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Conjoint Behavioral Consultation, Cognitive Behavior Therapy and Schema-based Instruction: Enhancing Mathematical Resilience

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ABSTRACT

In this study, we demonstrate the use of conjoint behavioral consultation (CBC) as a main model to join parents and educators in the shared development and implementation of comprehensive interventions for students. A cognitive behavior therapy (CBT) model and schema-based instruction (SBI) served as an intervention and delivered in the context of CBC to enhance mathematical resilience. A multiple probe design across participants was used. The mothers and teachers of three boys between the ages of 10 and 11 years who were exhibiting performance deficits on the mathematics outcomes served as consultation participants. Direct observation data suggest that intervention implemented within the context of CBC was related to increases in mathematical resilience. In general positive changes were noted from pretreatment to post treatment administrations of the well-being questioner. Measures of treatment acceptability, treatment integrity, and social validity also yielded positive results. This study lends support to the use of CBC as a means of joining parents and teachers in the delivery of effective academic and behavioral interventions.

Keywords: Conjoint Behavioral Consultation, Cognitive Behavior Therapy, Schema-based Instruction, Mathematical Resilience, family involvement

INTRODUCTION

The last two decades were characterized by increasing pressure to improve student achievements through high academic accountability emphasis. This focus has expanded and finally as a result, curriculum goals have become more academic and skill-oriented, and social and emotional components of educational programs have taken the back seat to increasingly rigorous academic demands (Hargreaves, 2003). More academic oriented and less social and emotional sensitive learning environments can foster negative attitudes and feelings (e.g., avoidance, anxiety) toward learning. The presence of social-emotional and behavioral challenges, are related to poor academic performance (Reid, Gonzalez, Nordness, Trout, & Epstein, 2004), and predictive of later school drop-outs. Externalizing behavior problems and academic difficulties are prevalent, stable, resistant to treatment, and cause great suffering to their victims and society. Tremendous resources have been expended trying to treat and prevent them, with discouraging long-term effects (Kazdin, 1987). One possible reason for discouraging results of treatment and preventive procedures may be that interventions have remained separate, largely ignoring the relationship between these two problems. Given the relationship between children's disruptive behaviors and negative school outcomes, it is important to identify effective interventions that can help to ameliorate disruptive behavior problems and academic success simultaneously. Estimates of the number of children with one problem who also

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State of the literature

- Parental factors are the most important factor behind academic achievement and are more influential than other environmental factors.
- CBC is found to be effective for addressing deficits in academic performance.
- Resilience levels can play a vital role for promoting wellbeing.

Contribution of this paper to the literature

- CBC can be used to systematically link teachers, parents, and consultants in the development and implementation of instruction and treatment
- Use of conjoint behavioral consultation (CBC) as a main model to join parents and educators helped to the implementation of comprehensive interventions for students.
- This study lends support to the use of CBC as a means of joining parents and teachers in the delivery of effective academic and behavioral interventions.

have the other varies depending on the assessment criteria and measures used but in each case range from 10% to over 50% (Frick, Kamphaue, Lahey, Loeber, Christ, Hart & Tannenbaum, 1991).

Teacher factors can have profound impacts on various outcome measures. Teachers who demonstrate patience, knowledge of intervention techniques, an ability to collaborate with an interdisciplinary team, and a positive attitude towards children with special needs can have a positive impact on student success (Greene, 1995). Like teachers, parents have a great effect on children's learning and academic achievement. In practice, previous studies have also indicated that parental factors are the most important factor behind academic achievement and are more influential than other environmental factors (Fan, and Chen, 2001; Pomerantz, Moorman, and Cheung, 2012).

