Effect of the Advancement Via Individual Determination (AVID) Program on Middle Level Students’ Executive Function

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Abstract

The current research investigated the impact of Advancement via Individual Determination (AVID) on middle level students’ executive function skills. AVID uses inquiry-based and student-centered instruction to close the opportunity gap in college attendance and degree attainment for underrepresented demographic groups. With AVID, teachers inspire students to take control of their learning. This study analyzed AVID elective class students (the intervention group) and a comparison group utilizing the Behavior Rating Inventory of Executive Function (BRIEF2) Teacher Form. Each group’s science teacher completed a pre-and post-survey to measure the participants’ individual BRIEF2 Behavior Regulation Index (BRI) and Cognitive Regulation Index (CRI). A multiple regression analysis was used to measure the change in the BRI and CRI from fall to spring. The findings indicate the AVID participants’ BRI and CRI indexes were significantly different from the comparison group following the implementation of the intervention.

Keywords: executive function, AVID, BRIEF 2

Student achievement in the middle level is vital to future success in high school and beyond. Middle grades students experience changes socially, academically, and developmentally (Berk, 2018; Huerta et al., 2013). Current research supports the impact of developing students’ executive function (EF) skills to increase school readiness and academic achievement beginning in early childhood and continuing through adolescence (Samuels et al., 2016; Zelazo et al., 2016). Strengthening EF skills may lead to students’ increased achievement in school, especially for those from low socioeconomic backgrounds. This study examined the impact of Advancement Via Individual Determination (AVID) strategies on middle level students’ EF skills in an AVID elective class and a non-AVID self-selected traditional classroom.

Executive Function

Executive function (EF) refers to a collection of thinking processes involved in guiding, managing, and directing cognitive functions and behavioral or emotional responses (Giola et al., 2015). Zelazo et al. (2016) defined EF skills as “the attention-regulation...
skills that make it possible to sustain attention, keep goals and information in mind, refrain from responding immediately, resist distraction, tolerate frustration, consider the consequences of different behaviors, reflect on past experiences, and plan for the future” (p. 1). High EF has been associated with school success because it is related to positive attributes, such as concentrating, organizing, and exhibiting goal-directed behaviors (Blair & Raver, 2012; Diamond & Lee, 2011; Isquith et al., 2004). A longitudinal study by Samuels et al. (2016) found that EF scores during early adolescence predicted academic achievement in later grades and the authors recommended the use of related strategies in academic interventions.

Teachers trained in Advancement Via Individual Determination (AVID) strategies focus on teaching organizational skills, use of a daily planner, organizing classwork in a binder, and teaching students step-by-step processes when learning new materials. These strategies help to improve EF by giving students strategies for organizing and using information and are believed to contribute to a child’s success by supporting the underlying processes required for learning (Bagby et al., 2012). Providing students with research-based instructional strategies can help reduce a student’s risk of difficulty, or even failure, in school (Zelazo et al., 2016).

A child’s socioeconomic status (SES) also plays a key role in cognitive development. “SES is strongly associated with cognitive ability and achievement during childhood and beyond” (Noble et al., 2005, p. 74); poverty negatively impacts achievement and is linked to poor EF skills (Zelazo et al., 2016). To reduce this deficit, schools need classrooms that provide opportunities for meaningful learning and offer students an opportunity to improve their cognitive skills, specifically critical thinking and problem-solving skills (Barkley et al., 2014; Darling-Hammond, 2008; Mattern et al., 2014). When teachers provide students these opportunities to think, reflect, and question, students actively participate in their learning and develop a wide range of cognitive processes. The college-readiness program AVID helps middle level school campuses provide opportunities to address and strengthen cognitive and EF skills.

Advancement Via Individual Determination (AVID)

AVID is a global, nonprofit organization that uses strategic teaching to close the achievement gap for students from demographic groups typically underrepresented in college and other post-secondary educational settings; it provides opportunities through instructional strategies and thus empowers students to control their own learning. AVID is implemented in schools as an elective class choice for students in grades 6–12 as well as a school-wide approach for campuses that are AVID certified.

