Muratori, P., Giofrè, D., Bertacchi, I., Darini, A., Giuli, C., Lai, E., Modena, A., Lochman, J. E., & Mammarella, I. (2021). Testing the efficacy of coping power universal on behavioral problems and pre-academic skills in preschoolers. *Early Childhood Education Journal*, *0123456789*. https://doi.org/10.1007/s10643-021-01179-0

Testing the efficacy of coping power universal on behavioral problems and pre-academic skills in pre-schoolers

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Manuscript accepted: 19/03/2021

Abstract

The Coping Power Program is an evidence-based intervention for children identified to be at risk for developing externalizing behavioral problems. The Coping Power Program has been adapted to universally prevent behavioral problems in school-aged children. This study sought to test the efficacy of this adaptation, the Coping Power Universal program, on preschoolers' behavioral difficulties and pre-academic skills. Teachers delivered the intervention in their classes. The study included a sample of Italian children ($N = 250$, 125 boys) with a mean age of 4.50 years ($SD = .50$) at the beginning of the study. Classrooms of these children were randomly assigned to receive either the intervention or the Italian preschool standard curriculum. Measures included a questionnaire and objective and standardized measures for numerical intelligence and metaphonological skills delivered by a psychologist to the preschoolers. Classes in which teachers applied the Coping Power Universal program showed lower problematic behaviors and higher pre-academic skills than those in which teachers followed the standard curriculum only. Although further studies are still needed, the current findings showed that the Coping Power Universal program can be adapted for preschoolers with good results. Implications for practice, methodological limitations, and directions for future research are reviewed.

Keywords: Emotional problems, Kindergarten, Hyperactivity, Social-Emotional Learning, Prosocial.

Testing the efficacy of coping power universal on behavioral problems and pre-academic skills in pre-schoolers

The Coping Power Program (CPP) (Lochman & Wells, 2002), in its original form, is an evidence-based intervention for children identified as being at risk for developing externalizing behavioral problems. The CPP is usually delivered in a small group format and includes cognitive-behavioral practices such as a token economy, goal setting, self-control techniques, and relaxation.

The CPP has was adapted to be applied to a whole classroom in order to prevent behavioral problems in all children in the class, regardless of their risk condition (i.e., universal prevention) (Muratori et al., 2015). This adaptation, named the Coping Power Universal program (CPU), applies the same principles and practices of the original CPP, but the activities of the CPU have been modified to be delivered to classes of 20–25 children. For instance, in the CPU, an illustrated story guides the children through the program's activities in order to motivate them to participate. Moreover, teachers deliver the CPU in their classes, whereas, counselors deliver the CPP to small groups of children. The CPU is not separate from school activities, and when implemented, it becomes an integral part of the school agenda; this integration allows for strengthening of skills by capitalizing on teachable moments and opportunities to reinforce and practice skills throughout the school day. The CPU is a manualized intervention, but teachers can modify the activities based on the developmental phases of the children, the subjects they teach, and the academic program they must follow. Therefore, the CPU has the potential to be implemented in different school grades and school contexts.

Since 2015, about 5000 children have received the CPU in Italian elementary schools. Previous studies have investigated the efficacy of the CPU in Italian elementary schools and they found that this program can reduce behavioral problems and hyperactivity in pupils

(Muratori et al., 2015, 2016, 2017a, 2019b). Furthermore, previous studies regarding the CPU for elementary school children showed that this intervention could produce positive benefits on children's grades (Muratori et al., 2016).

This article reports the results of a new study evaluating a further adaptation of the CPU for preschool-aged children. In this CPU for preschoolers, trained teachers deliver a CPU that is designed to improve children’s social-emotional learning competencies. Although two previous studies indicated the capacity of the CPU for preschoolers to reduce children’s behavioral problems (Muratori et al., 2017b, 2019a), this is the first study that investigated the efficacy of the CPU in promoting better pre-academic skills using standardized tests.

Social-Emotional Learning Interventions for Preschoolers

Social and Emotional Learning (SEL) includes competencies that help individuals understand and manage emotions and show empathy to others, establish and achieve positive goals, and develop and maintain positive relationships (Collaborative for Academic, Social, and Emotional Learning—CASEL, 2013). The SEL competencies include (a) self-awareness, which pertains to the ability to recognize and label others’ feelings and thoughts; (b) social awareness, which involves the capacity to take others’ perspectives and empathize with people; (c) self-management, which refers to the ability to regulate emotions, thoughts, and behaviors; (d) relationship skills, which can be broadly defined as the ability to establish and maintain healthy and rewarding relationships; and (e) responsible decision making, which involves the capacity to make constructive and ethical decisions within different relationships and contexts.

School-based SEL interventions aim to foster the development and enhancement of the above mentioned skills (CASEL, 2015). These programs differ in terms of intervention design, content of the curriculum, and the audience. Some interventions focus on enhancing teachers' classroom management abilities, while other interventions focus on directly teaching children and youths SEL skills throughout specific curricula (Kemple et al., 2019). There is established evidence that SEL programs can have positive effects on social and emotional skills, behavioral adjustment, and prosocial behaviors in students from kindergarten to high school (Durlak et al., 2011). In a recent systematic review Corcoran et al. (2018), exploring numerous studies regarding the effects of SEL programs on reading and mathematics achievement, supported the conclusion that SEL interventions could have effects on learning skills and academic outcomes.

