Journal of
Applied Behavior Analysis

Journal of Applied Behavior Analysis 2023, **56,** 146–165 NUMBER 1 (WINTER)

A systematic review of the correspondence between descriptive assessment and functional analysis

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Clinicians report that they often rely on descriptive assessments when developing behavior-reduction plans despite literature suggesting that functional analysis is the most rigorous assessment method. Further, research comparing the outcomes of descriptive assessments and functional analyses is mixed, with some studies showing low correspondence and others showing high correspondence. Such persistent use of descriptive assessments suggests that they may yield useful information despite inconsistent correspondence with functional analyses. A more fine-grained analysis of the relation between descriptive assessments and functional analyses may elucidate variables affecting their utility. We conducted a review of 48 studies that included descriptive assessments and functional analyses and evaluated several measures of correspondence between each pair of assessments. Results indicated that descriptive assessments had exact correspondence with functional analyses in 50% of comparisons. Results also suggested that descriptive assessments were more likely to accurately identify and predict the absence of a function relative to the presence of a function and that structured descriptive assessments were more likely to accurately predict functions.

Key words: challenging behavior, descriptive assessment, functional analysis, functional behavioral assessment

Treatments for challenging behavior based upon a functional behavior assessment lead to considerable improvements (e.g., Carr et al., 1990; Lewis et al., 2015; Newcomer & Lewis, 2004; Wood et al., 2009). Several methods of functional behavioral assessment are used by practitioners and researchers to identify environmental variables that influence challenging behavior, including indirect assessments, descriptive assessments, and functional analysis. Although a functional analysis is generally considered the most rigorous method of functional behavioral assessment (e.g., Saini et al., 2020; Schlinger & Normand, 2013), data from several survey and case review studies show that practitioners are more likely to use descriptive assessments than functional analyses (Desrochers et al., 1997; Oliver et al., 2015; Petursdottir et al., 2010; Roscoe et al., 2015).

In one example, Oliver et al. (2015) surveyed Board Certified Behavior Analysts and found that 94% reported "almost always" or

Conflict of Interest: The authors declare no conflict of interest.

We would like to thank Andrew Samaha for providing helpful feedback on earlier drafts of our analyses, and Stephen Kanne for providing guidance and resources regarding conducting accuracy and prediction analyses.

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doi: 10.1002/jaba.958

"always" using descriptive assessments as a method of functional behavioral assessment. In contrast, only 36% reported "almost always" or "always" using a functional analysis. Other studies have similarly reported that clinicians were most likely to use indirect assessments rather than direct observation when attempting to identify the function of challenging behavior (e.g., Ellingson et al., 1999; Petursdottir et al., 2010). For example, Petursdottir et al. (2010) reviewed the assessment processes employed by practitioners for 174 cases and found that indirect assessments were used most (73.9%), followed by a combination of indirect assessments and descriptive assessments in combination (21.7%). By comparison, practitioners in the same sample used functional analyses in just 0.2% of cases.

Given that practitioners appear to rely on descriptive assessments rather than functional analyses to inform function-based interventions, the extent to which these two assessment methods lead clinicians to reach the same conclusions is an important consideration. With respect to methodological rigor, functional analysis is the only method that provides direct evidence of a causal relation between problem behavior and environmental variables (e.g., Betz & Fisher, 2011). In contrast, descriptive assessments can only yield information regarding the correlation between environmental variables and the occurrence of problem behavior (e.g., Sloman, 2010; Thompson & Borrero, 2011). Therefore, functional analysis is frequently considered the "gold-standard" functional behavioral assessment method (Tiger & Effertz, 2021).

Several researchers have compared the correspondence between descriptive assessments and functional analyses (e.g., Lerman & Iwata, 1993; Sasso et al., 1992). In these studies, researchers conducted a descriptive assessment and a functional analysis with each participant and evaluated the correspondence between their results, with mixed findings across studies. That is, some indicated poor correspondence between descriptive assessments and functional analyses (e.g., Lerman & Iwata, 1993; Mace & Lalli, 1991; Pence et al., 2009; Thompson & Iwata, 2007). However, others indicated perfect correspondence between descriptive assessments and functional analyses (e.g., Alter et al., 2008; Sasso et al., 1992). Given such inconsistent results, the extent to which descriptive assessments yield similar results as functional analyses remain unclear.

Such inconsistent findings from studies comparing the results of descriptive assessments and functional analyses may be at least in part due to differences in the format of descriptive assessments compared. For example, the descriptive assessments conducted in several of these studies consisted of analyses of data collected using the "antecedent-behavior-consequence" (Bijou et al., 1968) method (e.g., Alter et al., 2008). In contrast, other studies compared results of a functional analysis to those of a structured descriptive assessment (Anderson & Long, 2002). Studies also differed in terms of the method used to analyze data from descriptive assessments. Finally, some studies compared the results of a descriptive assessment and functional analysis conducted in the same setting and with the same people (e.g., Arndorfer et al., 1994), whereas others conducted the descriptive assessment and functional analysis in different settings (e.g., school and clinic; Camp et al., 2009) or with different people (e.g., caregiver and researcher; Borrero et al., 2016). It may be the case that the different approaches to conducting descriptive assessment and analyzing the resulting data impact the correspondence between descriptive assessment and functional analysis.

The purpose of the current study was to conduct a systematic literature review to further elucidate what is known about correspondence between descriptive assessment and functional analysis outcomes. A second purpose of the current study was to describe how descriptive assessments are administered in research, and to

evaluate whether certain characteristics of descriptive assessments influenced the extent to which their results corresponded with those of a functional analysis. Thus, this study included a systematic literature search to identify and review published articles that (a) conducted both a descriptive assessment and functional analysis of the same target behavior and (b) compared the outcomes of these two approaches. We analyzed the degree of correspondence between these descriptive assessments and functional analyses to determine the extent to which the two methods produced the same results. Next, we evaluated whether the degree of correspondence varied according to the function(s) identified. Finally, we analyzed correspondence between different types of descriptive assessments (i.e., antecedent-behavior-consequence assessment vs. structured descriptive assessment) and a functional analysis.