In 1980, Mary Catherine Swanson created a system to support students who had been desegregated from the inner-city schools of San Diego to the suburban school where she was an English teacher. She focused on developing the students’ critical thinking, literacy, and math skills in all content areas to help the underserved students survive at the academically acclaimed suburban high school. In the current AVID system, academic behaviors, organization and note-taking skills, time management, and goal setting are taught three days a week (Freedman, 2000), and the other two days are tutorials designed to support students’ performance in content courses. The goal of the AVID elective class is to develop and strengthen these skills and to empower students to take responsibility for their learning (Swanson et al., 2000). AVID focuses on educational best practices and instructional strategies combined with 21st century tools to ensure college readiness for students. The educational best practices and instructional strategies include a focus on questioning, predicting, clarifying, summarizing, and promoting student interactions (Berk, 2018; Darling-Hammond, 2008; Donovan et al., 1999; Marzano et al., 2001); these practices have also been linked to higher-order thinking.

Griffith and Ruan (2005) found that “instructional strategies include teacher modeling and student-guided practices, which are keys to successful learning” (p. 12). AVID teachers build on their students’ previous learning (Donovan et al., 1999) and provide students an opportunity to collaborate and be active learners. Providing students opportunities to organize, summarize, predict, and clarify, can strengthen students’ metacognition skills (Darling-Hammond, 2008) and provide a framework for college and career readiness and increased academic success.

Previous AVID Research

Previous studies have reported AVID students have increased academic achievement and expect to enroll in advanced courses (Black et al., 2008; Ensr, 2009;
Huerta et al. (2013) and Black et al. (2008) reported the AVID elective course may increase organization skills, self-efficacy, and better study habits. Huerta et al. (2013) reported that the length of time enrolled in AVID was positively correlated with student grade point average (GPA), the number of college entrance requirements completed, and the number of Advanced Placement courses completed. AVID has also been linked to increases in students’ self-esteem, problem-solving, and awareness (Llamas et al., 2014). AVID students also show increased performance and retention in higher education (Watt et al., 2013).

The AVID elective class begins in the 6th grade and continues through the 12th grade. AVID expectations are for schools to select students to the AVID elective class that are normally underrepresented in higher education, such as Hispanic and African American students, and would qualify for free or reduced lunch. AVID provides students opportunities to develop executive functioning skills and study skills and students in the AVID elective class receive assistance in completing college scholarship applications and college entrance applications. AVID has been an effective college preparatory program and students enrolled in AVID have been four times more likely to attain a four-year college degree within a six-year time frame when compared to their peers who were not enrolled in the AVID elective class (AVID, 2021).

Prior research suggests AVID may impact elective students’ cognitive growth (Bernhardt, 2013; Gordon, 2011), but there has been little quantitative work in this area. Black et al. (2008) analyzed aspects of metacognition and the overall program effectiveness of AVID. They also suggest studying the impacts of the AVID program through quantitative research and focusing on questions about its impact on student organization, behavior, and leadership before and after enrollment in the program. Zelazo et al. (2016) also encouraged educational leaders to continue the quest for interventions to increase EF skills given the evidence that they can be improved. The current research examined the effectiveness of AVID in increasing middle level students’ EF. Researchers also examined the use of AVID as an educational intervention practice that can impact, both directly and indirectly, all students’ EF improvement.

**Methods**

This study examined the impact of AVID on students’ EF skills in the AVID elective class and a non-AVID self-selected traditional classroom. The AVID elective students served as the intervention group and the non-AVID students served as the comparison group. The instrument used was the Brief Rating Inventory of Executive Function Second Edition (BRIEF2) (Giola et al., 2015).

The comparison group was used to isolate the impact of the AVID program. To recruit participants, the AVID group and the comparison group were given an overview of the study and the students who chose to participate in both groups completed assent forms. Their parents or guardians completed consent forms in addition to the assent forms. Results for the pre-survey and post-survey were evaluated for both the AVID students and the comparison group to answer the following research questions:

1. What are the differences in the spring BRIEF2 Behavior Regulation Index (BRI) score for the students enrolled in the AVID elective class and for students not enrolled in the AVID elective class?
2. What are the differences in the spring BRIEF2 Cognitive Regulation Index (CRI) score for the students enrolled in the AVID elective class and for students not enrolled in the AVID elective class?

**Participants**

The participants (N = 66) for this study were students enrolled in a seventh-grade class in a central Texas middle level school serving approximately 850–900 students. Each participant’s parent or guardian granted permission for their child to participate and each child signed an assent form. The campus served a high population of economically disadvantaged students (91%), and more than half of the population identified as Hispanic students (52%). The remainder of the student population were African American (35%) and Caucasian (14%) students, and approximately 21% of the school population were English language learners.

