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ACADEMIC ACHIEVEMENT AND TRANSCENDENTAL MEDITATION: A STUDY WITH AT-RISK URBAN MIDDLE SCHOOL STUDENTS

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The middle school level is of particular concern to educators because of poor standardized test performance. This study evaluated change in academic achievement in public middle school students practicing the Transcendental Meditation® program compared to controls. A total of 189 students who were below proficiency level at baseline in English and math, were evaluated for change in academic achievement, using the California Standards Tests (CST). All students were from the same school and continued with the school’s standard curriculum and instruction. Ninety-seven percent were racial and ethnic minority students. The Transcendental Meditation program was practiced at school twice a day as part of the school’s Quiet Time program for three months prior to posttesting. Results indicated improvement for meditating students compared to controls on English scale scores (p = .002) and math scale scores (p < .001). A greater percentage of meditating students improved at least one performance level in math and English compared to controls (p values < .01). A matched-control subgroup yielded similar results. Results of this project indicate that it is feasible to have at-risk students regularly practice meditation at school and that meditation may help at-risk students improve academically, thereby helping to close the achievement gap.

Introduction
During the past decade, public schools in the United States have undergone reform to try to improve the quality of education. Among the main features of reform has been the emphasis on accountability through student standardized academic achievement assessment across grade levels (Torres, 2004).

The middle school level is of particular concern to educators and public policymakers because many state, nation-
al, and international tests indicate low performance and decreases in academic achievement during these school years (National Research Council, 2001). Research has found that middle school academic achievement scores make a consistent, independent contribution to whether students' graduate from or drop out of school (Battin-Pearson, Newcomb, Abbott, Hill, et al., 2000; Kaplan, Peck, & Kaplan, 1997).

Previous research in a Midwest private school indicated that practice of the Transcendental Meditation program significantly increased standardized academic achievement scores over a one-year period (Nidich, Nidich, & Rainforth, 1986; Nidich & Nidich, 1989).

The objectives of this study were to determine the feasibility of implementing a meditation program with at-risk urban public middle school students and to assess whether practice of such a program can help improve math and English academic achievement scores in students who were below proficiency (grade) level.

**Method**

**School Site**

The school participating in this study was a public middle school, located in a large, urban school district, with primarily low socioeconomic status (SES) racial and ethnic minority students. The school was in the lower half academically of all district middle schools.

**Students**

Participants in this study included 189 students (125 meditating students and 64 non-meditating control students) who were below proficiency level in either math or English at baseline on the California Standards Test (CST). All students were included who had academic achievement scores for both baseline (prior year) and posttest (current year).

A matched-control subgroup of 100 students (50 meditating and 50 non-meditating control students), matched on both math and English performance level scores, was used for further analysis. All identical matched pairs of meditating and non-meditating students below proficiency in both math and English were included in this subgroup.

All students attended the same urban public middle school and continued with the school's standard curriculum and instruction. Meditating students attended the sixth and seventh grades and practiced the Transcendental Meditation program at school for 12 minutes at the start and end of the school day for three months prior to the administration of the CST posttest. All of the students in the school's sixth and seventh grades learned the Transcendental Meditation program as part of the school's "Quiet Time" program.

Non-meditating control students attended the eighth grade, which did not participate in the school's Quiet Time/meditation program. The control group was selected to control for school climate factors such as principal leadership, faculty morale, curriculum and instruction policies and other school rules and policies that may have influenced academic achievement, as well as controlling for key
student demographic factors such as racial and ethnic group composition and socioeconomic status. The control group also served to control for testing effects and possible regression to the mean.

All students in the sixth, seventh, and eighth grades who had CST academic achievement scores for both the Spring of 2006 (prior year, baseline) and Spring of 2007 (current year, posttesting) were included in the study.

The Transcendental Meditation Program

Students were taught the Transcendental Meditation technique by certified instructors in a standard seven-step course and then practiced this program twice a day morning and afternoon, as part of their daily Quiet Time program. The seven-step instruction included: 1) an introductory lecture (1 hour) that discussed the benefits of the program, 2) a preparatory lecture (1 hour) that presented the mechanics of how to practice the technique, 3) a brief personal interview with the teacher (10 minutes), 4) personal instruction session (1 hour), and 5, 6, 7) group meetings to verify the correctness of practice and to provide additional knowledge about the practice over the following three consecutive days (1 hour each session). Students then practiced their meditation program in school at the beginning and end of the school day, supervised by a classroom teacher or Transcendental Meditation instructor. Students were encouraged to practice at home over the weekend. Written parental permission was required prior to students’ learning the program.

