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EXAMINING STUDENT ADHERENCE WITHIN A COVER-COPY-COMPARE INTERVENTION

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Abstract

The Cover-Copy-Compare intervention is a self-management strategy developed to improve students' academic performance, particularly in the area of spelling. In academic intervention research, it is often assumed that students are completing an intervention as intended, yet this is seldom examined during intervention implementation or subsequent data analysis. The aim of this study was to retrospectively examine students' Cover-Copy-Compare permanent products to assess their ability to adhere to the intervention and to examine whether intervention adherence influences intervention effectiveness. Data for the present study were selected from two larger randomized control trials that examined the efficacy of the Cover-Copy-Compare intervention on students' writing productivity in comparison to two alternative writing interventions. For the purposes of this study, only participants who were randomly assigned to intervention conditions containing the Cover-Copy-Compare intervention were utilized, resulting in a total sample size of 86 third-grade participants. Results of the current study suggest that students were likely to adhere to the Cover-Copy-Compare intervention, and students' pre-intervention spelling performance and adherence emerged as significant predictors of students' post-intervention spelling performance. Limitations of the study and implications for assessing students' intervention adherence are discussed.

Keywords: Cover-Copy-Compare, spelling, student adherence, intervention outcomes

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Writing is a fundamental skill for academic advancement. In schools, teachers use various writing activities to support students' learning of content material (Gillespie et al., 2014; Ray et al., 2016). However, the most recent national assessment of students' academic achievement indicates that fewer than 30% of fourth-, eighth-, and twelfth-grade students are writing at the proficient level (National Center for Education Statistics [NCES], 2003; 2012). Additionally, further discrepancies emerge once demographic factors such as socioeconomic status, race, and ethnicity are taken into account. Using eligibility for free and reduced-price lunch as a predictor of socioeconomic status, 85% of fourth-grade students were not proficient in writing as of 2003 (NCES). Among fourth-grade students that identified as Black or Hispanic, 86% and 83%, respectively, were unable to write at a proficient level, compared to 66% of fourth-grade students that identified as White. Further, a population-based birth cohort study estimated that between 6.9% and 14.7% of students are affected by a specific writing disability (Katusic et al., 2009).

Writing difficulties may extend beyond the scope of academics and place students at risk for developing behavioral problems in school settings (Berninger et al., 2006; Katusic et al., 2009), or negatively impact employment opportunities (Katusic et al., 2009). Although few longitudinal studies have been conducted, results from one study (Abbott et al., 2010) demonstrated considerable consistency of writing abilities over time, with early difficulties predicting later writing difficulties. Further, a recent cohort study (Coker et al., 2018) of first-grade students demonstrated that writing difficulties could be identified as early as first grade. These findings, in concert with national assessments of students' writing proficiency, substantiate the need for early identification and targeted writing intervention for elementary-age

students in an effort to minimize the adverse outcomes associated with these difficulties (Thomas et al., 2020).

Theoretical Conceptualizations of Writing Among Elementary-Aged Students

Several theoretical conceptualizations of writing have been developed (e.g., Flowers & Hayes, 1981; Berninger et al., 2002; Berninger & Winn, 2006). Among these models, Berninger's simple view of writing (2002) and not-so-simple view of writing (2006) have received considerable attention because of their applicability to elementary-age students. The not-so-simple view of writing includes three components: (1) transcription skills (i.e., spelling and handwriting), (2) executive functioning (i.e., planning and revising), and (3) text generation (i.e., composing written text). Each of the components rely on working memory during the writing process; however, transcription skills, such as spelling, use a significant portion of cognitive resources in emerging writers. For example, students typically begin utilizing transcription skills in kindergarten, which includes developing fine motor skills to produce letters and spell words, and continue to gain proficiency in transcriptions skills through the second grade, which includes gaining proficiency in spelling and text generation. As transcription and text generation skills become automatic, working memory resources become available for planning, revising, and text generation (McCutchen, 1996). Thus, it is critical for elementary-age students to develop proficiency in transcription skills to enable more cognitive resources to become available for text generation and higher-level composition skills such as planning and revising.

Empirical support for the theoretical conceptualizations of writing outlined in the simple and not-so-simple view of writing was provided by Kim and Schatschneider (2016). Specifically, Kim and Schatschneider (2016) sought to expand our understanding of the relationships between

transcription, text generation, and executive function in an effort to clearly define the component skills that contribute to text generation. Investigation of the direct and indirect effects of writing component skills among first-grade students demonstrated that transcription skills, specifically spelling (.37), had a statistically significant direct effect on writing. Thus, targeting transcription skills such as spelling is necessary for improving text generation skills in emerging writers.

Spelling Interventions

In the early elementary grades, spelling interventions are often combined with reading interventions that target a component of spelling (Morris et al., 1990; Santa & Hojen, 1999). When spelling is targeted directly, the most commonly used components include: (a) introducing new words, (b) administering a pretest, (c) using the words in a sentence, (d) practicing correctly spelling words identified as difficult, and (e) administering a final spelling test (Rowell, 1972). Although national surveys (Graham et al., 2003; Graham et al., 2016) of elementary school teachers suggest that additional spelling interventions may be implemented with students experiencing spelling difficulties, such as creating personalized spelling lists, using word banks or other aids to facilitate correct spelling, there is limited empirical support for these approaches.

In an effort to systematically evaluate the effectiveness of commonly used spelling interventions, Wanzek and colleagues (2006) conducted a meta-analysis of 19 empirical studies conducted between 1995 and 2003. To meet inclusion criteria, studies needed to (a) include students (kindergarten – grade 12) who were identified as having a learning disability, (b) utilize a treatment-comparison, single-subject research design, or a quasi-experimental single-group, (c) implement an intervention that included a spelling component, and (d) report spelling outcomes. Of the 19 studies included in the meta-analysis, most were conceptualized as explicit spelling instructional interventions ($n = 9$), or multiple modalities or assistive technology approaches (*n*

= 7). A small number of studies (*n* =3) focused on explicit reading interventions that included spelling instructional components.

Results of this meta-analysis indicated that explicit spelling instruction interventions produced the largest effects, especially when students were provided with explicit spelling strategies (e.g., immediate error correction: *ES* = 1.76), or word practice coupled with immediate feedback (e.g., student self-monitoring procedures: *ES* = 1.25). Although these findings demonstrate that explicit spelling instruction and word practice coupled with immediate feedback were the most effective strategies for improving students' spelling performance, this meta-analysis only synthesized studies that included students identified with specific learning disabilities. As a result, the extent to which these findings generalize to students without specific learning disabilities or students who are only struggling with spelling is unknown.

Cover-Copy-Compare: Spelling Intervention

As reported in the meta-analysis conducted by Wanzek and colleagues (2006), spelling interventions that provide students with word practice coupled with immediate feedback produced large, positive effects on students' spelling performance. Although spelling interventions that included explicit spelling strategies produced larger effects, these interventions require intensive teacher time, which can be inefficient in a general education classroom. Spelling interventions that include word practice and immediate feedback can be adapted for use in general education classrooms and implemented as a class-wide intervention. One example of this type of intervention is Cover-Copy-Compare.

Cover-Copy-Compare involves instructing students to study the correct spelling of a word, cover the word and write it from memory, uncover the word, and compare their spelling to the correct spelling of the word (Joseph et al., 2012). During the intervention, if students spell the

word correctly from memory, they proceed to the next word; however, if the word is spelled incorrectly, students make another attempt at spelling the word. It has been conceptualized that increased practice opportunities, self-monitoring, self-evaluation, and error correction are key components of the Cover-Copy-Compare intervention.

Joseph et al. (2012) conducted a meta-analysis of the effectiveness of the Cover-Copy-Compare intervention among elementary and secondary students with and without disabilities. To meet inclusion criteria, studies needed to (a) be published in a peer-reviewed journal, (b) include students with or without disabilities, (c) include an academic achievement outcome measure, (d) examine the effects of Cover-Copy-Compare or a variation of the intervention, and (e) use a group experimental, quasi-experimental, or a single case research design. Of the 31 studies that met inclusion criteria, all were single-case research designs, with the majority of studies examining the Cover-Copy-Compare intervention in the context of spelling (n = 17) and mathematics (n = 12) instruction.

