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WH-Question Intervention for Children With Language Disorders

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Structured Abstract

Clinical Question: For a school-age child with a language disorder, what therapy strategies are effective to improve the child's *Wh*-question answering abilities?

Method: Systematic search and review

Study Sources: Academic Search Complete, ASHAWire, Education Full Text, Education Research Complete, ERIC, Google Scholar, Psychology & Behavioral Sciences Collection, PsycINFO

Search Terms: *wh*-questions OR *wh* questions AND school age OR child* OR preschool AND intervention OR therapy OR treatment

Number of Included Studies: 4

Primary Results:

Speech-language pathologists should be aware of the developmental progression of answering *Wh*-questions, as well as what factors, beyond question type, that may influence children's *Wh*-question performance.

Children who struggle to answer *Wh*-questions may benefit from a variety of instructional techniques, including strategies that:

1. increase the visual representation of complex syntactic movement (e.g., assign colors and shapes to parts of speech, phrases, or clauses);

2. increase intrinsic motivation (e.g., immediately give the child an object associated with the question he/she answered);

3. increase naturalness (e.g., use a typically developing peer to answer the clinician's questions when the child is unable to do so); and

4. increase the level of modeling, feedback, and support (e.g., use an "I do, we do, you do" structure to therapy sessions) for incorrect answers to questions.

Conclusions: Few studies have analyzed the effectiveness of interventions to improve *Wh*-question answering abilities in children with language impairment. Of the studies that met our inclusion criteria, the majority included special populations (i.e., autism spectrum disorder, hearing loss). Only one study investigated intervention for children with developmental language disorder (DLD). These studies also covered a wide age range (3–17 years) and question types, and no two intervention studies investigated intervention for the same *Wh*-questions. Because children with DLD frequently experience difficulty answering *Wh*-questions, there is a critical need for more research on effective interventions.

Wh-Question Intervention for Children With Language Disorders

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Clinical Scenario

Briana is a graduate student in her third semester of a speech-language pathology program. She just received her clinical assignment for the summer semester—TJ, a 7-year-old boy, diagnosed with a developmental language disorder (DLD; often referred to as specific language impairment), who has come to her university's on-campus speech, language, and hearing clinic for five years. As Briana flipped through TJ's many years of norm-referenced assessment score forms and associated initial and final treatment plans, she noticed he had goals for answering *Wh*-questions across multiple semesters, with little evidence that the interventions were successful at improving his ability to answer a variety of question types.

After discussing TJ's history and the typical intervention activities used with two of his former graduate clinicians, Briana learned that both former clinicians provided therapy that asked TJ *Wh*-questions in a drill format (e.g., "Where are they going?" "Who is he going to play with?") while engaging him in play-based activities or reading a book. Later, Briana searched through therapy ideas and activities on Teachers Pay Teachers and Pinterest and found multiple products that also seemed to test *Wh*-question knowledge rather than materials that encouraged the clinician to explicitly teach the differences among question responses. Briana knew the importance of modeling a target behavior before expecting the client to perform the behavior (e.g., "I do, we do, you do" approach; Pearson & Gallagher, 1983), yet felt that TJ's last two semesters of intervention tested his question answering abilities, seemingly without teaching him specific knowledge and skills to answer the questions correctly. In other words, Briana wondered if a lack of explicit instruction may be related to the client's sustained poor performance. Before TJ came to the clinic next week for his session, Briana decided that she needed to learn more about best practices for *Wh*-question intervention because she did not want TJ to endure another semester of limited progress.