The preschool period presents a unique opportunity to support children's SEL competencies. During these school years, children begin to recognize and regulate emotions, attention, and behavior, equipping them to form prosocial relationships and engage in early learning activities (Denham & Brown, 2010). Recently, Blewitt et al. (2018) revised several SEL interventions developed for preschoolers. Findings of this review suggest that SEL programs administered at a relatively low intensity may be an effective way to increase social and emotional competencies, behavioral self-regulation, and early learning outcomes. However, this review includes 79 studies and only 16 of them reported data about early learning outcomes; the majority of those studies used teachers' reports to evaluate early learning outcomes instead of standardized measures of early learning. Although teacher reports of child learning competencies provide an important perspective, Blewitt et al. (2018) indicated that the addition of an objective assessment by raters blind to condition would lend credibility to the SEL interventions' efficacy on early learning outcomes. Furthermore, as described below, effects of SEL interventions on pre-academic and learning skills were quite inconsistent (see also Table 1).

Table 1 about here

The Chicago School Readiness Project (CSRP) (Raver et al., 2011) is an emotionally and behaviorally focused classroom-based intervention designed to support low-income preschoolers' school readiness. The CSRP provides teachers with training and support to effectively manage children's dysregulated behavior; the CSRP does not involve curricula to advance children's language, letter-naming, or math skills. The efficacy of the CSRP has been tested by Raver et al. (2011), who recruited 509 children (mean age 49.4 months) from 35 different Head Start classrooms from Chicago's high-poverty neighborhoods. The findings showed that CSRP had a significant effect on children's SEL skills and pre-academic readiness (see also Mackintosh & McCoy, 2019).

The Tools of the Mind Curriculum (Barnett et al., 2008; Meador et al., 2015) is another school-based SEL intervention that uses game activities and role-playing to strengthen children's ability to regulate their emotions. Practices and activities of the Tools of the Mind address children’s self-regulation, executive functions, and emotion regulation skills. In a sample of 759 kindergarten children, Blair and Raver (2014) found that the Tools of the Mind group showed significant improvements in reading, vocabulary, and mathematics. Barnett et al. (2008) evaluated the efficacy of this intervention in a sample of 274 children from New Jersey' s high poverty school districts, and indicated that the Tools of the Mind curriculum improved children's language development, but the effects on their vocabulary and literacy skills were not statistically significant.

Morris et al. (2013) tested the Foundation of Learning (FOL) on children's pre-academic abilities. The FOL project includes a training course for teachers based on the Incredible Years® Program. The Incredible Years® Program seeks to strengthen and promote positive teacher–child relationships, classroom organization (rules and predictable routines), and encourages the use of praise, incentives, and proactive discipline strategies to motivate students' learning. In a study involving a sample of low-income children attending 51 pre-schools in Newark (New Jersey), Morris et al. (2013) found that the FOL intervention provided a positive emotional climate in the classrooms, promoting emotional awareness, and prosocial behavior, but it could not produce transfer effects on children's pre-academic skills.

Lonigan et al. (2015) indicated positive impacts for Promoting Alternative Thinking Strategies (PATH) for preschoolers on vocabulary, phonological awareness, math, and socioemotional outcomes. Nix et al. (2013) tested the effects of the REDI intervention model on preschool SEL skills, as well as on emergent literacy skills. The authors indicated that the intervention had positive effects on reading achievement, learning engagement, and SEL skills. Differently from other SEL interventions, it is important to note that REDI intervention includes specific activities to sustain children's early learning skills.

There are other SEL programs developed for preschoolers. The Roots of Empathy (ROE) program is a theoretically derived universal prevention program that focuses on decreasing children's aggression and facilitating the development of their SEL skills. The program has as its cornerstone monthly visits by an infant and his/her parent(s) that serve as a springboard for building the skills of emotional intelligence in participating children (Schonert-Reichl et al., 2012). The Recognizing Understanding Labeling Expressing Regulating (RULER) is an evidence-based approach to SEL developed at the Yale Center for Emotional Intelligence. RULER supports the entire school community in understanding emotions, building emotional regulation skills and creating a positive school climate (see for the RULER for preschoolers, Rivers et al., 2013).

Overall, many benefits accrue when SEL abilities are improved among children their: They are more likely to be able to regulate their emotions during daily lessons, pay more attention to academic tasks, plan their behavior in a better manner, devote more resources to learning, and be more receptive to teachers' instructions (Trentacosta et al., 2006). SEL interventions reported consistent results concerning social-emotional and behavioral outcomes, however, results concerning early learning outcomes are mixed.

This Study

Transfer effects on children's pre-academic skills by SEL interventions have not been extensively studied in the literature. In a preliminary study of the CPU for preschoolers, Muratori et al. (2019b) found that the CPU could produce positive effects on children's pre-academic skills using teachers' reports. These findings were encouraging, but this study will extend beyond teacher reports and examine whether group differences between the CPU and control classes would be evident on standardized tests for pre-academic skills administered by objective testers.

Thus, based on previous studies showing that the Coping Power for at-risk children and the CPU for elementary school children are capable of reducing behavioral problems and promoting academic skills (Lochman et al., 2012, 2014; Muratori et al., 2016), we hypothesized that the CPU for preschoolers would (a) reduce emotional and behavioral problems in children and (b) improve children's pre-academic skills. This study tested these hypotheses in a sample independent from those used in our previous studies on the CPU for preschoolers.

Method

Participants and Procedures

A total of 16 classes (250 children) were included in this study. Children attended two nursery schools located in the south of Tuscany (Italy). One-hundred and fifty-one children (81 boys, 121 Caucasian, 30 African) with a mean age of 4.67 years ($SD = .49$) received the CPU intervention (eight classes), whereas 99 children (44 boys, 80 Caucasian, 19 African) with a mean age of 4.54 years ($SD = .50$) followed the standard curriculum activities and served as the control group (eight classes). There were no differences in gender frequencies, $\chi^2(1, N = 250) = 2.02$, $p = .155$, and race frequencies, $\chi^2(1, N = 250) = .017$, $p = .895$, between the two groups.

