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Review

A Systematic Review of Evidence-Based Video Modeling for Students with Emotional and Behavioral Disorders

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Abstract: This systematic review examined eight studies showing that video modeling (VM) can have a positive and significant effect for students with emotional and behavioral disorders (EBD). Building upon meta-analyses that sought evidence of video-based interventions decreasing problem behaviors of students with EBD in K-12 education, the review examined the standards of the Council for Exceptional Children (CEC) for evidence-based practice as well as additional quality indicators, neglected quality indicators, strategies combined with VM, the impact of the independent variables on the dependent variables, and common recommendations offered for future research. Findings revealed that the eight studies met the CEC standards for evidence-based practices as well as other quality indicators. For instance, all studies reported content and setting, participants, intervention agents, description of practice, as well as interobserver agreement and experimental control. According to the findings, fidelity index and effect size were the two most neglected quality indicators. Furthermore, instructions, reinforcement system, and feedback or discussion were the most common strategies used. Finally, generalizability—across settings, populations, treatment agents, target behaviors in the real world, and subject matter—was the most common recommendation for future research. While further investigation is warranted, these findings suggest that VM is an effective evidence-based practice for students with EBD when the CEC standards are met.

Keywords: behavioral intervention; effectiveness of intervention; empirically based intervention; emotional and behavioral disorders (EBD); evidence-based practices; single-subject research design; systematic review; video modeling; video other modeling (VOM); video self-modeling (VSM)

1. Introduction

Due to their socially and culturally inappropriate behaviors or feelings, many students with emotional and behavioral disorders (EBD) struggle to develop or maintain successful relationships with peers and teachers, in addition to experiencing difficulties in learning. These challenges continue into adolescence and adulthood [1].

At the postsecondary level, for example, 10-to-20% of youth with EBD attend college, compared to 53% of the typical population in the U.S. [2]. Further, upon leaving school, they are twice as likely as students with other disabilities to be living on the streets or in institutional settings, such as a correctional facility, halfway house, or drug rehabilitation center [2]. With such life-long consequences

of their core challenges, it is imperative to identify the needs of these individuals and provide evidence-based [3] as well as other effective school-based interventions [1].

1.1. Video Modeling

Video modeling (VM) is a widely used evidence-based practice for dealing with the challenging behaviors of individuals with autism [4]. In addition, findings suggest that it might be effective for students with EBD with high social validity when implemented with fidelity [5]. A comparatively new intervention, the premise behind VM is simple—individuals referred to as "models" act out scripted scenarios demonstrating appropriate behavior that is video-recorded. By watching, rehearsing, and demonstrating what is portrayed [6], students acquire new and appropriate behaviors using "observational learning" [7] (p. 270). Known as "vicarious capability" [7] (p. 270), this approach allows students to quickly acquire information about, and proficiency in, desired behaviors delivered by various models [7].

There are two types of video modeling: Video other modeling (VOM) and video self-modeling (VSM). With VOM, the most effective models are individuals who closely resemble the students learning the desired behaviors; that is, they are very close in age and other characteristics (e.g., gender, race, and personality), and show only slightly higher functioning levels [8,9]. However, the more effective form of VM is VSM, whereby students learning the desired behaviors serve as the models themselves [3]. In this type of VM, students are "self-reactors" [7] (p. 267), and their motivation to learn is generated from their self-contribution to learning experiences along with self-action in response to their learning outcomes [7].

1.2. Video Modeling Research

The first study on VM for students with EBD was conducted more than four decades ago [10]. Three 10-year-old boys with acting-out behaviors exposed to a treatment using VSM along with teacher feedback showed a significant increase in appropriate behaviors as well as a reduction in inappropriate actions. Since that time, a number of studies have focused on the use of VM for students with EBD, as reflected in several meta-analyses (e.g., [5,11,12]).

For example, Losinski et al. [12] examined the effect of using video-based interventions to decrease problem behaviors of students with EBD in K-12 education. This meta-analysis was innovative because it used the standards developed by the Council for Exceptional Children (CEC) for evidence-based practice [13]. Namely, the authors used the CEC quality indicators (content and setting, participants, intervention agents, description of practice, implementation fidelity, internal validity, outcome measures/dependent variables, and data analysis) to evaluate 14 single-subject research studies published since 1974. They also reported the percent of non-overlapping data (PND), Tau-*U*, and standard mean difference. The Losinski et al. [12] review revealed that only a handful of studies met the quality indicators of the CEC standards. As a result, caution is warranted in interpreting the findings of studies that show VM is an effective behavioral intervention for students with EBD, particularly among investigations that do not meet the CEC standards.

Other systematic reviews have been performed. Baker et al. [5] and Clinton [11], for example, examined increasing and decreasing trends of targeted behaviors and PND for each study included in their reviews. Baker et al. [5] reported on 16 single-subject studies published from 1974 to 2005, while Clinton [11] reported on 19 studies published from 1974 to 2014. Both studies noted that VM would be a promising behavioral intervention strategy for students with EBD; yet, in the studies examined, VM was mostly implemented to help students with autism.

The same sentiment has been reported in more recent research. That is, even though findings have varied in terms of effectiveness, social validity, and fidelity [3], VM has been found to be an effective intervention for students with EBD [5,14,15] in the areas of social [6,16], academic [1], attention [17], and self-regulatory or management skills [18]. However, while these findings are

promising, they should be tempered by the results of Losinski et al. [12], with future focus on examining VM as a behavioral intervention strategy for students with EBD in the context of the CEC standards.

