Promoting Prosocial Behavior and Self-Regulatory Skills in Preschool Children Through a Mindfulness-Based Kindness Curriculum

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Self-regulatory abilities are robust predictors of important outcomes across the life span, yet they are rarely taught explicitly in school. Using a randomized controlled design, the present study investigated the effects of a 12-week mindfulness-based Kindness Curriculum (KC) delivered in a public school setting on executive function, self-regulation, and prosocial behavior in a sample of 68 preschool children. The KC intervention group showed greater improvements in social competence and earned higher report card grades in domains of learning, health, and social-emotional development, whereas the control group exhibited more selfish behavior over time. Interpretation of effect sizes overall indicate small to medium effects favoring the KC group on measures of cognitive flexibility and delay of gratification. Baseline functioning was found to moderate treatment effects with KC children initially lower in social competence and executive functioning demonstrating larger gains in social competence relative to the control group. These findings, observed over a relatively short intervention period, support the promise of this program for promoting self-regulation and prosocial behavior in young children. They also support the need for future investigation of program implementation across diverse settings.

Keywords: mindfulness, executive function, prosocial behavior, preschool, early childhood

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Social, emotional, and cognitive functioning are deeply intertwined throughout the life span. As such, self-regulatory skills are increasingly recognized as important contributors to school success. The capacity to regulate attention and emotion are forms of self-regulation that provide a foundation for school readiness by supporting dispositions conducive to learning and maintaining positive social relationships (Blair, 2002). The importance of developing such competencies early in life is underscored by longitudinal research demonstrating that self-regulation in childhood predicts health, financial stability, and educational attainment into adulthood (Moffitt et al., 2011). There is particular interest in training during early childhood, given the malleability and plasticity associated with this period of development. Furthermore, economists have demonstrated that investments in early childhood education pay for themselves, yielding a return of 7% or more (Heckman, 2011). Investment in early education, therefore, has the potential to increase health and reduce risk behaviors over the life span, thus reducing overall societal costs.

Healthy functioning across academic and social contexts requires exercising self-regulatory ability in the pursuit of short- and long-term goals. Self-regulation involves modulating feelings, thoughts, and behavior, and is associated with academic achievement and social competence, both concurrently and prospectively (Eisenberg, Spinrad, & Smith, 2004; Spinrad et al., 2006). In a classic delay of gratification paradigm, self-regulatory ability at age 4 (indexed by waiting a longer time for a reward) predicts attentional capacity, self-control, and frustration tolerance years later during adolescence (Eigsti et al., 2006; Mischel, Shoda, & Peake, 1988; Shoda Mischel, & Peake, 1990). Furthermore, children who are better able to delay also score higher on the SAT and are perceived as more interpersonally competent by parents and peers (Mischel, Shoda, & Rodriguez, 1989). In contrast, deficits in self-regulation can significantly interfere with learning (Barkley, 2001). Thus, the ability to enhance and strengthen attention and emotion regulatory resources warrants further investigation.

Attention and executive functioning play a key role in effective self-regulation. Executive functions (EFs) refer to an array of related, yet distinct cognitive processes, such as cognitive flexibility, inhibitory control, and working memory, which impact all
areas of functioning (Anderson, 2002; McCloskey, Perkins, & Van Divner, 2009; Miyake et al., 2000; Zelazo, Carlson, & Kesek, 2008). The development of prefrontal cortical (PFC) regions are linked to attention and EFs, abilities which are present in a rudimentary form at the beginning of life and undergo rapid development, congruent with brain growth during the childhood years (Diamond, 2002). EFs are a fundamental component of school success and predict academic performance above and beyond general levels of intelligence (Blair & Razza, 2007). Therefore, early childhood is an opportune period of development for training such skills.

Despite evidence highlighting the importance of such self-regulatory skills to academic and life success, these skills are not often explicitly taught in school. Rather, instruction tends to emphasize academic knowledge and performance on standardized tests. There has been a surge in interest among educators, parents, and policymakers in addressing children’s social and emotional development in addition to academic skills but, as yet, no clear consensus exists on what constitute the best strategies and methods for cultivating these positive qualities in young children (Greenberg et al., 2003). Emerging scientific evidence supports the training of these skills in children through a variety of modalities including mindfulness-based practices (Diamond & Lee, 2011).

Mindfulness Training and Education

Mindfulness training enhances attention and EF by bringing awareness to a particular attentional object, whether it is the breath, external stimuli, thoughts, or emotions. It entails noticing when the mind has wandered from its object of attention (monitoring) and returning attention back to the chosen object (shifting/cognitive flexibility). Training increases the ability to maintain engagement of self-regulatory neural circuits (PFC), resulting in improved sustained attention and emotion regulation (Lutz, Slagter, Dunne, & Davidson, 2008; MacLean et al., 2010).

Through the training of attention, the qualities of kindness and care toward oneself and others can be cultivated implicitly and explicitly. Young children, for instance, engage in setting daily intentions and age-appropriate practices to extend care and well wishes. A similar form of mental training is associated with increased activity in cortical areas responsible for empathy and compassion among adults (Lutz, Brefczynski-Lewis, Johnston, & Davidson, 2008) with measurable change in altruistic behavior and corresponding neural activity in as few as two weeks (Weng et al., 2013). Thus, these practices may effect changes induced through neural plasticity that support prosocial behavior and academic success (Davidson et al., 2012; Davidson & McEwen, 2012).

While the popularity of mindfulness programs for children has increased rapidly, there is a paucity of empirical research on the effects of such practices. Initial studies of mindfulness training with children show promising effects (e.g., Flook et al., 2010; Napoli, Kretch, & Holley, 2005) and a review of meditation-based interventions among youth reported a median effect size between .27 to .70 for psychological and behavioral outcomes (Black, Milam, & Sussman, 2009). With some exceptions, existing research is primarily limited by a lack of randomized controlled trials and reliance on questionnaire measures. The present study uses a randomized controlled design to assess the effects of a mindfulness-based prosocial skills training curriculum on a range of cognitive and behavioral outcomes in preschool children. In addition, we examine moderators of the intervention effect with the hypothesis that those who are lower in prosocial skills and EF as assessed behaviorally at baseline will improve most in terms of teacher ratings of their social-competence over time.

