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Yoga for the prevention of depression, anxiety, and aggression and the promotion of socio-emotional competencies in school-aged children

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Children and youth coming from disadvantaged socioeconomic backgrounds are at risk of developing behavioural problems. This study examined the efficacy of a Yoga programme implemented in a low-socioeconomic status school, for the prevention of depression, anxiety, and aggression. After-school workshops were delivered twice a week during 12 weeks to 125 students in 5th, 8th, and 9th grades, enrolled in a school in Bogotá, Colombia. Participants were randomly assigned to an intervention and to a control group. Children's anxiety, depression, aggression, and some socioemotional competencies (specifically empathy, anger management, and prosociality) were quantitatively assessed before and after the intervention, by means of self- and peer-reported questionnaires. Qualitative data were also collected to assess children's perceived benefits from the workshops. Results suggested a potential of the programme to reduce children's anxiety problems, in particular. Results are discussed in terms of recommended improvements to the programme and its future evaluation.

Keywords: Yoga; intervention; prevention programmes; depression; anxiety; aggression; socio-emotional competencies

Introduction

Children and youth raised in lower socioeconomic contexts face many challenges that demand abilities for coping with stressful situations. These situations often put them at risk of developing mental and behavioural problems. In fact, research has shown that perceived chronic stress is related to anxiety, depression, and aggression (Suldo, Shaunessy, & Hardesty, 2008). Anxiety and depression can lead to maladaptive development given that children who exhibit these problems are more prone to be victimized by their peers (Kochenderfer & Ladd, 1996; Perry, Hodges, & Egan, 2001), which puts them at risk of psychopathology (Widom, 2000). On the other hand, research on aggression shows that children who are repeatedly aggressive in school have a higher risk of getting involved in violence and criminality later in life (Farrington, 1993; Huesmann, Eron, Lefkowitz, & Walder, 1984). Given the consequences and relative stability of these problems across life, especially when the onset occurs in childhood and adolescence (Fombonne, Wostear, Cooper, Harrington, & Rutter, 2001; Weissman et al., 1999), researchers and

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educational practitioners have looked for intervention alternatives to prevent them early in life (Shonkoff, Boyce, & McEwen, 2009).

Helping children to develop coping strategies to deal with stressful contexts can be an effective way to prevent depression, anxiety, and aggression. According to Harper (2010), Yoga might give children a "framework for processing and handling their emotions, helping to defuse anger and stress" (p. 101). In light of this, the present study explored the potential benefits of a school-based Yoga programme for the prevention of anxiety, depression, and aggression, in low-socioeconomic status (SES) children and youth.

One of the main concerns for children's development has to do with school violence. This problem affects between 9% and 54% of children and youth worldwide (Vanderbilt & Augustyn, 2010). In Bogotá, Colombia, a survey study conducted by the Secretary of Education of Bogotá (Chaux, 2013) revealed that around 35% of students in Grades 5 to 9 reported being victims of physical aggression, and around 25% reported being victims of exclusion in their schools. Previous research has shown that aggression can be attributed to the exposure to stressful environments, for example, community violence, family maltreatment, and aggressive peers (Saldarriaga, Velásquez, Bruce-Santo, Bukowski, & Chaux, 2009), which are more characteristic of public schools (Chaux, 2013). This could be related to the fact that, in Bogotá, 66% of public schools are below the mid-level of socioeconomic conditions (Secretaría de Educación del Distrito, 2013).

In addition to these contextual factors, aggression has also been associated with a lack of socio-emotional competencies such as empathy and anger regulation (Chaux, 2012). Empathy refers to the cognitive and emotional capacity to experiment feelings that are congruent to the situation of another person (Hoffman, 2000), and anger regulation refers to the capacity to modulate the degree of emotional reactivity (in this case, anger) to cope with the demands of the environment (Saarni, Campos, Camras, & Witherington, 2006). This has led to the development and implementation of interventions aimed at preventing school violence through the promotion of socio-emotional competencies (Chaux, 2012).

Another concern for children's development is depression and anxiety, given that children who exhibit these problems also experience social withdrawal (Rubin, Coplan, & Bowker, 2009), peer rejection (Harrist, Zaia, Bates, Dodge, & Pettit, 1997), and victimization (Kochenderfer & Ladd, 1996; Perry et al., 2001), all of which impair their social development. In Bogotá, a survey study showed that 52% of school-age children report moderate to high levels of social anxiety related to school activities (Chaux & Velásquez, 2008). Another study conducted by the first author in the same city with 1,346 elementary-school students showed that 78% of children reported having experienced depressive feelings, from sometimes to always, in a period of 2 weeks. Taking into account the association between these problems and chronic stress (Suldo et al., 2008), one way to prevent these problems in school-aged children is to provide them with tools to cope with and reduce stress.