The study included the investigation of two groups of middle level students. Students volunteered to be part of the study after listening to an overview of the program during their social studies class. Students who provided a student and parent permission slip were approved to participate in the study. The sample of participants included in the study was 44 AVID students and 22 students for the comparison group. The AVID student group consisted of students...
enrolled in the elective AVID class who chose to participate in the study. The comparison group students were students who selected to participate but were not enrolled in the AVID elective class. Details of the participants are included in Table 1.

**Table 1**  
**Participants’ Demographics**

| Group                  | Male | Fem | Total | Afr. Amer. | Econ. Dis. | Special Educ. | Avg. Age |
|------------------------|------|-----|-------|------------|------------|---------------|---------|
| AVID students          | 9    | 35  | 44    | 35         | 9          | 44            | 2       | 12.2    |
| Percent of AVID students | 21%  | 79% | NA    | 79%        | 21%        | 100%          | 5%      |
| Control group          | 12   | 10  | 22    | 19         | 3          | 21            | 3       | 12.0    |
| Percent of Control group students | 55%  | 45% | NA    | 86%        | 14%        | 96%           | 14%     |

*Note: Fem = Female; Afr. Amer. = African American; Econ. Dis. = Economically Disadvantaged; Avg. Age = Average; educ. = education.*

**Instrumentation**

Giola et al. (2015) completed the BRIEF2 (Parent, Teacher, and Self-Report Forms), a revision of the original BRIEF, which was published in 2000. The normative sample included over 3,600 ratings across all three forms. The BRIEF2 Teacher Form provides a measure of executive functioning in school environments based on teacher ratings of the student. The reliability coefficients for the teacher form are above .90. Content validity was established by a group of pediatric neuropsychologists and concurrent validity correlated with similar published instruments.

The BRIEF2 measures three indexes (behavioral, emotional, and cognitive). The BRII scales include inhibit (control impulses) and self-monitor (keep track of the effect of own behavior on others). Examples of the BRI statements are “Is fidgety,” “Talks at the wrong time,” and “Does not think before doing (is impulsive).” The ERI scales include shift (switching to a new task or activity) and emotional control (modulate emotional responses appropriately). Examples of the ERI statements are “Has explosive, angry outbursts,” “Small events trigger big reactions,” and “Mood changes frequently.” The CRI scales include initiate (begin tasks or activity), working memory (hold information in mind to complete a task), plan/organize (anticipate future events; set goals), organization of materials (keep work and play areas in order), and task-monitor (check work; assess performance to ensure attainment of goal). Examples of the CRI statements are “Does not plan ahead for school assignments,” “Had trouble finishing tasks,” and “Forgets to turn in homework, even when completed.” The current research analyzed the results for the BRI and the CRI scale for each student in the intervention group and the comparison group.

The BRIEF2 Teacher Form consists of 63 items, with a 3-point response format with values ranging from never, sometimes, and often. If the student’s behavior is never a problem then the student is scored a 1 on the statement. If the student’s behavior is sometimes a problem then the student is scored a 2 for that statement, and often receives a 3. Therefore, a student receiving a lower score from the teacher in the spring would indicate an improved CRI or BRI and possibly the success of the intervention.

**Data Collection**

Following IRB approval, a co-investigator conducted training for the school’s science teachers on the completion of the BRIEF2 Teacher Form. Each student’s science teacher completed a BRIEF2 Teacher Form at the beginning of the school year in October (pre-survey) and at the end of the school year (post-survey) in May. At the time of the study, the campus had completed the third year of AVID implementation and was a certified AVID campus. The campus provided professional development in AVID instructional strategies at least five times during the school year for all teachers and staff, and each of the science teachers had participated in the professional development for the last two years.
Participating students from the AVID group met with their AVID elective teacher every day for 45 minutes. The teacher had participated in three, three-day AVID curriculum and methodology trainings and was expected to follow the AVID Weeks At A Glance curriculum for the AVID elective class (MyAVID, n.d.). To address the fidelity of the implementation of the AVID elective class objectives, the AVID elective teacher was observed by the lead investigator twice in the fall and twice in the spring. A standardized form provided by AVID was used to complete the observations. To confirm the teacher was following the curriculum, lesson plans were reviewed every week. The AVID elective teacher’s evaluations supported the fidelity of the implementation of the AVID curriculum.

Data Analysis
For the analysis, the pre- and post- BRIEF2 Teacher Forms were scored and analyzed according to the scoring manual for CRI and the BRI subscales. Performance on state standardized assessments for the current year and previous year were used to approximate academic achievement for the AVID sample and the control sample. The variables of socioeconomic status and ethnicity were not included in the analysis due to the high percentage of participating students who were economically disadvantaged (99%) and were predominately Hispanic (82%). Gender was included as a covariate in the analysis.