The only inclusion criteria were (a) children must attend the last year of nursery school (equivalent to U.S. kindergarten) and (b) their parents must give written consent to let the child participate in the study. The recruited classes were randomly assigned to either CPU intervention or the control condition. The class was the unit for group assignment, and the random allocation sequence was computer-generated. The assessment of emotional/behavioral difficulties and of pre-academic skills, namely early mathematics and meta-phonological skills, was conducted before the intervention (November 2018) and after the intervention (May 2019). All the teachers from the intervention classes attended an eight-hour training workshop in October 2018 and they delivered the intervention in their classes from December 2018 to April 2019. All parents signed an active informed consent form to let their child participate. The study was approved by the institutional review board of each school involved.

Measures

Teachers completed the Italian version of the Strengths and Difficulties Questionnaire before and after the intervention (SDQ; Tobia et al., 2011). The SDQ is a 25-item questionnaire, which comprises five scales of five items each, and uses a Likert-type scale from 0 to 2. The SDQ assesses the occurrence of particular behaviors associated with (a) externalizing problems, comprising the conduct problems (e.g., bullying) and hyperactivity (e.g., squirming) scales; (b) internalizing problems, comprising the emotional problems (e.g., worrying) and peer problems (e.g., disliked by other children) scales; and (c) one scale associated with prosocial behavior (e.g., helping). For each scale, the score can range from 0 to 10 if all items are completed. Higher scores indicate more behavioral problems, except for the prosocial behavior scores, where higher scores indicate higher prosocial behaviors. The range of the total score of the SDQ is 0–40. In this study's sample, the SDQ reliability was generally satisfactory, as demonstrated by the mean internal consistency of subscales (α

Cronbach): .73 for conduct problems, .77 for hyperactivity, .81 for emotional symptoms, .80 for peer problems, and .82 for prosocial behaviors.

A school psychologist individually delivered the objective measures of pre-academic skills to the children, described below. The assessor was blind to the children's intervention group assignment. A school psychologist individually delivered the Battery for the Assessment of Numerical Intelligence (BIN 4–6), which is used to assess the early mathematical development in children between 4 and 6 years of age. Validity data of this tool are reported in Molin et al. (2006). This battery assesses the ability to read and write Arabic numbers, connect the number-word to the correct digit, compare numerical quantities (dots and Arabic digits), and link numbers to order multiple quantities. In this study, two subtests were used: (a) ordering quantities task and (b) Arabic numbers comparison task. In the ordering quantities subtest, children had to order figures representing different quantities from the smallest to the largest. Scores ranged between 0 and 10. In the Arabic numbers comparison task, children had to indicate which of the two Arabic numbers was the biggest (e.g., 3, 7). Scores ranged between 0 and 11. The sum of correct answers for each subtest was computed.

A school psychologist also individually delivered the meta-phonology competence test (CMF). Validity data of this tool are reported in Marotta et al. (2004). This test assesses meta-phonological skills in preschoolers. It evaluates phonological awareness and children's abilities to distinguish sounds, categorize words, and segment syllables. In this study, the following subtests were selected: (1) Fusion: children were required to pronounce simple words, resulting from the fusion of syllables and/or phonemes (e.g., *me-la* (apple) = *mela*); (2) Segmentation: children were required to pronounce the syllables or phonemes composing simple words (e.g., *sole* (sun) = *so-le*). The sum of correct answers for each subtest was computed. Scores ranged between 0 and 15 for both fusion and segmentation.

Intervention

The CPU for preschoolers includes 24 weekly sessions. The program involves lessons delivered by teachers, which promote the core concepts of the CPU intervention. The curriculum helps children to develop the behavioral and cognitive abilities to recognize and communicate emotions and manage their feelings positively. The lessons in CPU focus on self-control, awareness of feelings, awareness of physiological excitement linked to emotions, and problem-solving ability. See Table 2 for a detailed description of the aims and modules of the program. CPU for preschoolers typically uses classroom routines and activities (e.g., circle time, psychomotor activities, small-group sessions, and play) and developmentally appropriate teaching methods (e.g., storytelling, singing, role play, and puppetry). A detailed description of CPU for preschoolers' activities is reported in Muratori et al. (2019b).

Table 2 about here

The sessions lasted 45 min and were divided into three parts: (a) review of weekly goal sheets and brainstorming; (b) activities for the specific session; and (c) assignment of points, which were given for participating in the daily activities and achieving weekly goals. An illustrated story guided the children throughout the program's activities. The story talks about Ap-Apetta, a bee that does not like going to school and decides to flee. This adventure helps the bee learn new strategies to cope with her emotional difficulties. A simple song introduces each module. For example, module 3 is aimed at helping children recognize and manage emotions. Every week the teacher and the pupils read a section of the story: Ap-Apetta visits the Heartbeat Planet, where she meets Dr. Frog, another character of the book; he is baking some pastries, shaped as thermometers, to help kids better understand their feelings. As the story unfolds, different activities are introduced. These include exercises on rhythm and gait, reproduction of the heartbeat's rhythm, physiological arousal and breathing associated with emotions (e.g., anger), and relaxation strategies (e.g., deep breathing). The CPU program was carried out during school hours as part of the daily school routine. The CPU for preschoolers intervention manual (Giuli et al., 2017) describes each lesson, though teachers were asked to conform the activities to the developmental level of their pupils.

Classrooms assigned to the control group followed the standard curriculum activities provided in the Italian school context. Control classrooms were not exposed to SEL programs.