Indeed, supporting teachers' and families' participation in children's education may be one approach to minimizing the achievement gap. Multiple risk factors threaten child's experiences with success in school (Arnold & Doctoroff, 2003). Mathematics anxiety is one of them and it is an important construct to consider when studying influences on children's mathematical development. Mathematics anxiety involves physiological arousal, negative cognitions, escape or avoidance behaviors and has consistently been shown to be negatively related to mathematics achievement (Hembree, 1990; Ma,1999). Because of the increased standards for academic achievement in Grade 5, implementing support for children, before they reach that underachievement point, is essential for their school success and well-being. Yet little is known about the underlying mechanisms through which teacher and parental involvement influences children's academic achievement and well-being. The present study thus sought to extend the literature by examining potential pathways with support from conjoint behavioral consultation (CBC) to children's mathematical achievement and well-being. A cognitive behavior therapy (CBT) model and schema-based mathematical instruction served as an intervention and delivered in the context of CBC to enhance mathematical resilience.

Experimental studies have found CBC to be effective for addressing deficits in academic performance (Murray, Rabiner, Schulte, & Newitt, 2008; Power et al., 2012; Weiner, Sheridan, & Jenson, 1998), behavioral challenges (Mautone et al., 2012; Wilkinson, 2005), and social skills (Colton & Sheridan, 1998; Sheridan, Kratochwill, & Elliott, 1990) with high levels of acceptability among parents, teachers, and service providers (Freer & Watson, 1999; Sheridan & Steck, 1995). A meta-analysis by Sheridan et al. (2001) found meaningful effect sizes when CBC was used to improve inattention, noncompliance, disruptive behavior, reading accuracy and fluency, and anxiety.

CBT model which was embedded in CBC as an intervention system has many positive outcomes among many disorders. It has led to a promising innovation that CBT therapy models also might be employed to help people develop positive qualities and characteristics (Fava & Ruini, 2003). Early Theorists of resiliency, Levi and Wall emphasized on traits associated with positive outcomes in the face of adversity and tribulations of life. However, Kumpfer by providing an exchange model of resilience that include both process and outcome, less

emphasized on cycles of destruction and reintegration and more emphasized on the nature of the exchange of environment content and internal resiliency (environmental exchange of personal environmental processes). According to this view, resilience is not only ability and personality but also the capabilities and features in interaction with stressful factors will determine whether a person will be able to cope with stressors.

These ideas nourished several years in this century and end up with an increased interest in positive psychology, the study of positive human qualities and experiences (Fredrickson, 2001; Snyder & López, 2002). CBT methods can be considered as a process which functions in promoting happiness, resilience, courage and other positive qualities and for this purpose Padesky and Mooney designed a four-step Strengths-Based cognitive-behavioral therapy (CBT) model to help clients build positive qualities. Researchers believed it would be quite effective to focus on construction of resilient beliefs and behaviors rather than the dismantling of beliefs and adverse behaviors which block many roads to resilience (Mooney & Padesky, 2000). Students with high expectations, a meaning for life, goals and interpersonal problem solving skills are more likely to be resilient (Bernard, 1991). Consequently, high resilience levels can play a vital role for promoting wellbeing. Borman and Overman's (2004) study of mathematical academic resilience suggests that, with a safe and orderly environment and positive teacher-student relationships, is likely to promote resilience in children "at risk". They also suggest that students with characteristics such as strong mathematics self-efficacy, a more positive outlook toward school, higher self-esteem and those that are engaged in academic activities are likely to show resilience. This viewpoint leads to the conclusion that resilience resides within the context and then is 'transmitted' to individuals or nurturing resilient characteristics that were already present in the child is possible. So that resilience can serve as a buffer to protect us from psychological and physical health consequences during difficult times (Rutter, 1985).

Like (CBT) model the schema-based instruction (SBI) was included in CBC as part of the intervention system and this study thus focused on two different types of mathematics achievement: word problems involving whole number arithmetic, and pre-algebraic cognition.

Johnston-Wilder, Lee, Garton, and Brindley developed 'the Coaching for Mathematical Resilience' Pilot course for improving mathematical resilience (2015?). The coaches were trained to support, respect, listen, be compassionate, validate, model resiliency, and refrain from judging, in order to grow mathematical capability. However, they have little or no mathematical knowledge. They were not required to provide 'answers' but rather to support the students in finding their own. Finally, they felt overwhelmed by feelings of inadequacy and helplessness in the face of the students' difficulties in mathematics. For this reason it's meaningful to add a specific mathematical instruction and perform the research with a consultant who was successful in freshman calculus.