Multiple regression analysis was conducted in SPSS (v.25) to determine if there was a difference between the BRI and CRI scores from fall to spring for the students who participated in the AVID program and those who did not. Prior to regression analyses, chi-square tests were conducted to determine whether the AVID group and the comparison group were balanced by demographics, such as gender and ethnicity. Separate multiple regression equations were used to predict the spring BRI from the fall BRI scores and the spring CRI from the fall CRI scores.

Results
A series of chi-square tests were conducted to compare the demographic characteristics between the AVID participants and the comparison group. A chi-square test for independence was performed on the following: gender, ethnicity, economically disadvantaged (free and reduced lunch), and student with a disability. Two additional measures, phi (φ) and Cramer’s $V$, were used to measure the strength/magnitude of the association as appropriate. Phi (φ) was calculated to determine the effect size for the relationship between dichotomous variables. Cramer’s $V$ was used to determine the effect size for the relationship between the AVID participants and the categorical ethnicity variable.

Chi-square analysis revealed no significant differences between the two groups among any demographic variables except for gender. There was a statistically significant association between the genders of the two groups, $\chi^2 (1) = 8.19, p = .005$, $\phi = .35$ (Table 2). The AVID group demographics included only 9 male students of 44 in the group and the comparison group had 12 male students of the 22 in the comparison group.

| Variable     | $\chi^2$ | $\phi$ | Cramer’s $V$ | $p$   |
|--------------|----------|--------|--------------|-------|
| Gender       | 8.19*    | .35    | .00          |       |
| Ethnicity    | 0.49     | .08    | .38          |       |
| Low SES      | 2.08     | .18    | .33          |       |
| Special Educ. and 504 | 1.81 | .16 | .20 |       |

Note: $\chi^2 =$ Chi-square; $\phi =$ Phi; $V =$ Cramer’s $V$; *$p < .01$. The AVID group and comparison group state assessment scores for reading and math for the previous year and the current year were also compared. The reading average score for AVID students improved 120.11 points (current year $M = 1677.09$, $SD = 117.55$; previous year $M = 1556.98$, $SD = 138.12$) compared to the comparison group’s increase of 22.65 points (current year $M = 1557.86$, $SD = 88.83$; previous year $M = 1535.21$, $SD = 104.54$). Math scores of the AVID students improved 94.2 points (current year $M = 1726.16$, $SD = 143.65$; previous year $M = 1632.14$, $SD = 111.62$) compared to the comparison group’s increase of 79.02 points (current year $M = 1586.82$, $SD = 81.28$; previous year $M = 1507.80$, $SD = 90.80$). The results for the state reading assessment were positive for AVID students. The lower increase in math scores may be due to many AVID students being enrolled in advanced math classes and working above grade level in math already. Complete results for the two group’s state
Table 3
State Assessment Results

| Group          | Reading Previous Year | Reading Current Year | Math Previous Year | Math Current Year |
|----------------|-----------------------|----------------------|-------------------|------------------|
| AVID students  | $M = 1556.98$         | $M = 1677.09$        | $M = 1632.14$     | $M = 1726.16$    |
|                | SD = 138.12           | SD = 117.55          | SD = 111.62       | SD = 143.65      |
| Control group  | $M = 1535.21$         | $M = 1557.86$        | $M = 1507.80$     | $M = 1586.82$    |
|                | SD = 104.54           | SD = 88.83           | SD = 90.80        | SD = 81.28       |

Texas Education Agency (2016).

Table 4
Descriptive Statistics for Continuous Variables

| Variable                  | AVID Students | Comparison Group |
|---------------------------|---------------|------------------|
|                           | n  | M   | SD  | Skew | Kur | n  | M   | SD  | Skew | Kur |
| Fall BRI                  | 44 | 18.53 | 4.44 | .75  | .24 | 22 | 22.09 | 8.99 | .75  | −.71 |
| Spg BRI                   | 44 | 16.13 | 3.53 | 1.87 | 4.61 | 22 | 23.18 | 8.89 | .13  | −1.65 |
| Fall CRI                  | 44 | 45.80 | 10.79 | .48  | −.41 | 22 | 55.41 | 22.66 | .66  | −.95 |
| Spg CRI                   | 44 | 40.38 | 9.41  | 1.92 | 4.30 | 22 | 55.73 | 19.84 | .22  | −1.56 |

Note: Spg = Spring; Skew = Skewness; Kur = Kurtosis.

assessments for the current year and the previous year are provided in Table 3.