To estimate the magnitude of intervention effects, the percentage of nonoverlapping data (PND), a commonly used analytical approach for calculating effect sizes with single case research designs, was calculated by examining differences between a students' baseline and intervention performance. Using conventional guidelines for interpreting PNDs (i.e., PND > 70% for effective interventions, 50% < PND < 70% for interventions of questionable effectiveness, PND < 50% for ineffective interventions; Manolov & Solanas, 2009), results indicated that Cover-Copy-Compare had questionable effectiveness (M PND = 67.2%) on students' spelling performance. However, there was a range of PNDs (62.3% to 92.3%) across the studies, with the largest intervention effects (PND = 92.3%) observed when the Cover-Copy-Compare intervention included an additional intervention component, such as a token economy (i.e., points

were awarded based on the number of math problems completed, and the points could be traded for tangible rewards). Thus, the effect sizes of lesser magnitude were observed when there was no assessment of student engagement or adherence to the intervention procedures.

A key component of Cover-Copy-Compare is having students practice target spelling words or math problems under self-managed conditions; therefore, students monitor their accuracy and engage in additional practice when errors occur. Unlike other spelling interventions that are teacher-directed and result in teachers monitoring the intervention, Cover-Copy-Compare relies solely on the student to engage in the intervention. Thus, results of the meta-analysis suggest that including a student adherence component may explain the large effects and suggest the possibility that student adherence may be a factor that moderates Cover-Copy-Compare intervention effectiveness.

Cover-Copy-Compare: Student Adherence

Student adherence is an important aspect of academic intervention implementation to consider; however, it is seldom examined in the empirical literature. Rather, it is often assumed that students are completing the intervention as intended and adherence is not explicitly examined during intervention implementation or subsequent data analysis. Student adherence has been identified as one component of treatment integrity, or the degree to which a treatment is implemented as intended (Gresham, 1989; Sanetti & Kratochwill, 2009). Two of the most frequently used methods for assessing treatment integrity, both of which are directly related to measuring student adherence, include systematic direct observation and permanent product review (Collier-Meek et al., 2013). Systematic direct observation involves assessing whether the intervention was implemented as intended during an observation by an independent observer, whereas permanent product review involves examining the physical materials from the

intervention by an independent observer to assess whether the intervention was implemented as intended (Collier-Meek et al., 2013).

To date, there have only been nine published studies examining the effectiveness of Cover-Copy-Compare in improving students' spelling performance conducted with general education students (see Table 1). Participants included first- through fourth-grade students; however, the majority of studies (n = 8) included at least one student enrolled in third grade and utilized single case research designs (n = 6). Only three of the studies implemented Cover-Copy-Compare with general education students as a class-wide intervention, and only one study to date has examined a component of student adherence when implementing Cover-Copy-Compare. In a study conducted by Drivas and Drevon (2019), observers rated whether three student participants (a) took time to study the word, (b) covered the word list, (c) copied the word, (d) uncovered the word list, and (e) engaged in error correction contingent on an incorrectly spelled word. However, the five intervention components were aggregated into a single component, dichotomized (i.e., adherence or nonadherence) if students completed the combined intervention components correctly for 80% of the trials per session, and aggregated with interventionist proficiency (e.g., providing materials, providing instructions). As a result, although the aggregated student adherence and interventionist proficiency were high (M = 99%), it is unknown how frequently the students adhered to the intervention components. Further, no permanent product review of the Cover-Copy-Compare worksheets were conducted to further examine student adherence. Thus, although this study attempted to examine students' adherence to the Cover-Copy-Compare intervention, the assessment methods did not permit an independent analysis of student adherence.

Class-Wide Implementation of the Cover-Copy-Compare Intervention

The majority of the existing literature on Cover-Copy-Compare has been conducted with students eligible for special education services and has been individually implemented. However, three recent studies (e.g., Eckert et al., 2017; Williams 2017, 2020) have demonstrated that Cover-Copy-Compare can be implemented effectively as a class-wide intervention, which may be more efficient from an instructional perspective given the number of students struggling with spelling and the competing time demands of teachers. The three aforementioned studies were randomized controlled trials that evaluated the efficacy of the Cover-Copy-Compare intervention in relation to alternative writing interventions aimed towards improving third-grade general education students' spelling and writing performance. Results indicated that students across conditions performed similarly on post-intervention spelling and writing measures. There were no statistically significant differences in students' performances between the conditions. Although these studies increased our understanding of the effects of the Cover-Copy-Compare intervention that was implemented class-wide among general education students, students' adherence with the Cover-Copy-Compare intervention was not examined. Thus, it is difficult to discern whether the results observed in the study conducted by Drivas and Drevon (2019) are applicable here.

Summary of the Literature

Writing is considered an indispensable skill for academic and professional advancement; however, many students in the United States experience poor writing outcomes (NCES, 2003; 2012), and the need to improve elementary-aged students' writing performance is evident (Thomas et al., 2020). Building upon the simple view of writing and the not-so-simple view of writing, Kim and Schatschneider (2016) hypothesized that transcription skills, such as spelling,

were necessary for writing development. The Cover-Copy-Compare intervention was developed to improve students' academic performance (Skinner et al., 1997); however, given the self-management component, it is important to examine whether students are completing the intervention as intended, especially in studies that have implemented the intervention class-wide. To date, there has only been only one study (Drivas & Drevon, 2019) that measured student adherence using the Cover-Copy-Compare intervention; however, the intervention components were combined and a dichotomized assessment (i.e., correctly completing 80% of trials) was conducted. Therefore, adherence estimates were inflated.

Purpose of the Present Study

The purpose of the present study was to extend the empirical literature on students' intervention adherence by examining intervention permanent products completed by students who received the Cover-Copy-Compare intervention. For the purposes of the present study, data from two previously conducted randomized control trials (Eckert et al., 2017, Williams, 2020) were examined retrospectively. Only participants who were randomly assigned to the Cover-Copy-Compare intervention were included in the present study. Data from Williams (2017) was not included in the present study because the research methods differed significantly, which limits comparability.

As a result, the primary aim of the study was to examine students' Cover-Copy-Compare permanent products (i.e., Cover-Copy-Compare worksheets) to assess students' ability to adhere to the intervention that was implemented class-wide, as well as to examine how students' intervention adherence influences intervention effectiveness. To address this aim, three research questions and supporting hypotheses were proposed:

(1) Did students in this sample adhere to the Cover-Copy-Compare intervention?

a. Due to the limited prior research examining student adherence with the Cover-Copy-Compare intervention and no previous studies examining intervention adherence for a class-wide intervention, no a priori hypotheses were proposed.

(2) Are student demographic factors, such as gender, race, and ethnicity, associated with student adherence in this sample?

a. Previous research has demonstrated that further writing discrepancies emerge once demographic factors such as race, and ethnicity are taken into account (NCES, 2003). Additionally, previous research has demonstrated that female students score higher on writing scales compared to their male peers (NCES, 2003). Thus, it was hypothesized that demographic factors, such as gender, race, and ethnicity, will be associated with students' adherence to intervention guidelines.

(3) Did student adherence impact intervention outcomes in this sample?

a. Although there are limited studies examining the relationship between student intervention adherence and intervention outcomes, some prior research (e.g., Landrum et al., 2003) has reported that the degree of behavior change is directly associated with the degree of intervention implementation. Therefore, it was hypothesized that students' intervention adherence would significantly predict students' post-intervention spelling performance after controlling for students' pre-intervention spelling performance.

Method

Sample

The data of two cohorts of third-grade students enrolled in a moderately sized, urban public elementary school in the northeast and participating in two separate randomized controlled trials designed to examine the effects of the Cover-Copy-Compare intervention on students' writing productivity in comparison to two alternative writing interventions (i.e., Performance Feedback, Cover-Copy-Compare plus Performance Feedback) were used. The two studies were selected due to their comparability in student and school demographics, procedures, and outcome measures and reflected data collected in the Treatment Research in Academic Competence lab at Syracuse University in 2017-18 (cohort 1) and 2018-19 (cohort 2). All human research protection guidelines were followed, including obtaining parental consent and student assent.