1.3. Purpose and Research Questions

This systematic review attempted to establish VM as an effective evidence-based practice for students with EBD when the CEC standards are met. Extending the meta-analysis of Losinski et al. [12], the review reports the quality index of each study examined, the strategies used in combination with VM, the impact of the independent variables on the dependent variables, and recommendations proposed by the authors of the individual studies for future research. This review sets itself apart from other meta-analyses in several ways, making a unique contribution to the study of VM for students with EBD.

First, while the term "emotional and behavioral disorders" is commonly found in the literature [19], the term "emotional disturbance" has been defined in the Individuals with Disabilities Act (IDEA) since its 2004 amendment. Thus, to include this new language, the current review encompasses studies published since 2004. Second, the analyses of Baker et al. [5] and Clinton [11] were limited to increasing and decreasing trends of behavior and PND. The current review, on the other hand, examined not only the CEC quality indicators, but also social validity, interobserver agreement, fidelity index, experimental control or reported experimental design, calculated effect size included in each study, and the efficiency of a new intervention. Finally, as stated earlier, this review contributes to the literature on VM for students with EBD by examining diverse strategies combined with VM, changes to the dependent variables based on the independent variables, the significant contributions made by the authors of the individual studies, as well as their recommendations for future research.

The following research questions helped guide this review:

1. Do the studies meet the CEC standards (quality indicators) for evidence-based practices?
2. What are the most neglected quality indicators in the studies?
3. Which strategies are combined with VM?
4. Were the dependent variables altered by the independent variables?
5. What are the most common recommendations proposed by the authors of the individual studies for future research? And based on the findings of these questions,
6. Is VM an evidence-based practice for students with EBD when the CEC standards are met?

2. Materials and Methods

The authors systematically and individually searched four databases: Educational Resources Information Center (ERIC), PsycINFO, Education Full Text, and Medline. The searches were limited to peer-reviewed and empirically based journal articles published in English between 1 January 2004, and 31 May 2018. The terms "attention deficit hyperactivity disorder", "behavior disorder", "behavior disturbance", "conduct disorder", "emotional disorder", "emotional disturbance", and "video modeling" served as the descriptors. Variations of these descriptors were not used, only the spellings, as shown. While the language "emotional disturbance" appears in IDEA, the additional descriptors were used to perform a more comprehensive and inclusive search, given that the specific purpose was to report on the evidence-based practice of VM as a type of behavioral intervention. A total of 102 studies were identified using the above search terms.

2.1. Inclusion Criteria

The authors independently reviewed the 102 studies for inclusion based on the following criteria: The study had to (a) be empirically based; (b) have identified at least one PK-12 student with EBD or attention deficit hyperactivity disorder (ADHD) or include interventions to decrease aggressive behaviors if at least one of the participants' diagnosis was not addressed; and (c) have VM as an independent variable as part of the intervention. That is, the independent variable had to

comprise more than a video-based intervention in implementing VM. For example, if the intervention encompassed a teacher who provided questions about examples of (in)appropriate behaviors, the study was not included because no modeling was involved.

Eight studies were identified that met the aforementioned criteria. Of these, seven employed single-subject research, and one employed comparison between two interventions.

2.2. Data Extraction

Relevant data was then extracted from the chosen studies. Namely, the authors collaboratively summarized information concerning the (a) participants, (b) independent (or intervention) and dependent variables, (c) intervention agent, (d) length of video, (e) strategies used in combination with VM, (f) significant findings, and (g) recommendations proposed by the author(s) of the individual studies for future research.

The authors then rated each study using the CEC quality indicators for evidence-based practices (content and setting, participants, intervention agents, description of practice, implementation fidelity, internal validity, outcome measures/dependent variables, and data analysis) along with the other indicators (social validity, interobserver agreement, fidelity index, experimental control or reported experimental design, calculated effect size included in each study, and the efficiency of a new intervention).

2.3. Intercoder Agreement

Finally, intercoder agreement was assessed on the extracted information using two checklists developed by the authors (see Table 1). The first checklist was comprised of seven questions: Is the statement about the (a) participant demographics, (b) independent/dependent variables, (c) intervention agent, (d) length of video, (e) strategies used in combination with VM, (f) significant findings, and (g) recommendations proposed by the individual study's authors for future research clear and precise?

The second checklist consisted of the following questions: Is the score of the index about (a) social validity, (b) interobserver agreement, (c) fidelity index, (d) experimental control, (e) CEC standards (quality indicators), (f) evidence of calculated effect size, and (g) total score of the quality indicators accurate? Additionally, (h) are the new interventions (B or C) more efficient than the previous ones (A or baseline)?

A total of 120 items (8 studies by 15 checklist items) were assessed. The authors reached agreement on 117 of the 120 items (97.5%) that the data extracted from the studies were accurate and concise. For the remaining items, the authors deliberated until they reached consensus.

Table 1. Detailed Analysis and Quality Index of the Evidence-Based Practices Used in the Studies.

