

Fostering Positive Changes in Health and Social Relationships in Children

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Abstract Several studies have demonstrated that altruism and gratitude may confer beneficial effects on psychophysical wellbeing. The present chapter describes how positive changes in health and social relationships can be fostered in 6- to 9-year-old children when participating in positive interventions. The findings show that the experience of working with others to attain shared goals and focusing on gratefulness positively modulated altruism and social interactions among peers, highlighting the great behavioural plasticity of children. Moreover, interventions involving cooperative playing not only increased positive relationships but also contributed to a decrease in chronic stress levels. The positive outcomes of participating in the described interventions were assessed by means of quantitative methods, such as physiological parameters, sociometric measures and tests of altruism, the use of which, to our knowledge, has not been thoroughly explored in children. The present findings tie in well with the hypothesis that altruism is an embodied and situated human resource, which can convey intrinsic benefits. Furthermore, results from the studies mentioned indicate that positive transformations can be easily fostered through the performance of this type of intervention. Given that schools provide a stimulating environment that significantly influences children's development, our findings highlight the benefits of

working in this way to promote positivity in formal educational contexts, which could certainly contribute to the enhancement of individual and social wellbeing.

Keywords: Altruism, Gratitude, Empathic concern, Compassion, Cooperation, Embodiment

1 Introduction

Altruism and social relationships are important aspects of human life, and as such have been studied extensively by positive psychology (e.g., Seligman et al. 2005). Social interaction begins at birth and plays a prominent role both in wellbeing and cognitive development (e.g., Eisenberg 2002, Seligman 2011, Vygotsky 1978). Several investigations have shown how empathic concern for others and social network diversity can promote health and wellbeing (Brown et al. 2005, Cohen and Janicki-Deverts 2009, Kok and Fredrickson 2010, Pace et al. 2009, 2010, 2012). Consistent with this beneficial effect, it has been found that altruism in human beings, which involves the acts of helping, sharing, comforting, informing, and so forth, tends to occur beyond reciprocity, kinship or reputation in a higher proportion than predicted by evolutionary theory (Fehr and Fischbacher 2003, Lozada et al. 2011). The fact that consideration towards others results in positive consequences not only for the receiver but also for the giver highlights the importance of our social nature, and questions the excessive emphasis often placed on cost rather than valuing the intrinsic benefits of these human attributes.

Numerous studies have shown that altruistic motivation emerges at an early age; for example, toddlers spontaneously help nonfamiliar individuals (Warneken and Tomasello 2006, 2008) and attempt to respond to the emotional needs of others, showing empathic concern for those in distress (Warneken and Tomasello 2009, Zahn-Waxler et al. 1992). Interestingly, it has been observed that children of less than 2 years of age exhibit greater happiness when sharing with others than when receiving treats themselves (Aknin 2012), and that babies of 3 to 10 months prefer helping situations to neutral or hindering ones (Hamlin et al. 2007, 2010).

Embodied social experiences have a notable effect on children's prosociality. It has been found that assisting others favours prosocial attitudes (Eisenberg 1982, Eisenberg and Fabes 1998) and that playing cooperatively can decrease aggression and increase cooperation, whereas the opposite tends to occur after competitive games (Bay-Hinitz et al. 1994). Furthermore, cooperative activities have shown their usefulness in increasing self-confidence, creativity, and prosocial values (Garaigordobil 2004, 2005, Garaigordobil and Berruenco 2007). Along the same lines, it has been observed that after collaborating with a peer to attain a goal, 3-year-old children shared obtained resources equally (Warneken et al. 2011), although this egalitarian behaviour had previously been thought to occur later than 6 or 7 years old (Fehr et al. 2008). The studies above illustrate how these embodied experiences can foster prosocialness, emphasising the key role played by social contexts and highlighting the behavioural plasticity of young children.

There is much evidence to demonstrate the importance of experience in

social cognitive processes (e.g., Di Paolo and De Jaegher 2012, Varela 2001). The embodied cognition and enactive theory (Varela et al. 1992) proposes that cognition is embodied, lived, and embedded in socio-cultural contexts. It is inseparable from processes of perceiving and acting with others; i.e., cognitive agents are not passive data collectors who model the world, but active participants who enact a world in close coupling with others (e.g., Di Paolo and De Jaegher 2012, Held and Hein 1963, Varela 1999, Varela et al. 1992). Thus, cognition emerges from active participation with others (e.g., Di Paolo and De Jaegher 2012). This approach takes into account the search for meaning in participation ("participatory sense-making") in order to understand how mental states, intentions and actions are co-constructed while enacting with others (e.g., De Jaegher and Di Paolo 2007). Therefore, social cognition involves not only understanding others but also understanding with others (De Jaegher and Di Paolo 2007, Gallagher 2009).