Method

Participants

Seven classrooms were recruited from six different elementary schools within a public school district in a medium-sized Midwestern city. Within these schools, 37.9% of children are considered socioeconomically disadvantaged. A total of 99 children were invited to participate and parents of 68 indicated they wished to enroll their child in the study (acceptance rate = 68.7%). The sample included 40 White (58.8%), 8 Hispanic (11.8%), 4 African American (5.9%), 7 Asian/Pacific Islander (10.3%), 8 “Other”/mixed ethnicity children (11.8%), 34 girls (50.0%) and 33 boys (48.5%), with a mean age of 4.67 years (SD = .27). Of the parents, 49 (72.1%) were 4-year college graduates and 18 (26.5%) were not (demographic data were missing for one parent and child).

Participants were randomly assigned by classroom to either a mindfulness-based “Kindness Curriculum” (KC) intervention or a wait-list control group (n = 30 from three classrooms and 38 from four classrooms, for KC and control group respectively). Participants were assessed in individual testing sessions before and after the training period. All procedures for this study were approved by both the university and school district research review boards.

Kindness Curriculum (KC) Intervention

The intervention group received a 12-week mindfulness-based prosocial skills training designed for preschool-age children (see supplemental material for sample lessons). The foundation of the KC is mindfulness practice, aimed at cultivating attention and emotion regulation, with a shared emphasis on kindness practices (e.g., empathy, gratitude, sharing). The preschool KC is progressive in nature and incorporates children’s literature, music, and movement to teach and stabilize concepts related to kindness and compassion. The curriculum was taught by experienced mindfulness instructors in a secular manner and was provided universally to children as part of their standard classroom instruction during regular school hours. Student training in the KC consisted of two 20–30 min lessons each week over a 12-week period, totaling approximately 10 hrs of training.

Measures

Teacher-rated social competence (TSC). Teacher’s ratings of their student’s social competence were obtained using items from the Teacher Social Competence Scale (Conduct Problems Prevention Research Group, 1995). The measure (overall α = .94) was comprised of two subscales: a prosocial behavior subscale (seven items, showing empathy and compassion for others’ feelings, α = .95) and an emotion regulation subscale (five items, e.g., stopping and calming down when excited or upset, α = .82). Items were rated on a 6-point Likert-type scale with higher scores indicating greater social competence.
Sharing task. This task was designed for use in the current study and consisted of four separate trials in which children distributed stickers between themselves and a target recipient. The four target recipients included a most- and least-liked peer (identified by the participant) from their class, an unfamiliar child, and a child who was sick. In each of the four trials, children were presented with an envelope for themselves labeled “me” and an envelope with a picture of the designated target recipient.

Children were given 10 stickers at the beginning of each trial and told they could keep as many as they would like for themselves and give as many as they would like to the other person. Scores were computed for each trial along with a total average score that reflected the number of stickers put in the “me” envelope across all four trials.

Delay of gratification. The delay of gratification task was based on Prencipe and Zelazo’s (2005) procedure. The task included nine test trials requiring a choice between having a smaller reward “now” (one item) or a larger reward “later” (two, three, or five items). In the present study, rewards included food, crayons, and tokens (which could be exchanged for a variety of small toys). Scores were computed for all trials and each contingency representing the mean number of times the child chose the delay condition.

Dimensional change card sort task (DCCS). A computerized version of the dimensional change card sort task (DCCS) was used to assess cognitive flexibility, a core aspect of executive function (Garon, Bryson, & Smith, 2008). This task was taken from the National Institute of Health (NIH) Toolbox Cognitive Function Battery (Zelazo et al., 2013). The task requires participants to sort bivalent test cards first by one dimension (e.g., shape) and then sort the same cards by a second dimension (e.g., color).

The DCCS consists of three test blocks—preswitch, postswitch, and mixed. Practice trials (four trials for each dimension) are followed by the preswitch block (five trials). The postswitch block (five trials) requires sorting by the second dimension. The mixed block (40 trials) includes shifting between sorting dimensions.

Scoring followed recommended procedures (Zelazo et al., 2013), including the computation of a composite score that allows an equal contribution for accuracy and reaction time (RT). Composite scores were calculated for all trials as well as for only postswitch trials. Although the scoring procedures recommend using only the mixed block, the postswitch block was used given the large percentage of participants not receiving the mixed block due to low accuracy (the task ends if accuracy cut-off is not met). This postswitch block was seen as the next best proxy for cognitive flexibility since it still requires a shift in sorting dimension.

Flanker task. A computerized Flanker task, also from the NIH Toolbox Cognitive Function Battery (Zelazo et al., 2013), was used to measure inhibitory control, another core aspect of executive function (Garon et al., 2008). In this task, participants were presented with a row of five stimuli (either fish or arrows) and pressed one of two buttons indicating the direction the middle stimulus (either a fish or arrow) is pointing. During congruent trials all the stimuli are pointing the same direction while in the incongruent trials the flanking stimuli are pointing the opposite direction from the middle stimulus.

The Flanker task included three blocks: practice (four trials), fish (20 trials), and arrows (20 trials). Scoring followed recommended procedures (Zelazo et al., 2013), including the computation of a composite score that reflects equal contributions of accuracy and RT.

Both the Flanker and DCCS tasks have demonstrated excellent test–retest reliability (ICC = .92 for both tasks) as well as good convergent and discriminant validity (Zelazo et al., 2013).

School grades. Children’s grades reflecting performance for the second half of the academic year were obtained from school records. Teachers assigned grades in five different domains using a 4-point scale with higher scores indicating the child met or exceeded expectations: Approaches to Learning (three items, persists with self-initiated activities, α = .76), Cognition and General Knowledge (seven items, sorts and/or describes objects by size, shape, color, or use, α = .72), Health and Physical Development (five items, demonstrates balance and strength, α = .77), Language Development and Communication (nine items, retells a familiar story in sequence, α = .87), Social and Emotional Development (seven items, displays age appropriate self-control, α = .86).