Study/Items							
Participants (Demographics)	**Independent/Dependent Variables**	**Intervention Agent**	**Length of Video Watched**	**Strategies Used in Combination with VM**	**Significant Findings**	**Recommendations Proposed by the Author(s) for Future Research**	**Additional Quality Indicators**
Axelrod et al. [14]							
Three elementary-aged children: 8- and 7-year-old males with ODD and ADHD, and an 8-year-old with ODD	*IV*: Watching VSM in hospital and classroom settings *DV*: Percentage of compliance with adult instructions; percentage instructions leading to an aggressive episode	- Therapists at psychiatric inpatient unit - Special education teachers and paraprofessionals in a hospital-based classroom	12 days for 3 weeks; 4 days per week for 3 weeks	- Video included different setting systematics, hospital, and classroom - Students' self-recording (VSM) and editing - Participants' choice of video clips - Participant watched the video individually with the staff at different times	- Watching video might replace inappropriate with appropriate behaviors - Viewing video plays a role as an establishing operation or prime - VSM is a skill-acquisition strategy	- Further study of generalizability across treatment agents (teachers, therapists, and other related staff) or ways the treatment was practiced (e.g., randomly distributed sessions or orders) - Further investigation of the effectiveness of VSM treatment alone with the students who do not respond at the clinical setting - Further study on maintenance of compliance and reduction of aggressive behaviors in the future	- Social validity: 1 - Interobserver agreement: 1 - Fidelity index: 1 [1] - Experimental control: 1 - CEC standards (Max 8 pts.): 7 - Evidence of calculated effect size: 0 - Are the new interventions (B or C) more efficient than the previous ones (A or baseline)?: 1 - Total score of the quality indicators (Max. 14 pts.): 12
Blood et al. [18]							
Fifth grader (10-year-old male) in general and special education classes with a primary diagnosis of EBD and a secondary diagnosis of fetal alcohol syndrome, complex post-traumatic stress disorder, and ADHD. (Model person was not included as a participant.)	*IV*: Two same-age peers' VM of on-task behavior (VOM) in a special education classroom, following directions and completing work with narration of the behaviors and self-monitoring *DV*: Percent of intervals of time on task and occurrence of disruptive behavior	Special education teacher	Five minutes during the transition before math instruction delivered on iPod touch	- A daily check-in/out point system from each class during the school day - Teaching on- and off-task behaviors before self-monitoring phase	- The potential use of iPod touch attached with a timer as a portable, easier, practical individualized video-based instruction - VM combined with other strategies (reinforcement system and self-monitoring) seemed more effective than VM alone	- Determine the effectiveness of self-monitoring vs. VM - Replicating the current study	- Social validity: 1 [2] - Interobserver agreement: 1 - Fidelity index: 0 - Experimental control: 1 [3] - CEC standards (Max 8 pts.): 7 - Evidence of calculated effect size: 1 [4] - Are the new interventions (B or C) more efficient than the previous ones (A or baseline)?: 1 - Total score of the quality indicators (Max. 14 pts.): 12

Table 1. *Cont.*

Study/Items							
Participants (Demographics)	**Independent/Dependent Variables**	**Intervention Agent**	**Length of Video Watched**	**Strategies Used in Combination with VM**	**Significant Findings**	**Recommendations Proposed by the Author(s) for Future Research**	**Additional Quality Indicators**
Chu & Baker [20]							
Four students with EBD attending high school: Two girls (15 and 18 years old); two boys (17 years old)	*IV*: VM in general education classroom *DV*: Frequency of (in)appropriate social behaviors in the classroom	Researcher (first author); participants met with the first author at her office	Watched 3- to 5-min of video footage delivered on a laptop computer, 2 or 3 times a week, at the beginning of school	- A clip showed the participant engaging in inappropriate behavior and a corresponding clip showed the participant acting appropriately - Verbal reinforcement, saying "good job" - No comments were provided during or after watching the VSM	- Social validity was rated by general ed. teachers, special education employees, and participating students - The first study found VSM was effective as a single treatment - Video tape was recorded in the inclusive classroom	- Validation with more samples - Comparisons of VSM and peer modeling - Teachers' implementation - Supporting teachers' behavior to enhance the fidelity of the treatment	- Social validity: 1 - Interobserver agreement: 1 - Fidelity index: 1 - Experimental control: 1 [5] - CEC standards (Max 8 pts.): 8 - Evidence of calculated effect size: 1 [6] - Are the new interventions (B or C) more efficient than the previous ones (A or baseline)?: 1 - Total score of the quality indicators (Max. 14 pts.): 14
Cumming et al. [21]							
25 middle schoolers (11 to 14 years old) with EBD placed in a self-contained special education classroom	*IV*: 50-min social skills training sessions each week for 12 weeks: *Intervention 1*: Teacher-instructed social skills instruction; *Intervention 2*: Combination of teacher instruction and implementation of student-generated social skills DVD *DV*: Teacher, parent, and student perceptions ofstudent social skills; the student's social skills knowledge on pretests and posttests using the Teacher/Staff Skillstreaming Questionnaires	Special education teachers	Not addressed	- VSM was developed by the participants and included participants' role-plays in triads - At the last session of the week, each triad made presentations of the DVD and classmates gave feedback - After each presentation, a quiz was administered on the presented social skills	- Participants' involvement in developing the multimedia motivated them - The combination of traditional social skill instruction and multimedia authoring component was more efficient	- Generalizability in the general ED classroom with different populations - Differentiation of data collection timelines - Data collected on student performance - Incorporation of direct observation	- Social validity: 0 - Interobserver agreement: 1 [7] - Fidelity index: 1 - Experimental control: 1 - CEC standards (Max 8 pts.): 7 - Evidence of calculated effect size: 0 - Are the new interventions (B or C) more efficient than the previous ones (A or baseline)?: 1 - Total score of the quality indicators (Max. 14 pts.): 11