One promising alternative for the prevention of violence and the promotion of psychological well-being is Yoga training (Lamb, 2004). Yoga is defined as a "holistic system of multiple mind body practices for mental and physical health that include physical postures and exercises, breathing techniques, deep relaxation practices, cultivation of awareness/mindfulness, and meditation" (Khalsa, Hickey-Schultz, Cohen, Steiner, & Cope, 2012, p. 81). The practice of Yoga is considered to benefit individuals in different ways, exerting a positive influence on the individual's physiological and psychological systems. It has been explained that Yoga influences the nervous system by triggering the parasympathetic nervous system, which inhibits the sympathetic nervous system responsible for causing the stress response (Lamb, 2004; Vempati & Telles, 2002). In line with this, Steiner,

Sidhu, Pop, Frenette, and Perrin (2013) state that, through calm breathing, postures, and meditation, Yoga might help to regulate the autonomic nervous system, to calm down, and to focus the mind. Based on this, Yoga may have an effect of reducing depression and anxiety by enhancing adaptation through the improvement of self-regulatory capacities (Skinner & Zimmer-Gembeck, 2007) and by acting on the neural circuitry associated with stress reactivity function (Davidson et al., 2003). Also, Yoga training may be an effective method to reduce aggression (Steiner et al., 2013) by helping children and youth to develop abilities such as emotional regulation and empathy (Khalsa et al., 2012; Serwacki & Cook-Cottone, 2012). Steiner et al. (2013) pose that improvement in these skills may be achieved by Yoga training insofar as it increases the individual's cognitive capacities such as attention, concentration, and awareness of one's emotional states.

Studies on the beneficial effects of Yoga have suggested that it has a positive impact on individuals' well-being (for a review, see Silva, Ravindran, & Ravindran, 2009). For example, research findings have shown an effect of Yoga training on the reduction of anxiety (Kirkwood, Rampes, Tuffrey, Richardson, & Pilkington, 2005; Li & Goldsmith, 2012), depression (Shapiro et al., 2007), physical aggression (Berger, Silver, & Stein, 2009), anger control (Khalsa et al., 2012; Yoshihara, Hiramoto, Sudo, & Kubo, 2011), and perceived stress (Bayne, Aten, Smith, Greer, & Francisco, 2007; Granath, Ingvarsson, von Thiele, & Lundberg, 2006). However, most of these studies have been conducted in adult populations. Given the importance of preventing problems early in life, more attention needs to be paid to intervention programmes during childhood and adolescence. For this purpose, school settings become efficient contexts to intervene. On the one hand, the school is one of the settings where most of children's and adolescents' social life takes place; therefore, within this setting, they face challenging experiences, deal with stress, and manage anger. On the other hand, the school system and its organization provide adequate facilities for the implementation of prevention programmes. Therefore, this study sets out to examine the beneficial effects of Yoga interventions in school-aged children from low-income families.

Some studies have already explored the efficacy of Yoga training on children's school behaviour. For example, a recent study showed that Yoga reduced trauma-related distress in children (Culver, Whetten, Boyd, & O'Donnell, 2015). A meta-analysis conducted by Serwacki and Cook-Cottone (2012) showed that although participation in Yoga training may have beneficial effects on emotional regulation, attention, anxiety reduction, reactivity, and physical aggression for children in school settings, there are several methodological limitations that need to be addressed such as randomization, greater samples, and statistical clarity. A few studies, however, can be used as good models of rigorous research. One, conducted by White (2012), examined the effect of an 8-week Yoga programme, where 155 fourth- and fifth-grade children attending public schools were randomly distributed in experimental and control groups. Results showed improvements in self-esteem and self-regulation for children in both groups, but those in the experimental group reported having better coping strategies for stress, compared to the control group. Another study, conducted on seventh-grade students by Khalsa et al. (2012), evidenced positive results of Yoga training for the improvement of anger control. In this study, 121 participants were randomly assigned to physical education classes and Yoga classes during 11 weeks. At the end of the intervention, the students that took Yoga classes showed statistically significant differences when compared to the students who attended regular physical education classes. In light of these previous experiences, the present study addressed prior methodological problems revealed in the meta-analysis by using randomization at the individual level, a moderate sample, and advanced statistical techniques.

