that particular moment. Refusal may appear in presence of specific stimuli: Mondays, return to school from holidays, first day of classes after recovering from illness, change of classroom or school, and evolves to a definitive refusal to assist to school, preceded by anxiety symptoms and even physical symptoms such as nausea, vomits, headaches, diarrhoea, abdominal pain and throat pain, which often disappear when the child is allowed to stay home and reappear as the possibility of attending school materializes. Sosa and Capafons (2005) found that 57.5 % of their study sample informed on some type of direct experience in the origins of their fears, 17% indicated the presence of a vicarious experience, 10.4% assumed the origin to be based on negative information and a 15,1 % could not recall the origins of their fears.

Frequently, this problem becomes the cause of a chronic refusal in small children, which leads to a significant social and academic limitation (Berg, 1992; Last & Strauss, 1990). The risk of a low school performance and/or even an early school dropout increases in older children and adolescents as compared to the general population (Kessler, Foster, Saunders & Stang 1995). Usually, school refusal may appear at all ages, although some peaks have been found at ages of 3 to 4 years, 5 to 6 years, 11 to 12 years, and 13 to 14 years, thus at the beginning of the school experience or when moving on to the next school level, also when changing to a new school (Bados, García & Fusté, 2002). The onset is abrupt in small children, although the development in older children

and adolescents is more progressive and severe: the latest and the more gradual is the onset, the worst is the prognosis (Blagg, 1987; Bragado, 1994; Echeburúa, 1993; Marks, 1991). Berg and McGuire (1971) suggested that children with school phobia have dependent personalities and are socially immature. Other variables such as homelessness and poverty, school violence and/or burnout, school climate or parental involvement are considered contextual risk factors for school refusal (Kearney, 2008). School-related fears are more common in girls, as it is usually found with childhood fears in general (Méndez, García-Fernández & Olivares, 1996).

Estimations of the incidence of school refusal and school phobia may vary according to different studies. Kennedy (1965) reports 17 cases out of every 1000 in school age children in one year in the United States of America; Chazan (1962) calculates 1 case out of every 100 school absences in the United Kingdom. One study on children aged 10 to 11 years old from the general population of the Wight Islands reveals that less than 3 % of all children with psychiatric disorders were diagnosed as having school phobia (Rutter, Tizars & Whimore, 1970). Nevertheless, several cases are not detected. The National Health Secretary of Mexico reports in its 2002 Program of Action on Mental Health Care for Child and Adolescent Psychopathology the existence of epidemiological data with an occurrence of the problem in 5% of the population in primary school and up to 25% in secondary school; Wiederhold & Wiederhold (2005) indicate this behaviour occurs in approximately 2-5% of children in school age.

To the present, available evidence on effective treatments for school refusal and school phobia comes from non-experimental or quasi-experimental research and only very few controlled studies. Most of them are single case studies (Bados, 2005). Diverse graded and non-graded exposure techniques have been used in order to eliminate anxiety reactions. Most frequently found is the use of in vivo exposure techniques alone or preceded by imaginal. Revisions on this issue can be found in King & Bernstein (2001), King *et al.* (1995) and King, Tonge, Heyne & Ollendick (2000). A good example of in vivo graded exposure is the following hierarchy used by Garvey & Hegrenes (1966) in their study: to sit in the car with the therapist in front of the school, to get out of the car and to approach to the school wall, to walk near the sidewalk, to reach the beginning of the school front entrance stairs, to reach the end of the school front entrance stairs, to approach the school front door, to enter the school, to approach the classroom when the teacher is there, to enter the classroom, to sit in the school desk when the teacher and one or two classmates are there, to sit in the school desk with a full classroom. The procedure was performed the following 20 days for a period of 20-40 minutes. Operant conditioning techniques (Ayllon, Smith & Rogers, 1970) have also been applied in both contexts, school and home, to achieve the return to school by means of graduated modeling, an increased perception of school as having a reinforcing value (achieved by increasing classmates acceptance, interesting homework and/or approval of parents and teachers) and a decreased number of reinforcing stimuli when the child stays home without attending school (parental attention, watching TV during school hours, going to bed or waking up later). It is necessary to use

praise and perhaps material or activity reinforcing stimuli until natural consequences (good grades, good relationships at school) are enough to maintain school attendance. A different technique employed in combination with the described above is social skills training, used to handle problematic interactions with classmates and/or teachers (Esveldt-Dawson *et al.*, 1982). Cognitive techniques have also been used as supporting procedures in the treatment of school refusal, correcting erroneous thoughts and beliefs in order to obtain or facilitate the behavioural and emotional desired change (King *et al.*, 1995).