Table 1. *Cont.*

Study/Items							
Participants (Demographics)	**Independent/Dependent Variables**	**Intervention Agent**	**Length of Video Watched**	**Strategies Used in Combination with VM**	**Significant Findings**	**Recommendations Proposed by the Author(s) for Future Research**	**Additional Quality Indicators**
Fenstermacher et al. [22]							
Four males (4th to 7th grades, 10 to 13 years old) primarily diagnosed with ADHD and social difficulties with peers and adults; three Caucasian: two in the 4th grade and one in the 7th grade; and one African American/Caucasian in the 5th grade	*IV*: An interactive computer-facilitated (mediated) social skills training program implementing direct instruction with feedback in clinical settings (VOM) *DV*: Percent of social problem-solving behavior displayed during role-play with trained peers	Research assistant	- Six 50-min training sessions: Watch VOM - Problem-solving strategies were reviewed employing an animated environment; skills taught included argumentation, self-control, and accepting negative responses	- Peer (the same gender and similar age range) models providing direct instruction and identifying situations and modeling the appropriate behaviors - Computer-generated feedback and reinforcement - Point totals to exchange and reinforce - Provision of video scenarios	- Effectiveness of problem-solving-based social skills training to enhance self-esteem/consciousness of students with ADHD - Effectiveness of structured/predictable character of video game-(or computer-) based instruction	- Generalizability across participants, settings, and target behaviors in the real world - Comparative research design between computer-based and traditional instruction - Development of assessment protocols	- Social validity: 1 - Interobserver agreement: 1 - Fidelity index: 0 - Experimental control: 1 [8] - CEC standards (Max 8 pts.): 7 - Evidence of calculated effect size: 1 [9] - Are the new interventions (B or C) more efficient than the previous ones (A or baseline)?: 1 - Total score of the quality indicators (Max. 14 pts.): 12
Gulchak [17]							
One 8-year-old male with EBD in the 3rd grade	*IV*: Self-monitoring intervention: The student's self-recording of his reading assignment for 10-min intervals for an hour (VSM) in a self-contained classroom; when the reading class was over, the participant reported the number of his recorded on-task behaviors and graphed these data using a spreadsheet *DV*: On-task behavior	Special education teacher	Ten-minute intervals for an hour	- An alarm installed on a handheld computer was set up to ring at 10-min intervals beginning at 9:00 am for an hour to prompt the participant to monitor his on-task behavior on a mobile handheld computer - Reinforcement was not addressed	- The first study indicated efficacy of a mobile handheld computer to increase self-monitoring of on-task behavior - The first study used a handheld computer for student self-monitoring and researchers' data collection	- Further longitudinal studies to investigate if self-monitoring strategies using mobile handheld computers may be classified as an evidence-based practice - Generalizability and maintenance of the acquired skills - Generalizability with more populations	- Social validity: 0 - Interobserver agreement: 1 - Fidelity index: 1 - Experimental control: 1 [10] - CEC standards (Max 8 pts.): 7 - Evidence of calculated effect size: 0 - Are the new interventions (B or C) more efficient than the previous ones (A or baseline)?: 1 - Total score of the quality indicators (Max. 14 pts.): 11

Table 1. *Cont.*

Study/Items							
Participants (Demographics)	**Independent/Dependent Variables**	**Intervention Agent**	**Length of Video Watched**	**Strategies Used in Combination with VM**	**Significant Findings**	**Recommendations Proposed by the Author(s) for Future Research**	**Additional Quality Indicators**
O'Reilly et al. [23]							
Two expelled from class showing aggressive behavior (10-year-old males) attending general class in an elementary school	*IV*: VSM combined with self-management discussion (feedback) with a teacher *DV*: Percentage of intervals of aggressive and prosocial behaviors in the schoolyard during break	Therapist	Five-minutes divided into 30-s segments	- *Intervention 1*: Students watched the VSM and labeled their behavior as nice or not-nice behaviors when asked. The behaviors of the previous day in the school yard were recorded as a video clip. - *Intervention 2*: Identical to intervention 1, except the intervention was conducted immediately after the yard break for a child for whom intervention 1 was not effective. - Labeling a series of pictures of aggressive and prosocial behaviors - Verbal praise for labeling not-nice behaviors - Token economy for labeling nice behaviors	- Effectiveness of video feedback and self-management treatment package - First study to increase appropriate behaviors in a school yard - First field-based study using video feedback and self-management procedure in natural inclusive settings	- Generalizability with more participants and across participants and settings	- Social validity: 0 - Interobserver agreement: 1 - Fidelity index: 0 - Experimental control: 1 [11] - CEC standards (Max 8 pts.): 6 - Evidence of calculated effect size: 0 - Are the new interventions (B or C) more efficient than the previous ones (A or baseline)?: 1 - Total score of the quality indicators (Max. 14 pts.): 9
Young-Pelton & Bushman [24]							
Four students (three 10-year-old males and one 9-year-old male) attending an elementary school in restrictive settings for students primarily diagnosed with EBD and medical conditions: three with ADHD, one with pervasive developmental disorder not otherwise specified; and one with fetal alcohol effects	*IV*: Watched VSM and discussed with the researcher before reading instruction; students in the group reading instruction were recorded right after the intervention *DV*: Percent of intervals of active learning and problem behaviors	Researcher	Five-minutes: 30-s segment recorded on iMovie	- Role-play (students playing appropriate learning behaviors vs. teachers playing inappropriate behaviors)	- A convenience sample was used for participant selection in 3rd to 5th grade - Observer controls were implemented: Audio signals were used at 10-scond intervals for observing and 5-s intervals for recording - The first study to randomly treat participants in successive order in the VSM treatment - Increase in active learning behaviors and decrease in problem behavior could enhance the learning outcome	- Generalizability in other settings with different subject matter - Exploration of the reasons for improvement in reading; the reason could be enhancement in active learning skills and the decrease of problem behavior or either of them - Investigation of whether teaching a novel skill is necessary to decrease behavioral difficulties	- Social validity: 1 - Interobserver agreement: 1 - Fidelity index: 0 - Experimental control: 1 [12] - CEC standards (Max 8 pts.): 7 - Evidence of calculated effect size: 1 [13] - Are the new interventions (B or C) more efficient than the previous ones (A or baseline)?: 1 - Total score of the quality indicators (Max. 14 pts.): 12