Social interaction undergoes enormous changes throughout childhood (Winnicott 1979). During the first eight years of life huge transformations occur, not only related to children's cognitive development but also to ways of interacting with others, and ways of playing and experiencing enjoyment. Games thus become a way of developing and enacting numerous virtues and attributes that enhance socialisation, involving the possibility of interaction with others, while incorporating and internalising external rules. Given the relevance of participatory sense-making (Di Paolo 2005, Di Paolo et al. 2010), group games can favour individual and social skills that become so important at this stage of development.

One way of evaluating social relationships in a group is through the sociogram, a sociometric parameter that describes and illustrates the dynamic nature of social processes (Garaigordobil 2005, Gutiérrez 1999, Lozada et al. 2014a, Moreno, 1972). This reliable tool identifies the social network of each child in a group, assessed by means of a questionnaire asking each child to say which peers they want to play with, and which they do not. When this measure is applied at different moments within a certain group, dynamic social processes can be examined. In addition, as it analyses social exclusion, this indicator can also illustrate relational contexts in which antagonistic relationships might occur within a group. Thus, the analysis of all responses allows for a kind of X-ray of socioemotional ties within the group, facilitating understanding of subjects' relationships while they are immersed in complex and dynamic social contexts.

It has also been shown that experiences of gratitude, associated with empathic concern, can foster prosocial attitudes and the reduction of destructive interpersonal behaviour (Bono et al. 2004), and that grateful people tend to maintain more and better social relationships (Lyubomirsky 2008). Moreover, experimental studies have demonstrated that activities related to gratitude, such as writing a letter of appreciation, generate substantial positive changes in the writer (e.g., Seligman et al. 2005). Gratitude not only helps increase subjective wellbeing but also enhances altruistic motivation (Emmons and Shelton 2002). Thus, gratitude is considered a highly beneficial human strength, whose implementation might be of great significance. The development and promotion of these strengths, then, has been very much encouraged (e.g., Peterson 2006), given that they foster both subjective wellbeing and life satisfaction (Park et al. 2004, Proctor et al. 2011).

Positive interventions have proved to promote favourable change in educational settings and have therefore become more frequently applied worldwide (e.g., Flook et al. 2015, Quinlan et al. 2012, Schonert-Reichl et al. 2015, Seligman et al. 2009). Considering the importance of social interactions during childhood, and the intrinsic beneficial effects of prosocialness and gratitude, interventions that could promote the emergence of these positive qualities might be appropriate and desirable, given the complexity of social relationships nowadays. In this chapter we describe interesting findings related to positive interventions performed in primary classrooms, where empathic concern, cooperation, altruism, and gratitude were fostered in educational settings. Children participating in the studies showed positive changes, which were assessed using diverse methods including: physiological parameters, sociometric measures, and non-self-report altruism tests.

Our investigations aimed to evaluate whether the enactive experience of sharing and cooperating could facilitate the emergence of empathic concern and compassionate attitudes between peers. In line with this, we wanted to assess whether positive interventions that sought to enhance empathy and connectedness with others could promote physical and psychological wellbeing and also improve altruism and social interactions. We hypothesised that the enactment of mindful activities, cooperative playing or gratitude exercises would promote health, prosocialness, and better relationships between peers.

1.1 How do we work?

We work as an interdisciplinary team, composed of physicians, psychologists, teachers, and neurobiologists. In educational settings, we design experiential instances that allow 6- to 9-year-old children to learn about empathy and connectedness with peers. Before performing these activities, we generate instances that help children learn to listen to themselves, that is, learn to focus their attention on the present moment, so that this can help them listen to others.

We carried out two different types of intervention, i.e., embodied experiences, both of which began with mindfulness practices to promote children's awareness of themselves and of others' feelings and needs. One kind of intervention implied a second instance involving cooperative playing, in which children worked towards collective goals and had an opportunity to experience the joy of sharing and helping each other, beyond self-centeredness; during a third, reflective, instance, children shared their impressions of the whole experience. The other kind of intervention involved activities that promoted gratitude among peers. Three case studies are explained below.

2 Case Study 1: Plasticity of Altruistic Behaviour

In the first study we evaluated the plasticity of altruistic behaviour in 6- to 7-year-old children (Lozada et al. 2014b). We carried out a short intervention in a school context, once a week, which included mindfulness practices and cooperative activities. Our aim was to assess whether this intervention positively modulated children's altruistic behaviour beyond reciprocation and reputation.