In addition to addressing methodological issues, this study included rigorous standards for the implementation of a Yoga programme in a school setting. With regards to who delivers the programme, it needs to be noted that teaching children Yoga in a school setting can be overwhelming for those who lack preparation and training. Previous experiences have shown that teaching Yoga can be challenging in some settings where behavioural problems are more common given the large number of students and the wide variety of unmet needs (Harper, 2010). In this study, experienced Yoga teachers trained to manage large classes and children with behavioural problems implemented the intervention. This allowed us to have a better control over the quality of the implementation of the programme at this stage.

In sum, given that research findings suggest positive effects of Yoga training on school-aged children and youth, the main goal of the present study was to evaluate the impact of participating in extracurricular Yoga workshops on the prevention of anxiety, depression, and aggression. As a secondary goal, we examined the effects of Yoga on the development of three socio-emotional competencies: empathy, anger management, and prosociality. In particular, we were interested in replicating previous evaluation experiences (Khalsa et al., 2012; White, 2012), testing these effects in an urban sample of Colombian students coming from disadvantaged socioeconomical backgrounds.

Method

Participants

The participants of this study were 296 students from a public school (operated by a private educational institution) in Bogotá, from Grades 5, 8, and 9.[1] The students were informed about the purpose of the study and were given consent forms for their parents to grant them permission to participate in the study. A total of 153 signed forms were returned. Out of these, a total of 125 children were interested and had the availability to participate in the Yoga workshops. These students were randomly assigned to an intervention group and a control group in waiting list to take the Yoga workshops after the evaluation was finalized. Foreseeing attrition from the workshops, more children were assigned to the intervention group ($n = 68$) compared to the control group ($n = 57$). The students that were selected for the Yoga workshops were randomly divided into five groups, three elementary school groups (Grade 5) and two high-school groups (Grades 8 and 9). Across the 12-week intervention, a total of 11 students dropped out from the workshops. Analyses conducted to compare baseline differences between children who dropped out and children who remained in the workshops showed a statistically significant difference in peer-reported aggression ($F_{(1,\ 61)} = 7.40$, $p < .05$). Mean differences indicated that children who dropped out had lower levels of aggression at baseline.

Procedure

In June 2012, the school and the students were invited to participate in the project. Just before students went on their mid-year break, the active parental consent procedure was implemented to have the final list of participants and conduct the random assignment to the groups. In July 2012, we conducted a pretest to assess students' outcomes right after students came back from their mid-year break and 1 week before the workshops started. In October, focus group meetings with a subsample of students from the experimental group were held. The purpose of these meetings was to evaluate the participation process and explore what was the perception of the students in relation to the benefits of participating in the workshops. In November 2012, right

after the Yoga workshops were finished, posttest information was collected. This was accomplished using the same instruments employed in the pretest.

Intervention

In the 3rd week after returning to school from the mid-year break, the Yoga workshops started at school. Twenty-four 2-hr sessions were held for each of the five groups. An instructor, who was a school outsider and who was experienced in the conduction of Yoga trainings, led the sessions. To reinforce attendance, children were offered a small snack after each workshop.

Yoga professionals affiliated to Corporación Dunna (www.dunna.org) – a non-governmental organisation dedicated to the development of intervention programmes to create peace-building strategies in Colombia – developed a protocol that described in detail the activities to be carried out in each session. This protocol was designed according to the Satyananda Yoga tradition. This approach seeks to integrate all aspects of the individual: physical, energetic, mental, emotional, psychic, and spiritual (Saraswati, 1990). Overall, the protocol consisted of a number of postures (asanas), breathing exercises (pranayamas), relaxation (yoga nidra), and meditation techniques that were chosen for each of the 24 sessions. The activities in each session included postures practised in a dynamic and active way, with their names based on animals or flowers to help children understand and enjoy them. The selection of the postures was made based on previous empirical findings that showed that they could be used specifically to stimulate self-confidence and self-worth, as well as self-regulation, relaxation, and consciousness (Saraswati, 1990).

Instruments

Instruments to collect the information used as pretest and posttest data evaluated individual differences among the participants of the study. The following information describes each of the assessed variables.