Notes: [1] A multiple-baseline design across settings. [2] The authors did not used the term, but teachers rated the effectiveness and acceptability of the VM and self-monitoring interventions. [3] Changing condition design; BL-VM-VM + Self-monitoring. [4] PND between BL and VM phase; 100% for on-task behavior and 85.7% for DB. The PND between BL and VM + self-monitoring phase: 100% for on-task/DB. [5] Reversal design (BL-Intervention). [6] PND: 100%. [7] Not applicable. [8] Multiple-baselines-across-participants design. [9] PND: 66.7, 66.7, 16.67, 66.7 effect size. [10] BL-Intervention withdrawal design. [11] A multiple-baseline design across participants and a reversal design for a child because the first intervention did not work for him. [12] A multiple-probe baseline design. [13] PND of 97% for active learner behavior vs. 92% of problem behaviors.

3. Results

Overall, an analysis of the eight studies revealed that VM can have a positive and significant effect. This conclusion is reflected in the findings depicted in Table 1.

The first seven columns of Table 1 summarize each study's participant demographics, independent and dependent variables, intervention agent, length of the video watched, strategies used in combination with VM, significant findings, and recommendations proposed by the individual study's authors for future research. Table 1 also summarizes the quality of the evidence-based practice of each study by means of a total score (see last column). This score is a cumulative count of the number of CEC quality indicators found in the studies as well as additional quality indicators assessed in this systematic review. That is, a single point (1) was given for each of the eight CEC and six additional quality indicators. Thus, the CEC standards score found in the table had a maximum possible total of eight (8) points, whereas the total score of quality indicators—CEC standards plus additional quality indicators—had a maximum possible total of 14 points.

3.1. Participants

A total of 44 students receiving special education services participated across the eight studies. Of these students, 35 (79.5%) were diagnosed with EBD, two (4.5%) with ADHD and oppositional defiant disorder (ODD), one (2.3%) with ODD, four (9%) with ADHD, and two (4.5%) with aggressive behaviors. With regard to grade level, 14 (32%) participants were in elementary school, 26 (59%) in middle school (grades 7–9), and four (9%) in high school (grades 10–12). Finally, 40 (91%) of the students were male and 4 (9%) were female.

3.2. Independent and Dependent Variables

Two (25%) of the studies called out independent variables that used VOM (see References [18,22]). The other six (75%) reflected the use of VSM.

The dependent variables were categorized into increasing/decreasing trend-oriented behaviors. The increasing trend-oriented dependent variables in six (75%) of the studies were on-task behaviors (see References [17,18]), appropriate social behaviors in classrooms (see References [20,22]), prosocial behaviors in school-yards (see Reference [23]), and active learning behaviors (see Reference [24]). Meanwhile, the decreasing trend-oriented dependent variables in four (50%) of the studies were disruptive behavior in classrooms (see Reference [18]), inappropriate social behaviors in classrooms (see Reference [20]), aggressive behavior (see Reference [23]), and problem behaviors in classrooms (see Reference [24]).

3.3. Intervention Agent

Five types of professionals served as intervention agents. Special education teachers were found in three (37.5%) of the studies (see References [17,18,21]); researchers in two (25%) (see References [20,24]); a research assistant in one (12.5%) (see Reference [22]); a therapist, special education teachers, and a paraprofessional in one (12.5%) (see Reference [14]); and finally, a therapist in the remaining study (12.5%) (see References [23]).

3.4. Length of Video

The participants watched videos of various lengths: 5 min in three (37.5%) of the studies (see References [18,23,24]); 3–5 min in one (12.5%) (see Reference [20]); and 10 min in another (12.5%) (see Reference [17]). Three of the studies did not report video length. Two of the studies (25%) reported on the length of the sessions (see References [14,22]).