The SBI, with its focus on schemata (i.e., problem pattern or structure) identification, is known to benefit students at risk for math failure (Hutchinson, 1993; Zawaiza & Gerber, 1993). A primary feature of the SBI is the use of schemata diagrams to visually scaffold important information and bring forward semantic relations in the problem to facilitate problem translation and solution (Jitendra, DiPipi, & Perron-Jones, 2002). One of the characteristic of the SBI that distinguishes it from other approaches is the use of schemata diagrams to map important data and highlight semantic relations in the problem to facilitate word problem translation and solution. Cognitive and metacognitive strategy-training procedures also may include diagrams, but the emphasis is less on identifying the semantic relations in a problem and more on problem solving procedures (Jitendra, DiPipi, & Perron-Jones, 2002; Bulut Serin, Emran Özbulak, & Serin, 2012; Serin, Bulut Serin, & Saygılı, 2010).

Many educational innovations, including context-based teaching, and inquiry-based teaching, have been proposed in mathematics education, to foster positive attitudes, but there is little evidence about which educational approaches are effective to promote interest, attitude, and foster resilience (Fortus, 2014). Therefore, the purpose of the current study is to gain insight into the magnitude and the robustness of these effects through single subject studies that investigate the effects of innovative teaching approaches in the form of (CBC) as a main model on students' resilience, attitudes toward and achievement in mathematics.

Table 1. Participant Demographics

| Participant | Age | Grade | Diagnosis | District type | Parent education | Special education | Teacher experience |
|-------------|-----|-------|---|---------------|------------------|-------------------|--------------------|
| A | 11 | 5 | Attention deficit hyperactivity disorder (ADHD) | Suburban | High school | No | 12 years |
| B | 11 | 5 | Attention deficit hyperactivity disorder (ADHD) | Suburban | High school | No | 7 years |
| C | 12 | 5 | Attention deficit hyperactivity disorder (ADHD) | Suburban | High school | No | 9 years |

PARTICIPANTS

Inclusionary criteria

Children (ages 11-12) who experienced frequent struggle in learning mathematics, solving problems through combining many areas of cognitive functioning with trial and error were eligible to participate in the study. In addition, the child’s parents and teacher(s) had to be willing to participate in data collection, intervention development, and intervention implementation. We also required school administration to be supportive of participation in the study.

Participant recruitment

Four families were referred for the study by teachers, and self-referral. All of those families expressed interest and were formally screened for participation. Of the four families formally screened, one did not participate due to the time commitment. Three families met eligibility criteria and agreed to participate.

Participant information

The data reported in this study were collected with a sample of fifth-grade children who were highly mathematically anxious students. They enjoy mathematics less, are less confident in their mathematical abilities, and, steer away from mathematics courses. Participants attended three schools in two school districts in the Turkish Republic of Northern Cyprus. All three child participants were males who lived in dual-parent homes. All three participating teachers were male, math teachers. Additional information about the participants and their teachers can be seen in [Table 1](#).

Prior to participation in the study, none of the participants were getting therapeutic services in the community. All intervention components took place in the European University of Lefke where the consultant worked.

Prior to participation in the study, diagnosing childhood resilience performed as part of a participant recruitment. Because, assessing resilience is the first step toward the validation of interventions that focus on the promotion of wellbeing. (see [Table 2](#))

All child participants displayed problem behaviors that interfered with their successful completion of age-appropriate routines at home and school (see [Table 2](#) for specific information about participant behavior). For data collection purposes, we collapsed all of these specific problem behaviors into one overarching category of routine noncompliance. Routine noncompliance was defined as not engaging in the expected activity and/or not

complying with current adult directions. While all behaviors were rolled into one category for data collection, each specific behavior was independently evaluated and treated according to function and need (e.g., skill deficit vs. avoidance).