Method

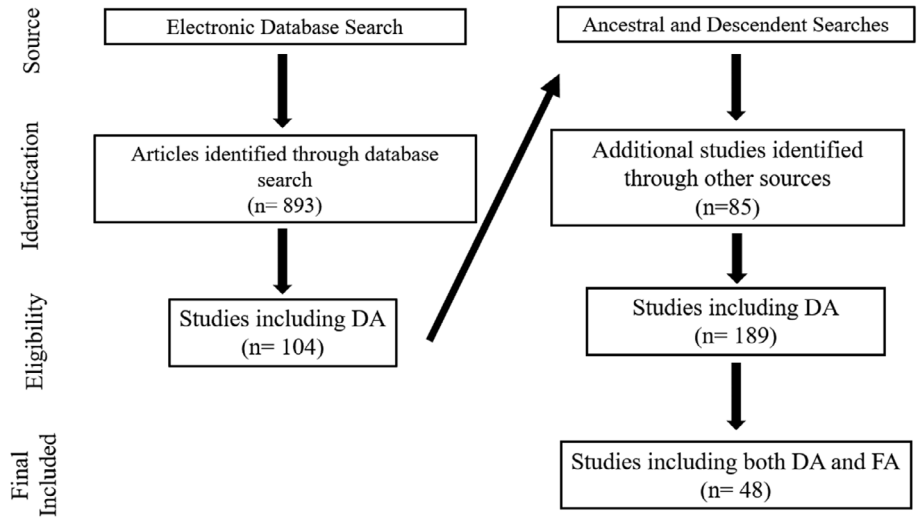
Search Strategy and Selection Criteria

We based our search, screening, and coding process on the methods presented in *Research Synthesis and Meta-Analysis* (4th ed.; Cooper, 2010). Our methods also follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for reporting on systematic literature reviews (Page et al., 2020), except for assessing risk of reporting bias. Figure 1 illustrates the process we used to select articles for this review. To identify articles for inclusion, we conducted a search of databases that contained research related to behavior analysis and the assessment and treatment of challenging behavior. We used EBSCO Host to search the following five online databases: Academic Search Complete, Education Resources Information Center (ERIC), Professional Development Collection, PsychArticles, and PsychInfo. We conducted the search on December 7, 2018 using the following (exact) search terms: (behavior assessment) AND (functional behavior assessment OR descriptive assessment OR descriptive functional behavior assessment OR ABC assessment OR ABC recording OR "structural analysis" OR scatterplot OR direct narrative recording OR descriptive analysis). Additional parameters for the search were that the manuscript needed to be available in English, published in a peer-reviewed journal, and published after 1982 (i.e., after publication of the paper on functional analysis by Iwata et al. [1982/1994]). The database search yielded 893 potential articles (after removing duplicates).

Following the initial database search, we conducted a first round of screening to identify studies that included a *descriptive assessment* of challenging behavior, defined as a functional assessment that involved direct observation and measurement of the target behavior that resulted in a conclusion regarding the function of the target behavior, but did not involve systematic manipulation of its consequences. We defined *challenging behavior* as any behavior targeted for reduction. Of the articles identified in the initial search, 104 described a study that included a descriptive assessment that met this definition. We then screened articles from the reference lists and "cited by" lists on Google Scholar for the included articles. This process identified 85 additional articles, yielding a total of 189 articles describing studies that included a descriptive assessment.

Next, we screened these 189 articles to identify those that also included a description of procedures and results for a functional analysis of the same participant and same challenging behavior targeted by the descriptive assessment. We defined *functional analysis* as a functional assessment that involved direct observation and measurement of the target behavior, and systematic manipulation of antecedents and consequences for the target behavior across at least two experimental conditions. We identified 48 articles describing studies that included both a descriptive assessment and functional analysis for the same challenging behavior.

Figure 1
Selection Process for Identifying Articles to Include in the Review



Interrater Agreement

An independent evaluator screened 330 (37%) of the articles using the same screening criteria for articles that described studies including a descriptive assessment. We calculated interrater agreement by dividing the number of agreements (i.e., both raters indicated "included") by the number of agreements plus disagreements (i.e., one rater indicated "included" and the other indicated "excluded") and multiplied by 100 to yield a percentage. Raters agreed for 85% of the articles (agreed on 281, disagreed on 49). The first author and an independent evaluator reached consensus on the final decision for inclusion for articles with disagreements.

Coding and Data Extraction

For each article, we coded study characteristics (authors, year published, and journal) and participant characteristics (diagnosis and target behavior). We also coded general characteristics of the descriptive assessment and functional analysis (type of descriptive assessment and functional analysis, who interacted with the participant during the assessment, who collected data, and where the assessment was conducted). We coded the type of functional analysis (multiple isolated contingencies, brief, pairwise, trial-based, latency-based, or other) and descriptive assessment (antecedent-behavior-consequence assessment or structured descriptive assessment) using the definitions provided in Table 1. For each descriptive assessment, we categorized the dependent variable(s) evaluated (e.g., conditional probability of a consequence given the occurrence of the target behavior).

We coded the outcomes of both the descriptive assessment and functional analysis based on the written description of the results provided in the articles. Although the authors of all studies included a graphical data display for the results of the functional analysis, most studies did not include the data for the descriptive assessment. However, all studies included the authors' interpretation of the results for both methods of assessment. Therefore, we relied on the authors' interpretations of their data rather than reanalyzing it based on an assumption that the peer review process exerted a form of quality control for the authors' interpretation of the functional analysis data. For both the descriptive assessment and

