Intellectual and Developmental Disabilities

# Food-Related Interventions in Schools for Students with Intellectual/Developmental Disabilities: A Systematic Review and Analysis

--Manuscript Draft--

| | |
|---|---|
| **Manuscript Number:** | IDD-D-23-00072R1 |
| **Article Type:** | Research |
| **Keywords:** | food interventions; schools; intellectual/developmental disabilities |
| **Corresponding Author:** | Brianna Grumstrup, PhD<br>University of Maine at Farmington<br>Farmington, ME UNITED STATES |
| **First Author:** | Brianna Grumstrup, Ph.D. |
| **Order of Authors:** | Brianna Grumstrup, Ph.D. |
| | MaryAnn Demchak, Ph.D., BCBA-D |
| **Manuscript Region of Origin:** | UNITED STATES |
| **Abstract:** | The purpose of this systematic review was to summarize research to date on school-based, food-related interventions (e.g., cooking, grocery shopping, food-related literacy, eating behavior) for students with intellectual and developmental disabilities (IDD). The second purpose was to evaluate quality of eligible studies according to What Works Clearinghouse (WWC; 2020) design criteria. Two levels of review took place: the first to establish eligibility for inclusion and the second to evaluate studies for research design criteria. Twenty-seven studies were evaluated, with five meeting WWC standards with or without reservations. Percentage of criteria met in each study ranged from 0 to 100 percent. Research needs and quality for the above outcomes in this population are discussed. |

Abstract

The purpose of this systematic review was to summarize research to date on school-based, food-related interventions (e.g., cooking, grocery shopping, food-related literacy, eating behavior) for students with intellectual and developmental disabilities (IDD). The second purpose was to evaluate quality of eligible studies according to What Works Clearinghouse (WWC; 2020) design criteria. Two levels of review took place: the first to establish eligibility for inclusion and the second to evaluate studies for research design criteria. Twenty-seven studies were evaluated, with five meeting WWC standards with or without reservations. Percentage of criteria met in each study ranged from 0 to 100 percent. Research needs and quality for the above outcomes in this population are discussed.

Key Words: *Food interventions, schools, intellectual/developmental disabilities*

# Food-Related Interventions in Schools for Students with Intellectual/Developmental Disabilities: A Systematic Review and Analysis

Children with intellectual and developmental disabilities (IDD) face greater inequities in health outcomes and fewer opportunities to learn about food choices compared to children without disabilities (Gibson et al., 2011; Hinckson et al., 2013). Eating habits are widely believed to influence health for all people (Ionescu et al., 2017; Kanaya, 2014), so teaching functional skills to children with IDD that promote health is of importance (Morse & Schuster, 2000; Scott & Havercamp, 2016). Such skills include nutrition facts, selection of healthy food, tracking food habits, shopping, cooking, food acceptance (i.e., willing to eat when prompted), food flexibility (i.e., increasing number of foods in repertoire), and independent eating behavior (i.e., feeding oneself while engaging in expected mealtime behavior). To this end, identifying quality research is necessary for making conclusions across studies about intervention efficacy. Attention to research quality is especially relevant given expectations for special education teachers to implement evidence-based practices. Guidelines such as those issued by the What Works Clearinghouse (WWC; 2020) define criteria for various experimental research designs, including single case research designs as aids to establish evidence-based practices (EBPs).

## Past Research on Food-Related Interventions in Schools

It is important to support the adaptive behavior of students with IDD by teaching functional skills that can be used in settings beyond the classroom (Alqahtani & Schoenfeld, 2014). Past research addressed several such functional skills, with cooking appearing most popular (Ayres & Cihak, 2010; Johnson et al., 2013; Mechling et al., 2010) and grocery shopping being another commonly studied skill (Bouck et al., 2012; Douglas et al., 2015; Douglas et al., 2018). Still other researchers focused on literacy applied to food vocabulary and comprehension

(Coleman et al., 2012; Collins et al., 1995; Douglas et al., 2011).

Also identified as important for children with disabilities are improvements in mealtime skills related to independent eating or using expected behavior at mealtime (Bailey & Angell, 2013; Qvarfordt et al., 2009). Others targeted food flexibility by expanding the amount or type of foods a child would eat (Johnson et al., 2008; Koegel et al., 2012). Additional researchers focused on health outcomes through programs designed to change behavior of children with and without disabilities. Hinckson et al. (2013) investigated the effects of motivational strategies, nutrition education, and physical activity training on various measures of health for children with ID in New Zealand.

Researchers in Sweden addressed nutrition knowledge for adolescents with ID through a group comparison design (Wallén et al., 2013). Multiple studies addressed nutrition and health education for children without disabilities (Hovland et al., 2010; Lazorick et al., 2015). Nearly all identified studies targeting eating behavior, independence, or nutrition knowledge focused on children other than those with IDD (e.g., children solely diagnosed as autistic). Database searches indicated an abundance of research in autism, suggesting that it is more commonly studied than other populations. Review of literature also revealed many interventions for children with IDD were conducted in countries outside the U.S. These findings indicate a need to explore the research on American school children within the broader diagnoses of IDD.

Jobling (2001) noted that research including students with disabilities in health education was scarce. Since then, school-age children with IDD have appeared in reviews including all ages in this population. Lancioni and O'Reilly (2002) reviewed 12 studies implementing visually mediated instructions and/or systematic prompting strategies to teach food preparation to individuals with ID and found that overall, the approaches were effective and skills were

maintained and generalized across studies. However, they examined studies with participants of all ages versus children or school environments. Scott and Havercamp (2016), citing Jobling's statements as a rationale to study health behavior for children with IDD, systematically reviewed 13 studies on health behavior programs for individuals with ID. They found most interventions resulted in improvements to health measures such as weight and Body Mass Index, behaviors such as diet or physical activity changes, knowledge of health topics, or well-being/happiness indexes. However, they determined most studies had weak methodological rigor. Almost all participants in studies for this review were adults in community settings.

**Determining Evidence Based Practices in Special Education**

Some topics in this area are studied more (i.e., cooking, grocery shopping, food vocabulary and literacy) than others (i.e., mealtime behavior, eating independence, nutrition knowledge). It is difficult to establish an evidence base when certain topics or populations are not commonly investigated, or research quality varies. Teaching accountability requires prioritizing practices with strong evidence for effectiveness over those lacking evidence (Maggin et al., 2013). However, the literature conveys a concern with research quality in education and there is debate on what constitutes evidence given context and population (Odom et al., 2005).