EXPERIMENTAL DESIGN

A multiple-baseline design across participants was selected to test the efficacy of conjoint behavioral consultation, cognitive behavior therapy and schema-based instruction. This single subject research design allows examination of the effectiveness of an independent variable using three different subjects. Experimental control is achieved when changes in the performance of the first participant is due to the application of the independent variable, no change is observed in the performances of the other participants to whom the independent variable

Table 2. Decision tree for diagnosing resilience

| Phase | Description | Status |
|--|--|--|
| (1) Assess exposure to adversity | Is there evidence of above normal, or atypical, exposure to adversity, or that the individual has experienced events in his or her life that threaten wellbeing, regardless of whether the individual shows mental health or behavioral problems? The answer to this question must be yes to proceed with the assessment. If the answer is no, the assessment becomes an investigation of the individual's strengths, but not resilience. <i>All the participants have experienced events in their lives that threaten wellbeing (e.g. all student participants changed schools at the end of the fall semester according to the interactions between learner/parent and teacher). All the participants found it difficult to take part in mathematical learning, to the point that they exhibit anxiety.</i> | <input type="checkbox"/> Yes Continue assessment |
| (2) Assess the differential impact of promotive and protective factors/processes | Is the individual's abnormal exposure to risk excessively severe or chronic? If yes, ecological factors should be assessed. <i>Ecological factors eliminated because all student participants have a new teacher and class.</i> Some emphasis should be placed on assessment of individual capacities. <i>All student participants can perform addition, subtraction, multiplication and division with two digit numbers.</i> Sufficient individual capacities may be enough to make individuals resilient in contexts of less severe and less chronic exposure to adversity. | <input type="checkbox"/> Yes Proceed directly with assessment of environmental resources (PhaseThree), then assess individual capacities. |
| (3) Assess the capacity of the environment to provide resources | In all contexts where there are abnormal levels of adversity (high, medium and low), does the environment have the capacity to mitigate the impact of risk exposure? To assess, review the availability and accessibility of resources, their strategic use, and whether the individual's coping strategies are reinforced by others. <i>Final decision: Developing mathematical resilience outside the mathematics classroom.</i> <i>Intervention: Conjoint Behavioral Consultation, Cognitive Behavior Therapy and Schema-based Instruction procedures can be applied in the European University of Lefke, where the consultant worked.</i> An environment with sufficient resources to mitigate risk predicts resilience when resources are used and coping strategies judged favorably. | <input type="checkbox"/> Yes Environment has capacity to sustain resilience. Resilience is predicted. |

Table 2 (Continued). Decision tree for diagnosing resilience

| Phase | Description | Status |
|--|---|--|
| (4) Assess whether coping strategies are experienced, and/or perceived, as adaptive or maladaptive | Are the protective processes used by the individual seen as adaptive by the individual? Depending on the social desirability of these coping strategies, and the individual's ability to influence the perception of others (help them to understand why a behavior is an appropriate response to adversity), individuals may be assessed as resilient or maladapted. <i>Will be found as a result in this research.</i> | <input type="checkbox"/> Yes? Coping strategies are either experienced and/or perceived as adaptive. Resilience is Predicted. <input type="checkbox"/> No? Coping strategies are experienced and/or perceived as maladaptive. Proceed |
| (5) Assess contextual and cultural considerations regarding promotive and protective processes. | Do the individual's coping strategies meet their own, and/or others', expectations for how to behave under conditions of adversity? If (a) maladaptive behaviors are reasonable given the environmental load and the availability and accessibility of resources, or (b) coping strategies reflect culturally relevant forms of adaptation that are reinforced by others, then a finding of (hidden, or culturally specific) resilience is appropriate. <i>Will be found as a result in this research.</i> | <input type="checkbox"/> Yes? Resilience is predicted. <input type="checkbox"/> No? Coping strategies may be temporarily functional, but resilience is not predicted. |

Table 3. Challenging Behaviors and Interventions

| Participant A | Home routine | School routine | School routine |
|----------------------|--------------|----------------|--|
| | Homework | Math | 1. Noncompliance 2. Off-task behavior/inattention 3. Lack of independent problem solving 4. Inappropriate movements, and crying |
| Participant B | Homework | Math | 1. Noncompliance 2. Off-task behavior/inattention 3. Lack of independent problem solving |
| Participant C | Homework | Math | 1. Noncompliance 2. Off-task behavior/inattention 3. Lack of independent problem solving |

was not applied, and the same effect is subsequently repeated in the other participants (Tekin-İftar, 2012). The dependent measures were participants' performance on a problem-solving worksheet assigned after instruction.