Frequently, different techniques are integrated in one treatment program, as done by Kendall *et al.* (1997) who considers the following components: learning relaxation techniques; continuous and progressive exposure to anxiety and stress trigger situations; modelling; contingency reinforcement; cognitive restructuring aiming to the modification of self-criticising, negative expectations, immature thinking, cognitive deficits and cognitive strategies resulting inappropriate to meet environmental demands; problem solving strategies that include learning to identify, to circumscribe and to define conflict, to arrive to alternatives of solution and to select best among all alternatives, testing the chosen solution and proving its efficacy.

Considering the limited skills repertoire and the limited motivation for therapy usually found in children with this problem, diverse supporting elements need to be progressively introduced to enhance their collaboration, facilitating their participation in therapy. Méndez (1999) distinguishes four general strategies to get a child to interact with the phobic stimuli:

1. To reduce the level of fear generated by the phobic situation: grading the phobic stimuli presentation, using representations of the phobic stimuli in relaxing and safe environments.
2. To offer external aids that help the child to approach the phobic stimulus: by means of inciting and modeling stimuli.
3. To generate the internal changes required so the child faces the feared situation: relaxation, breathing, imagery, self-instructions.
4. To motivate the child to reproduce their approaching behaviour: by means of extinction, and positive reinforcement.

To the present, studies on treatment efficacy allow to state that treatments results for children aged 10 years old or younger are very good (95% or more successful cases) disregarding the type of intervention utilized. Results achieved in children aged older than 10 years old are less favourable (35% to 60% successful cases depending on the study), although a study reported by Blagg (1987) obtained a 93% of successful cases in a sample of 30 participants after behavioural treatment. Children with a short history of the disorder can be treated more easily than children who already experience the problem for some months. The latest or the more gradually established is the onset of the disorder, the worst is the prognosis. Children with motivated parents respond better to treatment.

The possibility of using a new type of exposure technique as an alternative or a complement to the traditional forms of in vivo exposure or imagery has been studied for little more than a decade: that is, the exposure by means of virtual reality techniques. This new form of exposure involves some advantages over traditional techniques: it offers a more increased privacy than other in vivo exposure techniques, costs are lower given that complicated logistics required for in vivo exposure are not needed, it offers a higher control of exposure parameters, allows the creation of situations that go beyond what can be found in reality, facilitates self-training and overlearning, etc. (Gutiérrez-Maldonado, 2002; Gutiérrez-Maldonado, Alsina, Carvallo, Letosa & Magallón, 2007).

Among the diverse applications of virtual reality in psychology, the field of anxiety disorders is the most studied considering the research on agoraphobia (North & North, 1994), flying phobia (North & North, 1994), acrophobia (Rothbaum *et al.*, 1995), post-traumatic stress disorder (Rothbaum *et al.*, 1999), social phobia (North, North & Coble, 1998), claustrophobia (Botella *et al.*, 1998), driving phobia (Wald & Taylor, 2000), spider phobia (Vince, 1995), etc. Hence, given the great potential of application of this technology to anxiety disorders and the social demand of new and improved intervention techniques, our research group decided to perform a study to test the efficacy of a treatment for school phobia using virtual reality environments. Clinical practice with children suggests that the use of behavioural procedures requires a great amount of flexibility and creativity and also procedures that warrantee their comprehension and cooperation (King, Hamilton & Ollendick, 1988). Virtual reality based techniques address these requirements and can increase the motivation of children to participate in treatment. Wiederhold, B. & Wiederhold (2005) have proposed school phobia treatment procedures based on virtual reality before. In a virtual simulation of a school setting children are first trained in school related-coping skills and practice in this environment until they achieve satisfactory responses. In pursuit of the same objective, our research group has developed a series of virtual reality environments which can be integrated in a treatment program for children and adolescents with school phobia.

Methods

Participants

This study considered 36 children with a mean age of 11 years and 9 months ($SD=1.69$), ranged between 10 to 15 years old, with a 63.9% of female participants somewhat higher than a 36.1% of male participants. The sample was taken from a total population of 334 children in the fifth and sixth grade of primary school and secondary school of one private and two public schools in the city of Jiquilpan, Michoacán, México. Participants were selected using three diagnostic instruments: the School Fears Inventory (IME, forms 2 and 3,

Méndez, 1988), the School Refusal Assessment Scale (SRAS, Silverman & Burke, 1987) and the Fear Survey Schedule for Children- Revised (Ollendick, 1983).