2.1 Methods

2.1.1 Participants

The research was performed in a public school in San Carlos de Bariloche, Argentina, where 41 six-year-old children participated. Given that the school had two first grade classes, we randomly chose one class as an experimental group and the other as a control. The experimental condition included 21 participants: 11 girls and 10 boys, and the control condition comprised 20 participants: 10 girls and 10 boys. All children were in good general health, and there were no significant differences in socioeconomic level. The research was performed according to the Declaration of Helsinki—the project had also previously been approved by the Clinical Research Ethics Committee (CEIC) and the Council of Education of Río Negro Province, Argentina. We explained the activities proposed for the intervention to the children's parents and all procedures were implemented only after parents and school authorities had provided their written consent. The participants' data were analysed anonymously and treated under confidential conditions. An individual interview was performed with each participant before and after the intervention.

2.1.2 Intervention

The intervention was carried out once a week during the timetabled art class and consisted of 10 sessions of 50 min. Three researchers and the art teacher performed the intervention in both groups. The activities in the experimental group involved three instances: An initial moment of mindful breathing, where children learnt to focus their attention on their inspirations and exhalations, counting them silently for approximately 2-3 min. (and then the time was extended gradually), a second instance in which children played cooperatively in order to attain shared goals (Garaigordobil 2005), and a third instance in which artistic work was performed for 25-30 min. In the control group we performed environmental education classes including stories, movies, and pictures (extensively employed for primary school children), after which children carried out art class activities; that is, the instances involving mindful breathing and cooperative play were omitted.

2.1.3 Assessment

So as to evaluate the effects of the intervention we conducted a test of altruism between peers (Leighton 1992) similar to the Dictator Game¹, adapted for pre-schoolers (see Avinun et al. 2011). The test was carried out before and after the intervention in both groups by means of an interview conducted by one of the researchers. Each child was given 14 sweets for him/herself in an envelope and an empty envelope with the name of a peer, previously chosen at random. We said that the sweets were for him/herself, but if they liked, they could share some candies with the peer by putting them in the empty envelope; they were assured that the peer would not know about this. We left them alone for some minutes so that they could decide without pressure. The number of shared candies was compared before and after the intervention in both groups, evaluated by means of Wilcoxon matched pair test; we also compared the number of interruptions during the mindful practice of the first and last sessions in the experimental group through the Wilcoxon matched pair test.

2.2 Results

The intervention program promoted significant changes in children's behaviour, which was reflected in several parameters such as: increased altruism, decreased aggressiveness, and an enhanced capacity to remain calm.

2.2.1 Altruism

We found significant differences in altruistic behaviour before and after the intervention in the experimental group, that is, at the end of the program children shared significantly more resources with their peer than prior to the intervention ($Z = 2.14$; $N = 19$, $p < 0.03$). In contrast, nonsignificant differences were found in the control group, that is, the intervention consisting of environmental education classes did not change altruism rates ($Z = 0.17$; $N = 20$, $p > 0.87$). No gender differences in altruism were observed in the control or experimental group prior to the intervention ($Z = -0.79$, $N_{1,2} = 21, 22$, $p > 0.45$), or after the intervention ($Z = -0.75$, $N_{1,2} = 11, 8$, $p > 0.49$). (see Figure 1)

2.2.2 Mind-body Integration Practices

The mindful breathing practice seemed to improve after the intervention in the experimental group, given that the number of interruptions were significantly reduced in the last session in comparison with the first one (0.83 vs. 0.17 respectively, $p < 0.0001$). Furthermore, the proportion of children who interrupted during the practice

had decreased substantially by the last session (10%) in relation to the first practice (43%).

In conclusion, the experiences of playing cooperatively while developing empathic concern and achieving moments of mindful breathing enhanced altruistic attitudes in children of the experimental group, increasing awareness of themselves and of others and favouring the emergence of intrinsic altruism. These results are in line with our hypothesis that altruism is an embodied human resource, highly susceptible to experience within social contexts.