Background Information
Wh-Question Development

The ability to ask and answer *Wh*-questions is refined over many early developmental years. Children typically learn to answer what and where questions before why and when questions (e.g., Cairns & Hsu, 1978; Toler & Bankson, 1976). Parnell, Patterson, and Harding (1984) found a similar sequence of development, albeit more detailed, while investigating the question answering abilities of 40 typically developing children between the ages of 3 and 6. Each participant was presented with a total 81 stimulus items, in reference to three levels of immediacy/availability (i.e., three-dimensional item/object/action in the environment, two-dimensional picture stimulus, or hypothetical/routine event) across nine *Wh*-question forms (i.e., *what + be, what + do, where + be, which + be, who + be, whose + be, why, when,* and *what happened*). Parnell and colleagues observed that as children age, their ability to respond with accurate information (i.e., content) in a grammatically correct format (i.e., syntax) improved, especially when the question referenced people, items, or actions within the contextualized setting (i.e., the child could see, feel, hear, etc., the response to the question). The authors stressed the importance of a multifactorial analysis of children's responses to *Wh*-questions (e.g., grammatically correct? accurate information?). In terms of producing grammatically correct responses to *Wh*-questions, the following sequence was observed, ranging from easiest to most difficult question type: *where, which, what + be, who, what + do, when, whose, why, what happened*. Children produced accurate responses, albeit with grammatical errors, according to the sequence: *what + be, which, where, who, whose, what + do, why, when, what happened*. With respect to asking questions, children also progress through a similar acquisition sequence for asking *Wh*-questions, beginning with mastery of asking *what, where,* and *who* questions, and subsequently, acquiring the ability to ask *how, why,* and *when* (Bloom, Merkin & Wooten, 1982). Overall, before a child's fourth birthday, the majority of question forms should be mastered and allow a child to ask, as well as answer, questions.

Wh-Question Abilities in Children With Language Disorders

Children with DLD (Deevy & Leonard, 2004; van der Lely, 1998) and autism spectrum disorders (ASD) (Cadette, Wilson, Brady, Dukes, & Bennett, 2016; Vicker, 2006) often struggle to answer *Wh*-questions. The differences observed among children with impaired language skills and those for whom language has developed typically may be, in part, related to the finding that implicit exposure to *Wh*-question forms, although an effective language learning input for typically developing children (Valian & Casey, 2003), does not appear to facilitate development in the same manner for those children with language impairment (Bishop, Adams, & Rosen, 2006).

Depending on the nature of the child's language impairment, preschool- and school-age children with delayed language skills will likely progress through the developmental acquisition of *Wh*-question answering abilities similar to that of typically developing students, albeit at a slower rate (Goodwin, Fein, & Naigles, 2012), with comprehension of *who, what-do*, and *where* questions appearing sooner than comprehension of *why, when,* and *how* questions (Friemoth Lee & Ashemore, 1983; Parnell, Amerman, & Harting, 1986). Beyond the type of *Wh*-question asked to a child with language impairment, difficulty answering the question may also be related to other factors. Several studies have reported on the influence of *Wh*-phrase movement (e.g., object questions [*What are you baking?*] versus subject questions [*Who is baking the cake?*]), because the syntax of a question may require the person to rearrange the initial order of the arguments (see Friedmann & Norvogrodksy, 2011, for a review). Indeed, for children with DLD who present with specific impairments in syntax, subject *Wh*-questions are easier than object *Wh*-questions because the former question type requires "less syntactic rearranging" than the latter (Deevy & Leonard, 2004; Friedmann & Novogrodsky, 2011). Increased linguistic processing demands required to understand the question, which occurs when including more words per question, may also impact *Wh*-question performance, because children with language impairment perform better on *Wh*-questions with fewer words (Deevy & Leonard, 2004).

Clinical and Academic Relevance of *Wh*-Question

Wh-questions not only serve multiple functions in social interactions, but also hold clinical and academic merit. Norm-referenced assessments and state academic standards commonly contain language related to question answering and question asking abilities. For example, norm-referenced assessments often measure an individual's ability to answer or ask *Wh*-questions, sometimes with the use of a visual support (e.g., pictures, objects) about literal, hypothetical, or future events. Responses may be personal (i.e., in reference to the child), collective (i.e., in reference to a group, including the child), or related to "other(s)" (i.e., of no reference to the child). Furthermore, the Common Core State Standards (National Governors Association Center for Best Practices and Council of Chief State School Officers, 2010) addresses *Wh*-questions across several subcomponents of the English Language Arts Standards (e.g., Reading: Informational Text, Speaking & Listening) and grade levels; students are expected to ask and answer multiple question forms for a variety of reasons (e.g., to clear up confusion about the text, to gather additional information, to deepen understanding).

