Examining the Relationship Between Anxiety, Executive Functioning, and Reading Achievement in Adolescents with Specific Learning Disabilities

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Introduction

Background

- **Learning Disabilities** (LDs) are differences in a person's brain that can affect how well they read, write, speak, do math, and handle other similar tasks. LD is not related to intelligence[1].
- **Executive Functions (EF)** are control processes that regulate behavior and cognitive functioning[14].
- EF can be divided into three primary domains: shifting, inhibition, and working memory.
- EF skills enable a person to perform complex cognitive processes and goal-directed tasks including planning, focusing attention, remembering instructions, and adapting to new situations[23].
- Difficulties with EF are associated with higher rates of anxiety and lower rates of academic achievement [2, 10, 19, 24].
- **Generalized anxiety** (GA) is commonly comorbid with LDs, with studies suggesting that up to 30% of children with LDs experience comorbid anxiety disorders [2, 5, 12, 13, 17, 21].
- **Reading Anxiety** (RA), a form of situation-specific anxiety that arises when engaging in reading activities, is particularly common in children with LDs[2, 5, 17].

Theories to Explain the Relationship Between EF, Anxiety, and Reading Achievement

Attentional Control Theory

- Anxiety demands attention thereby depleting cognitive resources that could otherwise be allocated to the completion of complex cognitive tasks. Anxiety, therefore, reduces processing speed, taxes working memory, and compromises task performance [6, 7].

Deficit Model

- Lack of achievement in reading may increase negative thoughts and emotions toward reading, which leads to a decreased desire to perform reading-related tasks and poorer overall performance. Poor performance and negative emotions then lead to higher levels of reading anxiety [3].

Reciprocal Theory

- Students who struggle with reading may become anxious about reading, which, in turn, may worsen their reading ability. Thus, anxiety and reading difficulty reciprocally influence one another [11].

Gap in the Literature

- LDs are related to lower academic achievement overall and may predispose children to academic failures[8].
- Likewise, GA, RA, and EF difficulties have all been shown to be inversely associated with reading achievement in children with and without LD[2, 4, 9].
- Few studies have attempted to test the associations between GA, RA, EF, and reading achievement in adolescents with LD.
- Theories attempting to explain the relationship between EF, anxiety, and RA have not yet been assessed longitudinally.

Aim

To longitudinally assess the associations between GA, RA, EF, and reading achievement, as well as the theories that attempt to explain their relationships using data from a 17-week study designed to assess the outcomes of a mindfulness-based intervention (MindUP) for children with LDs relative to a business-as-usual control group.

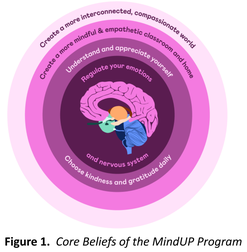


Figure 1. *Core Beliefs of the MindUP Program*

Hypotheses

Reading Achievement will be inversely associated with both RA and GA
RA and GA will be positively associated
The intervention group will exhibit lower RA and GA and higher achievement than the control group
Levels of RA and GA will predict achievement
EF will be inversely associated with GA and reading
The intervention group will exhibit higher EF than the control post-intervention
EF will predict anxiety

Methods

Participants

- 68 adolescents in grades 5-12 with LD who attend a private school for children with LD in Birmingham, Alabama.
- 34 students were randomly assigned to each group.
- 44% of participants (n=30) identified as female, 50% (n=34) identified as male, 6% (n=4) identified as non-binary/other.
- Mean age of the control group was 13.92 years (*SD* = 2.21; range = 10.17-19.25) and mean age of the MindUP group was 14.21 years (*SD* = 2.37; range = 10.08-18.50).