The Transcendental Meditation technique is a simple, natural, effortless technique that allows the mind to settle down and experience a silent yet awake state of awareness, a state of “restful alertness.” (Roth, 1987). Compared to eyes-closed rest, research has found that Transcendental Meditation practice is characterized by decreased activation or arousal of the autonomic nervous system, as reflected in decreased breath rate and lower sympathetic nervous system activity (Dillbeck, & Orme-Johnson, 1987). With regard to brain functioning, the Transcendental Meditation program has been shown to increase electroencephalographic (EEG) brain integration and coherence, especially in the frontal area of the brain, responsible for higher-order processing (Travis, Tecce, Arenander, & Wallace, 2002). The ability to learn how to meditate does not involve any change in beliefs, values, religion, or lifestyle (Roth, 1987).

Measures

The California Standards Test (CST). The CST, part of the California State Testing and Reporting (STAR), is a standardized academic achievement measure that schools throughout the state administer annually to students to assess student progress (Anderson, 2008). The major categories on the CST are math and English. Student scores are expressed as both scale scores and performance level scores (advanced, proficient, basic, below basic, far below basic), with the first two levels indicating grade-level proficiency.

Statistical Analysis

Change in English and math scale
scores from baseline to posttest were analyzed using analysis of covariance (ANCOVA), covarying for baseline dependent variable scores. Chi square statistics were used to determine differences between groups on the percentage of students who improved at least one performance level on English and math. Two-tailed p values were used in all analyses.

Results

Demographic and Baseline Variables

All the students included in this study were below proficiency level at baseline (either basic, below basic, or far below basic in terms of their performance level for math and English). Overall 60% of the students were male, 97% were racial or ethnic minority students, 76% were classified as Title 1, and 59% reported English as the primary home language. The meditating and non-meditating groups did not differ on any of the demographic factors.

Baseline scale scores for the meditating students were 274.03 ± 38.62 for math and 289.06 ± 31.53 for English. Baseline scale scores for the non-meditating students were 284.60 ± 34.95 for math and 301.67 ± 33.04 for English. Baseline scale scores for English were significantly different between groups (p < .05).

Change in Math and English Academic Achievement

Results of ANCOVA, covarying for baseline dependent variable scores, indicated significant improvement in composite scale scores (average of math and English) for Transcendental Meditation students (adjusted mean change = +9.90 ± 24.78) compared to controls (adjusted mean change = -9.88 ± 23.36; F(1, 160) = 25.24, p < .001). For math, a significant difference in scale scores was found for meditating students (adjusted mean change = +13.93 ± 38.83) compared to controls (adjusted mean change = -16.93 ± 34.95; F(1, 180) = 29.89, p < .001). Change in English scale scores indicated significant improvement for Transcendental Meditation students (adjusted mean change = +7.31 ± 26.53) compared to controls (adjusted mean change = -4.91 ± 24.84; F(1, 186) = 9.61, p = 0.002).

There was also a difference between groups in the percentage of students who showed a gain of at least one performance level in math and English. For the meditating students 40.7% of the students gained at least one performance level in math compared to 15.0% of the non-meditating control students (χ² = 12.15, p < .001). For English, 36.8% of the meditating students exhibited a gain of at least one performance level compared to 17.2% of the non-meditating students (χ² = 7.73, p = .005).