Applying the Background Information to TJ

After completing research on the developmental progression of *Wh*-questions, as well as learning that children with language impairments struggle to develop developmentally appropriate abilities in this area, Briana felt confident that adding a goal related to answering *Wh*-questions was appropriate to include within TJ's treatment plan, despite a history of limited growth. To determine which questions to address in therapy, Briana looked at the state academic standards. For TJ's age and grade level, he is expected to "ask and answer such questions as *who, what, where, when, why,* and *how* to demonstrate understanding of key details in a text" (National Governors Association for Best Practices, Council of Chief State School Officers, 2010). Although Briana knew the importance of accurately measuring her client's abilities at baseline, as well as aligning the client's therapy goals to the knowledge and skills needed for mastery of state academic standards, she was less sure of how to provide high-quality, evidence-based intervention.

Clinical Question

Using the PICO format (Population, Intervention, Comparison/Control, Outcome) to frame her clinical question, Briana posed the following inquiry: For a school-age child with a language disorder (P), what therapy strategies (I) are effective to improve the child's *Wh*-question answering abilities (O)?

Because Briana was unaware of any specific treatment approaches for *Wh*-question intervention beyond simply asking the child questions, she did not include a comparison or control (C) within her question.

Search for the Evidence

To locate as many intervention articles as possible, Briana thought it best to include broad search terms that addressed the nature of the intervention/outcome (*Wh*-questions OR *Wh* questions), contained a similar age range to her client (AND school age OR child* OR preschool), and terms synonymous with intervention (AND intervention OR therapy OR treatment). Because Briana was still a university student and had access to the university's library, she decided to search several databases including: the university library (ERIC, Academic Search Complete, Education Full Text, Education Research Complete, Psychology & Behavioral Sciences Collection, and PsycINFO); ASHAWire; and Google Scholar. Briana decided that she would only review the first 10 pages of results in Google Scholar (i.e., 100 articles), because sometimes the search engine returns irrelevant results.

Briana also decided to only analyze the results of experimental, quasi-experimental, or single-subject designs in which the researchers included participants between the ages of 3 and 21, as well as administered specific *Wh*-question progress monitoring probes and/or *Wh*-question pre- and posttest measures. In addition to these search terms and inclusion criteria, Briana limited her online search results to articles that were written (or could be translated) in English, and were published in peer-reviewed journals between January 1980 and the time of the search (May 2018).

Evaluating the Evidence

Of the three sources Briana searched (i.e., university library databases, ASHAWire, Google Scholar), 240 articles were returned. Briana was overwhelmed at the idea of reading more than 200 articles, but then realized that she could often make decisions whether or not to retain a search result by reading the title of the article. She looked for words that were familiar to her, such as *intervention, therapy,* and *treatment*, as well as research design terms, such as *single-subject, randomized control trial,* and *experimental* to determine if the article required further analysis. In situations where the title seemed a bit ambiguous, Briana read the abstract to determine if the study met her inclusion criteria (e.g., age, language, intervention for *Wh*-questions). The initial review of titles and abstracts provided Briana with 13 studies to review. Rather than reading all 13 articles in their entirety, Briana went directly to the Methods section for each article. After applying her inclusion criteria, Briana excluded 10 articles because of study design (*n* = 2; case study); a language other than English spoken by participants (*n* = 3; Afrikaans, Hebrew, Norwegian); and the absence of a dependent measure of answering *Wh*-questions (*n* = 5; interventions focused on asking, rather than answering questions) (see Figure 1). She also found an additional article that met her inclusion criteria from the reference list of one of the articles reviewed. Finally, Briana was left with four articles to read in their entirety to learn about the strategies to improve the *Wh*-question answering abilities in children with delayed language skills (see Table 1).