Table 1

Definitions for Types of Functional Analysis Used in Coding

Type of Functional Analysis	Definition	Reference
Multiple isolated contingencies	Included 3 or more of the following conditions: play/control, attention, escape from task demand, tangible, alone, ignore; used a multielement design or reversal design with a single condition per phase	Iwata et al. (1982/1994)
Brief	Included a limited number (1-2) of brief sessions (less than 10 min) with contingency reversals	Northup et al. (1991)
Pairwise	Included comparison/s between one test and one control condition at a time using a multi-element design	Iwata et al. (1994)
Trial-based	Included series of test/control trials as opposed to sessions	Bloom et al. (2011)
Latency-based	Conducted in a session format, where the sessions were terminated as soon as the target behavior occurred	Thomason-Sassi et al. (2011)
Other	Included analyses that met the definition of *Functional Analysis*, but did not fall within one of the above defined categories	--
Type of Descriptive Assessment	**Definition**	**Reference**
ABC	Observers collected direct measures on antecedents and consequences of the occurrence of the target behavior and did not arrange for or conduct any systematic manipulation of antecedent variables	Miltenberger (2016)
SDA	Researchers arranged for systematic manipulation of antecedent variables, but not consequent variables; observers collected direct measures on the antecedents, behaviors, and consequences	Anderson & Long (2002)

Note. ABC = antecedent behavior consequence; SDA = structured descriptive assessment. The categories for Type of Functional Analysis were based on two main aspects: (a) the number and type of conditions included and (b) the method for implementing the conditions.

functional analysis, we coded the presence or absence of each function using the following categories: attention, escape, tangible, and automatic. For example, if the authors concluded that the target behavior served both attention and escape functions based on the descriptive assessment for one participant, we coded it as identifying the presence of attention and escape functions and the absence of tangible and automatic functions.

The first and second author coded each article. We calculated point-by-point interrater agreement by comparing the completed coding forms for each article and dividing the number of agreements by the number of agreements plus disagreements and then converting the proportion to a percentage. Interrater agreement was 92% overall (range, 75%–100%). Table 2 displays the interrater agreement scores for each coding category (e.g., participant information, descriptive assessment characteristics). For all articles that did not have 100% agreement, the first and second author met to reach a consensus for all points of disagreement; the consensus data were included for data analysis.

Data Analysis

Analysis by Article and Participant

At the article level ($N = 48$), we summarized the frequency of article characteristics including publication outlet and year published. At the participant level ($N = 148$), we summarized the frequency of diagnosis and target behavior.

Analysis of Correspondence between Assessment Outcomes

Several articles described studies that included multiple descriptive assessments, functional analyses, or both, per participant (e.g., conducting

Table 2

Summary of Interobserver Agreement for Coding

Coding Category	IOA score
Final eligibility check	100%
Participant information	96.6%
Descriptive assessment characteristics	87.9%
Descriptive assessment "quality indicators"	93%
Functional analysis characteristics	91.5%
Functional analysis methodological quality	98.7%
Summary of outcomes for descriptive assessment & functional analysis	92.2%

two types of descriptive assessment for a participant and comparing the results to a functional analysis). Therefore, all remaining analyses are at the level of individual comparisons of descriptive assessment and functional analysis results ($N = 219$). Across comparisons we summarized the frequency of general characteristics of the descriptive assessment and functional analysis (e.g., type of descriptive assessment and functional analysis, implementers, data collectors). We analyzed the *degree of correspondence* between the outcomes of the descriptive assessment and functional analysis for each comparison by dividing the number of functions on which the two assessments agreed by the total number of functions assessed by the functional analysis. For example, if a descriptive assessment indicated an attention function for one participant and the functional analysis tested for attention, tangible, escape, and automatic functions, but only identified an escape function, we scored the assessments as agreeing on the absence of tangible and automatic functions but disagreeing on the presence of escape and attention functions. Accordingly, the degree of correspondence for this example comparison would be two agreements out of four possible functions, or 0.5. It should be noted that whenever the degree of correspondence was less than 1.0, this indicated that the two assessments did not agree on the presence or absence of at least one function of challenging behavior. We evaluated two characteristics of the correspondence data: the percentage of comparisons with exact correspondence and the mean degree of correspondence. The percentage of comparisons with exact correspondence was essential to include because it characterized how likely descriptive assessments and functional analyses were to agree on the function of challenging behavior (i.e., agree on the presence and absence of all functions). However, in addition to this stringent measure, it was important to include the mean degree of correspondence (a more lenient, but comprehensive measure) to characterize the degree of correspondence across all comparisons. Including both of these measures provides a more complete analysis of the correspondence between the outcomes of descriptive assessment and functional analysis – when the percentage of comparisons with exact correspondence measure indicates that there were comparisons without perfect correspondence, the mean degree of correspondence measure provides information on whether those comparisons without perfect correspondence were usually close (e.g., 0.76 or 0.8; disagree on one function) or far off (e.g., 0 or 0.2; disagreed on most functions).

Analysis of Outcomes by Function

To further examine the nature of correspondence between descriptive assessments and functional analyses, particularly with respect to the tendency for one assessment method to show more or less correspondence for certain functions, we calculated the extent to which descriptive assessments rule in or out the same functions and predicted the outcomes of the functional analysis.

Sensitivity and Specificity. We examined the sensitivity and specificity of descriptive assessments relative to functional analyses for the attention, escape, tangible, and automatic functions, and summarized these data across all comparisons and by type of descriptive assessment (i.e., structured descriptive assessment vs. antecedent-behavior-consequence assessments). In the context of this study, the term *sensitivity*

refers to the proportion of functions identified by descriptive assessments that are true positive findings. Similarly, the term *specificity* refers to the proportion of functions ruled out by descriptive assessments that are true negative findings. We considered the functional analysis the standard against which the results of descriptive assessments were compared when calculating sensitivity and specificity. That is, we calculated the sensitivity of descriptive assessments by dividing the number of comparisons where a descriptive assessment and a functional analysis agreed on the presence of a function by the number of comparisons in which the functional analysis indicated the presence of that function. A high level of sensitivity would suggest that, when the functional analysis indicates the presence of a function, the descriptive assessment is likely to identify the presence of that same function. In contrast, low sensitivity would suggest that a descriptive assessment is unlikely to indicate the presence of a function identified by a functional analysis. We calculated specificity by dividing the number of comparisons in which the descriptive assessment and functional analysis agreed on the absence of a function by the number of comparisons in which the functional analysis indicated the absence of that function. In contrast to sensitivity, a high level of specificity would suggest that a descriptive assessment is likely to indicate the absence of a function ruled out by a functional analysis.