In response to these concerns and increased expectation to use evidence-based practices (EBPs), the Institute for Education Sciences (IES) synthesizes research through the WWC, evaluating four types of study design: Randomized controlled trials, quasi-experimental studies, regression discontinuity designs, and single case research designs (SCRDs; IES, 2018). WWC (2020) specified five criteria, each with methodological components, to determine if a study meets a high standard for SCRDs. The WWC (2020) SCRD criteria focus on (1) data availability in graphical or tabular form; (2) systematic manipulation of the independent variable by the

researcher; (3) inter-assessor agreement data collected in a minimum of 20% of sessions in each phase meeting a minimum threshold; (4) no residual treatment effects in alternating treatment designs or other designs; and (5) a minimum of three attempts to demonstrate experimental effect and specific number of data points per phase with specific numbers linked to type of design. There are also specific requirements related to concurrency of baseline phases for designs to meet standards (WWC, 2020). If the first four criteria are not met, then the design would be coded as "Does Not Meet Standards." If the first four criteria are met, then criterion five related to attempts to demonstrate experimental effect and number of data points per phase is reviewed and a study could be coded as "Meets Standards without Reservations," "Meets Standards with Reservations," or "Does Not Meet Standards."

### Purpose

Given evidence that children with IDD receive less attention in food-related research than other populations, a systematic review, with a focus on research quality, of interventions to improve food-related behaviors and knowledge can contribute to EBPs by demonstrating what works for this population. Therefore, the first purpose of this review was to comprehensively synthesize research to date on food-related interventions for children with IDD in school settings within the United States. The second purpose was to evaluate the quality of intervention studies meeting design criteria as specified by WWC (2020). The research questions are as follow: What are the characteristics of food-related intervention studies for students with IDD in schools to 2023? What level of adherence to What Works Clearinghouse single case research design criteria exists in eligible studies?

## Method

### Literature Search Procedures

Articles were identified using combinations of the following 15 search terms applied to study abstracts in peer-reviewed journals, published in English: Teaching, nutrition, food, eating habits, eating problems, diet, schools, students, intervention, cooking, grocery shopping, meal planning, intellectual disability, mental retardation, and developmental disability. The following databases were simultaneously searched: Education Research Complete, ERIC, PsycINFO, PsycARTICLES. Education Research Complete was unavailable to researchers after July 2022, so Education Full Text was searched for the time period of July 2022 to July 2023. Specific results, number of articles coded after duplicate removal, and number of articles eligible for inclusion for each combination of search terms are outlined in Table 1.

**Inclusion and Exclusion Criteria**

The search was conducted on publications through July 2023. No beginning date was set for the search as the intent was to capture all studies addressing the dependent variables (DVs) of interest (those identified by initial review of literature) occurring in educational settings. A key inclusion criterion was the following DVs needed to be targeted: nutrition (i.e., facts/habits/choices/meal planning/cooking/grocery shopping with a focus on food selection), eating behaviors (i.e., supporting expected behavior during mealtimes), independent eating (i.e., skills needed to eat independently), and/or food acceptance/flexibility (i.e., eating what is being expected/prompted or increasing number of foods in one's repertoire). An additional inclusion criterion was the intervention needed to occur in a school setting, including residential schools, vocational, and community settings during the school day. Studies conducted in institutional settings with no indication of educational programming were excluded. It was required that participants be early intervention or school-aged (i.e., birth to 22 years) and the study occur in the United States or its territories. These criteria were included to maintain relevance to

mandates governed by Individuals with Disabilities Education Act (IDEA, 2004), as well as consistency with WWC intervention review guidelines for children with ID (WWC, 2017). Criteria required that 50% or greater of participants in a specific study have a diagnosis of intellectual, intellectual/developmental, or multiple disabilities. Finally, articles were required to be published in peer reviewed journals. Articles not meeting all inclusion criteria were excluded from further review. To align quality review with WWC design criteria, if an article described an intervention design other than randomized controlled trials, quasi-experimental designs, regression discontinuity designs, and SCRDs, it was excluded.

**Coding Instrumentation and Procedure**

The coding procedure for this study had two levels (coding documents used at both levels may be obtained from the first author).

**Level 1.** A 10-item coding form was created by the first author to document meeting inclusion criteria for each search-identified study. Furthermore, the following information was coded for each study: the independent variables (IVs) and DVs, study design, demographics (i.e., participant sample size, ages, and disability category), and results summary.

**Level 2.** All studies meeting criteria for further evaluation were coded a second time using a second, researcher-created instrument incorporating design criteria as specified by WWC (2020). The five WWC (2020) SCRD criteria were included as well as a final rating of whether the study met standards with or without reservations or did not meet standards and contained operationalized definitions to ensure accurate independent scoring for inter-assessor agreement (IAA). To evaluate quality of research design and evidence, all studies were coded for the first four criteria (i.e., data availability, IV manipulated by researcher, minimum IAA, residual treatment effects) as met or not met. Additionally, a rating of "meets standards without

reservations," "meets standards with reservations," or "does not meet standards" was assigned to the criterion involving effects over time and data points per phase, as well as the overall rating for the study.

**Inter-assessor agreement.** There were two levels of IAA: (1) inclusion criteria and (2) research design criteria. To establish IAA for inclusion criteria, a random 30% of the 188 studies were selected by an online randomizer, then independently coded by a colleague familiar with the target population and trained in the coding procedure. The point-by-point method, with each point consisting of the 10 separate items on the coding form, was used. Number of agreements was divided by number of disagreements plus agreements, then multiplied by 100 to obtain percentage of agreement. Though discrepancies occurred, they were discussed until 100% consensus was ultimately reached, with a third researcher familiar with SCRDs and the target population serving as a tiebreaker for one particular study. Specifically, the range was 20% to 100% across studies with a total agreement of 97.63% and a third researcher did not need to intervene for unresolved disagreements. The 20% was due to a disagreement about whether one specific study met criteria as examining an intervention or outcome eligible for the review, one of the first items on the coding form. If a study was determined to be ineligible to include in the review, it was not coded further, thereby leaving all subsequent coding items blank. In this case, the two reviewers disagreed about the eligibility of the study, so one filled out all coding items and the other reviewer left eight items blank as she deemed the study ineligible.

To conduct IAA for research design criteria, a random 33% of the studies were selected, using an online randomizer, by a second researcher with expertise in the target population and SCRD. The point-by-point method was also used as calculated above, with a point consisting of a single criterion on the form. IAA for Level 2 coding (i.e., design criteria review) was 90.56%

(range 67% to 100%).