Data Analysis

Independent t tests were conducted to compare groups at baseline. Repeated measures analysis of variance (RMANOVA) analyses were conducted with baseline scores entered as covariates to assess for group by time interactions. Subsequent RMANOVA models also included child gender and age as covariates. Paired t tests were used post hoc to examine change from pre- to post-test within intervention and control groups separately in cases where the omnibus F value from the RMANOVAs showed a significant effect (i.e., a significant group by time interaction effect controlling for baseline levels). For data only reported at post-test (i.e., school grades), independent t tests were used comparing groups postintervention. In addition, given the exploratory nature of this study and the relatively small sample size, we conducted both formal significance testing (using RMANOVAs and t tests) as well as generated effect sizes reflecting group differences. For measures assessed at both pre- and post-, we computed both within-group pre/post effect sizes (Cohen’s d, using pooled pre- and post-test standard deviations) and between-groups effect sizes (computed as the difference between within-group ds, with KC d minus control group d, equivalent to Becker’s del, 1988). For outcomes assessed only at post-test (school grades), only a between-groups d was computed, also using a pooled standard deviation. Effect sizes were interpreted based on Cohen’s (1988) guidelines.

In order to assess for individual differences in response to intervention, ANOVA models were constructed, examining baseline by group interactions as a predictor of change. The small number of level two units (i.e., classrooms) precluded the possibility of modeling treatment effects in multilevel models (Snijders & Bosker, 2012). Intraclass correlation coefficients (ICCs) were computed to index the amount of variance in outcomes attributable to classrooms.

Results

There were no significant differences at baseline on any demographic variables or other measures assessed at baseline (i.e., delay of gratification, sharing task, TSC, DCCS, Flanker; p > .05).
Teacher-Rated Social Competence (TSC)

A significant group by time interaction was found in RMANOVA analyses (controlling for baseline levels) for TSC total score, $F(1, 63) = 6.78$, $p = .011$ as well as the prosocial behavior, $F(1, 63) = 4.37$, $p = .041$ and emotion regulation subscales, $F(1, 63) = 10.12$, $p = .002$. Results from all RMANOVA analyses along with group means and SDs are reported in Table 1. Significant pre/post change with large effect sizes was found for both groups in post hoc paired $t$ tests for TSC total score (KC: $t(28) = 8.06$, $p < .001$, $d = 1.31$; control: $t(36) = 8.79$, $p < .001$, $d = 1.05$) as well as prosocial behavior (KC: $t(28) = 8.03$, $p < .001$, $d = 1.27$; control: $t(36) = 8.51$, $p < .001$, $d = 0.98$) and emotion regulation subscales (KC: $t(28) = 6.81$, $p < .001$, $d = 1.22$; control: $t(36) = 6.25$, $p < .001$, $d = 0.97$). A small between-groups $d$ (computed as the difference between within-group $d$s) was found favoring the KC group for TSC total score ($d = 0.26$) as well as for the prosocial behavior ($d = 0.29$) and emotion regulation subscales ($d = 0.25$). RMANOVA analyses including gender and age did not change significance tests for the TSC total score or emotion regulation subscales; the RMANOVA including prosocial behavior was no longer significant, $F(1, 60) = 2.71$, $p = .105$.

Sharing Task

A significant group by time interaction was found with the RMANOVA analysis for sharing (total stickers kept for self), indicating that the control group kept significantly more for themselves over time relative to the KC group, $F(1, 58) = 6.53$, $p = .013$; Figure 1. This result remained significant when controlling for gender and age. Paired $t$ tests conducted post hoc revealed a significant increase in stickers kept for self in the control group, $t(33) = 2.28$, $p = .029$, $d = 0.48$ but not in the KC group, $t(26) = 0.51$, $p = .613$, $d = 0.15$. The between-groups effect ($d = -0.33$) was small.

Delay of Gratification

No significant RMANOVA analyses were noted for the delay of gratification task (all trials: $F(1, 59) = 1.39$, $p = .244$, one vs. two: $F(1, 59) = 0.02$, $p = .901$, one vs. three: $F(1, 59) = 1.93$, $p = .170$, one vs. five: $F(1, 59) = 2.47$, $p = .121$). Within-group $d$s reflected small- to hyphenate increases in the KC group ($d$s = 0.42, 0.16, 0.47, and 0.48 for all trials, one vs. two, one vs. three, and one vs. five, respectively) and small increases in the control group ($d$s = 0.19, 0.20, 0.18, and 0.11 for all trials, one vs. two, one vs. three, and one vs. five, respectively). Examining between-groups $d$s, a small effect size was noted across all trials ($d = 0.23$), in one versus three ($d = 0.29$), and in one versus five ($d = 0.37$) trial types in the direction of more delay in the KC group relative to the control group. A very small effect size ($d = -0.04$) was noted favoring the control group on one versus two trials.