Procedures

This study involved three phases: (a) a baseline phase when participants were asked to complete worksheets of twenty mathematics word problems with the 45-minutes, (b) post instruction phase after conjoint behavioral consultation, cognitive behavior therapy and schema-based instruction, and (c) delayed post instruction phase.

Mathematics anxiety

The Mathematics Anxiety Rating Scale-Elementary Form (MARS-E) (Baloğlu, & Balgalmuş, 2010) was administered to all the student participants. This scale contains 26, 5-point Likert-type items. Cronbach alpha reliability coefficient for the whole MARS-E was found to be .94. Subscale alpha reliability coefficients ranged from

.77 to .86. Thus, the items of the Turkish scale were found to be reliable as evidenced by internal consistency scores. According to the (MARS-E) all student participants have got maximum mathematics anxiety.

Word Problem Solving and SBI

Schema-based instruction (SBI) contains change, group, compare, restate, and vary problems (Marshall, 1995). SBI has four strategy steps which include finding the problem type, organizing the information in the problem using the diagram, making a plan to solve the problem and finally solving the problem. Consultant uses a checklist based on the strategy steps to scaffold the cognitive processes as she thinks aloud to solve word problems (modeling). By using the first step of the strategy, the consultant identifies the problem type via reading, retelling, and examining information in the problem. In addition, the consultant makes the connection between previously solved problems by explaining the differences and similarities between them. In the second step, the consultant demonstrates how to organize information using the schematic diagram. This second step includes self-instructions to read the problem to identify critical information in the problem to represent using the schematic diagram. Third step involves translating the information in the diagram into a math equation. Fourth and the final step have the students solve the problem using the solution strategy identified in Step 3. Participants received two months of instruction for 3 days per week from consultant. Instruction took place during the regularly scheduled mathematics class for 1 hr. daily, in the European University of Lefke.

The participants attempted to solve 20 word problems that required them to incorporate their knowledge of mathematics involved in scenarios that would have been familiar from their daily lives, and that depend on their knowledge about magnitude relationships. The word problem examples in the present study are gathered from their student mathematics book for measuring their mathematical word problem solving abilities. The problems included addition, subtraction, multiplication and division calculations within change, group, compare, restate, and vary problem types. Each participant was given two pieces of scratch paper, and they had free access to scratch paper. If the answer was correct, it earned half score point; otherwise, no point was awarded. Scores, therefore, could range from 0 (no problems solved correctly) to 10 (all 20 problems solved correctly). The students had 45 minutes to solve twenty word problems in every three phase of multiple-baseline design. Post instruction data gathered immediately after the end of intervention and delayed post instruction data collected four months later.

Resilience and Cognitive-behavioral Therapy (CBT)

CBT includes four steps to resilience: (1) search for strengths, (2) construct a personal model of resilience (PMR), (3) apply the PMR to areas of life difficulty, and (4) practice resilience steps used to bring hidden strengths into participant awareness are demonstrated through consultant-participant dialogues (Padesky and Mooney, 2012). Consultant helps clients identify the strengths they already possess and builds a model of resilience from these existing strengths. For example, after learning how to solve word problems combined with increased homework completion, these strengths may be the basis for their resilience. On the other hand, people are frequently unaware of their strengths and do not identify themselves as resilient in these areas like mathematical word problem solving skills. For this reason, therapists search for "hidden strengths" within common everyday experiences and bring these to client awareness. For this reason participants word problem solving success shared by showing pre and post intervention data via single subject design graphics including only related participant.