## Results

### Eligible Studies

One hundred eighty-seven articles (188 studies, one article contained two experiments) were coded for Level 1. Twenty-seven studies (14.44%) met criteria for Level 2 review of design criteria. All were SCRDs published between 1981 and 2018. No randomized controlled trials, quasi-experimental designs, or regression discontinuity design studies were identified. Studies had a total of 113 participants with IDD spanning ages 4 through 22 years with most being middle or high school students. Specific single case research designs employed, in order of most to least frequent, included multiple probe (*n* = 16, 59.26%), alternating treatments (*n* = 5, 18.52%), multiple baseline (*n* = 4, 14.81%), reversal/withdrawal (*n* = 2, 7.41%).

Table 2 summarizes participant demographics, research design, IVs and DVs, and results for each study. Participants (n=113) spanned ages 4 through 22 years and were in groups by school level as follows: thigh school (n=62, 54.87%), middle school (n=21, 18.58%), elementary school (n=26, 23%), and multi-level private schools (n=4, 3.54%).

IVs employed in eligible studies (from most to least frequent) were symbol prompts (n=8, 29.63%), constant time delay (n=8, 29.63%), video prompting or modeling (n=7, 25.93%), verbal or recorded auditory prompts (n=5, 18.52%), in-vivo training (n=3, 11.11%), computer-based instruction (CBI; n=3, 11.11%), role play (n=3, 11.11%), system of least prompts (n=3, 11.11%), most to least prompts (n=1, 3.70%), oral motor intervention (n=1, 3.70%), and behavioral interventions (n=1, 3.70%). Some studies employed more than one IV.

DVs of eligible studies (from most to least frequent) were cooking/food preparation (n=12, 44.44%), grocery shopping (n=9, 33.33%), food-related literacy (n=5, 18.52%),

independent eating (n=1, 3.70%), and mealtime behavior (n=1, 3.70%). One study measured more than one DV. In general, all studies reported favorable outcomes with participants improving from baseline, with at least some maintenance and generalization of skills over time, suggesting that various types of prompts, computer based, and in-vivo teaching were successful in increasing, maintaining, and generalizing skills.

**Research design criteria review.** Table 3 summarizes percentages of design criteria present in each reviewed study, as well as presence of each criterion across studies. Five studies (18.52%) of 27 met WWC standards with or without reservations. The single study meeting design standards without reservations examined video modeling and prompting to teach cooking skills (Taber-Doughty et al., 2011).

Four studies met standards with reservations, one teaching cooking with symbol prompting, specifically graphic organizers with meal preparation components (Douglas et al., 2011). A second used constant time delay to teach snack prep with observational learning (Griffen et al., 1992). The third study that met standards with reservations (Mechling et al., 2002) utilized video modeling to increase grocery aisle and item sight words. Finally, Ayers & Cihak (2010) also used video modeling to increase percentage of correct steps in food preparation. Twenty-two studies (81.48%) did not meet WWC design standards.

Percentage of design criteria met within each study ranged from 0 to 100% ($M$ = 70.37%; $SD$ = 22.44%). Individual criteria met across at least 89% of studies were data presented in graphed format, IV actively manipulated, and unlikelihood of residual effects. Present in fewer than half the studies were IAA reported, recorded on 20% of all participants/phases, and meeting minimum thresholds (33%) and sufficient effects demonstrated over time/data points per phase (44%). IAA conducted on at least 20% of data points for each phase/participant/condition

contained insufficient description in many studies to determine that each participant, phase, and condition had at least 20% of sessions analyzed. Furthermore, attempts to demonstrate effects over time/data points per phase had low presence across studies because graphs were lacking sufficient data points showing IV effect, as specified by WWC (2020), particularly the additional criteria required for multiple probe designs.

## Discussion

The purpose of this review was to synthesize research on a variety of food-related interventions in schools for students with IDD and evaluate the quality of research according to established design criteria. Some DVs, such as food preparation, were studied much more than others (e.g., Douglas et al., 2011; Griffen et al., 1992; Mechling & Stephens, 2009). These findings were consistent with past reviews reporting cooking as a popular DV for this population, also taught through visual (static and video) supports or systematic prompting procedures (Jobling, 2001; Lancioni & O'Reilly, 2002).

Dependent variables identified for this research review were somewhat limited and might be reflective of decades of focus on teaching functional skills. The focus on grocery shopping, cooking/food preparation, independent feeding, and mealtime behavior might be indicative of prior emphasis on targeting functional skills rather than academic/general education curriculum content. Given the increased emphasis on standards-based teaching, outcomes linked to dependent variables reflective of grade-based standards might be evident in future research.

The most common independent variables in this review were symbol prompts and constant time delay. Symbol prompts were comprised of visual supports such as picture graphics, recipes adapted with pictures, and adapted shopping lists comprised of pictures. Picture symbols or visual supports were effective in improving behaviors such as following recipes, making

shopping lists, finding groceries in stores, and completing purchases. Constant time delay, a response prompting procedure, similarly was effective in improving targeted food-related behaviors. Although the system of least prompts and most-to-least were not used as frequently as was constant time delay as a response prompting procedure, they were also effective in improving targeted behaviors. Other procedures relied on technology (e.g., video prompting and modeling, computer-based instruction, audio-recorded prompts) and were effective. Given increased use of mobile technologies such as smart phones, research focusing on use of such technology paired with response prompting procedures may prove to be beneficial as intervention for improving various food-related behaviors.

This review found that food-related interventions were most likely to occur with secondary-aged students (i.e., high school, middle school) than with younger students. This emphasis might be reflective of the skills most likely to be targeted (i.e., cooking / food preparation, grocery shopping), which might be considered more appropriately taught to older students than younger students. However, there are a number of food-related skills that should be targeted for younger children to highlight their importance from a young age (e.g., nutrition facts, healthy food choices).

Jobling (2001) suggested that little was known about inclusion of students with IDD in health education or the modification of quality curricula for their use. In response, Scott and Havercamp (2016) agreed that school settings are important to fostering foundational skills for health behaviors, yet there is very little research on the inclusion within or instructional practices surrounding health education for students with disabilities.

They subsequently reviewed health promotion programs with various outcomes, results indicating attempts to improve outcomes for individuals with ID. However, their review revealed

studies almost exclusively focused on adults. Furthermore, even though most studies reviewed had positive outcomes on health measures and knowledge, they found the studies had low methodological rigor, quite similar to findings from the current review.