For the purposes of this study, only participants who were randomly assigned to intervention conditions containing the Cover-Copy-Compare intervention were utilized resulting in a total sample size of 86 participants (see Table 2). The sample included a similar number of female (53.5%) and male (46.5%) students. Most of the students identified their race as Black or African American (41.9%) or White (36.0%). A small percentage of students identified their ethnicity as Hispanic or Latino/Latina (7.0%), Somali (4.7%), Nepali (3.5%) or Arab (2.2%). The average age of students was 8 years, 4 months (range 8 years, 0 months to 10 years, 0 months). A total of 18 (20.9%) of students were identified as English Language Learners, but still met the inclusionary criteria. Any students eligible for special education services or a Section 504 plan were removed prior to data analysis (n = 12).

Research Assistants

The initial data were collected by doctoral-level school psychology graduate students, with the assistance of advanced undergraduate psychology students. Although both studies were deemed exempt from the Syracuse University Institutional Review Board, all research assistants were required to complete online modules through the Collaborative Institute Training Initiative regarding human subject research protections. In the randomized control trials, research assistants received training in the administration and scoring of the dependent measures in addition to data entry and procedural integrity assessments and were required to demonstrate 100% proficiency prior to assisting with data collection.

For the purpose of the present study, advanced undergraduate psychology students served as research assistants and were provided a manual detailing all procedures necessary for data coding. All research assistants were required to demonstrate 100% proficiency coding a sample of Cover-Copy-Compare permanent products prior to coding independently.

Materials

Cover-Copy-Compare Worksheet

A Cover-Copy-Compare worksheet was created based on previous work by Manfred and colleagues (2015). The worksheet included three rows and three columns, presented in a landscape orientation (see Appendix A). In the first column, the intervention spelling words were listed. Next to each intervention word, there were three blank spaces, with corresponding labels in the top row, to provide the students with directions. Each intervention word was hidden by a stapled slip of paper, which served as the cover and prevented students from looking at the correct model of the word when spelling from memory. Students assigned to the Cover-Copy-Compare condition received a packet that included: (a) an identifying cover sheet and (b) a

Cover-Copy-Compare worksheet. The Cover-Copy-Compare worksheet listed intervention target words in the left column, and included separate, colored strips of paper to cover the first two columns of each row. Intervention target words used across the studies did vary, both in terms of the number of words presented over the course of the study as well as the source from which the words were identified (see Table 3).

CBM-WE Word List

In cohort one, intervention target words were derived from commonly misspelled words identified on a pre-intervention Curriculum Based Measurement in Written Expression (CBM-WE) probe. During administration of the CBM-WE probe, students were provided with a story stem (e.g., "One night I had a strange dream…") and were given one minute to think about composing a story and three minutes to complete the composition. Based on the students' compositions, the most frequently misspelled words were identified and used as spelling words. Specifically, a total of 15 spelling words (i.e., scared, strange, was, school, about, clothes, every, ghost, movie, trying, annoying, going, thought, where, and people) were identified by the investigators. Students' spelling proficiency on the 15 spelling words was examined pre- and post-intervention. Because this measure was developed by the investigators, no psychometric data are available.

Dolch Sight Word List

In cohort two, intervention target words were determined by examining the most commonly misspelled words on a Dolch Sight Word List that was administered pre-intervention. During two separate pre-intervention sessions, students were administered the Dolch Sight Word List, consisting of 20 and 21 words each. Students were given lined, numbered paper and a spelling word was dictated every 7 seconds. A total of 23 words (i.e., laugh, shall, carry, eight,

own, warm, together, try, bring, clean, hold, keep, light, done, hurt, only, drink, full, draw, better, pick, far, and seven) were selected by the investigators. Following conclusion of the study, a post-intervention assessment of the 23 words was conducted. Because this measure was developed by the investigators, no psychometric data are available.

Procedures

Data for the present study were selected from two larger randomized control trials that examined the efficacy of the Cover-Copy-Compare intervention and included a pre-intervention, intervention, and post-intervention phase. Data from cohort one were collected over 5 sessions and data from cohort two were collected over 4 sessions. All sessions were conducted in a large group format during 15-minute sessions. Primary and secondary research assistants were present at all sessions.

Pre-intervention Phase

One week prior to implementing the intervention, pre-assessment measures of spelling and written expression were administered to both cohorts.

Cover-Copy-Compare Intervention Condition

Following pre-intervention, students were randomly assigned to the Cover-Copy-Compare condition. During each session, a procedural script (see Appendix B) was followed by the primary research assistant. If students spelled a word incorrectly, they were told to put an "X" through the incorrectly spelled word and try again in the next blank space provided. If the word was spelled incorrectly a second time, the students were told to put an "X" through the second incorrectly spelled word and move on to the next word. Students were given three minutes to complete the worksheet.

Post-intervention Phase

Post-assessment measures of spelling and written expression were administered one week following conclusion of the intervention, which included the spelling word lists for both cohorts.

Procedural Integrity

Primary research assistants conducted all sessions using procedural scripts detailing each step of the session and secondary research assistants observed 43% (cohort 1) and 60% (cohort 2) of the intervention sessions to assess whether the procedures were implemented as described. To determine procedural integrity, the summed number of observed steps was divided by the total possible steps and multiplied by 100. Procedural integrity was 100% across all sessions and no deviations were reported.

Outcome Variable

Correct Letter Sequences

A correct letter sequence was defined as a pair of letters correctly sequenced within a word. For example, the word *DOG* contains four possible correct letter sequences (i.e., *^D^O^G^)*. In contrast, an incorrect letter sequence was defined when two letters are incorrectly sequenced within a word. For example, if a student spelled *DOG* as *DAWG*, three incorrect letter sequences would be recorded (i.e., $^{D^X}A^X W^X G^{\wedge}$). Correct letter sequence allows students to receive partial credit for words that in their entirety are incorrect and subsequently detects incremental spelling changes (Shinn & Shinn, 2002). To control for the varying number of spelling words contained on the spelling words lists for cohort one and two, the percentage of correct letter sequences for pre- and post-intervention was reported.

Predictor Variable

Student Adherence

For the present study, only intervention components that could be determined based on permanent product reviews of the worksheet were assessed, which included writing the intervention target word in the first box of the Cover-Copy-Compare sheet, writing the intervention target word in the second box, and writing the intervention target word in the third box if spelled incorrectly.

To assess whether students adhered to the intervention, the first column of the Cover-Copy-Compare worksheet was examined. Students received a score of 0 if they did not write the intervention target word in the box or copied the word incorrectly and a score of 1 if they wrote the intervention target word correctly in the first column. For the next adherence component of the intervention, the second column of the worksheet was examined. Students received a score of 0 if they did not write the intervention target word in the box, a score of 1 if they attempted to write the intervention target word but misspelled the word, and a score of 2 if they spelled the word correctly. For the final adherence component of the intervention, the third column of the worksheet was examined. Students received a score of 0 if they did not write the intervention target word in the box after spelling it incorrectly in the second column, a score of 1 if they attempted to spell the word correctly again but still spelled it incorrectly, and a score of 2 if they spelled the word correctly. The third column was coded a 2 if the student spelled the intervention target word correctly in the second column (see Appendix C, D, and E). Student adherence was measured as a continuous variable and is reported as a percentage.

Interscorer Agreement

At the conclusion of data coding for the present study, all Cover-Copy-Compare permanent products were re-scored by the primary investigator. The mean percentage of interscorer agreement for student adherence was 99.43%. Instances of disagreements were detected by the primary investigator and re-examined to make the final score determination.

Research Design

This study utilized a correlational design to examine the relationship between student adherence and pre- and post-intervention outcomes. An a priori power analysis was conducted using GPower (Erdfelder et al., 1996) for a fixed multiple regression model. The power analysis was conducted with the following parameters: alpha (two-sided) = .05, effect size (i.e., $f2$) = 0.34, power = 0.80, and the number of predictors set to 3. The effect size used in this analysis was estimated from a meta-analysis conducted by Wanzek and colleagues (2006), which examined the efficacy of the Cover-Copy-Compare intervention. The results of the power analysis indicated that a total sample size of 37 students was required.