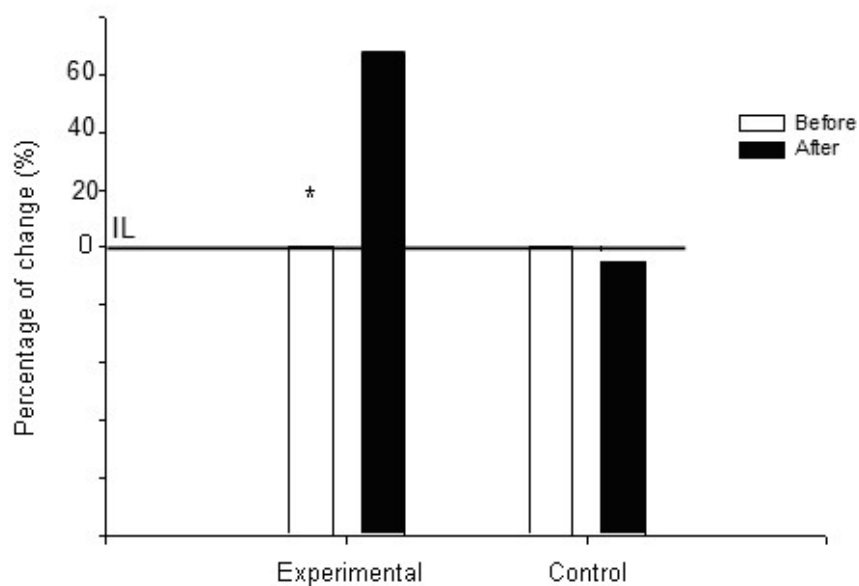


Fig. 1 Percentage of change in the altruism test before and after the intervention in the experimental and control groups; IL = initial level of response; * significant at $p < 0.05$

3. Case Study 2: Positive Interventions can Decrease Stress Levels and Improve Social Relationships

The aim of this study was to evaluate the effects of a positive intervention, which included mind-body integration practices and cooperative activities, on salivary cortisol stress levels and social interaction in 7- to 9-year-old children (Lozada et al. 2014a).

3.1 Methods

The study was carried out over 8 months. We first interviewed each child individually, and then performed an intervention program once a week for 10 weeks, during which children carried out mind-body integration practices and cooperative play. At the conclusion of the intervention an individual interview was carried out and a final interview was also conducted 5 months later.

3.1.1 Participants

The study was carried out with children aged 7 to 9 in a private school in San Carlos de Bariloche, Argentina. As in Case Study 1, participants were all in good health, and there were no significant differences in body mass index or socioeconomic level. One class was selected at random as the experimental group, which included 26 participants (54% boys and 46% girls), and another class of 18 children (54% boys and 46% girls) formed the control group (which followed the regular school program). The intervention was performed in accordance with the Helsinki Declaration, as in Case Study 1.

3.1.2 Assessment

Salivary cortisol samples were collected on a normal school day between 8.00 and 8.30 a.m. in each group at three points in the study: previous to and immediately after the intervention, and again 5 months after the intervention had ended. Given that parents followed written instructions, children did not eat or drink for 30 min. previous to collection of salivary cortisol. Participants were asked to drool saliva into a collection tube. Cortisol samples were examined blind using spectrophotometric methods (Chemiluminiscence, CLIA, Siemens). In order to compare relative differences in cortisol levels at the three points in the study for each group (i.e., experimental and control), we analysed the data by means of a 2x2 Factorial ANOVA test, evaluating interaction between variables (i.e., sample collection point and treatment group).

By means of a sociogram (Garaigordobil 2005, Moreno 1972) we evaluated social connectedness previous to and after the intervention. In an individual interview, children were requested to say which peers they would like to play with and which they would not like to play with. We used the social preference index (i.e., total number of positive choices minus the number of negative choices) to measure changes brought about by the intervention, and evaluated the results statistically by means of the Wilcoxon matched pair test.

3.1.3 Intervention

In the experimental group three researchers performed the intervention once a week, accompanied by the class teacher. We performed a total of 10 sessions of 60 min each. As in the first case study, the intervention entailed three consecutive instances, including: an initial stage of mind-body integration practices, a second stage of cooperative games, and a third stage of group reflection while sitting in a circle.

The first instance included breathing techniques and other mindfulness practices, and tai chi like exercises that involved slow, flowing and balancing movements, guided in a mindful way so that children could focus on these practices for several minutes. The breathing techniques were conducted as in Case Study 1. These practices helped children become more aware of moment-by-moment experiences (these resembled the mindful awareness practices (MAPs) which include forms of meditation, yoga, and tai chi) (Flook et al. 2010, Wall 2005). At the end of the intervention, by means of a questionnaire, each child was asked whether they continued practicing the learnt exercises in their homes, and under what circumstances.