Predictive Value Analysis. We calculated the positive predictive value and negative predictive value across all comparisons, and by type of descriptive assessment (i.e., structured descriptive assessment vs. antecedent-behavior-consequence assessments). For this study, *positive predictive value* refers to the extent to which the results of a descriptive assessment correctly predicted an instance in which the corresponding functional analysis identified the presence of the same function. We calculated the positive predictive value of descriptive assessments by dividing the number of comparisons where a descriptive assessment and a functional analysis agreed on the presence of a function by the number of comparisons in which the descriptive assessment indicated the presence of that function. High positive predictive value for a given function would indicate that, when the descriptive assessment suggests the presence of that function, the functional analysis is likely to corroborate the result. That is, the descriptive assessment would be a good predictor for the presence of that function. Low positive predictive value would indicate that the descriptive assessment is a poor predictor for the presence of that function, and that when that function is indicated by the descriptive assessment, a functional analysis will likely identify a different function. In contrast, *negative predictive value* refers to the extent to which a descriptive assessment correctly predicted an instance in which the corresponding functional analysis identified the absence of the same function. We calculated the negative predictive value of descriptive assessments by dividing the number of comparisons where a descriptive assessment and functional analysis agreed on the absence of a function by the number of comparisons in which the descriptive assessment hypothesized the absence of that function. High negative predictive value would indicate that descriptive assessment is successful at predicting the absence of a given function.

Results

Analysis by Article and Participant

Table 3 depicts the number of articles that compared descriptive assessment results to those of a functional analysis by journal and year. Studies were published across 18 journals, with the most articles identified from the *Journal of Applied Behavior Analysis*. The earliest study was published in 1991, and about half of the studies were published between 2000 and 2009. Table 4 summarizes participant characteristics. The most commonly reported participant diagnosis was developmental delay/intellectual disability

Table 3

Article Characteristics

Characteristic	*n*	%
Journal		
Journal of Applied Behavior Analysis	13	27
Education and Treatment of Children	6	12
Journal of Behavioral Education	4	8
Behavioral Interventions	3	6
Behavior Modification	3	6
Education and Training in Mental Retardation and Developmental Disabilities	3	6
Behavior Analysis in Practice	2	4
Behavioral Disorders	2	4
Research in Developmental Disorders	2	4
School Psychology Review	2	4
Australian Educational and Developmental Psychologist	1	2
Behavior Change	1	2
Journal of the Associations for the Severely Handicapped	1	2
Journal of Developmental and Physical Disabilities	1	2
Journal of Positive Behavioral Interventions	1	2
Proven Practice	1	2
School Psychology Quarterly	1	2
Topics in Early Childhood Special Education	1	2
Total	48	
Year Published		
1990-1999	14	29
2000-2009	23	48
2010-2018	11	23

Table 4

Participant Characteristics (N = 148)

Characteristic	*n*	%
Diagnosis		
Developmental delay, intellectual disability, mental retardation	61	41
Autism spectrum disorder	42	28
Medical diagnosis (e.g., seizures, microcephaly)	22	15
No Diagnosis	14	10
Physical disability (e.g., cerebral palsy, hearing impaired)	13	9
Not reported	9	6
Genetic disorder (e.g., Down Syndrome, Angelman)	6	4
Emotional or behavioral disorder, or mental illness	5	3
Speech/language delay	4	3
Total	176	
Target Behavior		
Disruptive behavior	53	36
Aggression	45	30
Self-injurious behavior	45	30
Food refusal	19	13
Noncompliance	14	10
Stereotypy	13	9
Low engagement	12	8
Property destruction	10	7
Elopement	3	2
Total	214	

Note. Many participants had multiple diagnoses and target behaviors. The sum in each category was divided by the number of participants, yielding a total percentage above 100.

(41%), followed by autism spectrum disorder (28%). The most common target behavior was disruptive behavior (36%), followed by aggression and self-injurious behavior (30% each). Table A of the Supporting Information includes descriptions for each article included in the review.

The remainder of the results describe the data and analyses conducted at the comparison level. Table 5 depicts the assessment characteristics for descriptive assessments and functional analyses. There were 201 comparisons (92%) that included an antecedent-behavior-consequence assessment, whereas 18 included a structured descriptive assessment (8%). Forty percent of descriptive assessments were conducted in the school/classroom setting, followed by home/community setting (21%). Accordingly, the most common implementers of descriptive assessments were caregivers (39%) and teachers (32%). Although descriptive assessments frequently took place in natural settings and were conducted by individuals typically in those settings, the data were primarily collected by researchers (63%).

Assessment characteristics differed for functional analyses: The most common forms of functional analysis were those that evaluated multiple isolated contingencies (n = 153, 70%), and pairwise functional analyses were the second most common (n = 39, 18%). Thirty-four percent of functional analyses took place in school/classroom settings and 32% in clinic settings. Even though many functional analyses frequently took place in school settings, most were conducted by researchers

Table 5

Assessment Characteristics per Comparison (N = 219)

Descriptive Assessment Characteristic	*n*	%	Functional Analysis Characteristic	*n*	%
DA Type			FA Type		
ABC	201	92	Multiple isolated contingencies	153	70
SDA	18	8	Brief	16	7
DA Dependent Variables			Pairwise	39	18
CP given behavior	74	34	Trial based	6	3
CP given event	11	5	Latency based	1	.5
Both CP	29	13	Other	4	2
CP and UP	36	16			
Unclear/unspecified	69	32			
DA Implementer			FA Implementer		
Teacher	71	32	Teacher	33	15
Staff	47	21	Staff	16	7
Researcher	-	-	Researcher	130	59
Caregiver	85	39	Caregiver	12	5
Multiple	4	2	Multiple	8	4
Not reported	12	5	Not reported	20	9
DA Data Collector			FA Data Collector		
Teacher	9	4	Teacher	-	-
Staff	-	-	Staff	-	-
Researcher	139	63	Researcher	209	95
Caregiver	49	22	Caregiver	-	-
Observer	4	2	Observer	4	2
Not reported	18	8	Not reported	6	3
DA Setting			FA Setting		
School/classroom	88	40	School/classroom	75	34
Home/community	47	21	Home/community	23	11
Clinic/analog	20	9	Clinic/analog	69	32
Multiple	64	29	Multiple	52	24
Not reported	-	-	Not reported	-	-

Note. DA = descriptive assessment; FA = functional analysis; ABC = antecedent behavior consequence; SDA = structured descriptive assessment; CP = conditional probability; UP = unconditional probability.