In agreement with researchers above, no evidence was found for interventions to improve mealtime behavior or independent eating skills because studies did not meet design criteria. No studies were identified targeting nutrition fact recall or mealtime choice-making for children with IDD in U.S. schools. It seems the lack of quality research on food-related behaviors persists over 20 years after Jobling's (2001) appeal to increase such research.

Established single case research design criteria, such as those specified by WWC (2020), serve researchers in developing and disseminating methodologically sound studies. When using these guidelines to determine EPBs, a study showing positive outcomes is most relevant if it meets design standards. Besides lack of research on certain outcomes, design quality of published studies was an issue in this review; consistent with concerns on varying research quality in other areas of education (Odom et al., 2005).

Following research design criteria when developing studies has only relatively recently been emphasized (e.g., Horner et al., 2005; Kratochwill et al., 2013; WWC; 2020). Most recently, emphasis is placed on WWC criteria for designs of various types. Furthermore, criteria are updated by the WWC every few years, changing the alignment of practices within studies depending on which set of criteria are being applied. Some studies in this review were published after dissemination of research design criteria, yet most of the reviewed studies did not meet standards, suggesting that researchers did not adhere to the criteria. This finding was surprising given the assumption that publication of criteria would result in improved quality of research and given the need to improve health behaviors and subsequent outcomes for children with IDD is

well documented.

It is also noteworthy that among recent identified studies, only nine studies (33%) were published since 2010. This suggests that this topic may have fallen in popularity, though many researchers indicate food-related interventions are not studied enough. Lack of research may also mean that these DVs are deemed less socially significant than others, despite the abundance of documentation on adverse health behaviors and outcomes for individuals with IDD indicating otherwise.

**Limitations**

Excluding intervention studies where less than 50% of participants had IDDs could be a limitation, as examining outcomes for individual students with IDD who were included in studies where majority of participants did not have IDD, is possible by examining only those individuals. Also, IAA for this study had some instances of agreement below 80% for the entire range of percentages. However, all discrepancies were resolved with full consensus, retaining an average IAA of over 80% for both levels.

The requirement that studies be published in peer reviewed journals is a potential limitation as it excluded gray literature such as dissertations. However, peer review was included as a criterion as it is considered by many to be the most reputable means of disseminating research for practice, as well as being recommended by WWC for reviewing research for children with IDD (Cowell, 2014; Goldberg et al., 2010; WWC, 2017). Expanding the review to include gray literature might have expanded the number of eligible studies.

Because four databases were searched simultaneously, it is not possible to indicate specific numbers of identified articles to any one database. Although this could be viewed as a limitation as it is not possible to indicate the specific database leading to identification of specific

studies, the search is still replicable in that other researchers could simultaneously search the same databases using the same combinations of search terms.

**Implications and Future Research**

This review focused on synthesis of literature and study quality for specific DVs focusing on food-related interventions for students with IDD in educational settings. Though more research is needed to confirm efficacy, symbol prompting, constant time delay, and video prompting/modeling were commonly implemented interventions in this review and may be promising practices for teachers to utilize when teaching cooking, grocery shopping, or food-knowledge skills within functional routines.

Researchers are encouraged to study interventions focused on increasing food choices and dietary knowledge in school settings for students with IDD, as no existing research for these outcomes was identified. Furthermore, particular attention should be paid to aligning study design and reporting with established criteria when examining graphic organizers, prompting procedures, and video modeling to improve cooking and grocery shopping skills. Evidence for effect was found for these practices in high-quality studies, but an increased number of replications could allow objective evaluation for whom such interventions are beneficial and in what settings. Researchers are also encouraged to use group design methodology as might be appropriate for studying food-related interventions. This review found that only single case research designs were used to investigate food-related interventions.

It may be useful to examine each of these practices for effectiveness with different DVs related to functional skills for students with IDD in schools. Specifically, meta-analysis through calculation of appropriate effect size measures could prove useful for these practices. Finally, identifying additional examples of intervention outcomes for this population and topic, by

including other studies where those with IDD were not the majority of the sample, could contribute to the literature.

## Conclusion

Quality of research design varied depending on intervention, population, and outcome under investigation. This review revealed that most existing food-related intervention studies for students with IDD did not meet research design criteria, and that some outcomes were not investigated. Findings also indicated that most of the research focused on secondary-aged students with the most frequently used interventions being constant time delay, symbol prompts, and video prompting and modeling. Although there is abundant research on food intervention for other populations, limited food-related intervention research suggests this topic might not be a priority area of study for students with IDD. However, documentation of health problems for students with IDD persists as do recommendations that students with IDD need to gain improved food-related knowledge and behavior. Increased research targeting food-related interventions could be beneficial for students with IDD.

## References

*Aeschleman, S. R., & Schladenhauffen, J. (1984). Acquisition generalization and maintenance of grocery shopping skills by severely mentally retarded adolescents. *Applied Research in Mental Retardation, 5*(2), 273-288. https://doi.org/10.1016/s0270-3092(84)80005-3

Alqahtani, H. H., & Schoenfeld, N. A. (2014). Teaching cooking skills to young women with mild intellectual disability: The effectiveness of internet websites. *Current Issues in Education, 17*(1), 1-10. https://cie.asu.edu/ojs/index.php/cieatasu/article/view/1302

*Ayres, K., & Cihak, D. (2010). Computer and video-based instruction of food-preparation skills: Acquisition, generalization, and maintenance. *Intellectual and Developmental*

*Disabilities, 48*(3), 195-208. https://doi.org/10.1352/1944-7558-48.3.195

*Bailey, R. L., & Angell, M. E. (2005). Improving feeding skills and mealtime behaviors in children and youth with disabilities. *Education and Training in Developmental Disabilities, 40*(1), 80-96. api.semanticscholar.org/CorpusID:20190236

*Bouck, E. C., Satsangi, R., Bartlett, W., & Weng, P. (2012). Promoting independence through assistive technology: Evaluating audio recorders to support grocery shopping. *Education and Training in Autism and Developmental Disabilities, 47*(4), 462-473. https://www.jstor.org/stable/23879639

*Bouck, E. C., Satsangi, R., & Muhl, A. (2013). Using audio recorders to promote independence in grocery shopping for students with intellectual disability. *Journal of Special Education Technology, 28*(4), 15-26. https://doi.org/10.1177/016264341302800402

*Coleman, M. B., Hurley, K. J., & Cihak, D. F. (2012). Comparing teacher-directed and computer-assisted constant time delay for teaching functional sight words to students with moderate intellectual disability. *Education and Training in Autism and Developmental Disabilities, 47*(3), 280-292. https://www.learntechlib.org/p/50198/.