Results

Data Preparation

Data input and consistency checks

The primary researcher was responsible for entering data into a Microsoft Excel file. Data was then transferred from Microsoft Excel to SPSS 27.0 (IBM Corp., 2020). SPSS was used to perform all statistical analyses.

Data inspection

Prior to conducting the analyses, data were inspected for missing data. There were no missing data for demographic variables; however, the percentage of missing values for the

spelling outcome was 2.3% at pre-intervention and 5.8% at post-intervention. A missing values analysis indicated that Little's test of Missing Completely at Random was not significant, $\chi^2(20) = 30.80$, $p = .06$. In order to obtain a complete data set, multiple imputation was conducted (Baraldi & Enders, 2010). The multiple imputation procedure in SPSS was conducted to generate five imputed datasets. The five imputations were then averaged together to generate a complete data set that was used in all subsequent analyses.

Cohort Equivalency

To examine whether there were demographic differences between the two cohorts, chi-square tests were conducted for gender, race, and ethnicity. No statistically significant differences emerged between the two cohorts for gender or race; however, a statistically significant difference emerged for ethnicity. Specifically, a statistically significant cohort difference emerged for participants who identified as Somali, $\chi^2(1, 86) = 4.40$, $p = .04$, with more participants in cohort one identifying as Somali than in cohort two (see Table 2).

Major Analyses

Descriptive Analysis of Intervention Adherence

Because the data were collected across two cohorts of students, a series of one-way analysis of variance (ANOVA) were conducted to examine whether there were differences between students' intervention adherence across sessions based on cohort. Due to the differences in the number of intervention sessions conducted between the cohorts, the analyses only examined cohort differences between four intervention sessions.

Prior to conducting the analysis, data were analyzed to test for the statistical assumptions of independence of observations, homogeneity of variances, and normality of residuals. Although the independence assumption was upheld, visual inspection indicated the heterogeneity

of variances as well as non-normality of the residuals. Because ANOVA is robust to violations of homogeneity and normality, the ANOVAs were conducted without additional transformations of the data.

Results revealed that there were no statistically significant differences in students' mean adherence between the two cohorts for session one, $F(1,84) = 2.622$, $p = .109$; session two, $F(1,84) = 3.233$, $p = 0.76$; or session three, $F(1,84) = .521$, $p = 0.473$. However, a statistically significant difference in students' mean adherence between the two cohorts emerged for session four, $F(1,84) = 7.583$, $p = 0.007$, with cohort one displaying lower mean adherence (M = 78.69%, SD = 29.78%) than cohort two (M = 93.64%, SD = 19.78%) (see Figure 1). Although these findings suggest that the cohorts were relatively similar with respect to intervention adherence during the initial intervention sessions, differences emerged over time.

For cohort one, the mean percentage of adherence to the Cover-Copy-Compare intervention across all sessions exceeded 80% (M = 81.43%, SD = 27.79%). A one-way ANOVA was performed to compare the mean adherence between each of the five sessions and results indicated no statistically significant differences, $F(4, 205) = 1.503$, $p = .202$. As illustrated in Figure 1, there was some variability in students' adherence over the course of the intervention. For cohort one, the highest mean adherence was observed during the first three sessions (range, 78.57% to 88.10%). Although not statistically significant, mean adherence was reduced during the last two sessions (range, 75.95% to 78.69%).

For cohort two, the mean percentage of adherence to the Cover-Copy-Compare intervention across all sessions exceeded 90% (M = 91.78%, SD = 21.50%). A one-way ANOVA was performed to compare the mean adherence between each of the four sessions and indicated no statistically significant differences, $F(3, 172) = 1.348$, $p = .260$. The pattern of

intervention adherence was notably different for cohort two, with similar adherence levels observed during the first and third sessions (range, 87.80% to 89.62%), as well as during the second and fourth sessions (range, 93.64% to 96.06%).

Inferential Analysis of Intervention Adherence

To examine whether student demographic factors (i.e., gender, race, and ethnicity) were associated with student adherence, a series of one-way ANOVAs were conducted (see Table 4).

For cohort one, results of the inferential analyses indicated no statistically significant differences in students' intervention adherence based on their gender, $F(1,40) = 2.277$, $p = .139$; race, $F(4,37) = .487$, $p = .745$; or ethnicity, $F(8,33) = .538$, $p = .819$. For cohort two, results of the inferential analyses indicated no statistically significant differences in students' intervention adherence based on their gender, $F(1,42) = .057$, $p = .812$, or ethnicity, $F(1,42) = .009$, $p = .923$; however, a statistically significant difference emerged for race, $F(3,39) = 4.053$, $p = .013$. A Tukey HSD test demonstrated that students who identified as Asian adhered to the intervention significantly less ($M = 63.75\%$) than students who identified as Black/African American ($M = 93.68\%$) or White ($M = 90.89\%$). To examine whether language (e.g., English Language Learners) was a factor that interacted with Asian students' ability to understand the intervention and subsequently impact their intervention adherence, a chi square test was conducted and was not statistically significant, $\chi^2 (5, 81) = 9.96$, $p = .076$. Results of the inferential analyses indicated no statistically significant differences in students' intervention adherence based on their gender, $F(1,84) = .553$, $p = .459$; race, $F(5,80) = 1.208$, $p = .313$; or ethnicity, $F(8,77) = 1.064$, $p = .397$ when the two cohorts were combined.

Hierarchical Regression Analysis

To examine whether intervention adherence impacted intervention outcomes, a hierarchical regression was conducted. The percentage of intervention adherence served as the predictor variable, and the percentage of students' spelling performance (i.e., correct letter sequences) was covaried from pre-intervention to post-intervention and served as the outcome variable, and cohort was controlled for in the model.

Prior to conducting the analysis, data were analyzed to test for the assumptions of normality, independence, homoscedasticity, and linearity, as well as identify the presence of outliers. With the exception of independence, all assumptions were violated. The residuals were not normally distributed (i.e., negative kurtosis), as assessed by visual inspection of the normal probability plots. Visual analysis of the variance around the fit line of scatterplots of the predicted standardized values from the model against obtained standardized residuals indicated that variance was not constant and thus, the assumption of homoscedasticity was violated. Because the residuals were not normally distributed and the data violated the assumption of homoscedasticity, linearity could not be assumed. No severe multicollinearity was evident between the predictor variables (tolerance range 0.86 – 1.00; variance inflation factor range 1.00 – 1.59), and the correlations between outcome and predictor variables ranged from 0.09 to 0.57 (see Table 5). Ten outliers were detected using a Cook's distance analysis; however, given the concerns associated with excluding data (e.g., Brandt, 2012) and the fact that the 5% trimmed mean was similar to the true mean for pre-correct letter sequences (M = 67.51%), post-correct letter sequences (M = 73.19%), and adherence (M =86.72%), the outliers were included in the final data set. Further, the major analyses were run with and without the outliers and similar results were obtained.

Due to the aforementioned violations, transformations of the data were conducted by taking the log and square root of the predictor and outcome variables. The data were then analyzed again to test for the assumptions of normality, independence, homoscedasticity, and linearity. Except for the statistical assumption of independence, all the assumptions remained violated.

A hierarchical regression with the non-transformed data was conducted with cohort entered into the first block (see Table 6). The model was not statistically significant, $F(1,84) = .646$, $p = .424$, with cohort accounting for 8.7% of the variance in students' post-intervention correct letter sequences. Pre-intervention correct letter sequence was entered as a predictor variable into the second block. The model was statistically significant, $F(2,83) = 19.99$, $p < .001$, and accounted for 57.0% of the variance in students' post-intervention correct letter sequences. Including student adherence in the third block resulted in a statistically significant R^2 change of .089, $F(3,82) = 19.32$, $p < .001$, and accounted for 64.4% of the variance in students' post-intervention correct letter sequences. Pre-intervention correct letter sequence (ß = .564, $t = 6.25$, $p < .001$) and student adherence (ß = .513, $t = 3.53$, $p = .001$) emerged as significant predictors of students' post-intervention correct letter sequences.