Intervention Adherence

All the teachers from the intervention classes attended an eight-hour training workshop in October 2018 and had two-hours of monthly meetings in small groups for the duration of the program. Information about the theoretical frame of the intervention, its experimental bases, and a description of the activities that were to be implemented during each session were provided during the training. During our monthly meetings, teachers discussed and solved difficulties they had encountered during the implementation of the intervention. A school psychologist, trained in the CPU model, monitored the teachers' adherence to the intervention using the following procedures. He asked the teachers to complete a checklist to document whether major lesson elements were delivered as intended. A review of these checklists showed that 86% of the elements of the CPU intervention sessions were delivered. Furthermore, a school psychologist observed 20% of the sessions, which were previously recorded. The previously recorded sessions included an equal proportion of sessions delivered by all participating teachers. He used a systematic observation grid and scored teachers' behavior during the two essential phases of the CPU session: goal sheet and daily activity. The grid included four statements that guided the observer to evaluate teachers’ adherence to CPU principles and techniques. Each of these statements matched with a level of adherence, low-sufficient-good–excellent; 88% of the reported levels of adherence were good or excellent.

Data Analytic Approach

Generalized linear mixed models (GLMM) were used to account for the fact that multiple responses from the same person were more similar than responses from other people. This method, as compared to traditional analyses, such as ANOVAs, considers that information tends to be nested within classes. The general purpose of random effects is instead to quantify the variation among individual units and encompass variation among individuals (when multiple responses are measured per individual, Bolker et al., 2009). Therefore, this study included a series of mixed models (Pinheiro & Bates, 2000). In each model, there were two “random” variables: subject and class (we did not include school variables in our models because we collected data from only 2 schools, which is not large enough for including these variables into the model). We opted for measuring two independent random effects in order to evaluate each of these effects independently. Group (experimental and control) and time (pre and post) were used as “fixed” effects, that is, the effect of interest after considering random effects. Analyses were conducted using R (R Core Team, 2019), with the package “lme4” (Bates et al., 2015) to fit mixed models and the package “lmerTest” (Kuznetsova et al., 2017) to calculate the F-like statistics and significant values for the random effects. Results using model comparison and chi-square differences, which are typically used for GLMM, produced very similar results. However, we opted for F-like statistics because they are easily understood by the naïve reader. We also tried to minimize the statistical jargon and to only include essential information for each model. However, a detailed description for each model, including null model and interclass correlations, is available upon request. As measures of effect size, this study reported Cohen’s d for the two groups (Cohen, 1988), see Table 3.