CBC Implementation

In the initial stage of the process (needs identification), consultant, families and teachers prioritized their concerns (e.g., increasing word problem solving and mathematical resilience, and homework completion (e.g., "lack of interest in homework") for the participants. In the second stage (needs analysis), observations and goals were discussed and consistent treatment plans were developed by the consultant, parents, and teachers. This stage includes Schema-based instruction (SBI) and then CBT therapy implementation. At the same time consultant guide three math teachers and three mothers about their responsibilities. In this stage recommendation for teachers performed in two sessions including accommodating for different learning styles, creating a variety of testing environments, designing positive experiences in math classes, removing the importance of ego from classroom

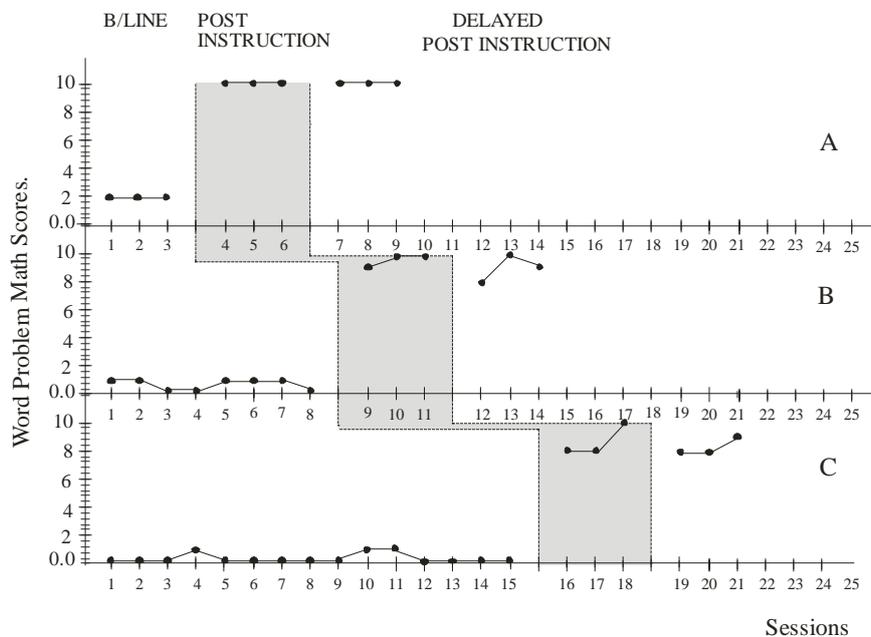


Figure 1. Word problem math scores before intervention, post instruction and delayed post instruction across the three participants

practice, emphasize that everyone makes mistakes in mathematics. Consultant informed about what to say when a student struggles with math (It’s better to say “Yes, this school work/homework is challenging, but I know that with hard work you can do it!” This indicates that the student has the capability and the potential for success. Recommendation for parents includes several ways which parents can help their child with math performed in six sessions: Showing an interest and be positive about math. Encouraging child to talk about what they are doing in math at school. Keeping up to date with what child is doing in math at school and their progress. Praising every effort. Reassuring and encouraging child and giving the message that math is an enjoyable part of our daily life. Talking to child’s teacher about how child is doing in math at school and the progress. In the third stage (plan implementations), the plans were implemented, and progress toward desired goals was consistently monitored. Finally, in the fourth stage (plan evaluation), the participants’ progresses toward goal attainment was monitored.

RESULTS

Figure 1 shows the word problem math scores of participants A, B, and C. Participant A was in the baseline condition for three sessions until a stable baseline was established. Participant A solved 4 word problems out of 20 and got 2 points (0.5 points for each question) in every baseline probe and solved each 20 questions in the post instruction (10 points). Participant A got full points in the delayed post instruction phase.

Participant B was in the baseline condition for 8 sessions. Participant B got 0.62 on the average in baseline with a range of 0-1. 9.67 in post instruction with a range of 9-10, and 9 with a range of 8-10 in delayed post instruction phase.