Discussion

Writing is considered an indispensable skill for academic and professional advancement; however, many students in the United States experience poor writing outcomes (NCES, 2003; 2012), and there is an evident need to improve elementary-aged students' writing performance (Thomas et al., 2020). Building upon the simple view of writing and the not-so-simple view of writing, Kim and Schatschneider (2016) hypothesized that transcription skills, such as spelling, were necessary for students' writing development. One evidence-based intervention to improve

elementary-aged students' spelling skills is Cover-Copy-Compare. However, given the self-management component embedded in the Cover-Copy-Compare intervention, it is important to examine whether students are adhering to the intervention, especially in studies that have implemented the intervention class-wide. As a result, the purpose of the present study was to extend the empirical literature on students' intervention adherence by examining intervention permanent products completed by students who received the Cover-Copy-Compare intervention. The study's primary aim was to examine whether students were able to adhere to the intervention when it was implemented in a class-wide setting.

Student Intervention Adherence

The results of the current study suggest that this sample of third-grade students were likely to adhere to the Cover-Copy-Compare intervention (*M* = 86.72%, range 75.95% to 92.17%) when the intervention was implemented in a class-wide setting. As previously discussed, although a number of studies have examined the efficacy of Cover-Copy-Compare administered individually (Cates et al., 2007; Erion et al., 2009; Jaspers et al., 2012; Mann et al., 2010; McCurdy et al., 2016) or class-wide (Eckert et al., 2017; Williams 2017, 2020), only one study (Drivas & Drevon, 2019) has examined student adherence. The results of the current study are commensurate with high levels of adherence reported by Drivas and Drevon (2019), although the overall levels of student intervention adherence in the present study were slightly lower. This may have been associated with the intervention being implemented in a class-wide format with a larger number of students. For example, when Cover-Copy-Compare is implemented individually or in a small group, the implementer is able to spend more time ensuring that students are adhering to the intervention and engaging in error correction with the student as needed. However, when Cover-Copy-Compare is implemented with a larger number of students

in a class-wide setting, the implementer must rely on the students to engage in self-management and error correction, which may explain the lower levels of adherence observed in the present study. Overall, the results of the present study provide preliminary evidence to suggest that for this sample of third-grade students, adherence to the Cover-Copy-Compare intervention remained high when the intervention was implemented in a class-wide context.

Although the results of the current study provide preliminary evidence to suggest that students demonstrated high levels of adherence to the Cover-Copy-Compare intervention across sessions, there was some variability in students' adherence across cohorts and sessions. For cohort one, a decreasing trend was observed during the last two sessions, which may be due to loss of a students' motivation over time. No notable decrease in students' adherence was observed over time for cohort two, with similar adherence levels observed during the first and third sessions, as well as during the second and fourth sessions.

Student Demographic Factors

Previous research has demonstrated that further writing discrepancies emerge once demographic factors are taken into account (NCES, 2003). Thus, it was hypothesized that demographic factors, such as gender, race, and ethnicity, would be associated with a students' ability to adhere to the Cover-Copy-Compare intervention. Results of this study indicated no statistically significant differences in students' intervention adherence based on participants' gender or ethnicity across both cohorts; however, a statistically significant difference for race emerged in cohort two. Specifically, students who identified as Asian adhered to the intervention significantly less than students who identified as Black/African American or White. Despite these findings, it is important to note that students who identified as Asian accounted for less than 10% of the current study's sample and were not equally distributed across cohorts. As a

result, this finding may be more reflective of individual factors associated with intervention adherence than racial group differences.

Contrary to my proposed hypotheses, no statistically significant gender or ethnicity differences emerged for students' intervention adherence, despite previous research demonstrating writing and spelling discrepancies based on these factors (Allred, 1990; Berninger & Fuller, 1992; Kaufman et al., 2011; Kim et al., 2015; NCES, 2003). Previous research has hypothesized that cognitive, motivational, and attitudinal factors may contribute to the gender and ethnicity differences in elementary-aged students; writing and spelling outcomes (Berninger & Fuller, 1992; Kaufman et al., 2011; Kim et al., 2015; Knudson, 1995). However, in the current sample of students, gender and ethnicity did not seem to influence their ability to adhere to the Cover-Copy-Compare intervention.

Student Intervention Outcomes

Although the empirical research examining the relationship between student intervention adherence and intervention outcomes is limited, some prior research (e.g., Landrum et al., 2003) has reported that the degree of behavior change is directly associated with the degree of intervention implementation. The results of the present study, which were consistent with the proposed hypotheses indicated that students' pre-intervention spelling performance and student adherence were significant predictors of students' post-intervention spelling performance. Although the results of the present study demonstrated that this sample of third-grade students engaged in high levels of adherence, these findings cannot be generalized to other academic interventions that are commonly implemented to improve students' academic performance, or to other intervention agents, such as teachers.

The results of this study highlight the potential importance of examining students' intervention adherence as they participate in academic interventions that are implemented in school settings. For example, evaluating a student's intervention adherence may be an important variable to examine when an intervention is not producing the desired effects. Previously, academic assessment approaches (e.g., can't do/won't do assessment; VanDerheyden & Witt, 2007) emphasized the importance of differentiating between students who have not acquired the skill (i.e., can't do) deficit from those that will not engage in the skill (i.e., won't do). Students' intervention adherence may be a third factor to consider that may help to explain intervention outcomes.

Limitations

There are several limitations that should be considered when interpreting the results of the current study. First, this study involved a retrospective examination of Cover-Copy-Compare permanent products that were previously administered within the context of randomized controlled trials. As a result, only the intervention components evident in the permanent product worksheets were evaluated. For example, it was assumed that students did not lift up the paper sheet covering the target word and copying it during the "cover" component of the intervention. Thus, the intervention adherence outcomes reported in this study may be inflated. Ideally, student adherence should be directly assessed in the classroom during intervention implementation. Additional adherence factors associated with student (e.g., lifting the stapled sheet of paper to reveal the intervention target word) and class-wide implementation (e.g., peers providing assistance) could not be assessed in the present study. As a result, adherence, as assessed in this study, only reflects what could be scored objectively based on students' permanent products. Second, causal inferences cannot be drawn because the study was

correlational in design. Finally, the study population was limited to third-grade students in an urban elementary school, most of whom were eligible for free or reduced-price lunch. Therefore, the generalizability of these results is limited to samples of similar demographics.

Directions for Future Research

Although the results of the current retrospective study suggest that third-grade students were likely to adhere to the Cover-Copy-Compare intervention when it was implemented in a class-wide setting, it is impossible to know whether these findings generalize to other class-wide academic interventions. In addition, the results of this study indicated that students' pre-intervention spelling performance and adherence significantly predicted students' post-intervention spelling performance. However, it is impossible to determine whether these factors would play a similar role within the context of other class-wide academic interventions. Future research should examine students' adherence within the context of other academic interventions to determine if these findings replicate. Further, future research should examine the minimal level of adherence necessary to improve students' academic performance within the context of Cover-Copy-Compare.

Future research should also directly examine students' intervention adherence through direct observation, as it may yield a more reliable and valid assessment. In addition, it may be helpful to use mixed methods (e.g., semi-structured interview with students) to obtain additional information regarding factors that impede students' intervention adherence. Further, future research should consider using experimental methods to investigate the role of intervention adherence on students' performance such that causal conclusions can be drawn. For example, a randomized control study could examine if adding a performance feedback condition, in which students receive information about their adherence from the previous week, increases students'

intervention adherence. Finally, in order to fully examine the generalizability of the findings, this study should be replicated with varying populations of students.

Conclusion

Given that the majority of elementary-aged students are performing below their expected grade-level on measures of writing ability, including spelling (NCES, 2003; 2012), there is a need for evidence-based interventions to improve students' writing and spelling skills. Although the Cover-Copy-Compare intervention was developed to improve students' spelling performance, and research syntheses (e.g., Joseph et al., 2012; Wanzek et al., 2006) have demonstrated that it is effective, scant empirical attention has been paid to examining whether students are capable of adhering to the intervention. As is the case in most academic intervention research, it is often assumed that students are completing the intervention as intended, yet this is seldom examined during intervention implementation, or subsequent data analysis. Results of the current study suggest that this sample of third-grade students were likely to adhere to the Cover-Copy-Compare intervention when it was implemented as a class-wide intervention. Further, the results of the present study indicated that pre-intervention spelling performance and student adherence emerged as significant predictors of students' post-intervention spelling performance, which may help to explain intervention outcomes. Although the results of this study provide preliminary evidence that adherence may be an important factor to examine, there were methodological limitations that should be considered when informing future research. Future research should examine student adherence directly during intervention implementation, using mixed or experimental methods.