Similar to the previous case study, the cooperative games entailed playing in a collaborative way in order to achieve group goals (Garaigordobil 2005). In the third instance, the children were invited to sit in a circle, and each child had the opportunity to express how they felt, say which parts of the game they enjoyed most and whether they preferred helping or being helped.

3.2 Results

Our findings showed that the intervention helped decrease salivary cortisol levels and helped improve social relationships between peers. Furthermore, most of the children reported that they continued practicing the learned exercises in their homes, in situations of emotional tension.

3.2.1 Salivary Cortisol

Relative cortisol levels measured before the intervention, at the end of the intervention, and 5 months after its conclusion, decreased significantly in the experimental group (Friedman ANOVA, $\chi^2 = 7.52$, $df = 2$, $p < 0.023$); the relative decrease in cortisol levels was 27.7% at the end of the intervention and 42.6% 5 months later. No significant differences were found, however, in the control group (Friedman ANOVA, $\chi^2 = 5.25$, $df = 2$, $p > 0.05$). A 2x2 ANOVA analysis demonstrated significant interaction ($df = 2$, $F = 3.1$, $p < 0.05$) between month (when cortisol was collected) and treatment (experimental or control), revealing a clear decrease in cortisol levels in the experimental but not in the control group. (see Figure 2)

3.2.2 Social Relationships

The intervention favoured positive changes in children's social interactions, given that in the experimental group children chose more peers to play with after the intervention than before it ($p < 0.019$), Wilcoxon pair test ($Z = 2.33$, $p < 0.002$). In contrast, changes were not found in the control group ($Z = 1.5$, $p > 0.13$).

3.2.3 Mind-body integration practices

Immediately after the intervention, most of the children (93%) mentioned practicing the mind-body integration exercises in their homes when feeling fear, anguish, anger, pain, when trying to sleep, or when trying to regulate their aggression. Five months after the intervention, 85% of the children mentioned that they had continued practicing the exercises in their homes in difficult situations.

In sum, the intervention promoted positive changes in the children, given that chronic stress levels diminished in the experimental group but not in the control group; furthermore, after the intervention social relationships between peers were enhanced. Interestingly, children tended to incorporate the mind-body integration practices in their homes in order to cope with negative emotions. These findings highlight the great behavioural plasticity of children at this age and the positive impact that this kind of intervention can confer in a formal educational setting.

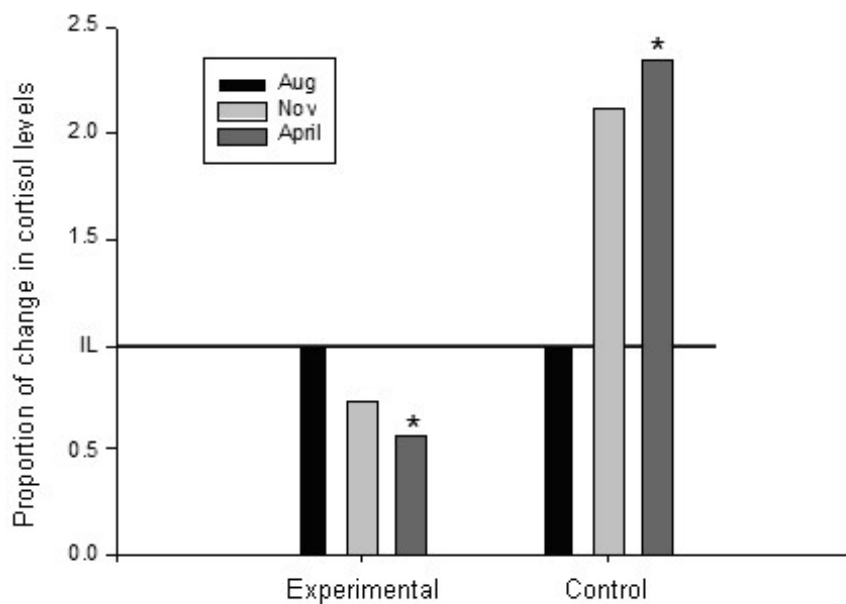


Fig. 2 Proportion of change in cortisol levels in the experimental and control groups, before the intervention (August), immediately after the intervention (November), and 5 months later (April). IL = initial level; * t test significant at $p < 0.05$ when comparing the experimental and

control groups at each collection point

4 Case Study 3: Positive Interventions Based on Gratitude can Improve Social Relationships

The aim of the present case study was to evaluate the effects of a positive intervention based on gratitude in social relationships in 8- to 9-year-old children.