Dimensional Change Card Sort Task (DCCS)

No significant RMANOVA analyses were noted for the DCCS task (all trials: $F(1, 53) = 0.08$, $p = .785$, postswitch trials: $F(1,$

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**Table 1**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Kindness curriculum</th>
<th>Wait-list control</th>
<th>Pre-test $M$ (SD)</th>
<th>Post-test $M$ (SD)</th>
<th>Pre-test $M$ (SD)</th>
<th>Post-test $M$ (SD)</th>
<th>Between-group $d$</th>
<th>$F$-value</th>
<th>$t$-value</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSC—Total</td>
<td>29</td>
<td>3.23 (1.01)</td>
<td>37</td>
<td>3.10 (0.77)</td>
<td>3.91 (0.79)</td>
<td>0.26</td>
<td>6.78</td>
<td>.011**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSC—PB</td>
<td>29</td>
<td>3.06 (1.11)</td>
<td>37</td>
<td>3.02 (0.91)</td>
<td>3.91 (0.93)</td>
<td>0.29</td>
<td>4.37</td>
<td>.041**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSC—ER</td>
<td>29</td>
<td>3.46 (0.98)</td>
<td>37</td>
<td>3.22 (0.76)</td>
<td>3.91 (0.68)</td>
<td>0.25</td>
<td>10.12</td>
<td>.002**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self Stickers</td>
<td>27</td>
<td>4.84 (2.15)</td>
<td>35</td>
<td>4.52 (1.90)</td>
<td>6.20 (1.33)</td>
<td>-0.33</td>
<td>6.53</td>
<td>.013*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay—all trials</td>
<td>27</td>
<td>1.47 (0.35)</td>
<td>35</td>
<td>1.44 (0.33)</td>
<td>1.50 (0.35)</td>
<td>0.23</td>
<td>1.39</td>
<td>.244</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay—1 vs. 2</td>
<td>27</td>
<td>1.47 (0.37)</td>
<td>35</td>
<td>1.45 (0.36)</td>
<td>1.52 (0.40)</td>
<td>-0.04</td>
<td>0.02</td>
<td>.901</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay—1 vs. 3</td>
<td>27</td>
<td>1.44 (0.36)</td>
<td>35</td>
<td>1.41 (0.37)</td>
<td>1.48 (0.38)</td>
<td>0.29</td>
<td>1.93</td>
<td>.170</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay—1 vs. 5</td>
<td>27</td>
<td>1.47 (0.41)</td>
<td>35</td>
<td>1.47 (0.38)</td>
<td>1.51 (0.38)</td>
<td>0.37</td>
<td>2.47</td>
<td>.121</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DCCS—All trials</td>
<td>24</td>
<td>4.75 (1.57)</td>
<td>34</td>
<td>4.66 (1.57)</td>
<td>5.84 (1.79)</td>
<td>-0.13</td>
<td>0.08</td>
<td>.785</td>
<td></td>
<td></td>
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<tr>
<td>DCCS—Post-switch</td>
<td>20</td>
<td>5.08 (1.83)</td>
<td>24</td>
<td>5.19 (1.48)</td>
<td>5.92 (1.86)</td>
<td>0.43</td>
<td>1.54</td>
<td>.222</td>
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<tr>
<td>Flanker</td>
<td>25</td>
<td>4.94 (1.78)</td>
<td>34</td>
<td>5.30 (1.64)</td>
<td>6.29 (1.46)</td>
<td>-0.17</td>
<td>0.62</td>
<td>.434</td>
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<tr>
<td>Grades—Learning</td>
<td>25</td>
<td>3.55 (0.36)</td>
<td>34</td>
<td>3.33 (0.42)</td>
<td>0.54*</td>
<td>2.05</td>
<td>.045*</td>
<td></td>
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<tr>
<td>Grades—Health</td>
<td>25</td>
<td>3.60 (0.28)</td>
<td>34</td>
<td>3.40 (0.41)</td>
<td>0.56*</td>
<td>2.23</td>
<td>.030*</td>
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<tr>
<td>Grades—Social/Emotional</td>
<td>25</td>
<td>3.51 (0.38)</td>
<td>34</td>
<td>3.16 (0.35)</td>
<td>0.97*</td>
<td>3.69</td>
<td>&lt;.001***</td>
<td></td>
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<tr>
<td>Grades—Cognition</td>
<td>25</td>
<td>3.35 (0.43)</td>
<td>34</td>
<td>3.47 (0.33)</td>
<td>-0.30*</td>
<td>-1.14</td>
<td>.260</td>
<td></td>
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<tr>
<td>Grades—Language</td>
<td>25</td>
<td>3.50 (0.41)</td>
<td>34</td>
<td>3.46 (0.45)</td>
<td>0.09*</td>
<td>0.35</td>
<td>.728</td>
<td></td>
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</tbody>
</table>

*Note.* Smaller sample size ($n$) for DCCS postswitch trials due to children not performing at preswitch accuracy cut-off. TSC = Teacher Social Competence; PB = prosocial behavior subscale; ER = emotion regulation subscale; Self Stickers = stickers kept for self during Sharing Task; Delay = delay of gratification; DCCS = dimensional change card sort computer task; KC = Kindness curriculum Wait-list control; DCCS—All trials = composite score across all trials; DCCS—Post-switch = composite score across post-switch trials only; Learning = Approaches to Learning; Health = Health and Physical Development; Social/Emotional = Social and Emotional Development; Cognition = Cognition and General Knowledge; Language = Language Development and Communication; $d$ = between-group Cohen’s $d$ computed as the difference (KC minus control) between within-group pre/post $d$s (within-group $d$s computed using an SD pooled between pre- and post-SD); $F$ value = from group by time interaction term in RMANOVA analyses controlling for baseline levels; $t$-value = from between-group independent $t$-test for school grades which were only assessed at post-test.

* $p < .05$. ** $p < .01$. *** $p < .001$. 

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Moderators of Treatment Effect

Moderators of the treatment effect were tested with ANOVA, using change in social competence total score as the outcome variable. In these models, baseline levels of social competence (total score: $F(2, 62) = 5.45, p = .023$ and prosocial behavior subscale: $F(2, 62) = 8.36, p = .005$), cognitive flexibility (DCCS, all trials: $F(2, 55) = 7.25, p = .009$), and inhibitory control (Flanker: $F(2, 55) = 14.72, p < .001$; Figure 3) significantly interacted with group to predict change in social competence. No other significant interactions were found ($p > .10$). Children in the KC group with lower levels of social competence and executive functioning at baseline showed larger improvements in social competence over time relative to the control group.