Table 3 about here

Results

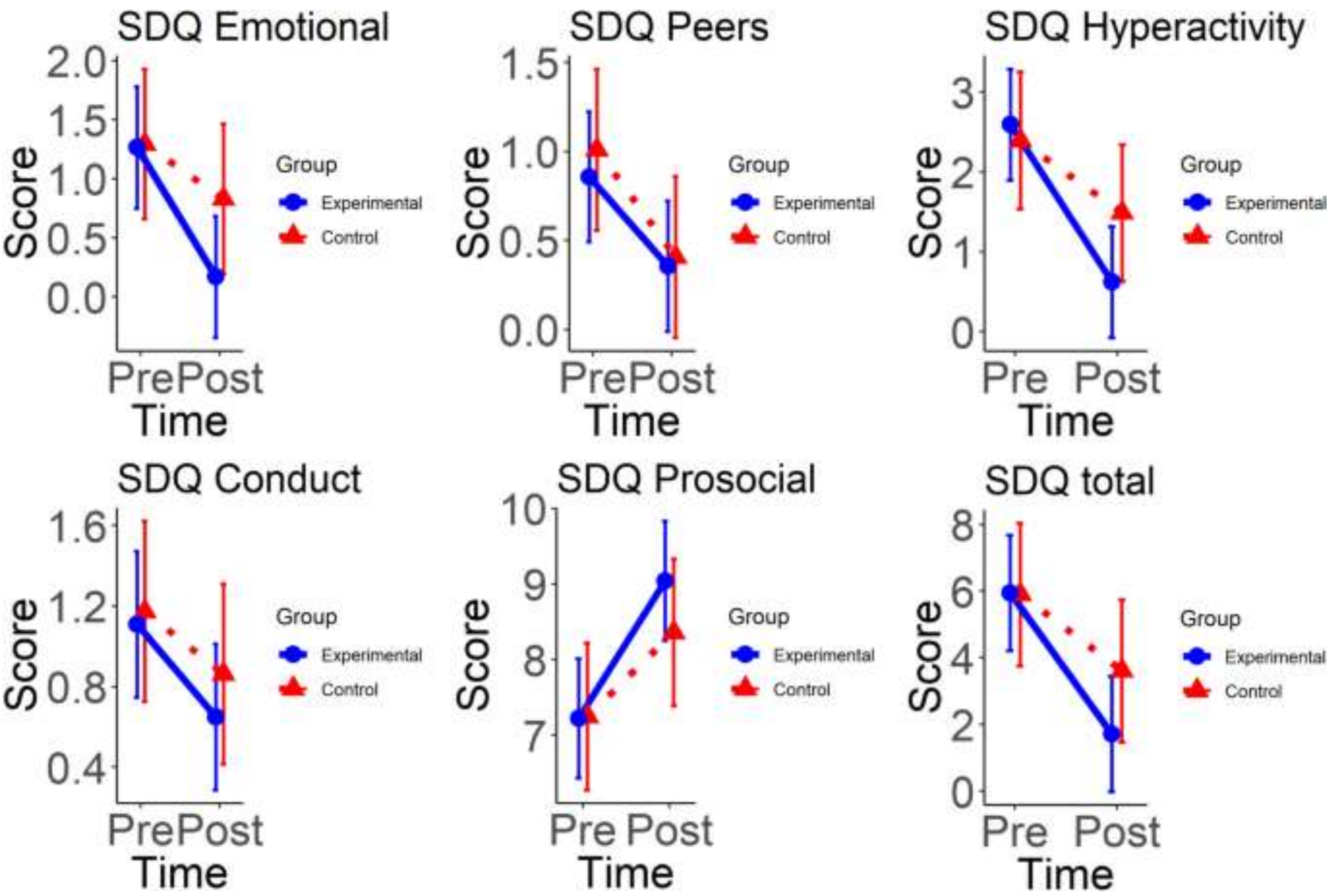
Generalized Linear Mixed Model

Table 3 describes the two groups at pre- and post-intervention time points. No differences emerged between the two groups on the study's variables at pre-test. In all the subsequent analyses presented below, class and subject were used as random variables, while group (experimental and control) and time (pre and post) were used as fixed factors.

In the first set of analyses, the performance on the SDQ was considered; however, one subject was not available ($n = 249$). Regarding the conduct problems scale, random effects of subject and class were statistically significant ($p < .001$); as for fixed effects, results showed a statistically significant effect of time, $F(1, 247.00) = 15.93$, $p < .001$, but non-significant effect of group, $F(1, 12.86) = 0.25$, $p = .627$, or of the interaction group × time, $F(1, 247.00) = 0.59$, $p = .441$ (Fig. 1). Concerning the hyperactivity scale, random effects of subject and class were statistically significant (ps $< .001$); as for fixed effects, results showed a statistically significant effect of group × time, $F(1, 247.00) = 11.68$, $p < .001$, and of time, $F(1, 247.00) = 85.45$, $p < .001$, while the effect of group was not statistically significant, $F(1, 12.95) = 0.38$, $p = .546$ (Fig. 1). Concerning the emotional symptoms scale, random effects of subject and class were statistically significant (ps $< .033$); as for fixed effects, results showed a statistically significant effect of group × time, $F(1, 247.01) = 7.97$, $p = .005$, and of time, $F(1, 247.01) = 48.59$, $p < .001$, while the effect of group was not statistically significant, $F(1, 13.32) = 0.74$, $p = .406$ (Fig. 1). As for the peer problems scale, random effects of subject and class were statistically significant ($p < .001$); as for fixed effects, results showed a statistically significant effect of time, $F(1, 247.00) = 32.96$, $p < .001$, but not of group, $F(1, 12.66) = 0.13$, $p = .723$ or of the interaction group × time, $F(1, 247.00) = 0.26$, $p = .609$ (Fig. 1). Finally, in the prosocial behavior scale, random effects of subject and class were statistically significant (ps $< .001$); as for fixed effects (higher scores represent better behaviors in this case), results showed a statistically significant effect of group × time, $F(1, 247.00) = 5.38$, $p = .021$, and of time, $F(1, 247.00) = 92.07$, $p < .001$, while the effect of group was not statistically significant, $F(1, 12.80) = 0.280$, $p = .606$ (Fig. 1). To summarize, the statistically significant interaction found in three SDQ scales (hyperactivity, emotional symptoms, and prosocial behaviors), indicates that the intervention had a significant contribution in lowering some of the children's problematic behaviors and increasing the prosocial abilities in children.

Fig. 1

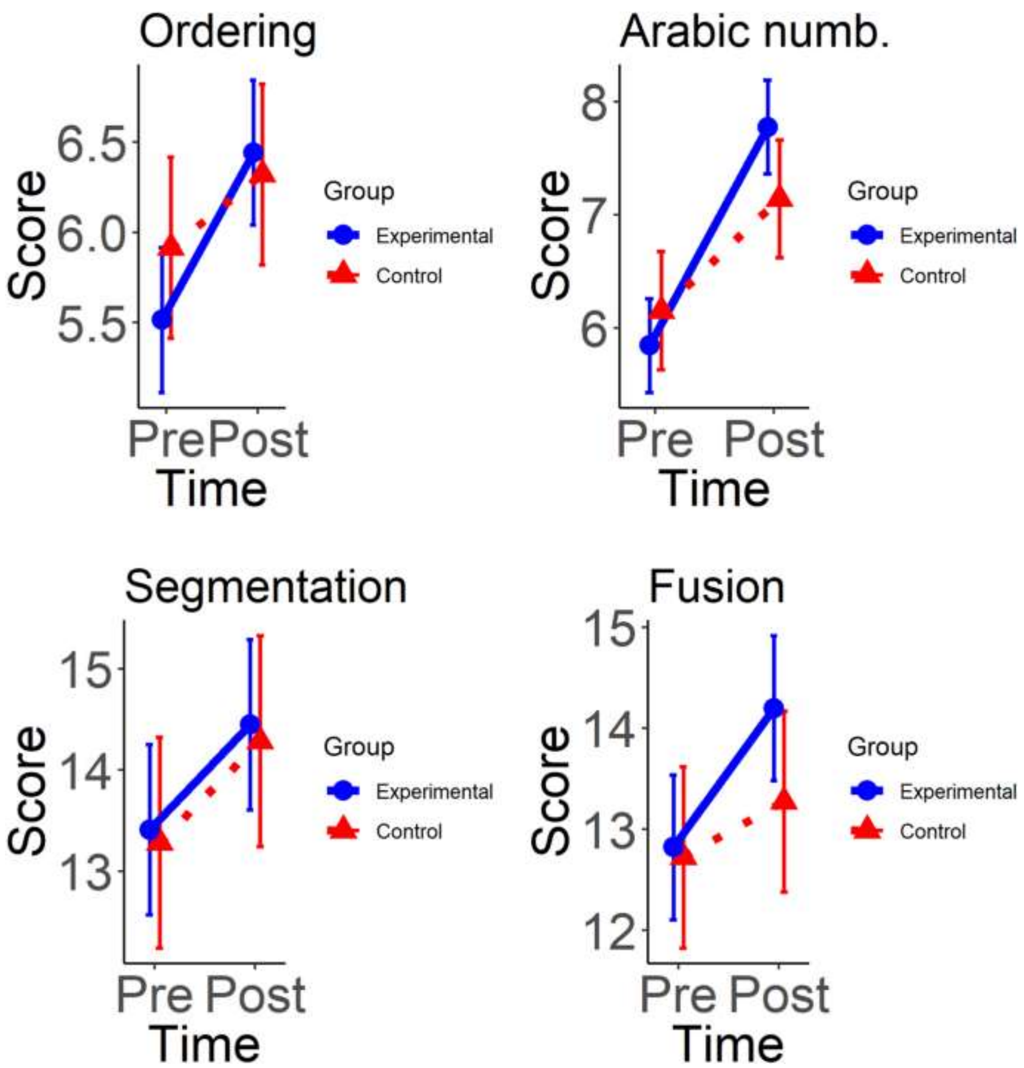
Performance at the SDQ in the two groups Error bars represents 95% confidence interval