*Collins, B. C., Branson, T.A., & Hall, M. (1995). Teaching generalized reading of cooking product labels to adolescents with mental disabilities through the use of key words taught by peer tutors. *Education and Training in Mental Retardation and Developmental Disabilities, 30*(1), 65-75. https://eric.ed.gov/?id=EJ501301

Cowell, J. M. (2014). Importance of peer review. *The Journal of School Nursing, 30*(6), 394–395. https://doi.org/ 10.1177/1059840514557235

*Douglas, K. H., Ayres, K. M., Langone, J., & Bramlett, V. B. (2011). The effectiveness of electronic text and pictorial graphic organizers to improve comprehension related to

functional skills. *Journal of Special Education Technology, 26*(1), 43-56. https://doi.org/ 10.1177/016264341102600105

*Douglas, K. K., Uphold, N. M., Steffen, S., & Kroesch, A. M. (2018). Promoting literacy with self-created grocery lists on mobile devices. *Journal of Special Education, 51*(4), 200-210. https://doi.org/ 10.1177/0022466917719260

*Ferguson. B., & McDonnell, J. (1991). A comparison of serial and concurrent sequencing strategies in teaching generalized grocery item location to students with moderate handicaps. *Education and Training in Mental Retardation. 26*(3), 292-304. https:// https://eric.ed.gov/?id=EJ434550

*Gaule, K., Nietupski, J., & Certo, N. (1985). Teaching supermarket shopping skills using an adaptive shopping list. *Education and Training of the Mentally Retarded, 20*(1), 53-59. https://www.jstor.org/stable/23877283

Gibson, J. C., Temple, V. A., Anholt, J. P., & Gaul, C. A. (2011). Nutrition needs assessment of young Special Olympics participants. *Journal of Intellectual & Developmental Disability, 36*(4), 268-272. https://doi.org/10.3109/13668250.2011.617360

Goldberg, L. R., Parham, D. F., Coufal, K. L., Maeda, M., Scudder, R. R., & Sechtem, P. R. (2010). Peer review: The importance of education for best practice. *Journal of College Teaching & Learning, 7*(2), 71–84. https://doi.org/10.19030/tlc.v7i2.91

*Graves, T. B., Collins, B. C., Schuster, J. W., & Kleinert, H. (2005). Using video prompting to teach cooking skills to secondary students with moderate disabilities. *Education and Training in Developmental Disabilities, 40*(1), 34-46. https://doi.org/10.1007/978-1-4899-2501-5_12

*Griffen, A. K., Wolery, M., & Schuster, J. W. (1992). Triadic instruction of chained food

preparation responses: Acquisition and observational learning. *Journal of Applied Behavior Analysis, 25*(1), 193-204. https://doi.org/10.1901/jaba.1992.25-193

*Hall, M. G., Schuster, J. W., Wolery, M., Gast, D. L., & Doyle, P. M. (1992). Teaching chained skills in a non-school setting using a divided half instructional format. *Journal of Behavioral Education, 2*(3), 257-279. https://doi.org/10.1007/BF00948818

Hinckson, E. A., Dickinson, A., Water, T., Sands, M., & Penman, L. (2013). Physical activity, dietary habits and overall health in overweight and obese children and youth with intellectual disability or autism. *Research in Developmental Disabilities, 34*(4), 1170-1178. https://doi.org/10.1016/j.ridd.2012.12.006

Horner, R. H., Carr, E.G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The use of single-subject research to identify evidence-based practice in special education. *Exceptional Children, 71*(2), 165-179. https://doi.org/

Hovland, J. A., Mcleod, S. M., Duffrin, M. W., Johanson, G., & Berryman, D. E. (2010). School-based screening of the dietary intakes of third graders in rural Appalachian Ohio. *Journal of School Health, 80*(11), 536-543. https://doi.org/10.1111/j.1746-1561.2010.00539.x

Institute for Education Sciences (IES). What Works Clearinghouse. (2018). https://ies.ed.gov/ncee/wwc/.

Individuals with Disabilities Education Improvement (IDEA) Act of 2004, 20 U.S.C. § 1400 *et seq*. (2004) (reauthorization of the Individuals with Disabilities Education Act of 1990).

Ionescu, L., Potora, C., Stan, O., & Lutrean, L. M. (2017). Promotion of an active lifestyle among children with hearing deficiencies-Presentation of an educational program. *Palestrica of the Third Millennium - Civilization and Sport, 18*(4), 192-195. https://doi.org/10.26659/pm3.2017.18.4.192

Jobling, A. (2001). Beyond sex and cooking: Health education for individuals with intellectual disability. *Journal Information, 39*(4), 310-321. https://doi.org/10.1352/0047-6765(2001)039<0310:BSACHE>2.0.CO;2

*Johnson, J. W., Blood, E., Freeman, A., & Simmons, K. (2013). Evaluating the effectiveness of teacher-implemented video prompting on an iPod touch to teach food-preparation skills to high school students with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 28*(3), 147-158. https://doi.org/ https://doi.org/10.1177/1088357613476344

Johnson, C. R., Handen, B. L., Mayer-Costa, M., & Sacco, K. (2008). Eating habits and dietary status in young children with autism. *Journal of Developmental and Physical Disabilities, 20*(5), 437–448. https://doi.org/10.1007/s10882-008-9111-y

Kanaya, A. M. (2014). Review: Diet and exercise counseling to improve intermediate health outcomes in persons with CV risk factors. *Annals of Internal Medicine, 161*(12), JC7. https://doi.org/10.7326/0003-4819-161-12-201412160-02007

Koegel, R., Bharoocha, A., Ribnick, C., Ribnick, R., Bucio, M., Fredeen, R., & Koegel, L. (2012). Using individualized reinforcers and hierarchical exposure to increase food flexibility in children with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 42*(8), 1574-1581. https://doi.org/10.1007/s10803-011-1392-9

Kratochwill, T. R., Hitchcock, J. H., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2013). Single-case intervention research design standards. *Remedial and Special Education, 34(*1), 26-38. https://doi.org/10.1016/j.jsp.2022.12.002