Participants were selected if they had scores superior to 30 in the IME-2 or superior to 70 in the IME-3 and also scores superior to 150 in the FSSC-R. They were also required to have the SRAS Scales “ANA” (Avoidance of Fear-Producing Stimuli in the School Setting) or “ESE” (Escape from Aversive Social or Evaluative Situations) as main variable in the functional analysis of the maintenance of school refusal.

Children were excluded if they had Getting Parental Attention (SRAS, subscale 3) as main variable in the functional analysis of the maintenance of school refusal, given that this condition is associated to the separation anxiety disorder (Ollendick & King, 1994), or if they presented antisocial behaviour or a history of skipping off school. Children were also excluded if they presented other psychological problems that required treatment (depression, developmental disorders, mental retardation or oppositional defiant disorder).

Instruments

A system of virtual environments was developed and applied on PC systems and a 17 inch CRT screen was used as visual projection system. Software utilized to design virtual environments included a variety of tools, 3D Studio Max 7 was used to create objects and animations, Poser to create characters (avatars), Photoshop 6.0 for the final graphic retouch of images and textures, Audacity for audio editing, and Virtools Dev 3.0 to program navigation and interaction.

Anxiety trigger elements and situations included in the environments were selected based on the most updated scientific literature related to the school fears and concerns more frequently found, and the results obtained in the first administration of the IME and FSSC-R. Each environment was divided into two levels of interaction, an “easy” level with a moderate performance demanded including stimuli provoking low levels of anxiety with indulgent authority roles, and a “difficult” level with an increasing amount of anxious stimulation, the presence of intimidating avatars and demanding authority roles, and the increasing amount of school performance requirements.

Environment 1. The school. The first environment simulates a school composed of a building and an exterior courtyard. The building has a rectangular basement of one single floor with only one front door entrance. The entrance communicates with two large corridors with a series of doors of different classrooms. The “easy” level of the environment requires the user to go to the main building and to search for a specific classroom. Two interactive characters can be found at the entrance. After the first five minutes of the environment exploration a bell is activated to indicate the student to enter the assigned classroom. The activity is then considered to be finished. In the “difficult” level, the student is also given instructions to explore school and localize a specific classroom. Many characters can be found at the entrance door and

corridors. When the student is located at one specific spot of the corridors, an intimidating avatar is activated who, for no apparent reason, challenges him to meet after classes. Next, a bell rings indicating the student to enter the assigned classroom. The activity is then finished.

Environment 2. The classroom. The classroom consists of four rows and four columns (16 school desks). Both levels of difficulty in this environment are determined by the type of responses avatars simulating classmates and the teacher offer to the behaviour displayed by the student. The “easy” level allows the user to seat immediately anyplace close to the door without having to move much and be exposed to the look of their classmates. The avatar of an indulgent teacher asks the students to introduce themselves from their place in the classroom giving their name, surname, and age and to talk about any hobby. The professor acts as a model introducing himself to the class. The audience consisting of virtual students behaves in a neutral way all the time, making no critiques or comments. Later on, the teacher asks the students to go in front of the class and resolve a mathematical calculus on the blackboard. If the students solve the problem correctly the teacher offers a positive verbal reinforcement whereas if the students make a mistake the professor gives them another opportunity to try again. If the solution is mistaken again the teacher asks the students to return to their school desk and to keep trying, using a neutral tone. The activity is finished when the teacher makes a comment to the whole classroom reinforcing their participation in class and their positive attitude towards trying to solve problems. In the “difficult” level the subject must be seated in a chair in the centre of the classroom surrounded by the other students and near a group of intimidating characters. An avatar simulating the demanding teacher requests the students to go in front of the class to introduce themselves giving their name, surname, and age and also talking about any hobby. The self introduction is not previously modelled by the teacher and the audience responds with expressions of discontentment and pejorative comments. Next, the subject must solve a complex arithmetic problem on the blackboard. The teacher makes no commentary if the solution is correct. If the solution is mistaken, the pupil is verbally punished and is not allowed to have another opportunity to try again. Disregarding the result, the rest of the class adopts a critical position, responding with expressions of discontentment and pejorative comments. As it occurs with the “easy level”, the activity is finished when the teacher makes a comment reinforcing the participation in class and the positive attitude towards trying to solve problems.

Measures. Instruments used for the assessment of participants are described below.

– IME, Inventario de Miedos Escolares (*School-Related Fears Inventory*) by Méndez (1988). It is a self-report questionnaire. Adapted versions of the original 50 items IME were used: IME-2 (Méndez *et al.*, 1996) for children aged

6 to 12 years old and IME-3 (Méndez *et al.*, 1996) for children aged 12 to 18 years old.