3.5. Research Question 1: Do the Studies Meet the CEC Standards (Quality Indicators) for Evidence-Based Practices?

Table 1 shows how well the studies conformed to the CEC standards, with up to eight points assigned, one for each quality indicator identified. All eight quality indicators were found in one (12.5%) of the studies (see Reference [20]), seven indicators were found in six (75%) (see References [14,17,18,21,22,24]), while six indicators were identified in one (12.5%) of the studies (see Reference [23]). Thus, most of the studies met the CEC standards for evidence-based practices.

Regarding the additional quality indicators examined in this review, the findings revealed that all of the studies included content and setting, participants, intervention agents, description of practice, as well as interobserver agreement and experimental control. All of the studies also indicated that the new interventions were more efficient than the previous ones.

3.6. Research Question 2: What Are the Most Neglected Quality Indicators in the Studies?

Only half (50%) of the eight studies reported a fidelity index (see References [14,17,20,21]) and half an effect size (see References [18,20,22,24]), making these two the most neglected quality indicators. In addition, social validity was a neglected indicator. While not faring as poorly as fidelity index and effect size, social validity was not indicated in three (37.5%) of the studies. These comprised two single-subject studies (see References [17,23]) and one quantitative comparison study (see Reference [21]).

3.7. Research Question 3: Which Strategies Are Combined with VM?

Commonly used strategies included instructions on behaviors, reinforcement systems, and feedback or discussion. Five (62.5%) of the studies used instructions on behaviors before or during the intervention (see References [17,18,21–23]). In Fenstermacher et al. [22], for example, the peer model gave direct instruction and identified the problem behaviors. Four (50%) of the studies used a reinforcement system or reinforcement (see References [18,20,22,23]). Blood et al. [18], Fenstermacher et al. [22], and O'Reilly et al. [23] used point systems, whereas Chu and Baker [20] and O'Reilly et al. [23] adopted verbal reinforcement. Finally, feedback or discussion after watching the video was used in four (40%) of the studies (see References [21–24]). Specifically, Fenstermacher et al. [22] used computer-generated feedback, whereas Cumming et al. [21] had classmates provide feedback after watching the participants' video. Thus, the most used strategies were instructions (63%), reinforcement system or reinforcement (50%), and feedback or discussion (40%).

Regarding combinations of the above strategies with VM, six of the studies (75%) implemented VSM (see References [14,17,20,21,23,24]) while two (25%) implemented VOM (see References [18,22]) as the independent variables, making VSM (75%) the more popular implementation of the two. In Axelrod et al. [14], Cumming et al. [21], and Gulchak [17], the participants recorded and edited video clips. In Gulchak [17], the participant used self-management strategies in that the author graphed and reported the data. Finally, in Blood et al. [18], same-aged peers without disabilities modeled, and in Fenstermacher et al. [22], same-gender and same-aged peers without disabilities served as models.

3.8. Research Question 4: Were the Dependent Variables Altered by the Independent Variables?

All eight studies reported a functional relationship between their respective dependent and independent variables, represented as changes in levels and trends in the visual analysis. That is, the interventions were found to be more effective than the baseline (see Table 1, are the new interventions [B or C] more efficient than the previous ones [A or baseline]?). The exception is Cummings et al. [21], who reported that students' knowledge and skills with regard to social interactions were enhanced from pre- to posttest with statistical significance.

3.9. Research Question 5: What Are the Most Common Recomendations Proposed by the Authors of the Individual Studies for Future Research?

The most common recommendations proposed by the authors are shown in Table 1. Generalizability was noted in all eight studies. In this systematic review, generalizability refers to the testing of the outcome of an intervention by repeating it with variations to gain further evidence of its reliability and effectiveness. Thus, the authors recommended that their studies be replicated by other researchers across a variety of settings, populations, treatment agents, target behaviors in the real world, and subject matter. Specifically, they included participants (see References [14,17,18,21–23]), settings (see References [14,17,18,20–24]), intervention agents (see References [18,20,23]), condition (see References [14,18,22]), length of intervention (see Reference [21]), different contexts, namely subject matter (see Reference [24]), and target skill (see References [22,23]). Overall, the authors emphasized the importance of generalizability in single-subject research, because such research typically involves few participants in very specific settings.

The authors of four (50%) of the studies also suggested comparing the effectiveness of each independent variable used in their own investigations (see References [18,20,22,24]). The authors of three (25%) studies suggested fidelity as a future research focus (see References [20–22]). Of these, Cumming et al. [21] was the only quantitative investigation that did not use single-subject research, proposing data collection fidelity. The authors suggested follow-up studies differentiating data collection timelines and data collection on students' performance (not perception), with Cumming et al. [21] adding direct observation. Finally, Chu and Baker [20] recommended supporting teachers' behaviors to enhance treatment fidelity, while Fenstermacher et al. [22] recommended the development of assessment protocols.

3.10. Research Question 6: Is VM an Evidence-Based Practice for Students with EBD When the CEC Standards Are Met?

The CEC quality indicators include content and setting, participants, intervention agents, description of practice, implementation fidelity, internal validity, outcome measures/dependent variables, and data analysis. The eight studies conformed well to these quality indicators, with one (12.5%) of the studies incorporating all of the CEC indicators (see Reference [20]); six (75%) incorporating seven (see References [14,17,18,21,22,24]); and one (12.5%) including six (see Reference [23]) of the indicators. Thus, the studies met most, if not all, of the CEC standards. Furthermore, the VM interventions across the studies resulted in a positive outcome, with the studies that did not report effect size revealing that VM was an effective intervention through the functional relationship between baseline and interventions. Together, these findings offer evidence of the effectiveness of the interventions and of the use of the CEC quality indicators in evidence-based research and practices.