(59%), and researchers were also the most frequent data collectors (95%).

In 74 comparisons (34%), data from descriptive assessments were analyzed by calculating the conditional probability of targeted antecedents or consequences (i.e., "events") given the occurrence of target behavior (i.e., P[Event|Behavior]). In 11 comparisons (5%), descriptive assessment data were analyzed by calculating the conditional probability of target behavior given different contexts or the occurrence of different antecedents or consequences (i.e., P[Behavior|Event]). In 29 comparisons (13%), descriptive assessment data were analyzed by calculating both aforementioned types of conditional probabilities. In 36 comparisons (16%), descriptive assessment data were analyzed by calculating conditional probabilities and unconditional probabilities. Finally, in 69 comparisons (32%), the articles did not clearly specify the method of analyzing data from the descriptive assessment.

Analysis of Assessment Outcomes

Figure 2 displays the degree of correspondence across all comparisons. Correspondence of 1.0 indicates that the descriptive assessment and functional analysis agreed on the presence and absence of all functions for that comparison. Thus, a correspondence of 0 would indicate that the descriptive assessment and functional analysis did not agree on the presence or absence of any functions. Fifty percent

Figure 2

Degree of Correspondence Across All Comparisons

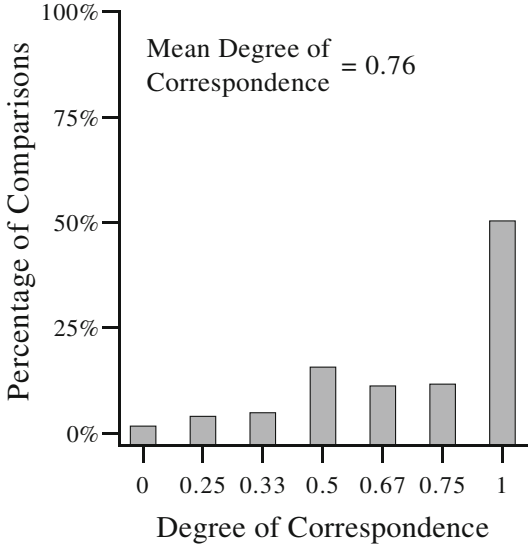
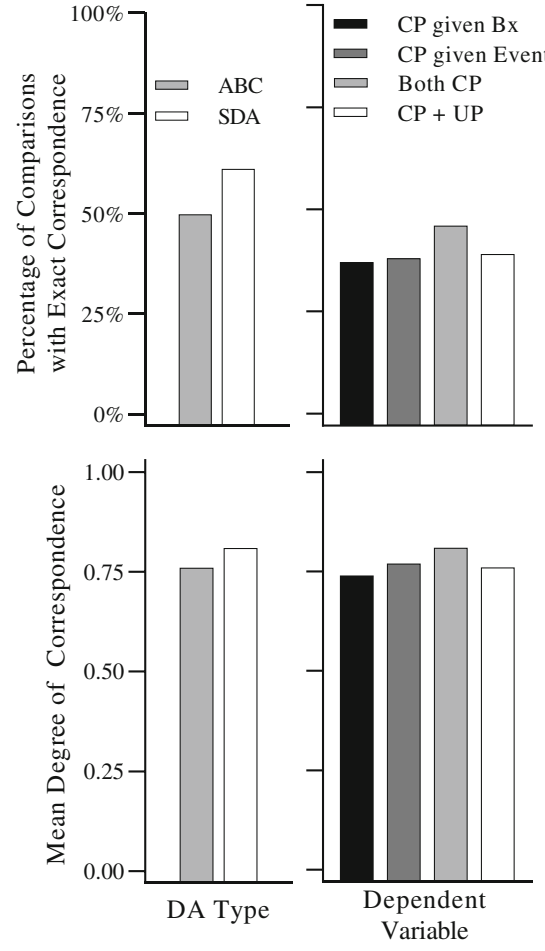


Figure 3

Correspondence by Descriptive Assessment Characteristics



Note. Percentage of comparisons with exact correspondence are shown in the top panel and mean degree of correspondence are shown in the botttom panel. ABC = antecedent-behavior-consequence recording; SDA = structured descriptive assessments; CP = conditional probability; UP = unconditional probabiltiy; Bx = behavior.

of all comparisons had correspondence of 1.0. Eighty-nine percent had correspondence greater than or equal to 0.5. Two percent of comparisons had zero correspondence. Mean degree of correspondence for all comparisons was 0.76 (95% confidence interval: 0.73 to 0.8).

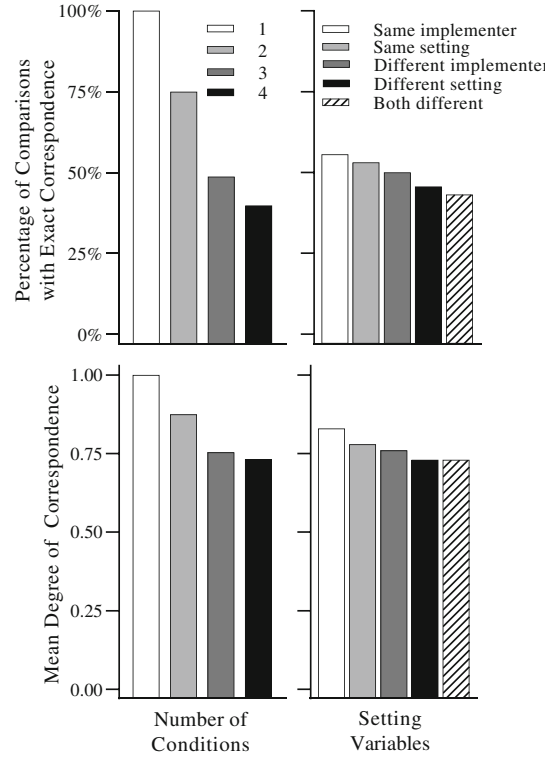
Figure 3 displays the correspondence between descriptive assessments and functional analyses across two procedural characteristics of the descriptive assessments: descriptive assessment type and descriptive assessment dependent variable. The top left panel of Figure 3 shows the percentage of comparisons with perfect correspondence (i.e., 100%) across antecedent-behavior-consequence assessments and structured descriptive assessments. Sixty-one percent of comparisons of structured descriptive assessments and functional analyses yielded prefect correspondence, whereas 50% of comparisons of antecedent-behavior-consequence assessments to functional analyses yielded perfect correspondence. The top right panel of Figure 3 shows the percentage of comparisons with exact correspondence across different descriptive assessment dependent variables: conditional probabilities of antecedents or consequences given the occurrence of target behavior (conditional probability given behavior); conditional probability of target behavior given different contexts or the occurrence of different antecedents or consequences (conditional probability given Event); both types of conditional probabilities (Both conditional probability); and conditional probability and unconditional probability. Thirty-seven percent of comparisons had