Intraclass Correlation Coefficients

Intraclass correlation coefficients (ICCs) were computed to index the amount of variance in outcomes attributable to classrooms (see the supplemental material, Table 2). As expected, ICCs were larger for teacher-reported outcomes (ICCs = .19 to .35 for TSC baseline and difference scores, ICCs = .17 to .48 for end-of-year grades). ICCs were close to zero (ICC < .02) for most behavioral tasks (baseline and difference scores) with the exception of the sharing task at baseline (ICC = .10) for self-stickers, inhibitory control at baseline (ICC = .23 for Flanker), and change in delay (ICC = .05 for one vs. three trial types). Although there was a range of ICCs, classroom effects alone do not explain the pattern of results. However, the sizable ICCs for some teacher-rated outcomes highlights potential limitations of relying solely on teacher-based measures when conducting research in schools. This accentuates the need for including larger numbers of teachers and

School Grades

Independent $t$ tests revealed group differences on end of year school grades (see Figure 2). The KC group earned higher grades than the control group in Approaches to Learning, $t(57) = 2.05, p = .045, d = .54$, Health and Physical Development, $t(57) = 2.23, p = .030, d = .56$ and Social and Emotional Development, $t(57) = 3.69, p < .001, d = .97$. There were not differences between groups on Cognition and General Knowledge or Language Development and Communication ($p > .10$, $d$s = -.30 and .09 for Cognition and Language, respectively).

Figure 1. Treatment effects on sharing behavior. Over time, the control group kept more stickers for themselves (shared less with others), on average, across all trials relative to the KC group. Standard error bars are displayed. Plot displays results of RMANOVA analysis controlling for sharing at baseline.

Figure 2. Group differences in end of year school grades. Kindness Curriculum group earned higher marks than control group across three subject areas.

Flanker Task

The RMANOVA analysis was not significant for the Flanker task, $F(1, 56) = .62, p = .434$. The pre/post within-group effect size was medium sized in both groups ($d$s = .47 and .64, for KC and control groups, respectively). The between-groups effect size was small in magnitude ($d = -0.17$) in the direction of improved inhibitory control performance in the control group relative to the KC group.

Independent $t$ tests revealed group differences on end of year school grades (see Figure 2). The KC group earned higher grades than the control group in Approaches to Learning, $t(57) = 2.05, p = .045, d = .54$, Health and Physical Development, $t(57) = 2.23, p = .030, d = .56$ and Social and Emotional Development, $t(57) = 3.69, p < .001, d = .97$. There were not differences between groups on Cognition and General Knowledge or Language Development and Communication ($p > .10$, $d$s = -.30 and .09 for Cognition and Language, respectively).
classrooms in designs that can adequately model informant response biases in future work.

Discussion

This project demonstrated the feasibility and potential benefits of implementing a mindfulness-based prosocial skills training curriculum in a real world classroom setting. Results indicated improvements in response to intervention across a range of outcomes. Between-groups analyses indicated that students who participated in the Kindness Curriculum (KC) training showed larger gains in teacher-reported social competence as compared to the control group. In addition, the control group acted more selfishly (sharing fewer resources with others) over time as compared to the KC group. Comparison of end of year school records showed higher marks for children in the intervention as compared to control group on indicators of learning, social-emotional development, and health. Notably, these differences emerged for second semester report card grades assigned approximately three months after the end of the intervention. Examination of effect sizes favored the KC group on measures of cognitive flexibility, specifically, postswitch trials, and delay of gratification. Both groups showed improvement on the Flanker task, with a larger effect size observed in the control group, indicating that the intervention did not selectively improve inhibitory control. Overall, however, inspection of effect sizes lends support to a general pattern of change favoring the intervention group, even though not all outcomes were significant in the omnibus test of the group by time interaction, which highlights the need for larger samples in future studies.

Understanding differences in how individuals respond to intervention is useful, as there may be moderators of the intervention effect. Given the emphasis on prosocial skills development of this mindfulness-based curriculum, we focused on social competence as an outcome of interest, potentially moderated by individual differences. The KC intervention appears to have been particularly beneficial for some children, specifically those with lower baseline functioning. Children in the intervention group who started out with lower social competence and lower executive functioning (indexed by inhibitory control and cognitive flexibility) at baseline showed greater improvements in social competence relative to the control group. This pattern of differential treatment effects is consistent with previous research documenting larger gains among children with poorer baseline function (Diamond & Lee, 2011; Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008). Taken together, the findings from this study suggest that there are benefits for a general education classroom and that children with deficits in executive function and social competence may experience additional gains.

That these changes were observed after a relatively short intervention period with a very modest dose of the intervention supports the practicality of this approach. The training shows promise as an accessible and cost-effective strategy to promote well-being and prosocial behavior by training noncognitive skills that are also important for academic success. Taking a universal preventive approach may set children on a positive trajectory for ongoing development. As effects of self-control are found to follow a gradient, an intervention that produces even small increases in self-control could yield societal benefits by shifting the distribution of associated outcomes (Moffitt et al., 2011).

While teachers were not blind to the study condition, the present methods include objective behavioral measures along with informant report. Additionally, report card grades were assigned approximately three months after the end of the intervention and grades were not higher across all subject areas for the intervention group. This suggests that teachers did not demonstrate a systematic bias in assigning student grades. Rather, differences may reflect particular domains of performance in which intervention group children demonstrated greater competence. The findings that individual differences moderated improvement in social competence further suggest a lack of uniform bias displayed by teachers in their ratings of children in the intervention group. The current study is limited by the relatively small sample size. Larger samples that enable analyses to account for the nested structure of data and follow-up to assess longer-term effects of training at six months and beyond are needed to more rigorously assess the effects of training. Assessment would be augmented by incorporating other objective measures such as cortisol (as a biological marker of stress) and third party observations of classroom behavior. Future work should also explore ongoing supports for practice as well as adding a parent component to training as recent research indicates a stronger impact of child training when combined with parent training (Neville et al., 2013).

This study demonstrates the promise of incorporating mindfulness-based training into an early education curriculum. Overall, these results suggest that a relatively brief mindfulness-based training can enhance a range of academic and prosocial outcomes in young children. Clearly, more work is needed on the cultivation of kindness and compassion in young children and their
parents and teachers. Training these skills and capacities early in life has important consequences throughout development, at both an individual and societal level.