Depression and anxiety

We relied on self-reports to assess anxiety and depression. According to Miller (2012), given that these attributes may not be completely visible to external evaluators, self-reports provide an essential assessment of these problems. Items were selected and adapted from the Strengths and Difficulties Questionnaire (Goodman, Meltzer, & Bailey, 1998). Students reported how often they had experienced feelings of depression and anxiety during the last month. The questionnaire included three items to evaluate depression (Cronbach's alpha = .71) and three items to evaluate anxiety (Cronbach's alpha = .70), which asked children how frequently they had experienced some feelings during the past 2 weeks. The items for depression were: "I have felt sad", "I have felt depressed", "I have felt unhappy". For anxiety, the items were: "I have felt worried", "I have felt nervous", "I have felt stressed". The possible answers were "0 = *Never*, 1 = *A few times*, 2 = *Sometimes*, 3 = *Almost always*, 4 = *Always"*. The scores for these two variables were obtained after calculating the items' average for each scale.

Aggression

This type of behaviour is easily observable by others, therefore we relied on peer assessments for the assessment of this variable, where multiple observers provide their perception

on each participant's behaviour. An unlimited peer nomination procedure, widely used in peer research (Bukowski, Cillesen, & Velásquez, 2011; Rubin, Bukowski, & Parker, 2006), was utilized. Children were asked to pick, from a list of all participating peers, those who fit a particular description. To measure aggression, a set of three items tapping into physical, verbal, and relational aggression was used. The items were: "During the last week, which of your classmates hit or pushed someone else?" (physical), "During the last week, which of your classmates made fun of someone or insulted him or her, making him or her feel bad?" (verbal), "During the last week, which of your classmates rejected or tried to keep others out of their group?" (relational). Scores were calculated based on the number of nominations received by each child. Scores on the three items were averaged to represent an overall index of aggression (Cronbach's alpha = .86). Given differences in the number of nominators for each class, scores were converted to proportions, dividing the number of nominations received by the total number of nominators in the class, minus one.

Socio-emotional competencies

Empathy and anger management were measured by means of two self-report questionnaires, which have been validated and widely used in the Colombian population, particularly for the National Test of Citizenship Competencies administered by the Instituto Colombiano para la Evaluación de la Educación (ICFES, 2013) to all fifth- and ninth-grade Colombian students. Empathy was assessed with five items, in which students reported about their feelings when facing adverse situations that could happen to others. Examples of these items are: "When someone I don't get along with trips, falls, and gets hurt" and "When someone I don't get along with is sad"; the response options were 0 = *I find it funny*, 1 = *I don't care*, 2 = *I feel bad*. The five items were averaged to obtain an indicator of each student's level of empathy (Cronbach's alpha = .85). Anger dysregulation was used as a reversed proxy of anger management. We measured this construct using a set of four items where students reported how often, during the last week, they experienced the situation mentioned in the item. The following statements exemplify two of the items: "During the last week, how many times did you get angry and ended up acting out without thinking?" and "During the last week, how many times did you yell at someone because you were very angry?"; the possible answers were 0 = *Never*, 1 = *Once, 2 to 4 times*, 3 = *5 or more times*. The mean score of the four items indicated the extent to which students had problems regulating their anger (Cronbach's alpha = .74).

Prosociality, on the other hand, was assessed with the same peer nomination procedure that was utilized in this study to measure aggression. Four items were used for children to report how often they engaged in prosocial behaviours, for example: "During the last week, which of your classmates helped those in trouble?", "During the last week, which of your classmates cheered up others who were sad?" Scores were calculated with the mean of the four items for each child (alpha = .74) and were transformed to proportions, as explained above, to control for differences in the number of nominations.

Perceived benefits

To complement the impact evaluation of the programme, we conducted a formative evaluation for purposes of the programme improvement. The qualitative information was collected to evaluate the variety of students' perceptions on the potential benefits of the workshops. In order to collect this information, three focus groups were conducted at the

end of the intervention, two from elementary and three from high-school students. Each group consisted of a random sample of four students. Some of the questions used to evaluate these benefits were: "Why do you think these workshops are useful?", "What have you learned after going to the workshops?", "What changes have you noticed at school or at home after taking part of to the workshops?"

Results

Quantitative analysis on the impact of the workshops on students' competencies

Mixed analyses of variance (ANOVAS; experimental condition X repeated measures) were conducted in order to evaluate whether the programme had a positive impact on the students who took part in the Yoga workshops. Specifically, changes on the scores of the evaluated variables between the students of the experimental and the control group were compared before and after the intervention. The objective was to examine the degree to which the students that practised Yoga benefited from the workshops, in comparison to the students that did not participate in them. Descriptives for each variable are presented in Table 1.

