Spring 5-13-2024

A Systematic Review on the Efficacy of Video Modeling on Social Interactions Among Individuals with Autism Spectrum Disorder

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A Thesis by:

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Submitted to the Office of Graduate Studies

Texas A&M University-San Antonio

In partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

May 2024

Major Subject: Applied Behavior Analysis

ABSTRACT

A Systematic Review on the Efficacy of Video Modeling on Social Interactions Among Individuals with Autism Spectrum Disorder

(May 2024)

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This systematic review aimed to evaluate the effectiveness of video modeling in increasing social interactions with individuals with ASD (IwASD) in transitional or postsecondary educational settings. The study inclusion criteria included (a) quantitative data must be present, (b) an objective or research question must be stated, (c) video modeling must be an intervention in their study, (d) a minimum of one target behavior must focus on social interactions, and (e) all studies must be published within the last six years. This systematic review analyzed the purpose, sample, methodology, settings, discussion, and results to find the effectiveness of the intervention, resulting in 12 out of 14 studies showing an effective and positive outcome. Furthermore, this review found that video modeling, along with an unspecified intervention, was associated with the desired intervention effect. However, the review could not reach a definitive conclusion about effectiveness in the absence of video modeling as an isolated intervention.

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INTRODUCTION

Autism spectrum disorder (ASD) is a developmental disorder characterized by impairments in social communication, sensory difficulties, and repetitive and highly restrictive behavior (Lord et al., 2020). Impairments or deficits in social communication and other interactions are ongoing issues throughout the individual's life and are often present higher in the transition from adolescence to adulthood. Individuals diagnosed with ASD may receive special education services while attending school, especially during the transitional age, to help mitigate these impairments or deficits in social interactions.

Transition Age

The Individuals with Disability Education Act (IDEA) defines transitional services as providing effective transition planning to promote successful post-school employment or education (USC1400). During transitional age, planning for independent living is an essential part of a healthy and successful life for individuals with ASD (IwASD). To help combat the difficulty with social interactions faced by IwASD, the federal legislation of IDEA provided services in postsecondary education, career, vocational, and independent living, as well as community resources and planning for adulthood starting at age 16, which help IwASD overcome the difficulties of finding employment that their disorder may present (Yell, 2019). However, these individuals still face more challenges in achieving independence. These challenges are often alleviated through planning from both professional and familial sources.

Schools and educational services for IwASD play an important role in planning transitional services like postsecondary education (Alverson et al., 2015). Postsecondary education or training is a service provided for individuals with disabilities that can be delivered

in different ways, including specialized programs in a traditional college. In these programs, independent living skills or vocational skills are tailored to the needs of the individual on or off campus. There may be mixed/hybrid programs where individuals attend inclusive classes at a college or some other separate programs for independent living skills (Ryan et al., 2019).

Challenges for IwASD

Although some programs and services are available for IwASD to continue progressing after high school, they are underutilized. Few IwASD seek to further their postsecondary education. Even though schools must plan and facilitate further training in this area, most families do not continue these interventions or services after high school. Compared with their peers with other disabilities, students with ASD are less likely to take steps to prepare for college while in high school and more likely to enroll in a 2-year college (32%) than a 4-year college (17%). Moreover, the postsecondary completion rates for IwASD remain significantly lower (39%) than that of their peers in the general population (59%) or that for students with all types of disabilities (50%) (Petcu et al. (2021). The non-continuation of their education and services can cause challenges in their progression, such as those related to meaningful social interaction skills and independent living.

Challenges in social interaction skills can affect many aspects of adulthood for any IwASD. For example, finding and keeping employment is both necessary and challenging. Miscommunication and a need for increased supervision in the workplace were negative factors when assessing the impact of hiring IwASD in the workplace (Scott et al., 2017). Focused conversation or eye contact, frequent interruptions, and deficits in recognizing facial expressions are examples of where an IwASD could face challenges (Solomon, 2020).

Further, challenges centered on social interactions leave lasting consequences in all aspects of IwASD's lives. IwASD experience less time with peers and have higher isolation rates (Orsmond et al., 2013). Not interacting/socializing with peers or obtaining friends and lasting relationships can cause mental health issues while in these transitional phases or later on in life; in fact, adults with ASD show increased levels of anxiety and loneliness, which impact their quality of life (Lin & Huang, 2019). These findings were not unique to an isolated study. However, when looking closely at higher-functioning adults with ASD who lacked the social skills to communicate effectively or interact socially, negative social-emotional outcomes like depression were noted (Laugeson & Ellingson, 2014).