– FSSC-R (*Fear Survey Schedule for Children Revised*) (Ollendick, 1983; Ollendick, Yule & Olier, 1991), Spanish translation by Sandín & Chorot (1998), consists of a revised form of the FSSC by Scherer and Nakamura (1968). It is one of the instruments more frequently used for the assessment of childhood fears.

– SRAS-C (*School Refusal Assessment Scale, children version*) by Silverman & Burke (1987). It identifies variables related to the origin of school refusal classifying them in four groups: avoidance of fear-producing stimuli in the school setting, escape from aversive social or evaluative situations, getting parental attention, and positive tangible reinforcement.

– STAI-C (*Strait-Trait Anxiety Inventory for Children*) by Spielberger, Edwards, Lushene, Montuori & Platzek (1973). Spanish adaptation by Seisdedos (1990).

Procedure

The sample was divided into two groups, 18 participants were randomly assigned to a group of treatment and 18 were assigned to a waiting list group. The treatment procedure was an adaptation of the protocol used in the treatment of social phobia by Klinger (Riva, Botella, Légeron & Optale, 2004). It was adapted and restructured for the treatment of school phobia in a child-adolescent sample. For the first session, parents who showed disposition to collaborate with the investigation were sent a citation. They and their children were given information about the therapeutic procedure and individual tests were performed. The second and third sessions aimed at applying procedures of relaxation training with imaginal exposure exercises to a hierarchy of fears associated to school. Virtual environments were applied during the fourth, fifth and sixth sessions. Assessment was carried out in the seventh session, and results and general conclusions were offered during the last session.

Results

Results were analyzed with inter-intra subjects 2x2 designs taking the experimental condition (group in treatment and control group on a waiting list) as the intergroup factor, and the pre and post-treatment measures obtained in the school fears questionnaire (IME), the general fears questionnaire (FSSC-R), the functional variables of school refusal (SRAS) and the anxiety scale (STAI-C). Results obtained with the SRAS and STAIC questionnaires have been described elsewhere (Gutiérrez-Maldonado *et al.*, 2007). The present paper analyzed results obtained with IME and FSSC-R scales.

Homogeneity regarding gender and age was examined for both treatment and control groups before analyzing data on the efficacy of treatment. Mean age for participants in the treatment group was 12.39 (SD=1.72) with 61.1%

of female participants and 38.9% of male participants whereas the mean age for the control group was 11.44 (SD=1.58) with 33.3% of male participants and 66.7% of female participants. T-test showed no significant differences in age between groups ($t= 1,086$; $p= 0,286$) and χ^2 tests indicated there were no significant differences in gender distribution ($\chi^2= 0.061$; $p= 0,805$). Differences in the distribution of school level (primary and secondary school) were also not found ($\chi^2= 1.460$; $p= 0.227$).

Given that different forms of IME (IME-2, IME-3) were used to assess the school-related fears in primary and secondary school students, its analysis required their scores to be typified in order to have only one measure to facilitate comparison. "Post" measures were typified from "pre" measures in order to clarify the effect of treatment, which allowed verifying if the displacement of the distribution of school related-fears scores towards the low end as a result of treatment was more noticeable in the experimental group as compared to the control group. A significant interaction was found between groups and moment of assessment regarding their effect on school-related fears, ($F= 17.087$; $p< 0.001$), indicating fears were more importantly reduced in the group receiving treatment. Figure 1 shows that intensity of school-related fears in the experimental group drops noticeably after treatment (to -2.32 ; $SD= 1.483$) whereas no changes in this variable were detected in the control group.

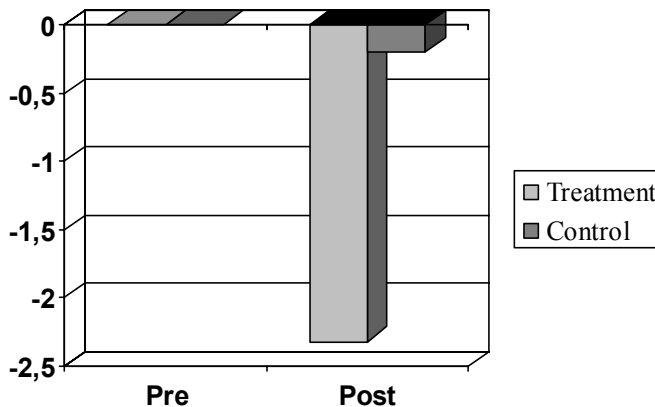


Figure 1. Experimental group and control group scores in the school-related fears questionnaire (IME) before and after treatment.