Descriptive Statistics and Correlations

Descriptive statistics for the continuous variables for the fall and spring scores for BRI and CRI are presented in Table 4. The table includes statistics for the AVID group and the comparison group. The fall BRI score and the spring BRI score for the AVID participants exhibited a larger decrease compared to the comparison group fall BRI score ($M = 22.09$, $SD = 8.99$) and the spring BRI ($M = 23.18$, $SD = 8.89$) score. Also the fall CRI score ($M = 45.80$, $SD = 10.79$) and the spring CRI ($M = 40.38$, $SD = 9.41$) score for the AVID participants demonstrated a larger decrease compared to the comparison group fall CRI score ($M = 55.41$, $SD = 22.66$) and the spring CRI ($M = 55.73$, $SD = 19.84$) score.

The pattern of correlations is presented in Table 5 and suggests a strong positive correlation of several variables. The fall BRI and the fall CRI were strongly positively correlated, $r$ (67) = .96, $p = .000$. The spring BRI and the spring CRI were also strongly positively correlated, $r$ (67) = .93, $p = .000$.

Table 5
Correlations

| Variable | 1   | 2   | 3   | 4   |
|----------|-----|-----|-----|-----|
| 1. Fall BRI | -   |    |     |     |
| 2. Spring BRI | .66*| -   |     |     |
| 3. Fall CRI  | .96*| .66**| -   |     |
| 4. Spring CRI| .72*| .93**| .73**| -   |

Note: *$p = .000$. 

Regression Analysis

For the two multiple regression models, BRI and CRI, the following assumptions were examined: (1) independence of observations, (2) linearity between the dependent variables and each of the independent continuous variables, (3) homoscedasticity, and (4) the normal distribution of residuals. Models were also examined for multicollinearity, outliers, or
observations exerting undue influence. For each model, the assumptions were met.

**Model 1 – Behavioral Regulation Index (BRI).** A multiple regression analysis was used to determine if there was a difference between the BRI for the students who participated in the AVID elective class and those who did not. Spring BRI score was predicted from the fall BRI score, the students participating in AVID, the comparison group, and gender. The model, $F(3, 63) = 25.56, p < .001$, explained approximately 55% of the total variation in the spring BRI score. Two variables were statistically significant predictors of the spring BRI score, enrollment in AVID, and the fall BRI score (Table 6). Regression coefficients, standard errors, standardized coefficients, $p$-values, and confidence intervals are reported in Table 6.

Students in the AVID program, $t(63) = −3.91$, $p = .000$, spring BRI scores decreased significantly compared to the comparison group. The students that were enrolled in the AVID elective class realized a 5.01 ($B = −5.01, p = .000$) unit decrease on the spring BRI score compared to the comparison group. The fall BRI score had a positive relationship with the spring BRI score, $t(63) = 5.83, p = .000$. As the fall BRI score ($B = .59, p = .000$) increased one unit, the students’ spring BRI scores increased (0.59). The effect size for each variable is also listed in Table 6. Effect sizes are measured by the regression coefficients, $β$, and range between ±1. Cohen (1992) states that .2 represents a small effect, .5 a moderate effect, and .8 a large effect. The $β$ associated with the score for fall BRI ($d = .57$) has a large effect and the AVID participants ($d = −.36$) had a large effect in comparison with the reference group. The AVID group is in comparison with the reference group, the comparison group.

**Model 2 – Behavioral Regulation Index (CRI).** A multiple regression analysis was also used to determine if there was a difference between the CRI for the students who participated in the AVID elective class and those who did not. As with the BRI model, a multiple regression was run to predict the spring

### Table 6
**Summary of Multiple Regression Analysis – Model 1 (BRI)**

| Variable | $B$  | $SE_B$ | $β$  | $p$  | 95% CI B |
|----------|------|--------|------|------|----------|
| AVID$^a$ | −5.01| 1.28   | −.36 | .00  | [−7.57, −2.44] |
| Gender – Male$^b$ | .19 | 1.45 | .01 | .89 | [−2.70, 3.08] |
| Fall BRI  | .59 | .10   | .57  | .00  | [−.39, .80] |

Note: $R^2 = .55; Δ R^2 = .53; B =$ unstandardized regression coefficient; $SE_B =$ Standard error of the coefficient; $β =$ standardized coefficient and effect size; CI = Confidence Interval; dependent variable: Spring Self-Efficacy Attendance.

$^a$Reference group Comparison Group.