4.1 Methods

4.1.1 Participants

The research was performed in a school context where 50 fourth graders (experimental group $n = 24$, control group $n = 26$) from a private school in Buenos Aires, Argentina, participated in the study. Of the total number of children, 62% were girls ($n = 31$) and 38% were boys ($n = 19$). Children's parents reported belonging to the middle class of Argentine society. Each of the two divisions was randomly assigned one condition: experimental or control. The experimental group consisted of 24 children ($n = 24$) of which 46% were boys ($n = 11$) and 54% were girls ($n = 13$). The control group had 26 children of which 8 were boys ($n = 8$, 31%) and 18 were girls ($n = 18$, 69%).

4.1.2 Assessment

As in the previous study, the sociogram was used to evaluate positive and negative social relationships through analysis of the following questions: a) Who would you choose as a playmate because you like to play with him/her? b) Who wouldn't you choose as a playmate because you do not like playing with him/her? Each item has 20 empty numbered spaces in which children write the names of the classmates chosen for each question. There is no minimum or maximum number stipulated for the completion of each item, so the number of partners chosen for each child is at their own discretion. The score obtained for each dimension is represented by the number of subjects chosen by each participant.

4.1.3 Intervention

The school in which the experiment was conducted assigned one class (50 min.) once

a week for the research. It was applied for six consecutive weeks with the two divisions of fourth grade, each of which was assigned a condition (experimental or control).

Children's parents signed their informed consent prior to the start of the research, the task, and work goals having been explained to them.

Initially, the gratitude questionnaire and sociogram were administered to both divisions before applying the research interventions. During all meetings, the experimental group used two instruments: storytelling and activities that children should prepare during the week. The stories were presented in power point format; the examiners read the stories aloud while the children followed the line by looking at the images on the screen. In the experimental group, each of the six meetings began with a story that encouraged children to relax and focus their attention on their breathing. This story aimed to provide a repetitive stimulus that would prepare children to initiate activities and get them ready for the next activity, which involved the mind-body integration practice and reading a story. Throughout the six meetings, three types of story were read, based on three different themes: solidarity, gratitude, and optimism. At each meeting, one story was read and the children were given a task designed to promote gratitude, which required them to think during the week about things or situations they appreciated in their lives. They had to record this at home and take it to the next meeting. In the second week, participants handed in the task they had done during the first week, which was read by the researchers. The task of the second meeting was to think of a positive feature of the first friend who had been chosen in the sociogram (first positive choice) and write it down for the next week. In the third week, the task was to think of a characteristic they felt grateful for, but this time belonging to the second friend they had chosen in the sociogram (second positive choice) and write it down. The focus of the fourth week was the negative choices that children had registered in the sociogram. The task was to think of a positive feature of the second classmate who was elected as a negative social relationship in the sociogram (second negative choice). The fifth week children were requested to think of a feature they were grateful for, this time belonging to the first classmate chosen in the sociogram as a negative social relationship (negative first choice). These writing tasks were supervised by researchers and then returned in an envelope to each child in the sixth and final meeting.

The sociogram was applied again at the end of the research (post-intervention) and compared with the first.

For the control group, the application of the pre and postintervention questionnaires was the same as in the experimental group. Each meeting involved the reading of a popular children's story (e.g., Pinocchio, Sinbad the Sailor, The Steadfast Tin Soldier), followed by neutral activities related to the story read.

4.2 Results

The sociogram analysis before and after applying the intervention program showed that negative social relations significantly decreased in the experimental group ($t =$

2.18, $p < 0.05$), that is, at the end of the 6-week program the children chose fewer peers they did not wish to share their games with, compared to the number of peers selected before the applied intervention (pretest mean = 4.43, posttest mean = 2.45, percentage reduction in negative social relationships = 55.3%). However, non-significant differences were observed between pre and postnegative relationships in the control group ($t = 0.84$, $p > 0.05$).

In addition, the comparison of the postintervention negative social relationships between the experimental and control groups showed significant differences (experimental group mean = 2.45, control group mean = 5.13, $t = 2.78$, $p < 0.01$).

When comparing positive social relationships before and after the intervention, no significant differences were found in the experimental group ($p > 0.05$, $t = 0.10$) or in the control group ($t = 0.29$, $p > 0.05$). Moreover, no differences were observed when comparing positive social relationships between the experimental and control groups pre and post intervention ($t = 1, 17$, $p > 0.05$). (see Figure 3)

In conclusion, this intervention reduced the number of negative social relationships between peers, contributing to the improvement of children's social networks.