Summaries of Included Studies

The four studies appeared to address multiple ages (i.e., preschool to high school) and question types (i.e., who, what, where, and which). Briana thought that rather than attempt to summarize the articles as a single approach to therapy, she would instead analyze the articles for intervention strategies and ideas that she could apply individually, or in conjunction with one another, into TJ's therapy.

The first study incorporated using a typically developing (TD) peer to provide a model and increase the naturalness of answering *what + do* questions. Within a sample of preschool-age children with hearing loss, Richels, Bobzien, Schwartz, Browning, and Hester (2016) employed a multiple-baseline design to investigate the role of teachers and peers as models of grammatical forms, including answering *Wh*-questions. During 6-minute intervention sessions, picture stimuli were presented simultaneously to a child with hearing loss and a TD peer. First, the clinician asked the peer what was happening in the picture. Then,

after the peer responded, the child with hearing loss was asked the same question. Prompting procedures included verbal prompts (e.g., *What* did ____ say he was doing?"), verbal models (e.g., Yes, he *is* _____."), recasting, acoustic highlighting, and praise. Overall, this study's findings suggest that using a peer to model answering *Wh*-questions improved the question answering performance for the child with hearing loss, both immediately following intervention, as well as at a 6- to 10-week follow-up session.

The next study aimed to teach both asking and answering of *where* questions, again with preschool-age children. Koegel, Koegel, Green-Hopkins, and Barnes (2010) provided intervention to three children who were diagnosed with ASD. Intervention sessions lasted for 60 minutes and occurred two times per week over a span of approximately 4 to 10 weeks. Because the primary purpose of the intervention was to teach children how to ask "*Where* is the _____" in reference to an object hidden by the clinician, the clinician began the intervention by prompting the child with the verbal prompt, "Can you say, 'Where is it?'" If the child repeated the question, the clinician then answered the question, including the targeted language structure (i.e., preposition or ordinal maker), so that the child would also be exposed to terms commonly used when answering *where* questions (e.g., *under* the basket, *in front of* the door). These targeted linguistic structures (i.e., prepositions and ordinal markers) were specifically chosen for each participant based on areas of need evidenced by pretest performance and were progress monitored every fifth intervention session. By the end of the intervention, all three participants produced the correct language structure in response to a *where* question. Although generalization data was collected for asking *where* questions (all participants asked *where* questions, unprompted, in 100% of the opportunities), there was no generalization data collected for answering *where* questions. The study's findings indicated that a relatively high dose of individualized therapy (i.e., 60 minutes twice a week), with multiple models of specific linguistic structures, may be required for children with ASD. The treatment dose in this study was much higher than in the previous study for children with hearing loss (Richels et al., 2016), highlighting the need to consider the nature of a child's language impairment when determining parameters of dose and frequency of treatment.

Perhaps the most explicit and complex of all of the reviewed interventions, was the study completed by Ebbels & van der Lely (2001) in which they provided

intervention for four children, ages 11 to 13 years who were diagnosed with severe and persistent SLI, using a visual coding system to increase accurate comprehension and production of *Wh*-questions and passives. Initially, baseline measures of comprehension and production of passives and *Wh*-questions were assessed through using an "acting-out procedure" and a picture selection task from the Test of Active and Passive Sentences (TAPS; van der Lely, 1996). All participants received 13 half-hour sessions in which they were introduced to the visual coding system that consisted of color coding parts of speech (e.g., yellow = verbs) and the use of shapes to represent phrasal and clausal structure (e.g., hexagon = verb phrase). Then, participants were split into two groups (2 participants per group), with one group receiving *Wh*-question therapy while the other group received instruction on passives, both for 10 weeks. Participants received the reverse therapy the following 10 weeks, along with an additional block of *Wh*-question therapy, because the interventionists determined that the skill required more instruction. Participants were taught to identify and use syntactic cues and received explicit instruction on grammatical rules (e.g., movement of tense). This study's findings revealed that all participants improved production and comprehension of passives and *Wh*-questions, although questions that included syntactic movement (i.e., subject and object questions) negatively impacted some participants' performance.