Baseline differences

Independent samples *t*-test analyses were conducted to verify that the intervention and control group did not differ at baseline in the variables of interest. Results revealed only a statistically significant difference in depression ($t = 2.76$; $p < .05$). As shown in Table 1, the intervention group showed slightly higher levels of these variables compared to the control group.

Main effects

Results from the mixed ANOVAs only evidenced significant interactions for anxiety ($F_{(1, 123)} = 4.03$; $p < .05$) and depression ($F_{(1,123)} = 9.52$; $p < .05$). As evidenced in Table 1,

Table 1. Description of the pretest and posttest measurement of the outcome variables for each group.

	Group							
	Control				Experimental			
	Mean	Min	Max	*SD*	Mean	Min	Max	*SD*
Aggression – pretest	.12	0	1	.08	.12	0	1	.08
Posttest	.08	0	1	.04	.09	0	1	.07
Anxiety – pretest	1.60	0	4	.87	1.76	0	4	.96
Posttest	1.70	0	4	.73	1.57	0	4	.88
Depression – pretest	.96	0	4	.73	1.43	0	4	1.03
Posttest	1.14	0	4	.83	1.14	0	4	.90
Empathy – pretest	.86	0	2	.51	.86	0	2	.64
Posttest	1.16	0	2	.42	1.09	0	2	.47
Anger dysreg – pretest	.92	0	3	.63	1,03	0	3	.73
Posttest	2.11	0	3	.60	2.13	0	3	.74
Prosociality – pretest	.11	0	1	.05	.12	0	1	.06
Posttest	.08	0	1	.05	.08	0	1	.05

students who participated in the Yoga workshops reported a decrease in their anxiety and depression levels, while the control-group students experienced an increase in these indicators. However, given the pretest difference in depression, analyses were also conducted via an analysis of covariance (ANCOVA), with posttest scores as the dependent variable and pretest scores as the covariate. These results showed no significant main effects of the programme on depression. Further paired comparisons of pre- and posttest scores for anxiety showed that there was a statistically significant decrease in anxiety ($F_{(1,\ 123)} = 3.87$; $p < .05$), while no significant change in this variable was observed for the control group. According to Cohen's *d*, children in the experiment group showed a reduction of .21 standard deviations in anxiety.

Intervention effects moderators

Mixed ANOVAs that differentiated participants according to certain criteria were conducted in order to evaluate if the effects of the programme can be obtained under certain conditions. The criteria included: degree to which the participants attended the workshops, sex, school level (elementary vs. high school), and aggression level at the pretest. Results evidenced significant interactions for self-report on anxiety and depression, as well as peer evaluation of aggression, prosocial behaviour, and anger management.

First, we looked at differences in the effect of the intervention as a function of the time of exposure to the Yoga training. Given that mean attendance corresponded to 17 out of the 24 sessions, children who participated in the intervention were grouped into two categories: low-attendance (1 to 16 of the 24 sessions, $n = 21$) and high-attendance (17 or more of the 24 sessions, $n = 47$). *t*-Test comparisons indicated that low- and high-attendees differed significantly in their pretest levels of aggression ($t_{(56)} = –2.23$, $p < .05$, low = .11, high = .15). Mixed ANOVA analyses showed an interaction effect of treatment exposition on empathy (Wilk's Lambda .93; $F_{(1,\ 66)} = 4.82$; $p < .05$) and depression (Wilk's Lambda .87; $F_{(1,66)} = 9.89$; $p < .05$). Contrast effects analyses showed significant differences in empathy between the low- and high-attendance group at posttest (low = 1.74, high = 2.31), but not at pretest. In the case of depression, contrast effects revealed significant differences between pre- and posttest for the high-attendance group (pretest = 1.33, posttest = .85), but not for the low-attendance group.

Comparing the effects of the intervention between elementary (n control = 32, n experimental = 42) and high school (n control = 25, n experimental = 26), mixed ANOVA results showed a significant interaction among treatment, school level, and repeated measures of depression (Wilk's Lambda = .96; $F_{(1,\ 121)} = 3.95$; $p < .02$). When the mean differences were examined closely (see Figure 1), contrast analyses revealed that pretest and posttest difference comparisons were found only for elementary school children. While depression increased for children in the control group (pretest = .73, posttest = 1.19), it decreased for children in the experimental group (pretest = 1.31, posttest = 1.03).