Regarding early mathematical tasks, data were only available for 242 children. Considering the ordering quantities task, random effects of subject and class were statistically significant ($p < .001$); as for fixed effects, results showed a statistically significant effect of group × time, $F(1, 240.00) = 5.28$, $p = .023$, and of time, $F(1, 240.00) = 34.65$, $p < .001$, while the effect of group was not statistically significant, F(1, 13.62) = 0.46, p = .207 (Fig. 2). Results for the Arabic numbers comparison task were very similar, and the random effects of subject and class were statistically significant ($p < .001$); as for fixed effects, results showed a statistically significant effect of group × time, $F(1, 239.98) = 14.45$, $p < .001$, and of time, $F(1, 239.98) = 138.92$, $p < .001$, while the effect of group was not statistically significant, $F(1, 12.05) = 0.27$, $p = .061$ (Fig. 2). Overall, the significant group × time interaction indicated that the slopes for the experimental group were steeper, that is, the experimental group tended to improve more as compared to the control group.

Fig. 2

Performance of the two groups in mathematics (top) and reading (bottom)



Data on eight children were missing, and the analyses were performed on a sample of 242 children. Results of the segmentation task showed that random effects of subject and class were statistically significant ($p < .001$); as for fixed effects, results showed a statistically significant effect of time, $F(1, 240.01) = 54.85$, $p < .001$, but not of group, $F(1, 12.47) = 0.05$, $p = .832$, or of the interaction group × time, $F(1, 240.01) = 0.02$, $p = .885$ (Fig. 2). Considering the fusion task, random effects of subject and class were statistically significant ($p < .001$); as for fixed effects, results showed a statistically significant effect of group × time, $F(1, 240.00) = 4.68$, $p = .031$, and of time, $F(1, 240.00) = 25.47$, $p < .001$, while the effect of group was not statistically significant, $F(1, 12.19) = 0.86$, $p = .370$ (Fig. 2). Overall, the significant group × time interaction for the fusion task indicated that the slopes in the experimental group were steeper, indicating that the experimental group tended to improve more as compared to the control group.

All the analyses were repeated, including all the available information. The number of missing values was relatively small (lower than 3.2%); hence, this study initially adopted a listwise deletion. Expectedly, the results of these analyses corresponded to that of the original analyses.

Discussion

Social Emotional Learning skills are crucial during the preschool years (Howard & Williams, 2018), as they seem to be linked with pre-academic skills and learning engagement (Bierman et al., 2014; Darling-Hammond et al., 2020).

Therefore, the aim of this study was to test whether the CPU for preschoolers promoted better adjustment in children and improved their pre-academic skills. The first aim of the CPU is to improve children’s social and emotional skills to promote adjustment outcomes. However, it is also possible that a program designated to support children’s SEL skills could result in improved pre-academic skills.

This study used a teacher-report questionnaire to evaluate children's behavioral difficulties and strengths, and a psychologist assessed children on early mathematics and meta-phonological skills. Overall, our findings showed that CPU intervention reduced certain problematic behaviors and increased prosocial skills. Statistically significant interactions between group and time were found for the SDQ hyperactivity, emotional symptoms, and prosocial scales. Cohen's ES for CPU are particularly large for prosocial behavior.

The findings showed that CPU, consistent with other SEL programs (Durlak et al., 2011), could reduce children's hyperactive behaviors and emotional symptoms in the school context. Moreover, similar to the PATHS curriculum and the Roots of Empathy program (Domitrovich et al., 2007; Schonert-Reichl et al., 2012), the CPU can also increase levels of prosocial behaviors (empathy, peer social skills, and kindness with teachers) in children. Effective classroom management is a major concern for teachers of preschoolers. During CPU intervention teachers are encouraged to implement strategies to enhance classroom management (goal settings and token economy) and to promote SEL skills in students. Both of these aspects of the intervention could lead CPU to be effective in reducing emotional and behavioral problems in children (Waschbusch et al., 2019).

Regarding the intervention effects on pre-academic skills, the intervention seemed to be effective in improving them, but the effects were stronger in terms of magnitude for early mathematics as compared to meta-phonological skills. Research on the effects of SEL interventions on pre-academic skills has produced inconsistent results so far, with studies revealing significant positive (Raver et al., 2011) effects and others finding no benefits at all (Morris et al., 2013). This study indicated that the CPU can potentially produce transfer effects on pre-academic skills. How might CPU activities lead to positive early learning outcomes? More studies are needed to answer this question, but we hypothesize that CPU activities may have promoted emotion knowledge and emotion regulation, which were related to preschoolers' preacademic achievement (Leerkes et al., 2008). Some CPU activities work on children's ability to carry out complex directions, finish tasks, seek help when necessary, and enjoy challenging tasks: Howse et al. (2003) found a direct relation between these abilities and early learning outcomes.