More recently, Cadette et al. (2016) incorporated principles of direct instruction to teach three students with ASD (ages 15 to 17 years) how to answer *who, what,* and *where* questions. The authors selected these instructional targets because of participants' performance on the WH Comprehension Test (Vicker, 2002) at baseline (i.e., *What* = 0–40%, *Who* = 0–20%, and *Where* = 0–20%). Intervention was embedded into the participants' school curriculum, including modifications to include numerous opportunities for *Wh*-questions, teaching each question type in isolation, and only moving to the next question type after the participant achieved mastery on the previous. While participants looked at a picture, the interventionist 1) gave a verbal prompt, 2) referenced the picture/book, 3) asked a *Wh*-question, and 4) cued the students to respond using a hand signal. If a student did not answer the question correctly, the interventionist 1) provided a model of the correct answer (i.e., "I do"), 2) encouraged all students to say the correct answer along with her (i.e., "We do"), 3) asked the student to repeat the correct answer on his own (i.e.,

"You [all] do"), and then 4) repeated the initial question to ensure learning. At the completion of intervention (i.e., 20–30 instructional sessions in total), all students answered *who* and *what* questions with 100% accuracy and maintained mastery at the 2- and 4-week maintenance periods. The *where* question format appeared to be more difficult; one of the participants did not achieve mastery during the intervention period (average of 50% accuracy) and subsequently dropped to 25% accuracy at the 4-week maintenance probe. Although the other two participants reached mastery for answering *where* questions during the intervention, only one of these two students maintained that performance during the maintenance probes. Findings from this study indicated that systematic instruction—treating one *Wh*-question form at a time—paired with scaffolding strategies to promote independence, are effective strategies to promote mastery; however, ongoing "booster" sessions may be required to maintain these skills.

Each of the four articles that Briana reviewed addressed a slightly different aspect pertaining to her original clinical question: For a school-age child with a language disorder, what therapy strategies are effective to improve the child's *Wh*-question answering abilities? Because no two studies investigated the same *Wh*-question form, provided treatment to children of similar ages from the same population, or measured performance in the same way, Briana has several options for designing and delivering treatment for *Wh*-questions that are aligned with evidence from the literature.

The Evidence-Based Decision

Because all of the studies in this review were single-subject designs, each of which employed multiple opportunities to observe the effect of intervention, Briana decided that she would not give more weight to any single study. Although none of the studies included participants who were the same age as her client, Briana decided that she could feasibly incorporate the evidence-based intervention strategies for TJ, because he still displayed difficulty answering some of the questions targeted within the interventions. Therefore, she developed the following set of evidence-based recommendations to include in her therapy for TJ:

1. Target *Wh*-questions in the same developmental order that typically developing children display, because

there is no research to suggest that children with DLD comprehend *Wh*-questions in a different order (Cadette et al., 2016).

2. Be aware of how syntactic structures (e.g., subject versus object *Wh*-question) and length of the question may impact the child's performance (Ebbels, 2007; van der Lely, 1998).

3. Consider asking questions that have answers visible in the immediate environment. Furthermore, allow the child to manipulate or hold an object, perform an action, etc., after verbally answering the question, because the use of items/people/actions in the immediate environment may serve as an intrinsic motivator and increase generalization (Koegel et al., 2010).

4. When manipulatives may not be feasible for a question/answer (e.g., Why is she sad?), or perhaps in conjunction with using manipulatives, consider incorporating a typically developing peer into the session to serve as a language model and to increase the naturalness of asking questions and having someone else, other than you (the clinician), answer (Richels et al., 2016).

5. For children whose goals target more complex *Wh*-questions (e.g., how, why, when), or for whom, perhaps, other methods have been unsuccessful, explicitly teach the parts of speech associated with each question type, as well as how syntactic movement may influence the correct answer, using visual symbols (e.g., color coding, shapes). Make sure to present the visual symbols in a systematic manner, only presenting new symbols when required (Ebbels & van der Lely, 2001).