A significant interaction was also found for peer-reported prosocial behaviour (Wilk's Lambda = .97; $F_{(2,\ 121)} = 3{,}97$; $p = .04$). Contrast effects analyses showed a positive effect of the programme for high-school students only. As exposed in Figure 2, students in the control condition both in elementary and high school were likely to diminish their cooperative behaviours towards the end of the school year. However, while children in the Yoga training condition from elementary school showed a decrease pattern similar to that of the control group ($p = .00$), those in high school who participated in the programme kept the same levels of prosocial behaviour across the 6-month period ($p = .90$).

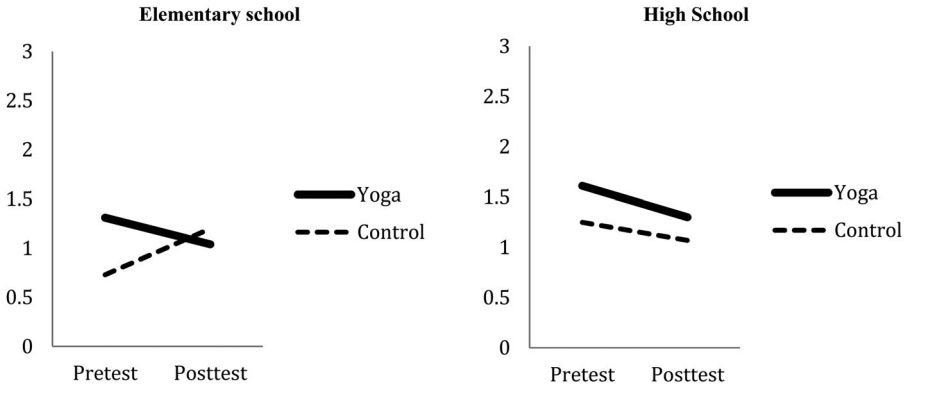

Figure 1. Schooling level moderation in the effect of Yoga workshops on depression.

Additionally, we evaluated the degree to which the effects of the programme varied as a function of children's initial level of aggression. To run these analyses, the children in the control and treatment conditions were subdivided into two groups: those children with scores in aggression above one standard deviation (*n* control = 13, *n* experimental = 16) and those below one standard deviation (*n* control = 19, *n* experimental = 26). Mixed ANOVA results showed a significant interaction for aggression (Wilk's Lambda = .52; $F_{(3,\ 121)}$ = 36.61; $p < .05$). Results from contrast analyses showed that the interaction was not due to a difference in the treatment condition, but to the initial status in aggressive behaviour. A similar pattern was found for both the control and experimental condition: While highly aggressive children reduced significantly in their level of aggression (pretest = .19, posttest = .08, for experimental; pretest = .21, posttest = .08, for control), low-aggressive children remained the same (pretest = .09, posttest = .07, for experimental; pretest = .09, posttest = .06, for control).

Finally, the differential effect of Yoga training on girls (*n* control = 22, *n* experimental = 33) and boys (*n* control = 22, *n* experimental = 18) was also analysed with mixed ANOVA analyses. A significant interaction among treatment, sex, and repeated measures of depression was revealed (Wilk's Lambda = .91; $F_{(3,\ 91)} = 2.83$; $p < .05$). Contrast analyses (see Figure 3) showed that the reduction of depression for the treatment group was

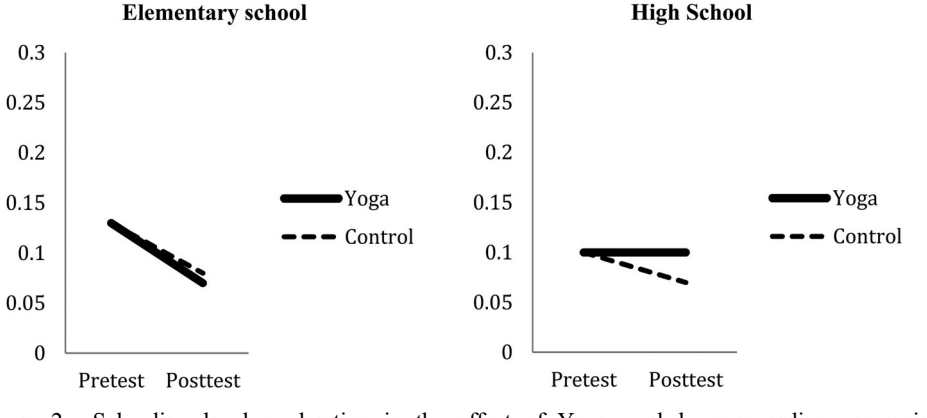

Figure 2. Schooling level moderation in the effect of Yoga workshops regarding pro-social behaviour.