References


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Promoting prosocial behavior and self-regulatory skills in preschool children through a mindfulness-based curriculum

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Kindness Curriculum (KC) Intervention Sample Lessons

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Table 2 – Intraclass Correlations
Kindness Curriculum Sample Lessons

Core Themes:

Theme One: Mindful Bodies and Planting Seeds of Kindness

Theme Two: I Feel Emotions on the Inside

Theme Three: How I Feel on the Inside Shows on the Outside

Theme Four: Taking Care of Strong Emotions on the Inside and Outside

Theme Five: Calming and Working Out Problems

Theme Six: Gratitude

Theme Seven: All People Depend Upon Each Other and the Earth

Theme Eight: Gratitude and Caring for Our World and Wrap Up

Overview of 24 Lessons:

Theme One: Mindful Bodies and Planting Seeds of Kindness
   Lesson 1: Mindful Bodies; Awareness of Attention and Breath
   Lesson 2: Growing Seeds
   Lesson 3: Growing Friendship with Kindness

Theme Two: I Feel Emotions on the Inside
   Lesson 4: Quiet Emotions on the Inside
   Lesson 5: I Can Notice Things When I'm Quiet on the Inside
   Lesson 6: Different Emotions Feel Differently on the Inside

Theme Three: How I Feel on the Inside Shows on the Outside
   Lesson 7: Emotions on the Inside Show on the Outside
   Lesson 8: Working with Emotions in a Kind and Friendly Way
   Lesson 9: Emotions Change Many Times Each Day

Theme Four: Taking Care of Strong Emotions on the Inside and Outside
   Lesson 10: Busy Mind and Clear Mind
   Lesson 11: Making Mind Jars and Practicing Using Them
   Lesson 12: What Else Can We Do When We are Upset?

Theme Five: Calming and Working Out Problems
   Lesson 13: Mindful Movement
   Lesson 14: Forgiving Myself
   Lesson 15: Forgiving Others

Theme Six: Gratitude
   Lesson 16: Gratitude for People or Things in My Life
   Lesson 17: Gratitude for My Body
   Lesson 18: Gratitude for Other People

Theme Seven: All People Depend on Each Other and the Earth
   Lesson 19: People Around the World Want Peace
   Lesson 20: Depending on Others
   Lesson 21: Caring for Small Animals

Theme Eight: Gratitude and Caring for Our World and Wrap Up
   Lesson 22: Gratitude and Caring for Our World
   Lesson 23: Bringing It All Together
   Lesson 24: Wrap Up
Theme One: Mindful Bodies and Planting Seeds of Kindness

Lesson 1: Mindful Bodies; Awareness of Attention and Breath

Concepts
- We can pay attention on the inside
- We can pay attention on the outside

Key Words (A= Attention card)
- breath, attention, inside, outside

Objective
Children will be able to:
1. Pay attention on the outside (bell tone)
2. Pay attention on the inside (breath sensations)

Materials
- Visual schedule board (VSB) with pictures (see visual schedule below), bell, container to hide bell, pin wheels, letters to parents about program and breath, A-Attention card

Visual Schedule
- Circle time, surprise, surprise

Activities
1. Introduction to paying attention and breath
2. Surprise? Pinwheel- focus on feeling the breath on inside
3. Transition- drop pinwheels and letters to parents in cubbies
4. Surprise? Bell- paying attention on the outside

Connection: Hi, my name is _______. I will meet with you two times each week. I feel excited on the inside to be here! Each day I will have a list of things that we will do... soon you will learn what each picture means. Today I have circle time, surprise, and surprise. (Demonstrate the schedule board.)

Teaching: Today we will learn a new word. “Mindfulness” Mindfulness means to pay attention in a special way. What does “pay attention” mean? (Wait for responses.) We can learn to pay attention on the inside and the outside of our bodies. When we pay attention, we use mindfulness and this can help us calm down if we are sad, angry or frustrated. It can also help us feel happy. (Hold up A=Attention card and hang it up on the wall) How can you tell this person is paying attention? (Eyes forward, body calm, no talking). When we pay attention, in a special way, sometimes our bodies automatically become still. Let’s say our new word, Mindfulness, 3x to help us remember it. (*Mindfulness*)

Now, let's pay attention to something I brought today... Are you ready? How do you feel on the inside waiting for a surprise? (Accept answers) What is this? (Pinwheel) How does it work? (Blow it) You are right... watching me, I will fill up my belly with air and then blow it out (blow pin wheel). I feel my belly and chest stretch on the inside when I breathe in and squeeze when I breathe out.

Active engagement: Now it is your turn to practice feeling your breath. Put one hand on your belly, take a big breath so your belly gets bigger and then pretend the back of your other hand is pin wheel and feel your belly get smaller. (Demonstrate) Great! Raise your hand if you want to share where you felt your breath. (Call on several students) Now it's time to blow the pinwheels. (Pass them out) Feel your belly fill with air ... then blow your pinwheel. (After several attempts, check-in to see what they noticed about the breath- easy or powerful breath).

These pinwheels are for you to take home. Please put them in your cubbies and then come to sit on the rug so I can show you one more surprise today. (Let kids put away pinwheels and two letters to parents)

I brought another surprise... what do you think it is? (Let students guess and ask...) How does it feel to “not know” what I have? It’s a bell. It can help us pay attention on the outside. Put one hand in the air. I will invite the bell. When you don’t hear the sound of the bell anymore put your hand on your belly. (Try it 2x) Everyone was paying attention on the outside to the bell and on the inside to the breath.

Closing: Today we learned about paying attention, breath and inviting the bell. I will see you soon!
Theme Two: I Feel Emotions on the Inside

Lesson 6: Different Emotions Feel Differently on the Inside

Concepts:
- I can tell someone how I feel on the inside
- I like some feelings and don’t like other feelings, but all feelings are helpful.