Table 1

Cover-Copy-Compare and Student Adherence Studies

Study	Student Demographics	Study Design	Student Adherence
Cates et al. (2007)	Three third grade general education students	Alternating treatments design implemented individually	Not examined
Drivas & Drevon (2019)	Two second grade students (1 SLI and 1 SLD) and one third grade general education student	Alternating treatments design implemented individually	Observer rated whether participants (a) took time to study the word, (b) covered the word list, (c) copied the word, (d) uncovered the word list, and (e) engaged in error correction contingent on an incorrectly spelled word.
Eckert et al. (2017)	Third grade general education students	Randomized Control Trial implemented class-wide	Not examined
Erion et al. (2009)	Three second grade general education students and one third grade general education student	Alternating treatments design implemented individually	Not examined
Jaspers et al. (2012)	Three first grade general education students	Alternating treatments design implemented individually	Not examined
Mann et al. (2010)	Five general education students (6-9 years old)	Multielement design implemented individually	Not examined
McCurdy et al. (2016)	Four third and fourth general education students	Single case design implemented individually	Not examined
Williams (2017)	Third grade general education students	Randomized Control Trial implemented class-wide	Not examined
Williams (2020)	Third grade general education students	Randomized Control Trial implemented class-wide	Not examined

Table 2

Student Demographic Data (n = 86)

Characteristics	Total Sample[a]		Conditions					
			CCC + PF Cohort1[b]		CCC Cohort2[c]		CCC + PF Cohort2[d]	
	%	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)
Gender								
Female	53.50	(46)	47.60	(20)	59.10	(13)	59.10	(13)
Male	46.50	(40)	52.40	(22)	40.90	(9)	40.90	(9)
Race								
American Indian or Alaska Native	1.20	(1)	2.40	(1)	0.00	(0)	0.00	(0)
Asian	9.30	(8)	14.30	(6)	4.50	(1)	4.50	(1)
Black or African American	41.90	(36)	45.20	(19)	40.90	(9)	36.40	(8)
Native Hawaiian or Other Pacific Islander	2.30	(2)	2.40	(1)	4.50	(1)	0.00	(0)
White	36.00	(31)	35.70	(15)	36.40	(8)	36.40	(8)
Ethnicity								
Arab	2.20	(2)	4.80	(2)	0.00	(0)	0.00	(0)
Hispanic or Latino/Latina	7.00	(6)	7.10	(3)	0.00	(0)	13.60	(3)
Hutu	1.20	(1)	2.40	(1)	0.00	(0)	0.00	(0)
Mandinka/Malinke	1.20	(1)	2.40	(1)	0.00	(0)	0.00	(0)
Nepali	3.50	(3)	7.10	(3)	0.00	(0)	0.00	(0)
Somali	4.70	(4)	9.50	(4)	0.00	(0)	0.00	(0)
Swahili/Waswahili	1.20	(1)	2.40	(1)	0.00	(0)	0.00	(0)
Vietnamese	1.20	(1)	2.40	(1)	0.00	(0)	0.00	(0)
English as a Second Language Eligibility								
English as a Second Language	20.90	(18)	23.80	(10)	27.30	(6)	9.10	(2)
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Age	8.04	0.05	8.04	0.05	8.02	0.04	8.05	0.06

Abbreviation Note: Cover-Copy-Compare (CCC) and Performance Feedback + Cover-Copy-Compare (PF + CCC)

[a]*n* = 86, [b]*n* = 42, [c]*n* =22, and [d]*n* = 22

Table 3

Intervention Target Words

2017-2018 Intervention Target Words	**2018-2019 Intervention Target Words**
Scared	Laugh
Strange	Shall
Was	Carry
School	Eight
About	Own
Clothes	Warm
Every	Together
Ghost	Try
Movie	Bring
Trying	Clean
Annoying	Hold
Going	Keep
Thought	Light
Where	Done
People	Hurt
	Only
	Drink
	Full
	Draw
	Better
	Pick
	Far
	Seven

Table 4

Adherence by Gender, Race, and Ethnicity

Demographic Characteristics	Overall Sample		Cohort 1		Cohort 2	
	M	(*SD*)	*M*	(*SD*)	*M*	(*SD*)
Gender						
Female	85.41%	19.56%	76.00%	23.78%	92.18%	12.21%
Male	88.24%	15.11%	85.82%	15.27%	91.20%	14.79%
Race						
American Indian or Alaska Native	98.00%	0.00%	98.00%	0.00%	-	-
Asian	76.94%	33.45%	81.33%	37.72%	63.75%	15.91%
Native Hawaiian or Other Pacific Islander	97.50%	3.54%	95.00%	0.00%	100.00%	0.00%
Black or African American	85.26%	16.53%	77.74%	16.87%	93.68%	11.63%
White	87.62%	14.78%	84.13%	20.08%	90.89%	13.50%
Ethnicity						
Arab	89.50%	10.61%	89.50%	10.61%	-	-
Hispanic or Latino/Latina	89.62%	9.28%	87.33%	5.13%	92.50%	12.99%
Hutu	97.00%	0.00%	97.00%	0.00%	-	-
Mandinka/Malinke	67.00%	0.00%	67.00%	0.00%	-	-
Nepali	68.33%	54.85%	68.33%	54.85%	-	-
Somali	73.00%	24.43%	73.00%	24.43%	-	-
Vietnamese	100.00%	0.00%	100.00%	0.00%	-	-

Table 5

Correlations Among Outcome and Predictor Variables

Variable	1	2	3	4
1. Cohort	-			
2. Pre-Intervention Correct Letter Sequences	0.11	-		
3. Post-Intervention Correct Letter Sequences	0.09	0.57***	-	
4. Student Intervention Adherence	0.30***	0.37***	0.48***	-

*** $p < 0.001$

Table 6

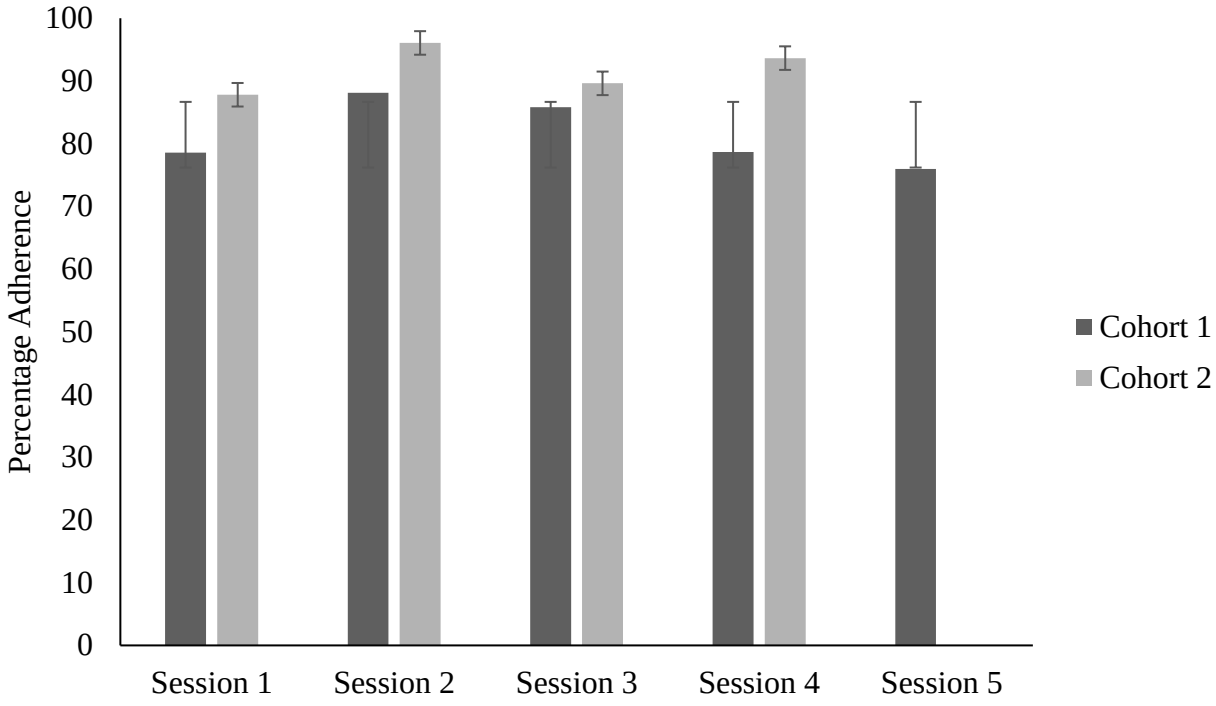
Hierarchical Regression Results

Variable	*B*	*SE (B)*	*ß*	R^2	ΔR^2
Step 1					
Cohort	4.69	5.84	0.09	0.01	0.01
Step 2					
Cohort	1.35	4.87	0.03		
Pre-Intervention Correct Letter Sequences	0.56	0.09	0.57***	0.33	0.32***
Step 3					
Cohort	-3.29	4.75	-0.06		
Pre-Intervention Correct Letter Sequences	0.45	0.09	0.45***		
Student Intervention Adherence	0.51	0.15	0.33***	0.41	.09***