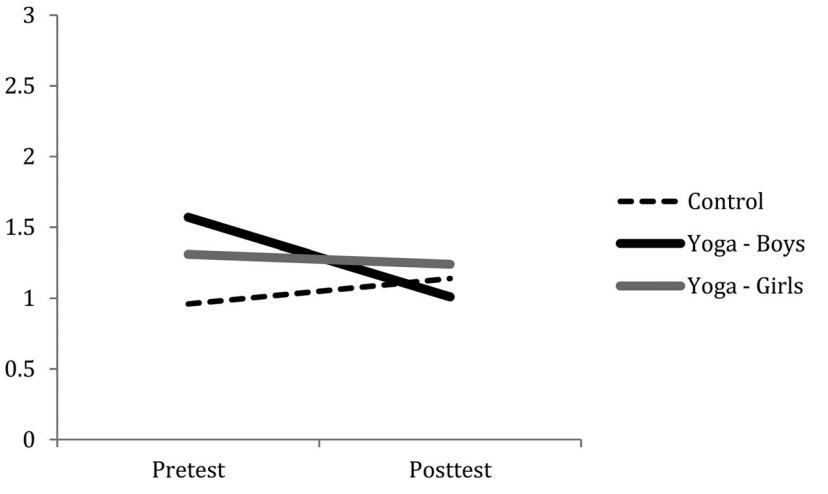

Figure 3. Sex moderations in the effect of Yoga workshops on depression.

statistically significant for boys (pretest = 1.45, posttest = 1.30), but not for girls (pretest = 1.29, posttest = 1.23).

Qualitative analysis on the perceived impact of the workshops

In addition to the results shown above, we also analysed the information obtained through focal groups from 12 students (*n* elementary school = 4, and *n* high school = 8). Data were coded and categorized by two researchers. The purpose of the analysis was to identify the variety of perceptions from the students with regards to the benefits of the programme.

Overall, a common and prevalent category on *stress reduction* was found in the reports of four elementary-school students and six high-school students. A fifth-grade student said: "I learned to relax, I could not relax before, but now I don't fight as much with my classmates". Another elementary school student said:

> I have felt more relaxed, since I started Yoga I don't fight as much, when I have homework to do I don't get stressed, I do them well, with care and I am very relaxed, that's why I like Yoga classes, because I feel relaxed.

On the other hand, a high-school student reported:

> Before I was all stressed out, and that affects us, I mean, I mixed one thing with the other, I had problems at home and I came here to school all stressed and got it back at everybody; but not anymore, now one knows how to control what belongs to home and to school.

Another high-school student also expressed that an important learning was that "relaxation is important for everything, and one doesn't get anything by being stressed".

In addition to this, three elementary school children manifested changes in their school lives, noticing an improvement on their academic performance. One student said:

> Before I came to this workshop I said to myself, I better don't go because I have to do my English homework, and I have to do it late, but I did it very quickly and I didn't get as stressed, I don't get that tired when I do my homework.

Also, another student reported: "I noticed some change in myself, I felt more intelligent because I ended up in the excellence level, I felt more active to write stories; I wrote a great story and I presented it to other schools".

Finally, six high-school students said they learned to control their emotions thanks to Yoga. In particular, they asserted that they learned how to calm down. As an example, some of the reports presented by the students in the focus groups include: "Me, I always responded … but now I try to calm down a little, I mean, I try not to be driven by my impulses, by my anger"; "Before, say, someone would call me dumb, and I would respond back, or kick them back, or something like that; not anymore".

It is important to also note that one of the high-school students manifested not understanding the purpose of the workshops and not perceiving any significant learning.

Discussion

The purpose of this study was to carry out an evaluation of the impact of the implementation of extracurricular Yoga workshops on depression, anxiety, and aggression, as well as some socio-emotional competencies in school-aged children and youth. The study was conducted with students from a public school located in a socioeconomic disadvantaged area in the city of Bogotá, Colombia.