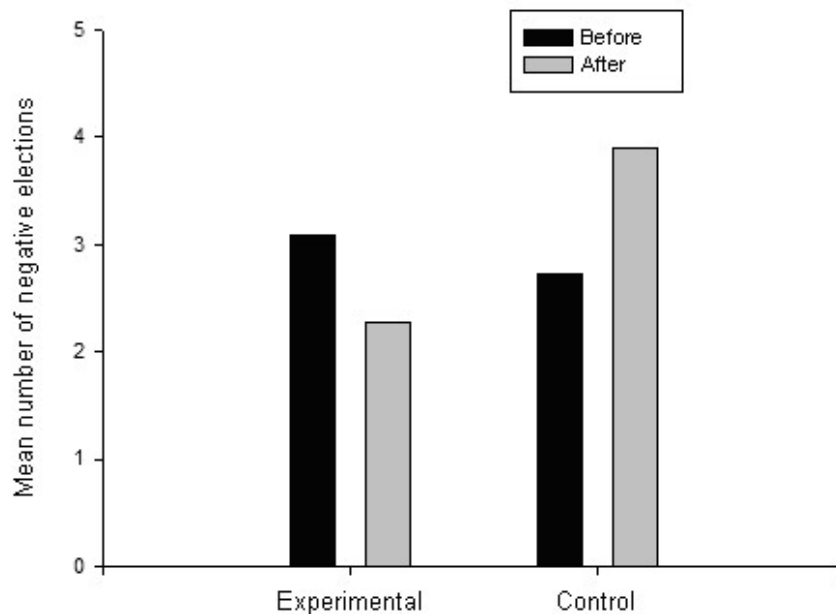


Fig 3 Mean number of negative elections, before and after the intervention, for the experimental and control groups.

5 General Discussion

The present studies show how the embodied experiences of cooperation and gratitude enacted during the positive interventions fostered social relationships, altruism, and physical wellbeing in children of primary school age. The findings demonstrate that the experience of working with others to attain shared goals and focusing on gratefulness positively modulated altruism and social interactions among peers, highlighting the great behavioural plasticity of children. Moreover, interventions involving cooperative playing not only increased positive relationships, but also contributed to a decrease in chronic stress levels. The positive outcomes of participating in the described interventions were assessed by means of quantitative methods, such as physiological parameters, sociometric measures, and tests of altruism, the use of which has not been thoroughly explored in children. Our findings tie in well with the hypothesis that altruism is an embodied and situated human resource, which can confer intrinsic benefits. Furthermore, results from all the studies mentioned indicate that positive transformations can be promoted through the enaction of the embodied social experience as proposed in the interventions described here.

On the one hand, we found that cooperative playing in combination with mind-body integration activities provided an opportunity for participants to enhance awareness of themselves and of others, possibly favouring the emergence of intrinsic altruism, beyond reciprocity and reputation. Following the intervention, altruistic attitudes, evaluated by children's sharing behaviour under anonymous conditions, increased in those children who participated in the intervention, whereas in the control group no such change was observed. Other studies also revealed that altruism was enhanced by cooperative play in children (Garaigordobil 2004, 2005) and that the experience of collaborating increased equitable sharing in preschool children (Hammann et al. 2011). Moreover, recent studies have shown that participation in a mindfulness-based prosocial training curriculum promoted self-regulation and prosocial behaviour in young children (Flook et al. 2015). In addition, a social and emotional learning program involving mindfulness and caring for others enhanced cognitive control, reduced stress and favored well-being and prosociality in elementary school students (Schonert-Reichl et al. 2015).

The second case study further illustrates that activities involving cooperation and mind-body integration improved social relationships among peers. This positive outcome was accompanied by a reduction in chronic stress levels. In agreement with this, diverse investigations have revealed how empathic concern and compassion can help diminish stress levels (Brown et al. 2005, Kok and Fredrickson 2010, Pace et al. 2009, 2010, 2012). Several studies found that the quality and extent of social networks can influence the immune system (Cohen et al. 2003, Pressman et al. 2005); for example, social support and positive social interaction can reduce the incidence of virus infection and can enhance immune response (Coan et al. 2006, Cohen et al. 2003). In line with this, our findings support the existence of an intricate association between social connectedness and stress in the early stages of life. It is interesting to note that the intervention not only promoted an improvement in social and physiological parameters but also in relational attitudes. For example, changes were ob-

served during the reflective instance when children shared their appreciation of the experience and listened to others. This perspective-taking instance fostered awareness of peers' perceptions, feelings and needs, in addition to the self-perception of emotional states during the activities. This cognitive-based awareness favoured recognition of the consequences of their own actions. This embodied reflective moment, which contributed to the integration of affection and cognition, not only helped develop listening skills but also the cultivation of ethical know-how (to use Varela's term), which was also awakened by the actual experience itself. In the same vein, some authors have highlighted the importance of working on compassion and concern for others' well-being in children's healthy development and socialization (Flook et al. 2015, Roeser and Eccles 2015, Taylor et al. 2015).