4. Discussion

This systematic review extended the meta-analyses of Losinski et al. [12] by reporting the quality index of eight studies, the strategies used in combination with VM, the impact of the independent variables on the dependent variables, and recommendations proposed by the author(s) of each study for future research. Specifically, the review evaluated and reported the evidence-based practices used in the studies based on the CEC quality indicators, with the intent of establishing that VM is an effective evidence-based practice for students with EBD when the CEC standards are met.

4.1. Participants, Independent and Dependent Variables, Intervention Agent, and Length of Video

Two of the studies included independent variables that used VOM, while the remaining six included VSM. This finding supports existing research [3,7]. As stated, increasing/decreasing trend-oriented behaviors defined the dependent variables. Increasing trend-oriented dependent variables were defined in six of the studies, whereas decreasing trend-oriented dependent variables

were found in four. This finding warrants further investigation, given that importance was placed on on-task behaviors, appropriate social behaviors in classrooms, prosocial behaviors in school yards, and active learning behaviors.

Regarding intervention agent, special education teachers were found to be the most common agents across the studies (37.5%), with teachers being viewed among the best individuals (roles) to improve treatment fidelity (see Reference [20]), including the use of assessment protocols (see Reference [22]).

Finally, 37.5% of the studies used 5-min videos, while 12.5% used videos lasting 3–5 min. It is difficult to determine if video length had any bearing on the respective studies' findings. However, researchers may want to examine possible relationships between video length and such factors as type of disability or age.

4.2. The CEC Standards (Quality Indicators) for Evidence-Based Practices

Chu and Baker's [20] study met all eight quality indicators of the CEC standards for evidence-based practices; in addition, six studies met seven indicators, for a total of 87.5% of the studies using evidence-based practices in their treatments. Chu and Baker [20] utilized a baseline (BL)-intervention reversal design to control their treatment or experiment with four high school students and PND 100%. The study also included all of the quality indexes developed for this systematic review (social validity, interobserver agreement, fidelity index, experimental control by reported experimental design, calculated effect size included in each study, and the efficiency of a new intervention). Further, their study also stressed social validity and teacher participation in the intervention in the classroom setting. These findings are promising. Given that the studies showed that the new interventions were effective, it is cautiously argued that their effectiveness was due to meeting the CEC standards. However, this is a finding that warrants further investigation.

4.3. Neglected Quality Indicators

One of the two most neglected indicators was the calculated effect size, given that seven studies used a single-subject research design and the eighth was a quantitative study using ANOVA and *t*-tests. Effect size refers to the size of the difference in effects in standardized units. Numerous applications for evaluating effect size with single-subject research have been proposed [25,26], including PND and Tau-*U* [12]. PND refers to a metric configured in percentage of data points in the intervention phases greater than one remarkable point in baseline [27], whereas Tau-*U* is an emerging index of effect size [28], and considered more powerful and accurate than other indexes of effect size [28–30]. The significance of the effect size of single-case design has been well documented in studies that utilize single-subject research [5,12,31] to include the studies in this systematic review (see References [18,20,22,24]).

As shown in Table 1, PND was included as the effect size in only four of the studies, emphasizing the effectiveness of the individual study's treatment, or the functional relationship between baseline and intervention. This finding supports existing research showing that PND is a frequently used and widely employed approach [32,33]. PND is simple and straightforward to calculate and ranges from 0% to 100% [27], but some researchers have argued against its use [34]. None of the included studies used other effect size indicators than PND; although Cummings et al. [21] reported the means and standard deviation from *t*-tests and ANOVA, they did not report effect size. This is an overall discouraging finding, and a possible limitation of existing research, signifying that more statistical approaches may be needed to address effect size in the context of evidence-based practices.

The other neglected indicator was fidelity index, which was reported in only half of the studies. Treatment integrity, which refers to the extent to which a treatment is carried out as planned [35,36], is significant because consistent and accurate implementation of an intervention across time, setting, and agent has been found to influence student learning outcomes [35,37]; that is, treatment integrity as an indicator of evidence-based practice is highly correlated with quality learning and student outcomes [35]. Unfortunately, some of the treatment agents and practitioners identified in this review

struggled with implementing treatment integrity. Studies have supported practitioners with ways to enhance treatment fidelity [38]. For example, research-based methods include research-supported implementation supports, such as the utilization of treatment manuals and protocols, fidelity training, scripts for treatment implementation, feedback, and modeling [35]. Based on this analysis, it is recommended that steps be taken to enhance treatment integrity or fidelity in an intervention, which will increase the quality of evidence-based practices and students' learning outcomes.

Finally, with regard to social validity, this indicator was reported in five studies. Social validity refers to how a group of people perceives the significance, efficacy, fitness, accessibility, and satisfaction of a specific treatment [39]. As such, social validity is one of the practical indices that can be used to indicate the estimation of the sustainability and appropriateness of an intervention as an evidence-based practice. An intervention with high social validity can influence students' learning and its outcomes [40]; thus, it is a critical index for practitioners who interact with students. While social validity did fare better than effect size and fidelity index, findings show the importance of taking it into consideration when developing and implementing interventions.