Key Words (E=Emotions card)
Snail/slow, bee/busy, basset dog/sad, lark/happy, tiger/brave, shrimp/shy

Objective
Children will be able to:
1. Reflect and comment on feelings in the body
2. Tell how feelings we like and don’t like are helpful

Materials
VSB, bell, belly buddies, Quick as a Cricket book

Visual Schedule

Activities
1. Bell
2. GFW
3. Quick as a Cricket book
4. Pretend to be animals/reflect on feelings
5. Belly buddies with Breathing In, Breathing Out song

Connection: It’s ___’s turn to invite the bell. (Support as needed) Let’s stand up and say our GFW and ___ will lead us. Thank you. (Offer kindness seed.) (Comment on growing number of seeds in the Kindness Garden or encourage teacher & students to recognize recent kind act in classroom.)

Teaching: Last time we talked about feeling quiet on the inside when walking and feeling or walking and listening even if it is noisy on the outside. We don’t always feel quiet on the inside. Today I brought a book that shows how some animals feel on the inside. Notice how YOU feel on the inside before we begin the book. (Read Quick as a Cricket)

Active engagement: Now it’s time for us to practice feeling on the inside and telling how we feel. First let’s practice being snails. What kind of movements do snails make? (Slow, slithery, etc.) When I invite the bell, start moving like a snail. When I invite the bell again, freeze. Ready? (Invite bell) Raise your hand to tell me how it feels inside to move your body like a snail. Where in your body do you feel it? (Continue on with Bee: excited/calm; Basset: sad/heavy/relaxed/busy; Lark: happy/light/scared flying; Tiger: brave/big/afraid; Shrimp: shy/small/afraid.)

Let’s do a feeling walk back to the rug, feel the bottom of your feet with each step. Then sit down crisscross applesauce and feel your bottom on the carpet.

We felt many emotions pretending to be animals. (Hold up E=Emotions card and add it to the wall with other letters). Raise your hand if you want to share with the class which animal you liked being best. (Students share; check to see how many other students liked being that animal.) Raise your hand if you want to share which animal you didn’t like being?

Even though we feel emotions we like and emotions we don’t like, all emotions are helpful. Why are emotions helpful? (They keep us safe and help us know what we need)

Closing: Let’s finish today resting into our quiet place on the inside. Before we lie down let’s stretch our arms and legs and then rest on the rug. When bodies are still and you can feel your breath, I will place a belly buddy on your belly as we listen to our Breathing In, Breathing Out song. Notice how you feel in your body and tell us as I collect the belly buddies. See you next time.
Theme Five: Calming and Working Out Problems

Lesson 14: Forgiving Myself

Concepts
- We all have accidents
- We can forgive ourselves when we have an accident

Key words (F=Forgive card)
- Accident, forgive, hug

Objective
Children will be able to:
1. Tell of a time they had an accident
2. Give themselves an “imaginary hug”

Materials
- VSB, bell, movement pictures, Down the Road book, theme-related song

Visual Schedule
- Bell, GFW, movement, book, song, brain game

Activities
1. Bell, GFW, movement (giraffe and eagle)
2. Book review (Down the Road)
3. Discussion:
   - How do you feel when you have an accident?
4. Song (accidents song)
5. Brain game (“Imaginary hug”, playful-bear hug, ant hug...)
6. Bell

Connection: (Have next student on list invite bell and lead GFW.)

Please stay standing. Yesterday we practiced animal movements. Sometimes when we are upset, if we move our bodies and breathe we can feel calmer. Let’s do giraffe and eagle today.

Teaching: Raise your hand if you remember this book. (Hold up Down the Road.) How did the girl feel when she had an accident? (Call on students) What did she do? (Sat in a tree) Did the girl’s parent stay mad at her for a long time? (No) They didn’t stay angry with her, they forgave her. (Show F=forgive card and add it to wall.) Forgiving helps us and the other person feel better. At school and at home we all have accidents. Can someone share about an accident that happened to them? (Call on a student to share. Be sure to have a story ready about an accident that you have had or seen at school if the children cannot remember something that has happened to them.)

Active engagement: We can probably all think of an accident that happened to us. They happen to everyone. How do you feel when you have an accident? Raise your hand if you’d like to share how accidents make you feel. (Bad, sad, embarrassed, etc.)

I’m feeling excited to teach you a new song about accidents. (Teach the song with hand motions.)

Let’s remember to say, “I didn’t mean it, are you okay?” when we need to.

Sometimes when I have an accident I feel really sad or embarrassed. Then I like to give myself an “imaginary hug”. I close my eyes and feel a hug. Let’s try it. Then I might give myself a real hug. Let’s stand up and try some hugs. Can you give yourself a great big bear hug (model)? Now a little tiny ant hug (have fingers crawl up opposite arms to the shoulders). Last, let’s try a patty cake hug (pat arms up to shoulders).

Closing: Let’s invite the bell to close our time together. (Choose next student on list to invite the bell)
Theme Seven: All People Depend on Each Other and the Earth
Lesson 19: People around the World Want Peace

Concepts
- We are the same as others because we all want peace
- We are different from others because we speak different languages

Key Words
- World, language, peace

Objective
Children will be able to:
1. Say one way they are the same and different from others
2. Name one thing that everyone wants: Peace

Materials
- VSB, bell, book (Can You Say Peace), maps and stickers, May You Be Happy
- Song, inflatable globe, parent letter #3, Betsy Rose CD (Rose, B. [2006]. Calm down boogie: Songs for peaceful moments and lively spirits [CD]. Albany, New York: A Gentle Wind.), CD player

Visual Schedule
- Bell, GFW, book, surprise?, song, bell

Activities
1. Bell and GFW
2. Read Book
3. Surprise (map activity)
4. Song (May You Be Happy)
5. Bell

Connection: (Have next student on list invite bell and lead GFW.)