6. Provide levels of support for incorrect responses, including a model of the correct answer. After giving the model (i.e., I do), encourage the student to repeat the answer with you (i.e., We do), followed by asking the student to say the answer independently (i.e., You do) (Cadette et al., 2016).

Although none of the studies included in Briana's synthesis addressed her initial concern that the *Wh*-question intervention previously provided to TJ lacked explicit instruction in how to answer each question type (e.g., *Who*. If I hear the word *who* in a sentence, it means that my answer will usually include a person or animal.), Briana knew that the provision of evidence-based treatment extended beyond using only information discovered during

a literature search and also included her professional knowledge/expertise and a consideration for the client's perspective, such as the client's circumstances, preferences, and areas of need (e.g., Dollaghan, 2007; Sackett, Straus, Richardson, Rosenberg, & Haynes, 2000). Therefore, Briana decided that in addition to incorporating the recommendations from the literature, she would rely on her professional knowledge and experience to develop a systematic treatment program that also provided TJ with explicit descriptions of how to answer each *Wh*-question targeted during therapy, with ongoing "booster" sessions provided as needed to ensure that TJ would be able to answer a variety of *Wh*-questions during functional and academic activities. With treatment beginning next week, Briana now feels confident in her approach to therapy this semester and is hopeful that incorporating evidence-based strategies will improve TJ's performance on *Wh*-questions so that she will be able to make recommendations for new goals at the end of the semester, now that TJ has had the same goals in place for multiple semesters.

Authors' Note

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Table 1. Articles Included in Review