exact correspondence for conditional probability of events given behavior, 38% for conditional probability of behavior given events, 46% for both types of conditional probability, and 39% for conditional probability and unconditional probability. The bottom panels show the mean degree of correspondence across all comparisons for descriptive assessment procedural characteristics. As shown in the bottom left panel, the mean degree of correspondence was 0.76 and 0.81 for antecedent-behavior-consequence assessments and structured descriptive assessments, respectively. As shown in the bottom right panel, the mean degree of correspondence was 0.74, 0.77, 0.81, and 0.76 for conditional probability given behavior, conditional probability given event, both conditional probability, and conditional probability + unconditioned probability, respectively.

Figure 4 displays the correspondence between descriptive assessments and functional analyses across characteristics of how the functional analysis was implemented. The top two panels show the percentage of comparisons with perfect correspondence separated by the number of test conditions included in the functional analysis (left panel) and differences in the setting and implementer of the descriptive assessment versus the functional analysis (right panel). The top left panel shows that 100% of comparisons in which the functional analysis included only one test condition had perfect correspondence with the descriptive assessment, 75% had perfect correspondence when the functional analysis included two test conditions, 49% when the functional analysis included three test conditions, and 40% when the functional analysis included four test conditions. The top right panel shows that when the same implementer conducted both the descriptive assessment and functional analysis, 56% of comparisons had exact correspondence. When the descriptive assessment and functional analysis were conducted in the same setting, 53% of comparisons had exact correspondence. Fifty

Figure 4

Correspondence by Functional Analysis Characteristics

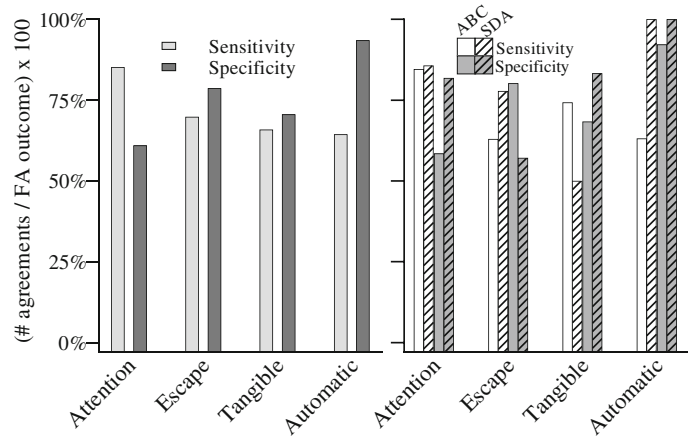


Note. Percentage of comparisons with perfect correspondence are shown in the top panel and mean degree of correspondence are shown in the bottom panel.

percent and 47% of comparisons had exact correspondence when the implementer and setting, respectively, were different across the descriptive assessment and functional analysis. When both the implementer and setting were different between the descriptive assessment and functional analysis, 43% of comparisons had exact correspondence. The bottom panels of Figure 4 show the mean degree of correspondence across all comparisons for functional analysis procedural characteristics. As shown in the bottom left panel, the mean degree of correspondence was 1.0, 0.88, 0.75, and 0.73 when the functional analysis included one, two, three, or four test conditions, respectively. As shown in the bottom right panel, the mean degrees of correspondence were 0.83 and 0.78 when the functional analysis was

Figure 5

Sensitivity and Specificity Across All Comparisons and by Descriptive Assessment Type



Note. ABC = antecedent-behavior-consequence recording; SDA = structured descriptive assessments.

conducted with same implementer and setting, respectively. The mean degrees of correspondence were 0.76 and 0.73 when the implementer and setting, respectively, were different. The mean degree of correspondence was 0.73 when both the implementer and setting differed.

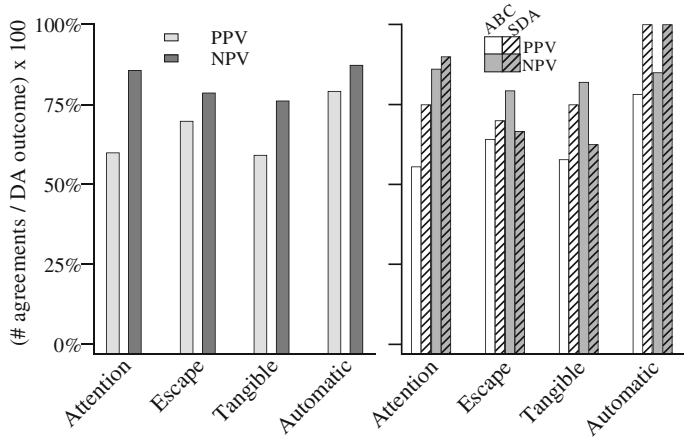
Analysis of Outcomes by Function

Sensitivity and Specificity Analysis

Figure 5 displays the sensitivity and specificity of descriptive assessments, overall (left panel), and by type of descriptive assessment (right panel). The left panel displays the overall sensitivity and specificity of descriptive assessments when compared to functional analyses across each function. The sensitivity of descriptive assessments with respect to detecting an attention function was 85%, meaning that descriptive assessments indicated an attention function for 85% (69/81) of comparisons for which the functional analyses indicated that attention was a function. The sensitivity of descriptive assessments was 70% (51/73), 66% (29/44), and 64% (38/59) for escape, tangible, and automatic functions, respectively. The specificity of descriptive assessment with respect to detecting the absence of an attention function was 61%, meaning that descriptive assessment indicated the absence of an attention function for 61% (72/118) of comparisons for which the functional analysis indicated that attention was not a function. The specificity of descriptive assessments was 78% (81/103), 71% (48/68), and 93% (145/155) for escape, tangible, and automatic functions, respectively.