*** $p < 0.001$

Figure 1

Percentage of Adherence by Session and Cohort



Appendices

Appendix A. Cover-Copy-Compare Worksheet

Appendix B. Cover-Copy-Compare Intervention Script

Appendix C. Permanent Product Coding Sheet Cohort One

Appendix D. Permanent Product Coding Sheet Cohort Two

Appendix E. Permanent Product Coding Manual Example

Appendix A

Cover-Copy-Compare Student Worksheet

Word	Copy	Write from Memory	Try Again
Laugh			
Shall			
Carry			
Eight			
Own			
Warm			

Appendix B

Cover-Copy-Compare Intervention Script

State to the students: “Please turn to the first page of your packet. You will see a worksheet with colored pieces of paper on it. Please listen carefully as I go over the instructions. Follow along on your worksheet. On your worksheet, you will see a colored strip of paper that is stapled over the left-hand side of your page. Lift the slip of paper and look at the first word in the first box. Silently say the word to yourself. While looking at the word, copy in the second box *(research assistant should point to the first blank space).* If you incorrectly copy the word, erase, and try again. Now, you will use the strip of paper (*research assistant should point out the strip of paper)* to cover the printed and written word. In the third box under the words “Write from Memory.” No peeking. Now, lift up the strip of paper and compare your answer to the correct spelling of the word. If you spelled the word correctly, you will move on to the next word. If you spelled the word incorrectly, put an “X” through the incorrectly spelled word and try again in the last box under “Try Again.” If you spell the word incorrectly again, put an “X” over it and move on to the next word. Does anyone have any questions before we begin? You will have 3 minutes to go through the worksheet. Complete as much as you can.”

Appendix C

Permanent Product Coding Sheet – Cohort One

Student ID:	Session #:	URA initials:

Scoring Rubric

Word	Copy	Write from Memory	Try Again
Sample	**0**: intervention word not written in box **1**: intervention word written in box	**0**: intervention word not written in box **1**: intervention word written in box **2**: intervention word written in box & spelled correctly	**0**: intervention word not written in box **1**: intervention word written in box **2**: intervention word written in box and spelled correctly OR no word is written in box because the word was written and spelled correctly in "Write from Memory"

Permanent Product Coding

Word	Copy		Write from Memory			Try Again		
Scared	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Was	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Strange	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
School	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
About	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Clothes	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Every	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Ghost	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Movie	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Trying	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Annoying	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Going	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Thought	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Where	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
People	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Total Scores								

Appendix D

Permanent Product Coding Sheet – Cohort Two

Student ID:	Session #:	URA initials:

Scoring Rubric

Word	Copy	Write from Memory	Try Again
Sample	**0**: intervention word not written in box **1**: intervention word written in box	**0**: intervention word not written in box **1**: intervention word written in box **2**: intervention word written in box & spelled correctly	**0**: intervention word not written in box **1**: intervention word written in box **2**: intervention word written in box and spelled correctly OR no word is written in box because the word was written and spelled correctly in "Write from Memory"

Permanent Product Coding

Word	Copy		Write from Memory			Try Again		
Laugh	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Shall	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Carry	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Eight	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Own	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Warm	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Together	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Try	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Bring	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Clean	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Hold	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Keep	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Light	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Done	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Hurt	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**

Only	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Drink	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Full	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Draw	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Better	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Pick	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Far	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Seven	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Total Scores								

Appendix E

Permanent Product Coding Sheet Example

Word	Copy		Write from Memory			Try Again		
Scared	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Was	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
School	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
About	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Clothes	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Every	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Ghost	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Movie	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Trying	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Annoying	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Going	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Thought	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Where	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
People	**0**	**1**	**0**	**1**	**2**	**0**	**1**	**2**
Total Scores	**4**		**5**			**8**		

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Williams, N. L. (2017). *Cover, copy, compare and performance feedback: An integrative writing intervention.* (Publication No. 10687878) [Master's thesis, Syracuse University]. ProQuest Dissertations & Theses Global.

Williams, N. L. (2020). *Examining the efficacy of combining cover, copy, compare and performance feedback: A randomized controlled Trial* (Publication No. 28000510). [Dissertation, Syracuse University]. ProQuest Dissertations & Theses Global.

CURRICULUM VITAE

Kaytlin Nelson

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EDUCATION

Syracuse University, Syracuse, NY
Graduate Student, School Psychology Program (APA and NASP approved)
Master of Science, Psychology — December 2022
Thesis: *Examining Student Adherence Within a Cover-Copy-Compare Intervention*
Doctorate of Philosophy, School Psychology — Expected 2025

Western New England University, Springfield, MA — February 2020
Bachelor of Arts, Psychology | Minor, Education
Summa Cum Laude

CLINICAL EXPERIENCE

Elmcrest Children's Center, Syracuse, NY
Student Clinician, Residential Treatment Center — August 2022 – Present

- Provide individual counseling and lead a Dialectical Behavior Therapy group for youth receiving residential services
- Monitor implementation fidelity of Boys Town Psychoeducation Model through milieu observations
- Provide behavioral consultation to program staff

Behavioral Consultant, SPICE — August 2021 – August 2022

- Provided behavioral consultation to special education teachers
- Administered and scored preschool assessment batteries (e.g., VB-Mapp)
- Conducted Functional Behavior Assessments for Syracuse City School District (urban school district)
- Implemented and monitored behavior intervention plans for preschool students with developmental disabilities receiving early intervention services

West Springfield School District, West Springfield, MA
School-Based Intern, Tatam Elementary School — August 2018 – April 2019

- Provided individual counseling by addressing the social-emotional needs of three students
- Implemented academic support and behavior plans for students with social-emotional and behavioral concerns within inclusion and external settings
- Attended academic testing and IEP meetings
- Scored assessments by hand and using Q-global

Synergy Alternative High School, East Hartford, CT
School-Based Intern August 2018 – December 2018
- Implemented academic support and a reinforcement-based behavior support plan to high school students with social-emotional and behavioral needs within the classroom
- Observed academic, attendance, and 504 plan meetings with social worker

RESEARCH EXPERIENCE

Graduate Assistant: Treatment Research in Academic Competence Lab (TRAC), Syracuse University August 2020 – Present
Faculty Mentor: Dr. Tanya Eckert
- Conduct independent research for milestone projects
- Co-author current lab research manuscripts and presentations
- Provide mentorship to undergraduate research assistants
- Manage data input and analysis
- Review literature on school-based interventions to improve student's academic skills

Graduate Assistant: Research in Interventions Targeting Educational Success Lab (RITES), Syracuse, University August 2020 – August 2022
Faculty Mentor: Dr. Bridget Hier, BCBA
- Located and code scientific research articles using an established coding manual for a systematic review on writing quality

Research Assistant, Multicultural Ideology December 2018 – February 2020
Faculty Mentor: Dr. Kevin Zabel, Western New England University
- Designed experimental tasks using Survey Monkey and Media Lab
- Ran experimental sessions with college students as participants
- Analyzed data using Statistical Package for the Social Sciences (SPSS)
- Prepared results for presentation at undergraduate and professional conferences

Research Assistant, Distance-Based ABA Intervention May 2019 – August 2019
Faculty Mentor: Dr. Greg Hanley, Western New England University
- Collected observational data using time sampling on Instant Data Software System
- Conducted integrity assessment for procedural fidelity
- Conducted interobserver agreement on both child and parent data

PUBLICATIONS

Eckert, T., Circe, J., Goldstein, A., Amidon, S., **Nelson**, K., Maguire, S. (in prep)
Examining the impact of interventions on writing productivity apprehension and self-efficacy.