Social interactions are essential for daily living, and generalizing these social skills across settings is highly important for any IwASD. The feeling of belonging in society is not always enough, but experiencing positive social contact with others is similarly necessary for anyone's future (Sun et al., 2020). Having these social interactions is difficult for IwASD, so real problems arise when it comes to low levels of socialization in their daily lives. Fortunately, there are many treatments or interventions available to combat these challenges.

Interventions for ASD

Social stories or short narratives are typical or common interventions used in school, clinical, or home settings, and they are designed to influence behavior by providing important information about the social context and behavior outcomes (Chan et al., 2011). This tool is easily crafted to reflect individual needs and can be implemented in multiple settings to increase generalization. Another commonly used intervention in school settings is peer mentoring, in which peers with neurotypical behavior provide guidance and support to students with autism (Akinla et al., 2018). Although there are some positive outcomes for peer mentoring, it is not

easily replicated in household settings for family use. This is especially true in households where IwASD do not have siblings or same-age peers.

With the recent COVID-19 pandemic, there has been an increase in virtual or screen-based interventions as a common mitigation approach that can be both easily accessed, produced, and includes video modeling. In this evidence-based intervention, individuals watch and model target behaviors shown in the video (Gul & Vuran, 2010). A target behavior is the response class selected for intervention and can be defined functionally or topographically (Cooper et al., 2020). For example, a target behavior for an IwASD could be eye-contact or a handshake. The attractiveness of this particular type of intervention lies in its easy accessibility for visual learners, affordability for its low production costs, cut in travel needs, and replicability in multiple settings with consistent application.

The field of Applied Behavior Analysis (ABA) has been a promising approach for assessing and mitigating difficulties faced by IwASD. ABA is a scientific approach to understanding human behavior through research-based interventions and environmental aspects to shape or alter socially significant behavior (Cooper et al., 2020). Research-based interventions and effective results are highly needed in the field. Thus, continued research of each intervention brings more vital information to the field, the practitioners, and the individuals who will most benefit from its use. Assessing the effectiveness of these studies would provide us with better methods of helping and guiding us toward additional research areas. ABA has helped many individuals, and the analytic principles encourage the development of additional skills while also improving individuals' lives and interfering behavior (Leaf et al., 2021).

Video modeling is a valuable intervention for IwASD for many target behaviors. In the case of social skills or social interactions, professionals or family members of an IwASD can

provide support. The ability to initiate promotes the quick acquisition of behaviors such as social communication skills (Cooper et al., 2020). Presently, healthcare insurance laws focus on early childhood intervention for IwASD and other adults who "age out" after 21 without adequate funding for further intervention (Gerhardt et al., 2022). Promoting this intervention, coupled with further study and utilization, would highlight to practitioners or related professionals and families the effectiveness of the usage. Additional research is needed in this area to advance the usage of video modeling as an effective means of intervention, especially as the increasing lack of social interactions continues to impact IwASD throughout their life. Laugeson and Ellingsen (2014) discuss the importance of this intervention and note an obvious lack of studies for adults and especially adolescents with ASD in transitional and postsecondary educational settings.

Purpose of Systematic Review

This research synthesizes studies evaluating treatments to improve social interactions with IwASD attending transition programs or postsecondary institutions that utilize video modeling as an intervention strategy. McCoy et al. (2016) found that only one out of seven studies focusing on video modeling received an adequate rating with a mean age of 9. Additionally, Qi et al. (2018) reviewed and reported video modeling as an evidence-based practice targeting social interactions with participants with a mean age of 7. The results from this current review can assist in gathering more information about this particular group and intervention. Both Qi et al. (2018) and McCoy et al. (2016) reviewed and reported valuable information for IwASD in preschool through high school settings but did not address transitional and postsecondary settings in their reviews. This review enables us to seek out, critique, and synthesize the information with replicable methods (Brunton et al., 2020). The following research question guided the review: What evidence supports the effectiveness of video-based

interventions for increasing social interactions among IwASD in transitional and postsecondary educational settings?