$^b$Reference group female.

### Table 7
**Summary of Multiple Regression Analysis – Model 2 (CRI)**

| Variable | $B$  | $SE_B$ | $β$  | $p$  | 95% CI B |
|----------|------|--------|------|------|----------|
| AVID$^a$ | −8.84| 2.73   | −.27 | .00  | [−14.29, −3.39] |
| Gender – Male$^b$ | −2.63| 3.14 | −.08 | .41  | [−8.90, 3.65] |
| Fall CRI  | .58 | .01   | .61  | .00  | [−.41, .76] |

Note: $R^2 = .62; Δ R^2 = .60; B =$ unstandardized regression coefficient; $SE_B =$ Standard error of the coefficient; $β =$ standardized coefficient and effect size; CI = Confidence Interval; dependent variable: Spring Self-Efficacy Attendance.

$^a$Reference group Comparison Group.

$^b$Reference group female.
CRI score. The model, $F(3, 63) = 33.85, p < .001$, explained approximately 62% of the total variation in the spring CRI score. Two variables were statistically significant predictors of the spring CRI score, enrollment in AVID, and the Fall CRI score (Table 7).

Students in the AVID program, $t(63) = -3.24, p = .002$ spring CRI scores also decreased significantly compared to the comparison group. The students that were enrolled in the AVID elective class realized an 8.84 ($B = -8.84, p = .002$) unit decrease on the spring CRI score compared to the comparison group. The fall CRI score had a positive relationship with the spring CRI score, $t(63) = 6.59, p = .000$. As the fall CRI score ($B = .58, p = .000$) increased one unit, the students’ spring CRI scores increased (0.58).

The effect size for each variable is also listed in Table 7. The $\beta$ associated with the score for fall CRI ($d = .58$) has a large effect and the AVID participants ($d = -.27$) had a moderate to large effect in comparison with the reference group.

**Discussion**

As suggested by Black et al. (2008) and Zelazo et al. (2016), educational leaders are encouraged to find interventions to improve students’ EF skills. The current study supports AVID as an intervention to improve the EF skills as noted by the decrease in BRI and CRI scale scores for students from the fall to the spring semester for those enrolled in the AVID elective class.

The subscale BRI, from the BRIEF2, measured behavioral changes that included controlling impulses and self-monitoring. Students in the AVID program spring BRI scores decreased significantly compared to the comparison group. The AVID students realized a 5.01 unit decrease from fall to spring on their BRI score. Decreasing the BRI score from fall to spring indicates the intervention may increase the ability of the student to control impulses.

The CRI scale was used to show changes in working memory, planning future events, setting goals, organization of materials, and task-monitoring to assist in reaching academic as well as personal goals. AVID students’ spring CRI scores also decreased significantly (8.84) compared to the comparison group. Decreasing the CRI score from fall to spring provides support that the students have increased working memory, can plan and organize better, and have increased organization of materials.

AVID may have provided students a structure that helps increase their EF skills as measured by the BRI and CRI scales (Freedman, 2000; Huerta et al., 2013; Llamas et al., 2014; Watt et al., 2004). Providing students opportunities to increase their EF skills can also result in increased school readiness and academic achievement (Zelazo et al., 2016), and this could help decrease achievement gaps. The current AVID students improved their behavior skills, cognitive skills, and results on the state assessment as compared to the control group of students participating in the study. The state assessment scores provide possible evidence of academic growth from one year to the next for the intervention group.

As supported by previous research and this study, future research should continue to determine the impact of EF skills and how they can be enhanced and improved with practice. Although determining the effects of an intervention or schooling on EF skills may be difficult (Bagby et al., 2012), the current study provides hope for the impact of a structured course in the middle level that can provide students an opportunity to improve and enhance their EF skills.

**Limitations**

Limitations of the study include small sample size and a disproportional number of students based on gender. The AVID student group also included only 9 male participants compared to 35 female. In addition, the AVID student group included 44 participants and the control group 22 participants, which may mean the comparison group had more variability in scores. Another limitation of the study is the evaluation experience of the two science teachers. The teachers completed the BRIEF2 Teacher Form twice after only one training by one of the co-investigators. The two teachers had not previously participated in a research project. Another limitation is the variable used to measure student achievement. Student achievement was based on the performance of the State of Texas Assessments of Academic Readiness (STAAR). Although the scores showed a large increase in the reading average score for AVID students, the results may prove difficult to generalize outside the state of Texas.

**Disclosure statement**

No potential conflict of interest was reported by the author(s).
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