Participant C was in the baseline condition for 15 sessions. Participant C got 0.20 on the average in baseline with a range of 0-1. 8.67 in post instruction with a range of 8-10, and 8.33 with a range of 8-9 in delayed post instruction phase. Overall, participants did well in post and delayed post instruction phases which means they can solve instruction related word problems independently which ends up with increased homework completion.

After teacher and parent involvement in CBC process data gathered by personal communication. Participants' progresses toward goal attainment were promising. All three mothers informed consultant about their changing behaviors like: insisting that the fun stuff can't happen until the homework is completed, making to-do lists together with the child, trying to overcome perfectionism in their children, going over homework with the child (double-checking). Finally, the end result of parental involvement is the increase in homework completion with a high motivation. Unplanned gains of this involvement are the increased time management skills. All three teachers informed consultant about their students' decreased off-task behavior and inappropriate movements, and crying (for participant A), accompanied by less noncompliance behaviors in the classroom. Finally, students identified how they had been feeling at these moments that were special for them. At the start of the activity they had felt: anxious and panicky; confused and frustrated; excited. They then moved on to feeling: enjoyment; motivated, empowered, engaged; proud; confident. Consequently, they reported feeling: comfortable; safe; supported and part of a learning community; a sense of achievement and resiliency.

Additionally, the protective processes used by the individual seen as adaptive by the individual because of fewer arguments in school with teachers and friends, including decreased amount of quarrels in the family so that participants can be assessed as resilient students. Students' coping strategies meet their own, because they can more easily control their emotions and after observing their school success they can adapt themselves to the school rules automatically so that their resilience is appropriate.

Inter-rater reliability

Inter-rater reliability for routine compliance observation data was calculated during both in-person checks in the school setting and the audio recordings for home routines. Research assistants had to achieve 85% inter-rater reliability with the consultant before conducting independent observations. To assess inter-rater reliability, two independent research assistants coded the same observation. Some of these observations were coded concurrently during in-person school routines (5 of 18; 27.8%), while some were coded at different times using an audio recording of the home routine (9 of 14; 64.3%). We compared each interval coding for reliability and divided the total number of matching intervals by the total number of intervals observed. All observations yielded strong inter-rater reliability of 85% or greater.

Behavior intervention rating scale-revised

Results from the BIRS-R (Elliott, & Von Brock Truting, 1991) suggest teachers and parents rated the CBC intervention package as generally acceptable with average acceptability ratings ranging from 3.8 to 6.0, with mean ratings above 5.0 for both teachers and parents. Teacher and parent responses were consistently positive, with all families rating the CBC intervention package as acceptable and effective.

DISCUSSIONS AND CONCLUSIONS

This study showed that collaboratively developed interventions can significantly improve resilient behavior at home and school. More specifically, we demonstrated that the positive behavioral outcomes can occur when parents, teachers, and consultants work together using the CBC process. Our study was unique in the following ways: We used a multiple baseline design to experimentally evaluate the effectiveness of conjoint behavioral consultation, cognitive behavior therapy and schema-based instruction for enhancing mathematical resilience. Parents, teachers, and the consultant worked together to create and support interventions at home and school. It is our hope that this study could act as a catalyst for improved collaboration and teacher/family involvement. Data from our study provide empirical support for a consultation process (CBC) that can be used to systematically link teachers, parents, and consultants in the development and implementation of instruction and treatment. Furthermore, Marchant, Heath, and Miramontes (2013) emphasized the importance of social validity and in this study; social validity was assessed using the Behavior Intervention Rating Scale (BIRS). In addition to the actual improvements in word problem solving, increased resilience and homework completion, responses on the BIRS revealed that all participating teachers and parents agreed that the CBC process were acceptable and

effective. All three teachers found the intervention to be acceptable. The observed improvements are meaningful because improving word problem solving independently can lead to more positive outcomes for students.