4.4. Strategies Combined with VM

Each study in this systematic review used VSM or VOM as appropriate for the independent variables. Specifically, six (75%) used VSM. A potential new finding derived from this review is that self-monitoring was used as a critical strategy for the students viewing the videos (see References [14,17,20,21,23,24]). Specifically, participants monitored their inappropriate behaviors and made corrective changes in similar contexts. It is recommended that this finding be further researched in the contexts of self-discipline and self-management combined with VM related to social learning theories along with multimedia learning [41].

Further, the findings of five (62.5%) of the studies that utilized instructions on behaviors and four studies that used discussion about behaviors support the claim that behaviors can be taught and learned, leading to behavioral change [40], while also showing that students can learn in social contexts [41]. Specifically, four of the studies incorporated a reinforcement system or reinforcement that showed the effectiveness of the treatment, whereas four did not. This finding could be interpreted as indicating that specific strategies might be effective for specific students based on their learning history, propensity, or experiences. This is another finding that warrants additional study.

4.5. Impact of the Dependent Variables on the Independent Variables

Each of the eight studies showed that the independent variables had a significant impact on the dependent variables, establishing a functional relationship between them. Thus, a visual analysis of each study showed changes in level, trend, or value of the dependent variables through PND (see References [18,20,22,24]) or the effectiveness of the intervention (see References [14,17,18,20–24]). Specifically, the studies that included VSM and other strategies stressed that VSM interventions were proactive (see Reference [14]), and yielded significant behavioral changes (see Reference [20]), social skill improvement (see References [21,23]), active learning (see References [17,24]), and higher academic motivation (see Reference [24]). The studies that conducted VOM with other strategies (see References [18,24]), on the other hand, reported and emphasized consistent and systematic behavior changes as a result of their intervention. Thus, the VM intervention and its measures were accountable for improving socially significant behaviors of students with EBD.

4.6. The Most Common Recommendations for Future Research Proposed by the Authors of the Individual Studies

In terms of recommendations for future research, all eight studies stressed generalizability, and two studies stressed treatment integrity (see References [20,22]). These two recommendations are directly related to quality learning and students' learning outcomes resulting from the use of evidence-based practices. To generalize the outcomes or behavioral changes of an intervention,

intervention procedures must be clearly defined and fully explained/documented so that the intervention can be replicated and produce consistent findings. Methodologies created to change behaviors are well documented, as shown across the included studies. The author recommendations noted here support the drive to move from exploration of mere behavior changes to investigating outcomes [42] of evidence-based practices for students with EBD across settings and time, including maintenance of skill acquisition. The suggested sustainability and treatment fidelity are essential to successful treatment. All in all, the findings show that more attention should be given to generalizability and treatment integrity in research and intervention development to sustain evidence-based practices.

4.7. VM as an Evidence-Based Practice for Students with EBD When the CEC Standards Are Met

Finally, given that the studies showed the effectiveness of the new interventions, it is cautiously argued that the studies were effective because they met the CEC standards. Building upon this line of reasoning, it is carefully contended that this systematic review offers evidence for VM as an evidence-based practice for students with EBD when the CEC standards are met.

This conclusion is reached for a number of reasons. First, seven of the eight studies (87.5%) included seven or all of the CEC indicators. Second, each of the VM interventions across the studies showed a positive outcome. This was specifically the case in the studies that reported effect size. The studies that did not report effect size showed that VM was an effective intervention through the functional relationship established between baseline and interventions. That is, the dependent variables were altered by the independent variables. Finally, all the interventions were conducted in the natural environment with experimental control by intervention agents who were familiar with the behavior intervention(s) (although some of the studies did not address fidelity).

4.8. Limitations

Caution is warranted when interpreting these findings, as several areas of this systematic review may be seen as limitations. First, this review was limited to peer-reviewed publications, creating the potential for publication bias. Second, the review used a number of search terms. As stated, variations of these descriptors were not used, only the spellings as depicted. This had a significant impact on the identification of the initial 102 studies. Thus, if variations of the terms had been used, additional studies may have been identified, possibly impacting the overall findings of this review. Thus, future study should include variations of the search terms used in this analysis, along with others as this may identify additional studies focusing on the practice of VM for students with EBD.

5. Conclusions

This systematic review attempted to determine if VM is an effective evidence-based practice for students with EBD when the CEC standards are met. The review reported evidence-based practices of VM for students with EBD, to include quality indicators for evidence-based practices, implementations, the impact of the independent variables on the dependent variables, and author recommendations for further research. Each quality indicator in VM interventions was discussed in detail.

Overall, the eight studies showed that VM can have a positive and significant effect in the context of individual differences for students with EBD. Perhaps of greater interest, the findings revealed that the studies met the CEC standards for evidence-based practices, as well as other quality indicators. These indicators included content and setting, participants, intervention agents, description of practice, as well as interobserver agreement and experimental control. Fidelity index and effect size were the two most neglected quality indicators reported. Instructions, reinforcement system, and feedback or discussion were the most common strategies used. Generalizability—across settings, populations, treatment agents, target behaviors in the real world, and subject matter—was the most common recommendation for future research. The findings stress the effectiveness and benefits of evidence-based practices and VSM and/or VOM along with self-monitoring for students with EBD.

All in all, it is cautiously argued that the results suggest that VM is an evidence-based practice for students with EBD when the CEC standards are met.

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