Lancioni, G. E., & O'Reilly, M. F. (2002). Teaching food preparation skills to people with intellectual disabilities: A literature overview. *Journal of Applied Research in Intellectual*

*Disabilities, 15*(3), 236-253. https://doi.org/10.1046/j.1468-3148.2002.00122.x

Lazorick, S., Fang, X., Hardison, G. T., & Crawford, Y. (2015). Improved body mass index measures following a middle school-based obesity intervention-The MATCH Program. *Journal of School Health, 85*(10), 680-687. https://doi.org/ 10.1111/josh.12301

Maggin, D. M., Briesch, A. M., & Chafouleas, S. M. (2013). An application of the What Works Clearinghouse standards for evaluating single-subject research: Synthesis of the self-management literature base. *Remedial and Special Education, 34*(1) 44-58. https://doi.org/10.1177/0741932511435176

*McDonnell, J., & Horner, R. H. (1985). Effects of in vivo versus simulation-plus-in vivo training on the acquisition and generalization of grocery item selection by high school students with severe handicaps. *Analysis and Intervention in Developmental Disabilities, 5*(4), 323-343. https://doi.org/10.1016/0270-4684(85)90003-5

*Mechling, C., Gast, L., & Fields, A. (2008). Evaluation of a portable DVD player and system of least prompts to self-prompt cooking task completion by young adults with moderate intellectual disabilities. *The Journal of Special Education, 42*(3), 179-190. https://doi.org/ https://doi.org/10.1177/0022466907313348

*Mechling, L. C., Gast, D. L., & Langone, J. (2002). Computer-based video instruction to teach persons with moderate intellectual disabilities to read grocery aisle signs and locate items. *Journal of Special Education, 35*(4), 224–240. https://doi.org/ 10.1177/002246690203500404

*Mechling, L. C., Gast, D. L., & Seid, N. H. (2010). Evaluation of a personal digital assistant as a self-prompting device for increasing multi-step task completion by students with moderate intellectual disabilities. *Education and Training in Autism and Developmental*

*Disabilities, 45*(3), 422-439. https://www.learntechlib.org/p/108115/.

*Mechling, L. C., & Gustafson, M. (2009). Comparison of the effects of static picture and video prompting on completion of cooking related tasks by students with moderate intellectual disabilities. *Exceptionality, 17*(2), 103-116. https://doi.org/10.1080/09362830902805889

*Mechling, L. C., & Stephens, E. (2008). Comparison of self-prompting of cooking skills via picture-based cookbooks and video recipes. *Education and Training in Developmental Disabilities, 44*(2), 218-236. https://www.jstor.org/stable/24233496

*Morse, T. E., & Schuster, J. W. (2000). Teaching elementary students with moderate intellectual disabilities how to shop for groceries. *Exceptional Children*, *66*(2), 273-288. https://doi.org/10.1177/001440290006600210

Odom, S. L., Brantlinger, E., Gersten, R., Homer, R. H., Thompson, B., & Harris, K. R. (2005). Research in special education: Scientific methods and evidence-based practices. *Exceptional Children, 71*(2), 137-148. https://doi.org/ 10.1177/001440290507100201

Qvarfordt, I., Engerstrom, I. W., & Eliasson, A. (2009). Guided eating or feeding: Three girls with Rett syndrome. *Scandinavian Journal of Occupational Therapy, 16(*1), 33-39. https://doi.org/10.1080/11038120802326214

*Schuster, J. W., & Griffen, A. K. (1991). Using constant time delay to teach recipe following skills. *Education and Training in Mental Retardation, 26*(4), 411-419. https://psycnet.apa.org/record/1992-13296-001

Scott, H. M., & Havercamp, S. M. (2016). Systematic review of health promotion programs focused on behavioral changes for people with intellectual disability. *Intellectual and Developmental Disabilities, 54*(1), 63-76. https://doi.org/ 10.1352/1934-9556-54.1.63

*Taber-Doughty, T., Bouck, E. C., Tom, K.,Jasper, A. D., Flaagan, S. M., & Bassette, L. (2011).

Video modeling and prompting: A comparison of two strategies for teaching cooking skills to students with mild intellectual disabilities. *Education and Training in Autism and Developmental Disabilities, 46*(4), 499-513. https://www.jstor.org/stable/24232362

*Trask-Tyler, S. A., Grossi, T. A., & Heward, W. L. (1994). Teaching young adults with developmental disabilities and visual impairments to use tape-recorded recipes: Acquisition, generalization, and maintenance of cooking skills. *Journal of Behavioral Education, 4*(3), 283-311. https://doi.org/10.1007/BF01531984

*van den Pol, R. A., Iwata, B. A., Ivancic, M. T., Page, T. J., Neef, N. A., & Whitley, F. (1981). Teaching the handicapped to eat in public places: Acquisition, generalization and maintenance of restaurant skills. *Journal of Applied Behavior Analysis, 14*(1), 61-69. https://doi.org/10.1901/jaba.1981.14-61

Wallén, E. F., Müllerdorf, M., Christensson, K., & Marcus, C. (2013). Eating patterns among student with intellectual disabilities after a multifactorial school intervention using the Plate Model. *Journal of Policy and Practice in Intellectual Disabilities, 10*(1), 45-53. http://dx.doi.org/10.1111/jppi.12020

What Works Clearinghouse. (2020). *Standards Handbook, Version 4.1*. https://ies.ed.gov/ncee/wwc/handbooks

What Works Clearinghouse. (2017). *Protocol for reviewing interventions for children and students with intellectual disability version 3.1*. https://ies.ed.gov/ncee/wwc/Docs/ReferenceResources/wwc_id_protocol_v3.1.pdf

*Note.* * Indicates article was reviewed at level 2

**Table 1**

*Combinations of search terms, results, number coded, and number eligible for identified articles*

| Search terms | Number of results | Number coded minus duplicates | Number of articles meeting criteria |
|---|---|---|---|
| Teaching, nutrition, intellectual disability | 21 | 21 | 0 |
| Teaching, nutrition, intellectual or developmental disability | 14 | 3 | 0 |
| Food, school, intervention, intellectual disability or mental retardation or developmental disability | 42 | 26 | 1 |
| Cooking, school, intellectual disability or mental retardation or developmental disability | 61 | 40 | 12 |
| Grocery shopping, school, intellectual disability or mental retardation or developmental disability | 15 | 9 articles (10 studies) | 4 |
| Eating habits or eating problems or diet, schools, intellectual disability or mental retardation or developmental disability | 76 | 60 | 1 |
| Meal planning, schools or students, intellectual disability or mental retardation or developmental disability | 0 | 0 | 0 |
| Ancestral search of reference lists (eligible studies, search titles by any of the 15 terms above) | 28 | 28 | 9 |
| Terms: 15 | 257 | 187 articles (188 studies) | 27 articles |