The analysis of the quantitative results, which allows for a comparison between the changes in the students that participated in the Yoga programme and those in a non-intervened control group, supported previous research findings (Kirkwood et al., 2005; Li & Goldsmith, 2012; Shapiro et al., 2007) that show a particular potential of this type of programmes in preventing anxiety. The study also suggests that Yoga may be beneficial in decreasing depression problems, especially for elementary school students, for boys, and for children whose permanent attendance to the workshops is encouraged. In addition to this, results showed that Yoga prevented decreases in prosocial behaviours over time in high-school children. On the basis of previous research that has shown that peer-reported prosocial behaviour tends to increase during the second semester of the school year (Velásquez & Bayona, 2014), it was surprising to find a general tendency towards a decrease in these behaviours in the control group. It is difficult to propose a theoretical explanation for this decrease in prosociality based on one study only; thus, the apparent positive results of the programme in high-school children, who do not seem to decrease in these behaviours when exposed to the Yoga programme, need to be taken with caution and call for further replication.

Another finding that was not expected was that students identified at pretest by their peers as highly aggressive showed a decrease in their aggressive behaviour across the 4-month period they were followed, regardless of the experimental condition. Other non-experimental longitudinal studies conducted in Bogotá with students from similar backgrounds have shown that aggression levels in schools tend to remain the same over the course of the school year, and particularly across the two time points that were examined in this study (Velásquez, Bukowski, & Saldarriaga, 2010). Therefore, it was not expected to find a decrease in aggression for the control group. This could have been due to a particular time effect related to a third unidentified variable affecting this particular sample. For example, the school or teachers could have taken a particular measure unknown to the researchers to reduce overall aggression. Also, it is possible that other highly aggressive students, not participating in the study, dropped out of school, reducing the overall aggressive climate of the school. However, another plausible explanation for this is a positive contamination effect, where students participating in the control group could have reduced their

level of aggression as a result of the participating students engaging in fewer aggression situations in their classrooms. This finding calls for further research where the possibility of positive contamination is more strictly controlled.

Results in this study were complemented with qualitative information collected from the focus groups. There was a high degree of satisfaction in the students that participated in the workshops, as well as an awareness of feelings of calmness and relaxation, and an experimentation of less stress. Even though the quantitative analysis did not show any evidence on the improvement of anger regulation, several answers from the students who participated in the workshops showed at least a cognitive acknowledgement of the usefulness of Yoga to control their emotions.

Despite having found promising results for the prevention of anxiety and depression, based on previous research (Berger et al., 2009; Khalsa et al., 2012; White, 2012), an improvement on aggression and on aggression-related socio-emotional competencies was also expected. It is possible that Yoga training, as it was planned and delivered in this study, was more effective in regulating the stress reactivity function that is associated with anxiety and depression (Davidson et al., 2003), than in improving the cognitive capacities thought to boost the socio-emotional competencies needed to prevent aggression (Steiner et al., 2013). Further implementations of our programme should then balance exercises to include more activities directed at developing those cognitive skills. In addition to this, keeping in mind that learning processes may take longer for some skills to transfer to daily life, it is possible that a 3-month-long intervention was not enough to generate changes in these cognitive attributes. Therefore, future studies should also be oriented towards carrying out this work with students for longer periods of time.

Although we intended to overcome some of the drawbacks of previous research (Serwacki & Cook-Cottone, 2012), some limitations from the present study need to be noted to inform future research. For example, we relied mainly on students' reports of their own and their peers' behaviour. Given that teachers as well as parents were well aware of the students' experimental condition, we considered that their evaluation could have been particularly biased; hence, we did not collect information from them. For future studies, observational data could provide valuable information to complement the students' view of the assessed variables. In addition to this, future research could include more waves of collected data to avoid regression to the mean effects possibly caused by measurement error, as well as to evaluate if the positive effects found remain in the long term after the end of the intervention.

This study shows that Yoga has a potential for diminishing anxiety and depression in school settings. This is important because research has shown that children who exhibit these problems tend to be more prone to victimization by their peers (Kochenderfer & Ladd, 1996; Perry et al., 2001), which in turn increases aggression in the classrooms. These results may have important practical implications as it may inform the violence prevention and social competencies promotion efforts of educational practitioners. For example, it is important that Yoga or other similar interventions have a clear theory of change that clarifies the mechanisms through which they can promote healthy development. This way, the programme components and activities can be more explicitly directed at the target they are trying to change. In addition, it is likely that, intended to prevent aggression, Yoga might be more effective if accompanied with other pedagogical strategies that support the development of socio-emotional competencies. In sum, this study sheds light on the actual extent of as well as on the limitations that a Yoga-based programme has to promote children and youth well-being.

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Note

1. Most Colombian students finish elementary school after completing Grade 5, and they finish high school after completing Grade 11.

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