The findings of this study were in line with previous studies on the CPU conducted among primary school children (Muratori et al., 2016) and extended preliminary results obtained with preschool-age children (Muratori et al., 2019a). Overall, this study indicated that improving children's behavioral functioning produces cascading effects on associated outcomes, such as pre-academic abilities. It could have a significant implication since the literature suggests that good pre-academic skills could influence the development of children's mathematics and literacy abilities during primary school (Anders et al., 2012; Melhuish et al., 2012). All these findings support and extend recent research examining the positive impacts of classroom-based SEL programs on children's social development and behavioral adjustment.

Limitations and Conclusions

This study had some limitations. First, sample size limited the generalizability of this study's findings. Second, this study used behavior ratings rather than direct observations of the child's behavior as outcome measures. Moreover, behavior ratings were provided by the same teachers who delivered the intervention. They underwent specific training that aimed to increase their knowledge about the treatment's objectives and activities. Thus, this might have unwittingly raised the teachers' expectations and partially influenced their post-treatment reports. Future studies should include multi-method approaches to assessing children's behaviors, such as the incorporation of observational techniques.

Besides these limitations, this study had strengths and several implications for research and practices. Transfer effects on children's pre-academic skills by SEL interventions have not been extensively studied in the literature. This study measured objectively, using standardized tests rather than teachers' reports, the effects of the CPU on these skills. This is an important strength of this study.

Furthermore, teachers (instead of counselors or psychologists) deliver the intervention using the CPU model; this method of implementation has several positive aspects. First, involving the teacher in the delivery of the program could increase the likelihood of generalization of the program throughout the school day. Second, teachers trained to deliver the CPU could use this expertise also in future school years. Third, this implementation method could be an inexpensive method that can be viable in settings where resources are limited (Steed & Shapland, 2020).

Current CPU findings were promising, however further research is still needed. Future studies should investigate whether the CPU can benefit children in successive years, for instance after their transition to primary school. Moreover, little is known about the mechanisms that promote the improvement in children's pre-academic skills after the CPU. Thus, future studies should include an assessment of those factors that may lead to similar results, such as change in children's executive functioning, school/classroom climate, teachers' way of teaching, and teacher-pupils' relationships (McClowry et al., 2010).

Finally, it is important to highlight that specific aspects of the Italian school system may partially impact the dissemination of the CPU to international school contexts. In Italy, preschool and primary education are part of the same Comprehensive Institute (Istituto Comprensivo) that brings together schools of a specific geographic area in the same network. This means that preschools and primary schools usually share the same school principal and administrative bodies. This helps to implement and to disseminate the CPU to different levels of education in our country. In other contexts where preschools and primary schools are separate organizations, the application of this intervention program could be more difficult. In our country, the economic burden of implementing the CPU is shared by the schools, which provide financial support for the intervention, and the universities and research institutes, which provide funds for evaluating the efficacy of the CPU. In contexts where this partnership is not possible, it would be necessary to find different financial support. That said, it is important to note that most of the school-based interventions for preschoolers are designed to be implemented in the North American school context, and their effectiveness is tested in this specific cultural context (Durlak et al., 2011; Joo et al., 2020). The current findings of this study show that an SEL program can also be implemented in different cultural and school settings with satisfying results on behavioral and learning outcomes.

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Table 1. Summary of the main results of the SEL interventions for preschoolers cited in our manuscript

Authors	Program	PRE-academic skill assessment	Benefit
Barnett et al., (2008)	**Tools of the Mind Curriculum**	**Vocabulary (PPVT – III)**	**Significant improvement (regression ES = .22; HLM ES = .22)**
		Reading decoding (Letter Word Identification subtest of the Woodcock–Johnson Psycho- Educational Battery-Revised)	**No statistically significant effect**
		Math skills (Applied Problems subtest of the Woodcock–Johnson Battery-Revised)	**No statistically significant effect**
		Early literacy skills (Get Ready to Read)	**No statistically significant effect**
		Expressive vocabulary (English: EOWPVT-Revised)	**No statistically significant effect**
		Receptive and expressive language skills (Spanish: IDEA Oral Language Proficiency Test)	**Significant improvement (regression ES = .35; HLM ES = .34)**
Blair & Rover, (2014)	**Tools of the Mind Curriculum**	**Reading (Letter Word Identification subtest of the Woodcock-Johnson III Tests of Achievement)**	**No statistically significant effect (ES = .07)**
		Vocabulary (Reading Vocabulary subtest of the Woodcock-Johnson III Tests of Achievement + Expressive One Word Picture	**Significant improvement (ES = .43)**

Authors	Program	PRE-academic skill assessment	Benefit
		Vocabulary Test)	
		Mathematics (Applied Problems subtest of the Woodcock-Johnson III Tests of Achievement)	**Significant improvement (ES = .13)**
Lonigan et al., (2015)	**Promoting Alternative Thinking Strategies (PATH)**	**Expressive vocabulary (EOWPVT)**	**Explicit and implicit SE group: no statistically significant effect (explicit ES=.15; implicit ES: .12)**
		Phonological awareness: blending (Phonological awareness subtest of the TOPEL)	**Explicit and implicit SE group: marginally significant effect (explicit ES=.26; implicit ES = .21)**
		Phonological awareness: elision (Phonological awareness subtest of the TOPEL)	**Explicit SE group: marginally significant effect (ES = .26) Implicit SE group: significant effect (ES= .30)**
		Literacy (Print knowledge subtest of the TOPEL)	**Explicit and implicit SE group: no statistically significant effect (explicit ES=.19; implicit ES: .17)**
		Informal math knowledge (Child Math Assessment)	**Explicit SE group: no statistically significant effect (ES = .05) Implicit SE group: significant effect (ES= .25)** *Note*: **Implicit group > Explicit group**