| Citation	Study design	Sample	Intervention	Measure of *Wh*-questions	Overall findings
Cadette et al., 2016	Multiple probe across behaviors	*n* = 3 Children, ages 15 to 17 years, with ASD	Approximately 30 small group sessions consisting of the clinician asking a *Wh*-question in response to a picture. Instruction occurred for only one *Wh*-question at a time. Direct instruction when student was incorrect; included a model of the correct answer and required students to repeat the correct answer.	Researcher-developed *who, what,* and *where* questions based on pictures within the Reading Mastery Language Arts curriculum. WH Comprehension Test (*who, what, where* portions only).	Increase in all participants' ability to answer *who* and *what* questions to a level of mastery; however, only two of three participants mastered *where* questions.
Ebbels & van der Lely, 2001	Multiple baseline across participants	*n* = 4 Children, ages 11 to 13 years, with SLI	Instructional sessions on the visual coding system (i.e., the meaning of the colors and shapes), followed by 10+ weeks of intervention (approximately 7 to 8 hours) on *Wh*-question comprehension and production. Intervention taught the identification and use of syntactic movement, as well as explicit grammar instruction.	Researcher-developed "*who*dunnit" game with *who* questions in response to active and passive sentences. Researcher-developed "semantically reversible" subject and object *who* and *which* questions.	Subject *Wh*-questions, easier than object *Wh*-questions. *Who* questions easier than *which* questions.
Koegel et al., 2010	Multiple baseline across participants	*n* = 3 Children, ages 3 to 4, with ASD	60-minute individual sessions implemented twice weekly; the clinician hid desired items and cued the child to produce a *where* question with a verbal prompt (i.e., Can you say, '*Where* is it?') or pause time. Objects given to child to hold as a motivator.	Researcher-developed *where* question (i.e., *Where* is the _____?).	Increase in all participants' ability to answer *where* questions to mastery (i.e., 100% accuracy).
Richels et al., 2016	Multiple baselines across participants	*n* = 3 Children, ages 3 to 4, with hearing loss	Five to seven 6-minute sessions with a peer language model. First, the peer language model was asked what was happening in a picture stimulus. Then, the child with hearing loss was asked the same question. Prompting procedures included verbal prompts (e.g., *What* did ____ say he was doing?), verbal models (e.g., Yes, he *is* _____.), recasting, pitch high-lighting, and praise.	Researcher-developed *what + do* question (i.e., *What* is he/she doing?) in response to picture stimuli.	Increase in all participants' ability to answer *what + do* questions using targeted grammatical form (e.g., correct pronoun + is + verb-ing + article/ preposition + object) to mastery (i.e., 100%).
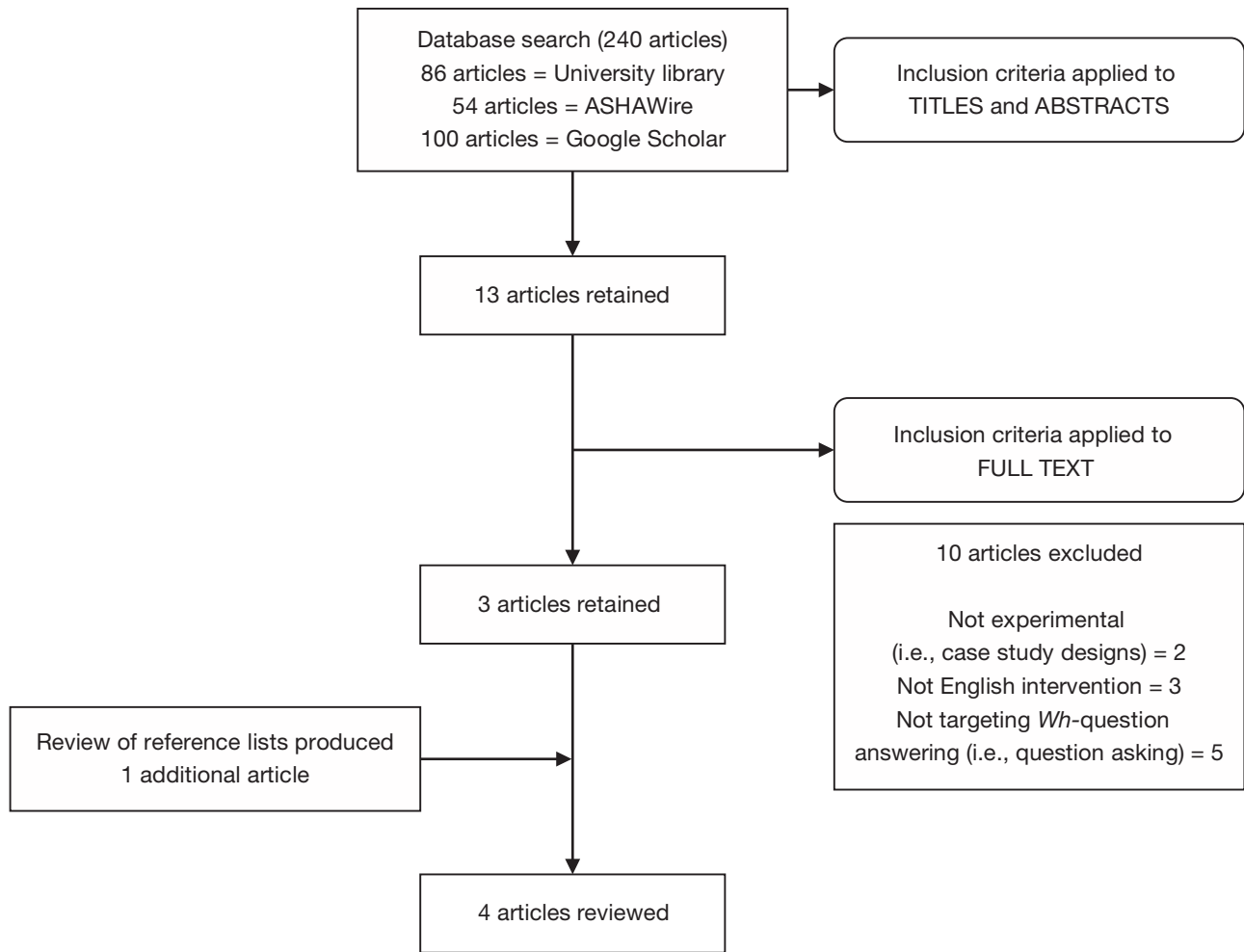
Figure 1. Search for Relevant Articles