Within-group analysis indicated that both sixth and seventh grade meditating students exhibited an increase in composite academic achievement scores (mean change = +8.10 ± 28.06; F(1, 57) = 4.83, p < 0.032; mean change = +15.01 ± 20.16; F(1, 51) = 28.81, p < 0.001, respectively). Eighth grade non-meditating students showed a decrease in composite scale scores (mean change = -11.35 ± 23.36; F(1, 52) = 12.51, p < 0.001).
Table 1: Between-Group Comparison of Academic Achievement Scale Scores

<table>
<thead>
<tr>
<th>Variable</th>
<th>Transcendental Meditation (n = 50)</th>
<th>Control (n = 50)</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
<td>Pretest</td>
</tr>
<tr>
<td>Composite</td>
<td>283.26(30.99)</td>
<td>295.79(36.39)</td>
<td>285.56(29.87)</td>
</tr>
<tr>
<td>Math</td>
<td>274.70(38.49)</td>
<td>290.89(43.50)</td>
<td>278.60(33.00)</td>
</tr>
<tr>
<td>English</td>
<td>291.82(29.30)</td>
<td>300.39(36.58)</td>
<td>292.52(31.30)</td>
</tr>
</tbody>
</table>

Pretest = mean (standard deviation); posttest = adjusted mean (standard deviation)

All p values < .01, two tailed.

Matched-Control Subgroup

A total of 50 sixth and seventh grade students (15 in each grade) were matched with 50 eighth grade students (11 in each grade) on baseline math and English performance levels. For each group, 15 and 11 were "far below basic" in math and English performance levels, 22 and 18 were "below basic" in math and English, and 13 and 21 were "basic" in math and English, respectively. None of the students were at proficiency level in either math or English. Corresponding scale scores in math and English did not differ between groups.

Results on composite scale scores (average of math and English) indicated significant improvement for Transcendental Meditation students compared to controls [$F(1, 97) = 27.12$, $p < 0.001$]. A significant difference in math [$F(1, 97) = 20.41$, $p < .001$] and English scale scores [$F(1, 97) = 8.68; p = 0.004$] were observed in meditating students compared to controls (see Table 1).

There was also a difference between groups in the percentage of students who showed a gain of at least one performance level. For math, 42.0% of the meditating students showed a gain of at least one performance level compared to 18.0% of the non-meditating control students ($\chi^2 = 6.86$, $p = .009$). For English, 26.0% of the meditating students exhibited a gain of at least one performance level compared to 14.0% of the non-meditating students although the difference did not reach statistical significance ($\chi^2 = 2.25$, $p = .134$).

Lowest Performing Students: Below Basic and Far Below Basic

A total of 54 students (27 in each matched-control group) were "below basic" or "far below basic" in both math and English. ANCOVA indicated a significant overall improvement in academic achievement based on composite scale scores for meditating students (adjusted mean change = $+9.93 \pm 18.55$) compared to controls (adjusted mean change = $+0.90$).
± 16.29; F(1, 51) = 5.85, p < 0.019).

Feasibility of Implementing the Transcendental Meditation Program

Observations by school administrators and teachers indicate the feasibility of implementing this program and having students practice it twice a day at the beginning and end of each school day. After the initial seven-step instruction course taught by the certified Transcendental Meditation instructors, both program instructors and trained school faculty led daily group meditations every day in each sixth and seventh grade class at the beginning and end of the school day. The administrators and faculty appeared highly supportive of the program and continued with the program on a regular basis throughout the school year.

Ninety-two percent of the faculty surveyed (n = 13) reported that they felt the Quiet Time/Transcendental Meditation program was valuable for the school. They generally felt that the students were calmer, happier, less hyperactive, friendlier, and had an increased ability to focus on schoolwork. Observed changes in the classroom environment included students being more quiet and attentive, including a greater ability to work silently in academic activities. In terms of the school environment, faculty reported less student fights, less abusive language, and an overall more relaxed and calm atmosphere.

As part of the project evaluation, 55 of the meditating students were administered a standardized measure of anxiety (Spielberger, Edwards, Lushene, Montuori, & Platzeck, 1973) prior to beginning the Transcendental Meditation program and again 3 months later. A reduction in trait anxiety was observed in both sixth grade (mean change = -4.48; F(1,32) = 10.05, p = .003, effect size = 0.80) and seventh grade students (mean change = -2.54; F(1,21) = 4.06, p = .057, effect size = 0.41).

Discussion

Results from this pilot study indicate significant improvement in both math and English academic achievement in at-risk middle school students below proficiency practicing the Transcendental Meditation program compared to controls. For the entire sample, there was a significant increase for the meditating students in math and English scale scores and performance level scores. Similar results were also found for the matched-control subgroup, which served to equate the two groups at baseline. The largest improvement was observed in math achievement, with an effect size of .82.