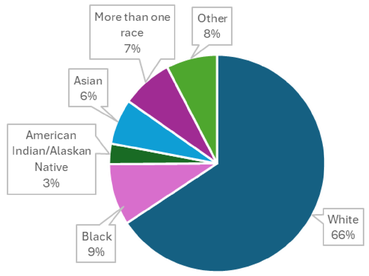


Figure 2. *Racial Distribution of Participants*

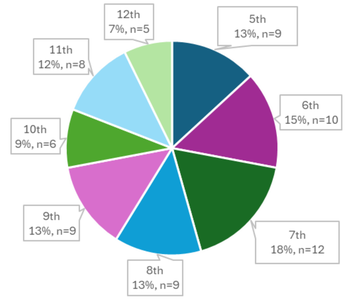


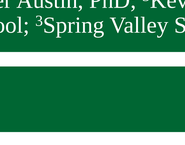
Figure 3. *Grade Distribution of Participants*

Measures

Executive Functioning

NIH Toolbox[20]

- **Inhibition: Flanker Task**[15]
  - A measure of inhibitory control and attention.
  - Participants focus on a given stimulus while inhibiting attention to stimuli flanking it.



- **Shifting: Dimensional Change Card Sort task**[25]
  - A measure of cognitive flexibility and attention.
  - Participant matches a series of pictures based on color or shape.

Generalized Anxiety

Anxiety Subscale of Behavior Assessment System for Children 3rd Edition (BASC-3)[16].

- **BASC-3 Parent Rating Scale**
  - 39-item questionnaire
  - Caregivers report how frequently their child engages in certain behaviors that may be indicative of anxiety using a 4-point Likert-type scale (*Never, Sometimes, Often, Almost Always*).
- **BASC-3 Child Self-Report Scale**
  - 13-item questionnaire
  - 3 true or false questions and 10 questions rated on a 4-point Likert-type scale ranging from *Never to Almost Always*.

Reading Anxiety

- 19-item questionnaire
- Children self-report the frequency they experience anxiety symptoms when faced with reading tasks using a 4-point Likert-type scale (*Never, Sometimes, Often, Always*).

Reading Achievement

Test of Word Reading Efficiency-2nd Edition (TOWRE-2)[18]

- **Sight Word Efficiency Subtest (SWE)**
  - Assesses the number of real words that an individual can accurately read and pronounce within 45 seconds.
- **Phonemic Decoding Efficiency Subtest (PDE)**
  - Assesses the number of pronounceable made-up words an individual can accurately decode and pronounce in 45 seconds.

Procedures

- This study came from a larger study designed to examine the biopsychosocial outcomes of a mindfulness-based intervention on children with LDs. Data from pre (Time-1) and post (Time-2) intervention will be utilized.
- The study protocol was approved by IRB-300010662.

Assessments

- Researchers administered a full battery of academic achievement assessments to participants at two separate time points nine weeks apart.
- Assessments were administered by researchers according to standard procedures in a quiet room at the participants' school during normal school hours.

Surveys

- Participants and their parents each took surveys, including the BASC-3 and the RA survey, at three separate time points five weeks apart.
  - REDCap was used for the creation and administration of all surveys.
- Parents completed a demographic survey at the first timepoint which included all diagnoses their child has received.

Scoring

- All assessments and surveys will be scored by trained research assistants then will be double-scored by an additional researcher according to standard procedure.
  - Both the child and parent versions of the BASC-3 will be scored using Q-Global

Data Analysis

Descriptive statistics and bivariate correlation analysis will be conducted.

A multiple regression analysis will determine whether participants' age, reading achievement, group (control vs. experimental), levels of RA, and levels of GA at Time-1 predict reading achievement at Time-2.

A second multiple regression analysis will determine whether age, GA, group, reading, and EF predict GA at Time-2.

Expected Results

We anticipate that a reciprocal relationship will be observed between anxiety and achievement, EF will predict anxiety and be associated with RA, GA, and reading achievement, and that differences will be observed between the control and experimental groups. This research may provide support for the reciprocal theory and help guide efforts to develop and improve social and emotional learning interventions for children with comorbid anxiety and SLDs.

Acknowledgements

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References: Scan the QR code for a copy of the poster and a list of references used in this poster