LITERATURE REVIEW

Young and Posselt (2012) characterized ASD as deficits in socialization and communication, restricted interests, and repetitive or stereotyped behaviors beginning in infancy (Young et al., 2018). Having these challenges will impact IwASD in their lives. This will lead to various interventions implemented from a young age that target these challenges, social/interaction skills (e.g., avoiding eye contact, lacking the ability to express emotions with facial expressions, lacking awareness regarding others' emotional states), repetitive behaviors, (e.g., lining up objects, becoming upset with minor changes, following routines) and challenges in other skills (e.g., language, learning, movement)(CDC, 2022). Notable differences in these deficits are present when examining gender. Females appeared to have greater social communication challenges, lower levels of restricted interests, lower cognitive ability, weaker adaptive skills, and greater externalizing problems relative to males. Intelligent Quotient (IQ) impacted greater social challenges and reduced adaptive behavior in females with ASD (Frazier et al., 2014). According to this study, lower levels of IQ have significant impacts on social interactions with females with ASD and adaptive behaviors like being able to function at home independently or navigating their community independently.

IwASD can have a wide range of abilities. ASD is often classified by level of support using a three-level ranking system. The system begins with level one (individuals requiring support), level two (individuals requiring substantial support), and level three (individuals requiring very substantial support; American Psychiatric Association, 2022). Other terms or categories used are high-functioning and low-functioning. The terms commonly identify individuals diagnosed with ASD with average or above-average intellectual abilities (IQ higher

than 70). High functioning differs from low-functioning autism (IQ lower than 70) based on the need for support and assistance in daily life (de Giambattista et al., 2019).

ASD is defined under IDEA as a developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before age three (USC1400). ASD is a category under the disabilities in the federal legislation of IDEA. This federal law outlines requirements that special education programs and services are provided to all eligible individuals between the ages of 3 and 21 (Yell, 2019). IwASD also received support with transitioning into adulthood, an important feature in preparation for adulthood as a student approaches the time to leave high school. A transition plan provides the structure for preparing an individual to live as fully and independently as possible. Schools and state vocational rehabilitation agencies work together to meet this need. They plan for assistive or rehabilitative technology, orientation and mobility services, travel training, and career exploration through vocational assessments and work experience opportunities (US Department of Education, 2020).

Some primary essential skills needed for independent living include personal hygiene, meal preparation, and money management. Research suggests that many individuals with ASD exhibit impairments in daily living skills relative to their cognitive skills (Bal et al., 2015). Further, a need for vocational skills training (i.e., educational programs related to preparing individuals for employment in occupations not requiring degree completion) is also important for IwASD (National Center for Education Statistics, n.d.). Transitional programs focus on teaching various areas, including employment, social security, community, long-term services and support, and postsecondary education. Additionally, information sharing with health and human services agencies and providers, guardianship, and alternatives to guardianship, including a supported decision-making agreement, can be a part of these services (Texas SPED Support.

n.d.). Postsecondary training is a legitimate path to maximize the personal growth and educational potential of students with disabilities. Thus, it is a vital stage in an individual's academic career and developmental process (Mazzotti et al., 2009).

Challenges and Interventions

Some of the challenges faced by IwASD are deficits in social skills, which are pervasive in individuals with ASD throughout their lives. Callahan et al. (2011) found that a popular intervention used to target this skill is the use of social stories or social narratives. Gray (2002) defined social stories as short stories to help IwASD understand complex social situations. For example, an individual having trouble understanding the social concept of greeting a peer every morning would use a social story or read a social story to comprehend and apply the learned behavior to the social interaction, thus acquiring the concept and building their social interactions. IwASD need these particular skills throughout life. However, interventionists focus on independence when looking at transitional and postsecondary settings.

As IwASD age, social interactions become increasingly challenging in educational or academic settings. Social interactions can be verbal and nonverbal. Thus, understanding these social interaction cues is important for a successful postsecondary education. These challenges are of major concern in postsecondary educational environments where individuals must communicate effectively and comfortably with their peers and college faculty without supervision (Zager & Alpern, 2010). An intervention targeting social interactions in postsecondary educational institutions is peer-mediation. Thiemann and Goldstein (2001) found that using peer-mediated strategies alongside social stories and video feedback was an effective tool for teaching social and communication skills. Participants increased appropriate communication (e.g., making comments, staying on topic) and decreased inappropriate social

behaviors (e.g., changing topics and not responding). Using these interventions can help target behavioral issues such as stereotyped motor movements and vocalizations, insistence on maintaining routines or sameness, and sensory difficulties, which are all associated with ASD (Schall, 2010).