On the other hand, the interaction between groups and moment of assessment had no significant effect on general fears ($F= 0.624$; $p< 0.436$). Figure 2 shows that before treatment, the mean score for intensity of general fears (FSSC-R) in the experimental group was 153.24 (SD=17.9) and 150.38 (SD=27.86) in the control group. After treatment, these scores are similarly reduced in both

groups, presenting a mean of 143.32 (SD=32.27) for the experimental group and a mean of 146.12 (SD= 23.14) for the control group.

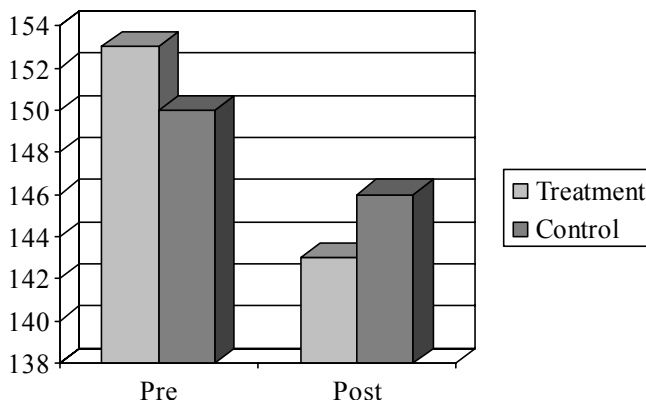


Figure 2. Experimental group and control group scores in the general fears questionnaire (FSSC-R) before and after treatment.

Discussion and conclusions

School phobia has been addressed by a variety of psychological interventions from the cognitive-behavioural approach, but no studies reporting data on virtual reality exposure therapy have been performed.

The virtual reality exposure treatment used in the present study was able to reduce the intensity of school-related fears significantly, but did not influence general fears in a significant manner. These results show that the impact of treatment can be considered to be specific, particularly influencing on school-related fears and on its social component. Given that virtual environments were developed based on the inclusion of anxiety trigger stimuli usually found at school, results show its validity as a specific treatment for fears in this setting. Besides the specific influence on school-based fears, treatment reported benefits in other aspects of school phobia as indicated by the other results obtained in the same sample described elsewhere (Gutiérrez-Maldonado *et al.* 2007). It was particularly found that treatment also generated decreased scores of avoidance of school-related stimuli provoking negative affectivity, and escape from aversive social or evaluative situations (SRAS) as it did with the scores of the state anxiety scale (STAIC).

Taken together, these results allow us to suggest the use of virtual reality exposure as an important tool among the rest of techniques for the treatment of school phobia. Its motivating properties can enhance involvement in treatment for children and adolescents who, despite having this problem, are reluctant to participate in intervention programs based on different treatment strategies.

Given the reduced number of sessions used for intervention, this treatment proved to have both efficacy and efficiency. Our intervention consisted of 8 sessions; only 6 of them were aimed to applying a treatment component: providing information, relaxation training, exposure by means of imagery and virtual reality. Other interventions previously applied to school phobia consisted of a larger number of sessions. Most of them included more than twice the number of sessions considered in our intervention. For example, Garvey & Hegrens (1966) applied their treatment during 20 sessions. King *et al.* (1998) applied a treatment of only 6 sessions for children but also included 5 more sessions with parents and one with the teacher.

Our study presents an additional value regarding the cultural background of its sample. So far, studies evaluating efficacy of treatments addressing this problem have been mainly performed on American, English and Australian samples. The data from our study, performed on a Mexican sample, offer additional evidence regarding the efficacy of this type of cognitive-behavioural interventions for school phobia in a wider range of cultures.

Given that the intervention applied in the present study included other elements beyond virtual exposure, it is necessary that future studies obtain information about the specific contribution of the virtual exposure component to the therapy final outcome. It is also important to complement this study with others that allow for the control of the non-specific effects of the therapeutic relation. In fact, Last, Hansen and Franco (1998) found that information about the problem and support therapy were as efficient as the cognitive behavioural intervention when treating school phobia. Hence, more information about the added value of virtual reality interventions above others based on information and support are required. Finally, follow-up studies are convenient in order to prove that effects of a treatment based on virtual reality are prolonged over time. Some studies in this line show positive results considering a 3 to 12 month follow-up (Kearney & Silverman, 1990; King *et al.*, 1998; Last *et al.*, 1998), or even longer (King *et al.*, 2001).

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