Mackintosh & McCoy, (2019)	**Chicago School Readiness Project (CSRP)**	**Early math skills (Applied Problems subtest of the Woodcock-Johnson)**	**No statistically significant effect**
Morris et al., (2013)	**Foundation of Learning (FOL)**	**General knowledge (21-item Academic Rating Scale)**	**No statistically significant effect**

Authors	Program	PRE-academic skill assessment	Benefit
		Language and literacy (21-item Academic Rating Scale)	**No statistically significant effect**
		Mathematical knowledge (21-item Academic Rating Scale)	**No statistically significant effect**
Nix et al., (2013)	**Head Start REDI (Research-based, Developmentally Informed)**	**Vocabulary (EOWPTT)**	**Statistically significant gains (ß = .25; $p < .05$)**
		Emergent literacy skills: blending and elision (Test of Preschool Early Literacy)	**Statistically significant gains (ß = .49; $p < .001$)**
Raver et al., (2011)	**Chicago School Readiness Project (CSRP)**	**Vocabulary (PVTT, shortened version)**	**Significant improvement (ES = .34)**
		Letter naming (Letter naming task)	**Significant improvement (ES = .63)**
		Early math skills (Early math skills test)	**Significant improvement (ES = .54)**

Table 2. Description of the program

SEL goals	CPU modules	Outline
Responsible decision making	**Module 1** **Group structure and behavioral** **Goal setting procedure** **Module 5** **Social problem solving**	**Module 1** **– Engage children in an activity to build group cohesion** **– Illustrate the process of personal goal settings** **– Review progress in achieving goals** **– Introduce the "buddy system"** **Module 5** **– Identify the problem solving steps** **– Define a problem in solvable steps**
Self-awareness	**Module 2** **Awareness of feelings and physiological arousal related to anger**	**– Identify various cues of anger and other feelings** **– Identify different levels of anger and other feelings**
Self-management	**Module 3** **Anger and self-control**	**– Identify different methods of coping with anger and other feelings** **– Practice using anger coping/self-control**
Social awareness	**Modulo 4** **Perspective-taking**	**– Identify different perspectives of a situation** **– Apply perspective taking to a social situation**
Relationship skills	**Modulo 6** **Positive quality development and peer relationship**	**– Identify personal strengths and how these strengths help when joining in positive peer activities and groups** **– Positive quality development**

Table 3. Descriptive statistics and Cohen's d for the two groups

	Pre			Post				95% CIs	
	Mean	n	SD	Mean	n	SD	Cohen's d	LL	UL
CPU group									
SDQ emotional	**1.28**	**151**	**1.86**	**0.19**	**151**	**0.6**	**− 0.79**	**− 1.02**	**−0.55**
SDQ peers	**0.86**	**151**	**1.6**	**0.36**	**151**	**1.12**	**− 0.36**	**− 0.59**	**−0.13**
SDQ hyperactivity	**2.6**	**151**	**2.87**	**0.63**	**151**	**1.64**	**− 0.84**	**− 1.08**	**−0.61**
SDQ conduct	**1.13**	**151**	**1.88**	**0.67**	**151**	**0.96**	**− 0.31**	**− 0.53**	**−0.08**
SDQ prosocial	**7.27**	**151**	**2.53**	**9.09**	**151**	**1.35**	**0.90**	**0.66**	**1.13**
Ordering	**5.6**	**149**	**1.52**	**6.62**	**143**	**1.23**	**0.74**	**0.50**	**0.97**
Arabic	**5.9**	**147**	**1.88**	**7.89**	**143**	**1.39**	**1.20**	**0.95**	**1.45**
Segmentation	**13.71**	**143**	**2.64**	**14.65**	**143**	**1.02**	**0.47**	**0.23**	**0.70**
Fusion	**12.93**	**143**	**3.1**	**14.31**	**143**	**1.62**	**0.56**	**0.32**	**0.79**
Control									
SDQ emotional	**1.28**	**98**	**1.6**	**0.81**	**99**	**1.62**	**− 0.29**	**− 0.57**	**−0.01**
SDQ peers	**1.03**	**98**	**1.4**	**0.42**	**99**	**1.11**	**− 0.48**	**− 0.76**	**−0.20**
SDQ hyperactivity	**2.37**	**98**	**2.37**	**1.44**	**99**	**2.05**	**− 0.42**	**− 0.70**	**−0.14**
SDQ conduct	**1.16**	**98**	**1.59**	**0.84**	**99**	**1.28**	**− 0.22**	**− 0.50**	**0.06**
SDQ prosocial	**7.16**	**98**	**2.5**	**8.29**	**99**	**1.7**	**0.53**	**0.24**	**0.81**
Ordering	**5.84**	**99**	**1.28**	**6.08**	**99**	**1.59**	**0.17**	**− 0.11**	**0.44**
Arabic	**6.12**	**99**	**1.9**	**7.05**	**99**	**1.63**	**0.53**	**0.24**	**0.81**
Segmentation	**12.99**	**99**	**2.43**	**14.13**	**99**	**1.63**	**0.55**	**0.26**	**0.83**
Fusion	**12.81**	**99**	**2.69**	**13.41**	**99**	**2.25**	**0.24**	**− 0.04**	**0.52**