Results further show that both sixth grade and seventh grade (meditating) students exhibited a significant improvement in academic achievement. These improvements were statistically significant, without taking into account the declines in the eighth grade non-meditating students.

In terms of feasibility of implementation, group meditation sessions were held every day during homeroom period and during the last class period for the duration of the three-month project. Faculty reports indicate positive changes in classroom environment and school climate as a result of implementing the Quiet Time/Transcendental Meditation program into the school’s daily schedule. Decreased trait anxiety was also found in both sixth grade
and seventh grade students.

Research indicates that practice of the Transcendental Meditation reduces psychological distress, including anxiety (Eppley, Abrams, & Shear, 1989), which may provide a possible mechanism for how the practice of the Transcendental Meditation program helped improve academic achievement in the current study. Studies show that practice of this stress reduction program reduces psychological and physiological response to stress factors, including decreased sympathetic nervous system and hypothalamic-pituitary-adrenal axis over-activation, and reductions in elevated cortisol levels (Barnes, Treiber, & Davis, 2001; Walton, Schneider, & Nidich, 2004).

Recent research on college students indicates that within the first few months of practice of the Transcendental Meditation program, students exhibit significant reductions in anxiety and other psychological stress factors (Nidich Rainforth, Haaga, et al., 2009). Research also shows a more coherent and integrated style of brain functioning within a few months of practice, evidenced by electroencephalographic (EEG) imaging, which is associated with reduced stress reactivity (Travis, Haaga, Hagelin, et al., 2009).

There is a growing literature describing the stressful nature of students’ school experience (Grannis, 1992; Burchinal, Roberts, Zeisel, et al., 2008). Common stressors related to school performance include: 1) having to study subjects that students do not understand or are not interested in, 2) trying to keep up with schoolwork load, 3) teacher and parental expectations, and 4) having to concentrate or stay focused for long hours during the school day (Byrne, Davenport, & Mazanov, 2007). Other environmental stressors such as poor quality of home life and community violence that adolescents, especially racial and ethnic minorities, experience is associated with adverse school performance (Grannis, 1992; Thompson & Massat, 2005; Burchinal, Roberts, Zeisel, et al., 2008; Close & Solberg, 2008).

Strengths and Limitations

This pilot study employed a quasi-experimental design to assess change in academic achievement scale and performance level scores in students practicing the Transcendental Meditation who were below proficiency level in math and English. Findings showed a significant difference between groups in math and English scale and performance level scores. A matched-control subgroup, matched on both math and English performance level scores, served to equate groups at baseline. The use of a control group from the same school helped to control for school climate factors (Stewart, 2008), student demographics such as racial and ethnic composition and socioeconomic status, testing effects, and possible regression to the mean. Because of the limitations of a non-randomized design, other factors such as differences in curriculum and instruction and other non-specific factors may have had an influence on the results.

Historically, there has been a general decrease in academic performance in students attending this urban middle school over time. The findings on increased academic achievement in both sixth grade and
seventh grade students suggest that the Transcendental Meditation program had a positive impact on academic achievement.

Further analysis of the lowest performing students (below basic and far below basic) also indicated significant improvement in meditating students compared to controls, who showed a slight increase in composite scale scores. This finding suggests the potential value of implementing this meditation technique with schools' lowest performing students.

Students practiced the Transcendental Meditation program for three months prior to the administration of the Spring CST. While this timeframe of practice was sufficient to produce the kinds of improvements in academic achievement reported in this study, it is expected that longer-term practice may result in more advanced academic improvement.

A limitation of the study was the use of a different grade level as a control, due to all of the students in the sixth and seventh grades volunteering to learn the Transcendental Meditation program. Future research on academic achievement is encouraged to use randomized-controlled designs with the same grade levels over a longer period of time. Future studies should also include measures of psychological distress to observe the relationship of change between student stress and academic achievement.

Conclusion

This study shows both the feasibility of incorporating twice-daily practice of this stress reduction program into the daily school schedule as well as the practical benefits of improving academic achieve-

ment in at-risk middle school students. Study findings suggest that the Transcendental Meditation program may help in closing the achievement gap experienced by our nation's schools (Goldsmith, 2004).

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