**Table 2**

*Summary of Eligible Studies*

| Number and Citation | Participant N, age range, dis. category | Design | IVs and DVs | Results |
|---|---|---|---|---|
| 1. Morse & Schuster (2000) | 10<br>5-12<br>ID, IDD | MPD across students | IV: Constant time delay (CTD), simulation w/ story board<br>DV: % correct grocery shopping for two items | All improved, most achieved criterion, 2 did not begin intervention condition. Reduced generalization %s. |
| 2. Ayres & Cihak (2010) | 3<br>15<br>ID | MPD across behaviors, students | IV: CBVI video models and simulation activities<br>DV: % of steps correct in 3 tasks for food preparation | All increased % of steps correct. Correct sequence of steps in a task and correctness of the task itself (regardless of sequence) were measured. |
| 3. Coleman et al. (2012) | 3<br>10-12<br>ID, MI | ATD | IV: Teacher directed (flash cards) vs. computer assisted (PowerPoint slides), CTD<br>DV: Functional sight words found in recipes. | Teacher directed strategy slightly more efficient for % correct and trials to criterion. Generalization maintained. |
| 4. Collins et al. (1995) | 4<br>16.1-18.7<br>ID | MPD across behaviors, word sets | IV: Peer CTD to teach food label/cooking sight words and definitions, find word on other labels, define words during cooking task.<br>DV: Read/define words | Many words were known in baseline, but all students increased reading and defining abilities increased. |
| 5. Douglas et al. (2011) | 3<br>13-15<br>ID | MPD across students | IV: Pictorial graphic organizer<br>DVs: Adherence to/comprehension of recipe, accuracy of completing organizer, answering questions about organizer | All students improved their comprehension of e-text recipe presentation after the introduction of graphic organizers, and performance generalized to novel recipes and food preparation. |
| 6. Graves et al. (2005) | 3<br>16-20<br>ID, MI | MPD across behaviors, students | IV: CTD video prompting<br>DV: Preparation of three food items | Each participant only learned 2 skills (school year ended). Participants required the same or fewer sessions to criterion on the second skill taught compared to the first. Parent-reported generalization and maintenance. |
| 7. Johnson et al. (2013) | 2<br>17<br>MI, IDD | MPD across behaviors | IV: Video prompts on iPod touch<br>DVs: Independence on cooking task (task analysis), teacher prompting to perform steps of a task (3 steps | Both students reached 100% independence on all cooking tasks w/ video prompting and reduced prompt dependency from baseline. Both students |

| | | | | |
|---|---|---|---|---|
| | | | least to most), teacher prompting when using iPod touch | maintained independence on all three tasks at maintenance. |
| 8. Mechling et al. (2008) | 3<br>19-22<br>ID | MPD across cooking, students | IV: Video prompting for cooking task, system of least prompts (SLP) for use of DVD<br>DV: % of independent cooking steps | All students demonstrated a higher % of correct responses for each task when using the portable DVD player (some steps correct in baseline, but immediate increase for each student, each task w/ introduction of DVD prompting device and SLP procedure. |
| 9. Mechling et al. (2010) | 3<br>15-17<br>ID | MPD across recipes, students | IV: Hand-held self-prompting system (three levels-video, picture, auditory prompts)<br>DV: Food preparation | All participants independently used PDA when cooking w/o adult prompting, maintained over time, self-adjusted levels of prompts w/in and across recipes. All used video level the most. All reported preference for DVD player over PDA. |
| 10. Mechling & Gustafson (2009) | 6<br>18-22<br>ID, MI | ATD | IV: Static picture prompting, video prompting<br>DV: % independent of steps in cooking task | Overall, video prompting resulted in a higher % of tasks performed correctly compared w/ static pictures from baseline. Most reached 100% correct performance during the comparison phase using video prompting. |
| 11. Schuster & Griffen (1991) | 5<br>9:5-12:1<br>ID | MPD across students | IV: CTD w/ picture and word recipe cards<br>DV: Complete task of drink prep using a recipe | Researchers changed criterion for some students based on data from training sessions. They added a reinforcement contingency for one student before he met criterion. All students then reached criterion. Students maintained independence of task analysis steps. |
| 12. Taber-Doughty et al. (2011) | 3<br>12-13<br>ID (mild) | ATD | IV: Video modeling and video prompting (system of least to most prompts)<br>DV: Cooking basic recipes | Increased independence according to task analyses: video modeling more effective for 2 students, prompting more effective for third. % of independence mostly maintained. During withdrawal condition 2 participants dropped in independence and 1 increased. |
| 13. Trask-Tyler et al. (1994) | 3<br>17-21<br>MI (VI+ID) | MBD across behaviors | IV: Tape recorded voice task analyses of recipes serving as a self-operated audio prompting system<br>DV: % independent on steps of nine recipes | All students reached criterion. Not all maintained at follow up. Generalized skills (w/out further training) to new similar recipes and new more complex recipes at follow up. Some discontinued use of audio prompts. |