Gratitude was the main focus of the third case study. As a result of the intervention, negative social relationships decreased, whereas no differences were observed in the control group. The activities proposed during the intervention, therefore, such as reading and writing stories about positive qualities and characteristics to be thankful for, improved social relationships between children. The fact that this kind of intervention reduced negative interactions agrees with previous findings suggesting that social harmony can be promoted in schools (e.g., Lozada et al. 2014a, b) and that gratitude can foster positivity and wellbeing, as also found in other studies (e.g., Bono et al. 2004, Emmons and Shelton 2002, Lyubomirsky 2008, McCullough et al. 2002, Seligman et al. 2005). It is worthy of note that in our study, negative social relationships diminished after the intervention but positive social relationships did not change (i.e., no changes were observed in the number of friends chosen to play with). That is, the program seems to have a greater impact on reducing exclusion among children than on increasing the number of peers included in the game, suggesting that the applied intervention was more effective in mitigating negative links between individuals than promoting new social bonds. This result could be associated with the type of activity proposed in this particular intervention. For example, thinking and writing a positive quality and a feature to be grateful for related to a classmate included in the list of peers selected to play with, did not lead to new friends being added to the list. However, the same activity related to a child not chosen as a playmate led to positive changes in the dynamics of rejection or exclusion of peers. This outcome seems reasonable given that the activity could contribute to reversing a negative perspective but not enhancing positive elections, since it probably reaffirmed preexisting relationships.

Interestingly, the embodied experiences which involved enacting cooperation and gratitude seem to have helped decrease self-centeredness in children, enabling them to connect with others, develop empathic concern, and appreciate what they receive from others. In other words, they became aware of others' positive attributes, were more conscious of the richness of social diversity and experienced the positive effects of giving, that is, they realised the happiness conferred by giving, not only receiving (Aknin et al. 2012, Lozada et al 2011, Post 2011). This agrees well with the enactive theory which proposes that cognition emerges from participation and emphasizes the key role of participatory sense making experiences, in which interaction plays more than a contextual role: it can promote and provide social cognition (De Jaegher et al. 2010, De Jaegher and Di Paolo 2007, Gallagher 2009).

In practical terms, when considering all the interventions carried out, we corroborated that these were easily replicable, given that most class teachers continued to perform the interventions during subsequent years with other grades. This suggests that they were confident about the beneficial effects and validity of this kind of intervention. The inclusion of these programs could be a valuable way of improving long-term welfare and it would be of interest for future research in this line to work with a greater diversity of ages, and different cultures.

In conclusion, the investigations presented here show that the interventions applied which sought to promote positive aspects in children, enabled them to relate to others from a new perspective, thus helping them improve social relationships between peers, enhancing empathic concern and psycho-physiological wellbeing. Our results emphasise the great flexibility and resilience of children when performing this type of embodied experience, which not only fosters empathy and prosocialness but also self-awareness. To our knowledge, this important topic has been little studied using the evaluation methods employed in the current work. Given that schools provide a stimulating environment that significantly influences children's development, the present findings highlight the benefits of applying these concrete ways of enhancing positivity in formal educational contexts, in which they could certainly contribute to enhancement of individual and social wellbeing.

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Footnote

¹The Dictator Game involves two players. One player is the “Dictator” and the other the “Recipient”. The “Dictator” receives a certain amount of money and has to choose how to divide it between himself and the “Recipient”, who has to accept the Dictator’s decision without any active role in the game. It is played under anonymous conditions, so that reputation and reciprocity do not affect decision making.

Figure Captions

Fig. 1 Percentage of change in the altruism test before and after the intervention in the experimental and control groups; IL, initial level of response. *significant difference ($p < 0.05$)

Fig. 2 Proportion of change in cortisol levels in the experimental and control groups, before the intervention (August), immediately after the intervention (November), and 5 months later (April). IL, initial level; *t test significant level ($p < 0.05$) when comparing the experimental and control groups at each collection point

Fig. 3 Mean number of negative peer elections, before and after the intervention, for the experimental and control groups