Figure 5 also depicts the sensitivity and specificity analyses separated by the type of descriptive assessment (antecedent-behavior-consequence assessment vs. structured descriptive assessment). Structured descriptive assessments had higher sensitivity than antecedent-behavior-consequence assessments for escape (78% [7/9] and 63% [34/54], respectively) and automatic (100% [2/2] and 63% [36/57], respectively) functions. The two descriptive assessment methods had similar sensitivity when detecting an attention function (86% [6/7] and 85% [55/65] for the structured descriptive assessment and antecedent-behavior-consequence assessments, respectively). For tangible functions, structured descriptive assessments had lower sensitivity than antecedent-behavior-consequence assessments (50% [3/6] and 74% [26/35], respectively). Structured descriptive assessments had higher specificity than antecedent-behavior-consequence assessments

Figure 6
PPV and NPV Across All Comparisons and by Descriptive Assessment Type



Note. PPV = positive predictive value; NPV = negative predictive value; ABC = antecedent-behavior-consequence recording; SDA = structured descriptive assessments.

for the attention (82% [9/11] and 58% [62/106], respectively), tangible (83% [5/6] and 68% [41/60], respectively), and automatic (100% [16/16] and 92% [119/129], respectively) functions. For escape functions, structured descriptive assessments had lower sensitivity than antecedent-behavior-consequence assessments (57% [4/7] and 80% [77/96], respectively). In short, structured descriptive assessments had higher sensitivity and specificity for most functions. However, this conclusion is tempered by the fact that there were far fewer structured descriptive assessments than antecedent-behavior-consequence assessments.

Predictive Value Analysis

Figure 6 displays the data for the predictive value analysis of descriptive assessments across functions. The positive predictive value for descriptive assessments was 60% (69/115), 70% (51/73), 59% (29/49), and 79% (38/48) for attention, escape, tangible, and automatic functions, respectively. In contrast, the negative predictive value for descriptive assessments was 86% (72/84), 79% (81/103), 76% (48/63), and 87% (145/166) for attention, escape, tangible, and automatic functions, respectively. These data reflect the extent to which the results of descriptive assessments correctly predicted the results of functional analyses and suggested that descriptive assessments are better at predicting that functional analyses will rule out a function (e.g., higher negative predictive value) than rule in a function (e.g., lower positive predictive value).

The right panel of Figure 6 displays the predictive values separated by type of descriptive assessment. Structured descriptive assessments had higher positive predictive value than antecedent-behavior-consequence assessments when detecting attention (75% [6/8] and 55% [55/99], respectively), escape (70% [7/10] and 64% [34/53], respectively), tangible (75% [3/4] and 58% [26/45], respectively), and automatic (100% [2/2] and 78% [36/46], respectively) functions. There was no consistent difference between structured descriptive assessments and antecedent-behavior-consequence assessments with respect to negative predictive value. Structured descriptive assessments had higher negative predictive value than antecedent-behavior-consequence assessments for attention (90% [9/10] and 86% [62/72], respectively) and automatic (100%

[16/16] and 85%, [119/140] respectively) functions. Structured descriptive assessments had lower negative predictive value than antecedent-behavior-consequence assessments for escape (66% [4/6] and 79% [77/97], respectively) and tangible (63% [5/8] and 82% [41/50], respectively) functions. These data suggest that the results of structured descriptive assessments may be a stronger predictor of functional analysis results than those of antecedent-behavior-consequence assessment when it comes to indicating the presence of a function. However, structured descriptive assessment and antecedent-behavior-consequence assessments performed similarly in terms of predicting cases where the functional analysis rules out functions.

Discussion

In this systematic review, we analyzed the results of 48 studies that included results for a descriptive assessment and functional analysis for the same participant and target behavior, allowing for an evaluation of the degree and nature of correspondence between the results of these two methods. We found that the results of descriptive assessments corresponded exactly with the results of functional analyses for 50% of comparisons analyzed, and that the results of descriptive assessments corresponded with those of functional analyses to varying degrees when it came to ruling in (sensitivity) and ruling out (specificity) specific functions. We also found that descriptive assessments were better at predicting when a functional analysis would rule out a function (negative predictive value) compared to predicting that a functional analysis would rule in a function (positive predictive value).

This systematic review contributes to the research literature in several ways. First, we analyzed a large number of studies and comparisons between descriptive assessments and functional analyses in an attempt to synthesize their findings and better understand the degree to which the outcomes of these two methods correspond. Our findings replicate previous studies (e.g., Thompson & Iwata, 2007) showing that the degree of correspondence between descriptive assessments and functional analyses is modest (50% of cases). This relatively low correspondence with the results of functional analyses suggests that descriptive assessments may be relatively less informative when developing function-based treatments. However, this interpretation rests upon the assumption that the results of functional analyses are always accurate and always lead to successful intervention. The ultimate test of any functional behavioral assessment, whether it be a descriptive assessment or a functional analysis, is the effectiveness of the treatment based upon its findings (Tiger & Effertz, 2021). Although results of this study demonstrate that descriptive assessment results do not correspond well with those of functional analyses, this does not necessarily mean that cases of low or no correspondence would have resulted in failed treatments. Future research might compare the outcomes of treatments derived from the results of descriptive assessments and functional analyses to address this question.