Although there is an increase in ASD awareness, there are still challenges in postsecondary educational institutions like local community colleges and universities. Cali and Richdale (2016) found that parents had challenges after enrolling their children in postsecondary education. Specifically, most students felt educationally but not socially supported, and most families felt support was poor in both areas. These needs or challenges focus on understanding one's disability, social interactions, environmental accommodations related to sensory needs, living needs on campus like laundry, financial management, and sexual relationships (Roux et al., 2015). Theory of mind is another potential intervention used to target social interactions. This intervention focuses on empathy and understanding other people's mental states (Baron-Cohen., 2014). This is implemented by showing IwASD how to identify facial expressions and use those social cues to help them with social interactions. Social cues are the signals people send through body language and expressions (Understood, n.d.). Results show that intervention is important for establishing and maintaining positive relations with others. Moreover, understanding other people and their thoughts, beliefs, and behaviors makes an individual capable of reacting and responding to others (Szumski et al., 2017).

Understanding feelings is the core of social interactions with peers and the community. Social interactions are important for individuals to be a part of their community and society. The field of ABA focuses on behaviors of social importance. Target or challenging behaviors are studied using scientific methods and intervened with research-based tools to demonstrate growth

or improvement (Cooper et al., 2020). Support in all settings, like clinical, educational, and especially the workforce, can benefit IwASD. Hedley et al. (2018) found that organizational support, advice from coworkers, supportive leadership, allowance of environmental modifications, and the presence of a consultant were important to IwASD's success in the workforce. The study also had outcomes identifying a sense of purpose, personal independence, and improvements in social relationships, both with work colleagues and within families of IwASD. However, despite the positive influence of insurance reform mandating coverage for scientifically based treatments such as ABA, some individuals may face discrimination based on state-imposed age limits (Trump & Ayres, 2020).

Video-Based Intervention

The intervention focused on this systematic review is video modeling or video-based intervention. This intervention involves demonstrating or displaying the target behavior through a video presentation of the behavior. A video modeling intervention typically involves an individual watching a video demonstration and then imitating the model's behavior. Video modeling uses peers, siblings, adults, or self as the model (Bellini & Akullian, 2007). Video modeling is effective when teaching a wide range of skills like motor behaviors, appropriate sexual behaviors, conversation skills, vocational skills, social behaviors, and safety skills (Shipley-Benamou & Taubman, 2002). Additionally, the potential benefits of using video modeling are highlighted in its low cost, reproducing, and time effectiveness (Charlop-Christy et al., 2000), greater results in skill generalization and maintenance (Haring et al., 1987), and better consistency when teaching (Mason et al., 2013). For example, a professional like a BCBA can create an individualized video model for a client who may have challenges with greeting peers.

The BCBA can quickly reproduce another version of the video if needed to generalize the behavior from peers to adults without the added cost.

McCoy et al. (2016) focused on the efficacy and evidence base of video modeling, role-play, and computer-based instruction for both children and adolescents with high-functioning ASD. The criteria specifically looked at studies published between 2001 and 2014. Thesample age range was preschool-17 years old. The review also used the nonoverlap of all pairs to determine the treatment efficacy of each study. The results were 1 study having a strong rating, seven studies having adequate rating, and 21 studies having a weak rating. The review concluded that their sample characteristics played a big part in their results.

Additionally, Qi et al. (2018) focused on examining the effects of video modeling for IwASD on social communication skills using single-case research designs. The review focused on studies published between 1985 and 2015 and did not have a sample age cap. The review used the What Works Clearinghouse guidelines to examine each study. Their results showed that three studies provided strong evidence, ten studies provided moderate evidence, and five studies provided weak evidence. They concluded that video modeling interventions are considered an evidence-based practice for improving social interactions with IwASD for all ages. These two reviews indicate gaps in research when it came to IwASD in transitional and postsecondary educational settings.

METHODOLOGY

I analyzed the data using the following methodology to ensure proper research was conducted. I used the criteria outlined in this section to evaluate the study's supporting claims to conclude the effectiveness of their video-based interventions. The findings were collected using criteria that ensured the most effective strategies focused on social interactions among IwASD in transition and postsecondary educational settings based on the overall positive outcomes. What is distinct in my study is that I looked at the percentages of participants with an increase in their target behavior and calculated a positive or negative outcome based on each study's results.