| | | | | |
|---|---|---|---|---|
| 14. Bouck et al. (2012) | 3<br>18-20<br>MI | RWD | IV: Audio recorders of grocery lists<br>DV: Correct # items identified, correct # obtained, # prompts, # of times audio items were listened to, time to complete 10 item list | Results varied w/ audio recordings vs. symbol supported lists used from baseline. One student was less successful w/ audio lists than w/ visual. The others just as successful w/ audio as visual. |
| 15. Bouck et al. (2013) | 3<br>17-19<br>MI | ATD | IVs: Prerecorded or student-recorded audio grocery lists<br>DV: Correct # items identified, correct # selected, # prompts, time to complete 10 item list | All became more successful at identifying items and required fewer prompts to correctly identify items on the list. The students were more successful when the list was self-recorded vs. prerecorded by researcher. One student was equally successful in identifying items for both intervention conditions. |
| 16. Douglas et al. (2018) | 4<br>11.6-14.6<br>ID, MI, MI, MI | MPD across students, conditions | IV: CTD for developing grocery lists on mobile device<br>DV: % correct creation of grocery list, reading grocery words measured by pre and posttest. | Functional relationship for all participants during intervention, some maintenance over time, some generalization to other conditions. |
| 17. Gaule et al. (1985) | 3<br>17-20<br>ID | MPD across skills | IV: Adapted shopping aid (binder w/ visuals of food items needed for recipes and approximate cost displayed and assessed through checkboxes in 50 cent increments)<br>DV: Preparing a shopping list, locating/obtaining items in supermarket, purchasing items | All approached or reached criterion following instruction. Partial skill maintenance according to follow up probes. The first probe showed lower # of skills than instructional sessions, but the second probe closer or matched instructional session levels. |
| 18. Bailey & Angell (2005) | 9<br>4-17<br>ID, MI | MTD (AB-BC-C-BC2-B'C') | IV-BC condition (dysphagia + positive reinforcement behavior management program), B or C alone w/ withdrawal conditions<br>DV: Feeding skills and mealtime behaviors (individual to each student, defined by IEP) | All made gains from baseline condition in feeding skills. Greater gains w/ combined treatment (BC condition). |
| 19. Aeschleman & Schladenhauffen (1984) | 4<br>17-18<br>ID | MPD across students | IV: Three different training procedures (verbal instruction, role play, and in vivo training), store probes to determine minimum level of support for shopping skills<br>DV: Purchasing groceries for a sack lunch | Baseline mean scores increased in most skill areas for the role play instructional condition. Increases for those skills that never reached mastery level across participants. Scores maintained 5 months later for most part. |
| 20. Ferguson & | 6<br>16-18<br>ID | MBD across students | IV: Concurrent sequence training across 3 store locations w/ fading prompts, sequence training one store at a time | Increase in mean correct during generalization probes in serial sequence and concurrent sequence training. |

| | | | | |
|---|---|---|---|---|
| McDonnell (1991) | | | DV: % items correctly located, type and frequency of errors, # of item presentations during teaching and minutes instruction to criterion | Students in serial condition at baseline improved once concurrent sequence condition introduced. |
| 21. Griffen et al. (1992) | 3<br>10.11-13.8<br>ID, MI | MPD across tasks, students | IV: CTD (5s)<br>DVs: % accurate in chained snack prep task for student receiving direct instruction, % accurate when "observer" not receiving direct instruction (observational learning) | CTD was effective in teaching snack prep to each student. Reached and maintained high % correct after CTD condition. For observational learning observers increased % correct from baseline when the student in IV condition reached criterion. |
| 22. Hall et al. (1992) | 4<br>16-18<br>ID | MPD across behaviors, students | IV: CTD w/ dyadic instructional arrangement (different halves of task analysis taught to each dyad participant, one observed while the other received IV)<br>DV: % correct responses across 3 cooking tasks | Unprompted correct % of responses increased while prompted correct responses decreased from baseline for all dyads across all three food prep tasks. |
| 23. Hutcherson et al. (2004) | 4<br>14.3-16.0<br>ID | MPD across behaviors and students | IV: Multimedia computer program designed to increase % of correct match to sample discrimination tasks<br>DV: % of correct match to sample trials completed on computer, % of items correctly selected in natural setting of grocery store | All increased accuracy in locating more items following intervention. Community performance increased after IV, but changes were not always immediately following the IV. Additional probes took place after the IV for 3 students that could have contributed to increases. |
| 24. McDonnell & Horner (1985) | 8<br>17-20<br>ID | MBD across students | IV: In-vivo and in-vivo alternated w/ simulation teaching of DV<br>DV: Location and selection of 15 grocery items | In-vivo training in one supermarket=some generalization of same items in nontrained stores. Combined simulation-plus-in vivo training resulted in varied levels of generalization. Most students ended the study selecting most of the target items from nontrained stores. |
| 25. Mechling et al. (2002) | 4<br>9-17<br>ID, IDD, MI | MPD across word sets, students | IV: Computer based video instruction<br>DV: Reading of words found on grocery aisle signs, location of grocery items in aisles | All increased # of correct aisles identified across all word sets. Mastery reached after IV, w/ some increase during baseline suggesting some learning during probe conditions. Word reading accuracy for the list increased across participants at post-test. |
| 26. Mechling & Stephens (2009) | 4<br>19-22<br>ID, MI | ATD | IV: Static picture vs. video prompting systems<br>DV: Multi-step cooking tasks | Mean % scores for each student, each student pair, and for all students together indicate higher success w/ video prompting than static picture. |

| | | | | |
|---|---|---|---|---|
| 27. van den Pol et al. (1981) | 3<br>17-22<br>MI | MBD across students, skills | IV: Simulation and role play using slides projected of target restaurant skills<br>DV: Restaurant skills (independent eating, social etiquette, ordering, paying) | Students increased their correct response % in all the skills. Generalization probe at a different restaurant showed high % correct on the restaurant skills. |

*Note.* MBD=multiple baseline design, MPD=multiple probe design, ATD= alternating treatment design, RWD=reversal/withdrawal design, MTD=multi-treatment design, #s assigned to studies correspond to #s in Table 3 for research design criteria review.

**Table 3**

*Presence of Research Design Criteria for All Eligible Studies*

| Criterion | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | % [a] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Data provided in graphical or tabular format? | + | + | + | - | + | + | + | + | + | + | + | + | + | + | + | + | + | - | - | + | + | + | + | + | + | + | + | 89 |
| 2. IV manipulated? | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | + | + | + | + | 94 |
| 3. IAA reported, on 20% of data points, meets minimum values? | - | + | - | - | + | - | - | + | + | - | - | + | - | - | - | - | - | - | + | - | + | - | - | - | + | + | - | 33 |
| 4. Residual effects unlikely? | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | - | - | + | + | + | + | + | + | + | + | 93 |
| 5. Effects over time/data points per phase, concurrency for MBD and MPD, contiguous data points for ATD? 1. Meets w/o res. 2. Meets w/ res. 3. Does not meet | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 1 | 2 | 1 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 41 |
| 6. OVERALL RATING: 1. Meets w/o res. 2. Meets w/ res. 3. Does not meet[a] | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | |
| Total Percentage of criteria met [a] | 80 | 100 | 60 | 40 | 100 | 60 | 60 | 80 | 80 | 80 | 80 | 100 | 60 | 80 | 80 | 80 | 60 | 0 | 40 | 60 | 100 | 60 | 60 | 60 | 100 | 80 | 60 | |

*Note.* + = Yes-criterion met, - = No-criterion not met

[a] Includes only those meeting with or without reservations as "present" for item 5