A second way in which these results contribute to the literature is the application of sensitivity, specificity, and predictive value analyses to further evaluate the nature of agreements and disagreements between the results of descriptive assessments and functional analyses. The results of these analyses shed some light on how the results of descriptive assessments do and do not align with those of functional analyses. Generally, descriptive assessments had relatively high negative predictive values across functions, suggesting that they correctly predict when functional analyses will rule out particular functions. A practical implication of these findings is that descriptive assessments may be good at predicting the absence of a function, though less useful for identifying the presence of one. This information could be used to refine clinical hypotheses and

guide the remaining steps of the functional assessment process by ruling out functions for further assessment via a functional analysis.

The results of the sensitivity, specificity, and predictive value analyses also provide information on the relation between descriptive assessment and functional analysis relative to specific function categories. Results of the sensitivity and specificity analyses suggest that descriptive assessments were more likely to agree with the results of functional analyses regarding the absence of automatic, escape, and tangible functions and the presence of an attention function. Sensitivity of descriptive assessments for automatic functions was 64% and specificity was 93%, indicating that the results of descriptive assessments have a high likelihood of agreeing with functional analyses that rule out an automatic function, but much less so for functional analyses that rule in an automatic function. A similar pattern was found for the escape and tangible functions, for which specificity was higher than sensitivity, suggesting that descriptive assessments are more likely to agree with functional analyses on identifying the absence of those functions. A different pattern was found for the attention function, for which sensitivity was higher than specificity. Further, the sensitivity for the attention function was high (85%) compared to the other functions. However, when viewing these data alongside the predictive value analyses, it seems clear that descriptive assessments are overly inclusive of the attention function. The positive predictive value of 60% indicated that, of the comparisons for which the descriptive assessment identified an attention function, the functional analysis did not for a large number of those cases. Thus, descriptive assessments appear to have low predictive value for the presence of an attention function. This pattern was also observed in the predictive value data for the escape, tangible, and automatic function, but is most notable for the attention and tangible functions.

A final way that this systematic review contributes to the literature is that it allowed an evaluation of the extent to which different descriptive assessment characteristics may have influenced correspondence with functional analyses. Structured descriptive assessments were more likely to have perfect correspondence with a functional analysis, result in higher sensitivity and specificity for most functions, and result in higher positive predictive value for all functions compared to antecedent-behavior-consequence assessments. This finding provides preliminary evidence that structured descriptive assessments, as a method of descriptive assessment, outperform antecedent-behavior-consequence assessments when it comes to predicting results of a functional analysis. We also saw that comparisons in which the descriptive assessment applied both types of conditional probability analyses resulted in a higher proportion of comparisons with perfect correspondence and higher mean degree of correspondence. This finding suggests that analyzing the results of descriptive assessments using both conditional probabilities by behavior (e.g., probability of an event given the occurrence of behavior), and by event (e.g., probability of a behavior given the occurrence of an event) may result in better prediction of the result of a functional analysis. Another variable that affected correspondence between results of descriptive assessments and functional analyses was the consistency in the implementer and setting across the two assessments. We found that consistency in who implemented the assessments and where the assessments took place influenced the extent to which descriptive assessments and functional analyses produced the same results, such that correspondence between results from descriptive assessments and functional analyses decreased as more differences were introduced. Future research is needed to elucidate the relative impact of other aspects of the environment in influencing correspondence across assessments and the impact this might have on intervention effectiveness.

Some limitations to this study merit attention. One limitation of this review is that the results based on descriptive assessment type and dependent variable are limited because of uneven sample sizes across the different procedural characteristics. For example, only 8% of comparisons analyzed used a structured descriptive assessment and only 39% of comparisons included conditional probability and unconditional probability. Therefore, further evaluation of how descriptive assessment type and dependent variable may affect correspondence with functional analysis results is needed. Another limitation that may have impacted our analysis was our reliance on the authors' interpretations of functional analysis data. Even though these studies all underwent peer review, relying on the authors' interpretations may perpetuate an error in their interpretation of the data (Hall et al., 2020; Saini et al., 2020; Saini & Mitteer, 2020). Future studies should analyze the functional analysis data using the same criteria across all studies (e.g., Saini et al., 2020; Saini & Mitteer, 2020).

The current review is also limited by potential bias in our search results. Our screening and search process may have resulted in systematic exclusion of studies that should have been included. Obtaining interrater reliability is a method to address bias in the screening process, and although an independent rater screened 36% of articles, IOA was 85% which is generally considered low for a systematic review. A second source of bias is the possibility of publication bias. That is, it may be the case that correspondence between the outcomes of published descriptive assessment and functional analysis results differ from those of unpublished assessment results. Taken together, it is possible that some relevant datasets were omitted from the current analysis or that those that were included are not representative of typical assessment results. Thus, the results of this review should be viewed in light of these sources of potential bias, and future literature reviews should take steps to minimize the likelihood of bias in the screening process. Specifically, reviews should obtain reliability for all articles screened. An additional method of addressing the effects of publication bias could be evaluating large sets of archived clinical data in a manner similar to that of Petursdottir et al. (2010) or presenting the unfiltered results of series of cases using the consecutive controlled case series approach (e.g., Hagopian, 2020).

In summary, this systematic literature review replicated findings from previous research regarding the lack of correspondence between the outcomes of descriptive assessments and functional analyses, but also highlights areas where the outcome of descriptive assessments accurately predicts those of functional analyses. As discussed by authors of prior studies (e.g., Camp et al., 2009; Lerman & Iwata, 1993; Thompson & Iwata, 2007), the modest correspondence with the results of functional analyses raises questions about the validity and therefore clinical utility of descriptive assessments at assessing the function of target behavior. However, the fact that many behavior analysts rely upon descriptive assessments when developing interventions for challenging behavior (Desrochers et al., 1997; Oliver et al., 2015; Petursdottir et al., 2010; Roscoe et al., 2015) suggests that their selection of descriptive assessments is maintained by some source of reinforcement: presumably at least intermittent generation of positive outcomes of treatment. Thus, additional potentially fruitful lines of research could examine the contingencies maintaining practitioners' continued use of descriptive assessments and investigation of the overall effectiveness of descriptive assessments as a method of functional behavioral assessment.

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Received June 6, 2021
Final acceptance November 3, 2022
Associate Editor, Nathan Call

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