Eckert, T., Hier, B., Circe, J., Goldstein, A., Maguire, S., **Nelson**, K. (revise and

resubmit). The impact of grit and writing apprehension on third-grade students' writing productivity. *Reading and Writing Quarterly.*

Eckert, T., Maguire, S., **Nelson**, K., Amidon, S., Goldstein, A., Antoine, M. (in prep). You'll learn to love it? Examining the relationship between intervention dose and acceptability among third-grade students.

Hier, B., MacKenzie, C., Ash, T., Maguire, S., **Nelson, K.**, Helminen, E., Watts, E., Matsuba, E., Masters, E., Finelli, C., Circe, J., Hitchings, T., Goldstein, A., & Sullivan, W. (revise and resubmit). Effects of the good behavior game on students' academic engagement in remote classrooms during the COVID-19 pandemic. *Journal of Positive Behavior Interventions.*

PRESENTATIONS

Eckert, T., Circe, J., Goldstein, A., Maguire, S., & **Nelson**, K. (2022, February 15-18). Impact of reading comprehension on elementary-aged students' writing performance. [Poster presentation]. National Association of School Psychologists, Boston, MA, United States.

Eckert, T., Hier, B., Circe, J., Goldstein, A., Eggleston, B., Maguire, S., & **Nelson,** K. (2021, February 23-26). Association between writing productivity, writing apprehension, and grit. [Poster presentation]. National Association of School Psychologists, Virtual Convention.

Hier, B., Datchuck, S., Eckert, T., Watts, E., Circe, J., Hitchings, T., Goldstein, A., Finelli, C., Maguire, S., & **Nelson,** K. (2021, February 23-26). Validity and Classification Accuracy of Curriculum-Based Measurement of Sentence Construction. [Poster presentation]. National Association of School Psychologists, Virtual Convention.

Hier, B., Eckert, T., Hitchings, T., Circe, J., Watts, E., Finelli, C., Maguire, S., & **Nelson**, K. (2022, February 15-18). Writing quality assessment: Preliminary results of a systematic review. [Poster presentation]. National Association of School Psychologists, Boston, MA, Unites States.

Nelson, K., Surprise, A., & Zabel, K. (2018, November 10). *Openness to multicultural messages: The role for situationally–activated needs for differentiation and similarity* [Poster presentation]. Annual meeting of the New England Psychological Association, Worcester, MA, United States.

Nelson, K., Surprise, A., & Zabel, K. (2020, February 27-29). *The influence of self–reflective mindsets on support for multicultural messages* [Poster presentation]. Annual meeting of the Society for Personality and Social Psychology, New Orleans, LA, United States.

Nelson, K., & Zabel, K. (2018, December 18). *The influence of self–reflective mindsets on support for multicultural messages* [Poster presentation]. Annual WNE Arts and Science Research Symposium, Springfield, MA, United States.

TEACHING EXPERIENCE

Syracuse University, Department of Psychology July 2021 – August 2021
Instructor of Record, Adolescent Psychology (PSY 336)

- Designed curricula for 6-week online summer course, held weekly office hours, and graded all written assignments for the course

Syracuse University, Department of Psychology August 2020 – May 2021
Teaching Assistant, Foundations of Human Behavior (PSY 205)

- Designed content materials, taught weekly recitation sections in a hybrid format, held office hours weekly, and graded all assignments for the course

PROFESSIONAL EXPERIENCE

Western New England University Springfield, MA
Member at Large, Alumni Board of Directors October 2020 – Present

- Attend quarterly Board of Director meetings, attend monthly committee meetings, and plan and execute alumni events that align with the university's mission and goals (e.g., WNEGives)

Student Assistant, Office of First Year Students May 2019 – December 2019

- Assisted in coordinating the transition of students in their first year of college by monitoring academic progress, encouraging academic engagement, and connecting struggling students to resources to promote academic success

Peer Tutor, College of Arts & Sciences January 2018 – December 2019

- Conducted one on one tutoring sessions for students enrolled in *Introduction to Psychology, Statistics for Behavioral Sciences, Research Methods,* and *Math for Elementary Education*
- Collaborated with Student Disability Services

Course Assistant, College of Arts & Sciences August 2017 – December 2019

- Communicated with professor to make recommendations for tutoring
- Graded all assignments for the course
- Kept record of students' grades via an Excel Document

Ludlow Boys and Girls Club Ludlow, MA
Group Leader August 2016 – August 2019

- Supervised counselors in training and provided data to supervisors
- Provided after school child care for large groups of elementary and middle school aged students
- Designed age-appropriate High Yield Learning Activities and STEM projects for students

Mary Walsh Elementary School Springfield, MA
America Reads Tutor September 2016 – May 2017

- Provided academic support and a reinforcement-based behavior support plan to kindergarten students

PROFESSIONAL AFFILIATIONS

National Association of School Psychologists: Graduate Student Affiliate
APA Division 16: Student Affiliate

TRAININGS AND CERTIFICATIONS

CITI Training
NYS Mandated Reporting Training
TF-CBT Training (11 Continuing Education Contact Hours)
QB Training
Managing Bias Training
Reducing Microaggression Training
OCFS (20 hours of training)
Boys Town Psychoeducation Model
Specialized Sexual Abuse Services (SSAS)
National Register's Associate Certificate Program on Clinical Suicidology

SERVICE AND LEADERSHIP ACTIVITIES

Professional Development Committee, August 2022 – Present
Syracuse University

WiSE 2nd Year Associate, Syracuse University August 2021 – Present

NASP Student Affiliate, Syracuse University August 2021 – Present

Psychology Action Committee (PAC), Syracuse University August 2021 – Present
First-Year Student Mentor
Events Chairperson

Committee for Diversity, Equity & Inclusion (DEI), August 2020 – Present
Syracuse University

Committee for Diversity & Inclusion (CDI), August 2020 – Present
Syracuse University
Vice President

Admissions Committee, Syracuse University August 2020 – Present

C.A.R.E., Western New England University August 2017 – December 2019
President
Hunger and Homelessness Chairperson

Psi Chi, Western New England University August 2018 – August 2019
President

Psychology Club, Western New England University August 2018 – August 2019
President

HONORS & AWARDS

President's List & Dean's List (GPA 3.30 or higher): 2016 - 2019
Alpha Lambda Delta (First Year Honor Society): Inducted 2017
Psi Chi (Psychology Honor Society): Inducted 2018
Omicron Delta Kappa (Leadership Honor Society): Inducted 2019
Mortar Board (Senior Year Honor Society): Inducted 2019
Citation for Community Service Co-Curricular Award Recipient: Received 2019
Skookum Award of Excellence Recipient (excellence in academics, leadership, and community service): Received 2019
Honor Graduate in Psychology (graduating senior in Psychology who demonstrates the highest ideals in Psychology by virtue of their academic performance, contribution, service, and commitment to the department or field): Received 2020
Certificate in University Teaching: Received 2022

RELEVANT COURSEWORK

Syracuse University
Introductory Seminar in School Psychology, Principles of Applied Behavior Analysis, Cognitive and Affective Bases of Behavior, Child and Family Interventions, Behavior Therapy Practicum, Statistics and Research Design I & II, Consultation Processes & Practicum, Developmental Psychopathology, Direct Academic Assessment, Cognitive & Intellectual Assessment, Socioemotional Assessment, Individual Differences, Social Cognition, School Psychology Practicum

Western New England University
School Psychology, Psychological Assessment, Psychology of the Exceptional Persons, Counseling Skills, Psychology of Learning, Child Behavior Management, Principles and Problems in Education, Developmental Psychology, Abnormal Psychology, Introduction to Social Work, Introduction to Neuroscience