Limitations

While the results support the use of conjoint behavior consultation (CBC) in developing collaborative interventions among parents, teachers, and consultant, certain limitations exist. Because this study used a collaborative consultation process, it is difficult to control the types of interventions that result from the process. Central to the CBC process is the flexibility to incorporate multiple interventions suggested by multiple people to be implemented in multiple settings. This limitation is present throughout the consultation research.

The multiple roles played by the consultant (i.e., consultant, math teacher, researcher) may have interfered with objectivity. However, fidelity checks and inter-rater reliability calculations were implemented to control for this limitation. Results revealed that the CBC process was implemented with fidelity and that observation data were reliable.

Generalizability

In this study, several possible problems with generalizability exist. First, the teachers and parents who agreed to participate were highly motivated to support the participants at home and school. Teachers who agreed were very interested in helping the child and family. Parents who agreed to participate were extremely supportive so that it is an open question as to the degree to which the results could be attributed to others without such clear motivation and support.

Future Research

Future research could address the stated limitations and provide additional support for the use of conjoint behavioral consultation (CBC) to develop and implement collaborative behavior and academic intervention plans at home and school. First of all, the use of a single-subject design was a valuable way to collect empirical data about the effectiveness of the process. However, a larger study with more participants would provide greater statistical support. In addition, subsequent single-subject designs conducted with diverse populations would provide information about the generalizability of the results to different types of teachers, families, and student.

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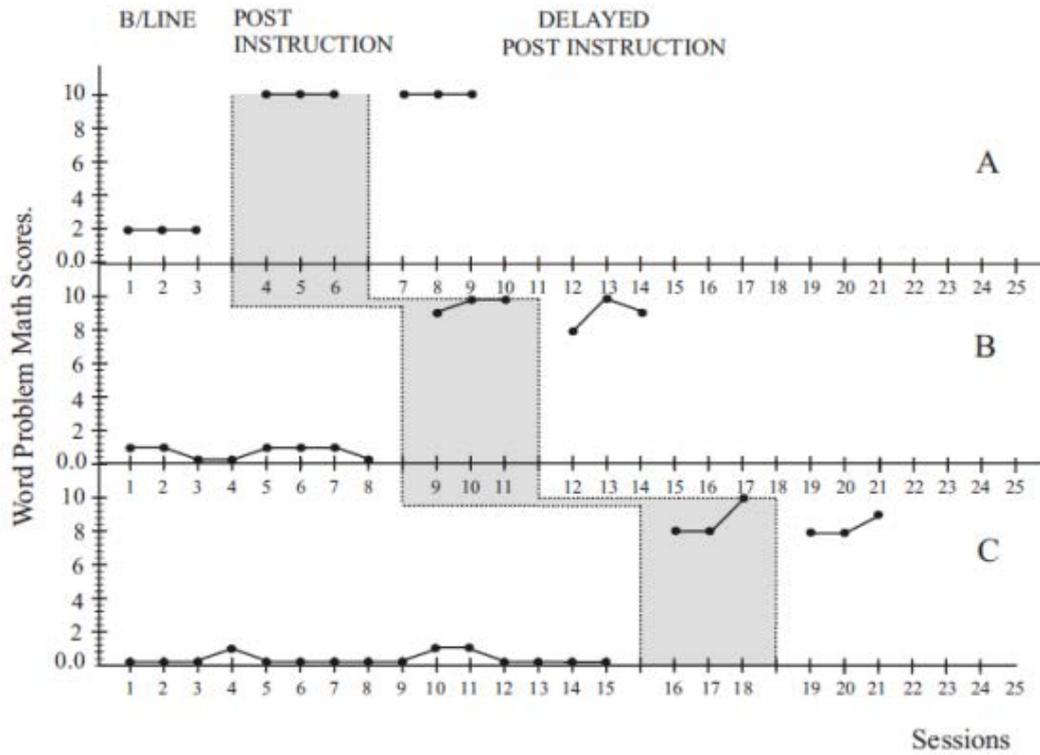
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APPENDIX

CONJOINT BEHAVIORAL CONSULTATION, COGNITIVE BEHAVIOR THERAPY AND SCHEMA-BASED INSTRUCTION



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