Teaching: (Hold up the inflated globe.) Does anyone know what this is? (World, earth, globe) Yes, and this is where we live in the world (point to state). But there are children who live all around the world. Today we’re going to talk about people we have never even met who live very far away. Just like we want peace and kindness in our classroom, people all around the world want peace and kindness. We will see where each of the children live and how they say “Peace” in their language. (Read Can You Say Peace?)

I brought pictures of kids who live in other places around the world. Some look the same as us and others look different from us.

Active Engagement: (Hold up sticker sheet) These are children who live in different places from us. We will put their pictures where they live on this (Hold up the map). (See if children know the word ‘map’ or teach it) The stickers and the map have small signs on them. We can know where to put the picture by matching the signs. Let’s start with the first picture. This child/these children live in_____ (tell the country - start with the U.S. and point it out on the map) and we say the word “peace”. (For each picture, have students describe what they see and teach them how to say “peace” in that country’s language)

- U.S. = peace (English)
- Bolivia = mojjsa kamana (Aymara)
- Ghana = goom-jigi (Buli)
- France = paix (French)
- Iran = sohl (Farsi)
- Russian = mir (Russian) pronounced “meer”
- China = he ping
- Australia = kurtuku (Warnmen)
- Mexico = paz (Spanish)
- Japan = heiwa (Japanese)

Now you know how to say “peace” in other languages.

Closing: So, kids from other places are similar to you because they like to play and have fun. Sometimes they wear different clothes, speak different languages and eat different foods. Do you think they want to be happy and filled with love too? Let’s sing the May You Be Happy song for them so we all can be happy, peaceful and filled with love. (Play & sing song)

You can take your map home today and share it with your family. I have a letter for you take home that explains to your families what the map is all about. Have fun practicing some of these new words for ‘Peace’ at home!

* Much gratitude to A. Hayes and J. Zell for their contribution of this lesson.
Methods

**Dimensional change card sort task (DCCS) and Flanker.** Both the DCCS and Flanker tasks were earlier versions of the NIH Toolbox Cognitive Function Battery tasks and differ slightly from that described by Zelazo et al. (in press). The Flanker task used in the present study included only 20 (rather than 25) trials in the fish and arrow blocks and the DCCS included 40 (rather than 50) trials in the mixed block.

In order to decrease practice effects, each child received a counterbalanced version of the DCCS at baseline and post-test. The versions differ in which sorting dimension (i.e., color, shape) is taught first. Performance at baseline was equivalent across both versions ($p > .10$).

**Sharing Task.** Before this task began children were presented with 6 different types of stickers and asked to select the four types they liked best. On each of the four trials a different sticker type from among those selected by the child was used for variety and novelty in order to maintain interest and reduce habituation. Pictures representing each of the four recipients were adhered to an envelope. An actual photo was used of the most and least liked child, a picture of a silhouette of a same-gendered child was used to represent the stranger, and a picture of a same-gendered child with a thermometer (girls) or ice pack (boys) represented the sick child. The examiner turned away while the child distributed the stickers. At the end of the task, the examiner placed all of the stickers from the “me” envelopes into a single envelope for the child to take with them. After the child left, the stickers from each of the other envelopes were counted.

**Delay of Gratification.** As with the DCCS, each child received a counterbalanced version of the Delay of Gratification task at baseline and post-test. The delay task versions differ in the ordering of trial reward and contingency types. Performance at baseline was equivalent across both versions ($p > .10$).
APPENDIX

Results

Missing data. Missing data. Pre-test behavioral data were unavailable for five children for the following reasons: did not provide assent (two in KC, two in WL), child moved (one in KC). By post-test, one additional child had moved in the KC condition and was unavailable for testing. Additional data were missing for the following reasons: sharing task (one WL due to examiner error), DCCS (two KC due to computer error, one KC due to child refusing to continue task, two WL due to computer error, one WL due to performance below range necessary for scoring), Flanker (one KC due to computer error, one KC due to performance below range necessary for scoring, one WL due to computer error).

Within-group correlations. To further unpack the significant group by time interaction predicting change in social competence, correlations between change in social competence and baseline scores on variables of interest were examined separately for each group. In the KC group, significant negative correlations were found between change in social competence and each of the variables at baseline (TSC total score: $r = -.80, p < .001$; TSC prosocial behavior subscale: $r = -.78, p < .001$; DCCS overall composite: $r = -.52, p = .008$; Flanker composite $r = -.58, p = .002$). These correlations indicate that children with lower baseline scores on these variables showed larger increases in social competence over the course of the intervention. In the control group, correlations between change in social competence and the same variables at baseline were as follows: TSC total score: $r = -.33, p = .045$; TSC prosocial behavior subscale: $r = -.22, p = .184$; DCCS composite for all trials: $r = .10, p = .586$; Flanker composite: $r = .30, p = .085$. There is a pattern of stronger negative correlations between baseline scores and change in social competence for the KC group (lower scores at baseline predicting greater increases in
APPENDIX

social competence), which is consistent with the results of the baseline score by group interaction ANOVA reported.
APPENDIX

Table 2: Intraclass correlation coefficients (ICCs) of study variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>ICC</th>
<th>Difference Score ICC</th>
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<tr>
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<td>.35</td>
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<tr>
<td>TSC - PB</td>
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<td>TSC - ER</td>
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<td>DCCS – Post-switch</td>
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Note. Intraclass correlation coefficients (ICCs) computed using baseline and difference scores (except for end-of-year grades which used post-test scores). Models conducted in the ‘nlme’ package using R statistical software with classroom modeled as the nesting variable. Delay = Delay of gratification; Self Stickers = stickers kept for self during Sharing Task; TSC = Teacher Social Competence; PB = prosocial behavior subscale; ER = emotion regulation subscale; DCCS = Dimensional change card sort computer task; DCCS - All trials = composite score across all trials; DCCS – Post-switch = composite score across post-switch trials only; Learning = Approaches to Learning; Health = Health and Physical Development; Social = Social and Emotional Development; Cognition = Cognition and General Knowledge; Language = Language Development and Communication.