Inclusion and Exclusion Criteria

The inclusion criteria were designed to have an effective selection of studies. The inclusion criteria included the following: (a) quantitative data must be present, (b) an objective or research question must be stated, (c) video modeling must be an intervention in their study, (d) a minimum of one target behavior must focus on social interactions, and (e) all studies must be published within the last six years. The criteria ensured an inclusive sample of individuals around the country and internationally affiliated and extended the review done by Qi et al. (2018). A total of fourteen studies met these criteria. Studies that did not meet these criteria were excluded from this review.

Information Sources

I implemented a two-pronged approach to identify eligible studies. First, I searched Google Scholar and EBSCO. These databases were selected for use based on their comprehensive and extensive databases covering a wide range of disciplines like the one I am researching. The databases were also used for accessibility purposes and easy citation tracking. Second, I completed a journal-specific search of the *Journal of Organizational Behavior*

Management, Journal of Positive Behavior Interventions, Journal of Special Education Technology, Journal of Autism and Developmental Disorders, Journal of Applied Behavior Analysis, Focus on Autism and Other Developmental Disabilities, Journal of Autism and Developmental Disorders, Journal of Vocational Rehabilitation, Education and Treatment of Children, Communication Disorders Quarterly, *Behavior Analysis in Practice* and the *Career Development and Transition for Exceptional Individuals*. I selected these periodicals in favor of others, given the alignment of their aims and scope with the fields of education, ABA, interventions for individuals with severe disabilities like ASD, and transitional or vocational skills. The searches used the following keywords or terms: *video modeling, autism, college students, college-level, increasing peer interactions, social skills, young adults, transition-aged students, video-based interventions, social competence, enhancing social conversational skills, screen-based interventions, online modules, and tele-coaching.* The search terms I used initially focused on the main target age group, sample, and intervention. I did not use "video-prompting"; instead, I used video-based interventions, which gave me inclusive results. Video modeling was the main intervention, with video-based interventions, screen-based interventions, online modules, and tele-coaching supplementing a lack of available literature. Confirmation was conducted to ensure that forms of video modeling were utilized in every study to maintain search parameters. I did this by screening all interventions used per study and ensuring that video modeling was used during their intervention implementation. The terms I used were *college students,* and *college-aged individuals* were replaced with *young adults* and *transition-aged students,* which yielded additional opportunities for the search to be more inclusive with the population. The terms I used for the target behaviors were *increasing peer interactions, social skills, social competence, enhancing social conversational skills, conversation skills, and social*

interactions. Increasing peer interactions was used once during the search, and the term increasing was not used thereafter.

Search Timeline and Challenges

The initial search began in August of 2023 and focused on using a variety of interventions. Utilized terms included *video modeling, social narratives, and naturalistic intervention*. In October 2023, after I received feedback to explore more related behaviors, the search expanded to include *teaching social skills, vocational skills, sexual wellness, and personal hygiene using video modeling.* The expansion also changed to transition-aged individuals. The focus was selected after doing a simple search into the challenging behaviors of college-age students with ASD and available interventions. The research expanded to transition-aged and college students to ensure a more inclusive sample size. The lack of articles with the sample criteria, intervention, quantitative data, and purpose, arose as challenges to my research.

Study Selection

The screening procedures focused on finding a research question or objective, quantitative data, sample fitting the criteria, and interventions used. The sample criteria were focused on IwASD, seeking transitional services, or attending a postsecondary institution. The quantitative data focused on the target behavior of social interactions. The main difficulties were finding correct samples and ensuring standardized interventions throughout all studies.

Data Extraction

The data extraction focused on finding the purpose, sample, methodology, settings, results, discussion, future research, and effectiveness of each study. I carefully studied these relevant sections to interpret the findings of each study and find an answer to the research question. The data extraction began when I categorized all 14 articles and reviewed them

according to sample characteristics, effectiveness, study design, and treatment plan usage or dependent variables. Although qualitative data is not a part of this review, it will be reviewed to ensure an inclusive account of the emotional impact on the samples as additional sources of information to further our understanding of the impact or effectiveness.

The data were manipulated using a research matrix visual that gave quick access to information from each study, comparable insights to all studies, and effectively facilitated the information with visual aids comprehension. The systematic review was organized with the guidance of PRISMA 2020 (Page et al., 2021). A column was added to organize and rate the conclusion with a "+" for effective or "-" for ineffective and to organize more complex data, specifically the effectiveness of each article. The criteria to meet effectiveness focused on the overall average of the participants meeting at least an 80 percent mastery level or higher. Each study's results were used to calculate the average and effectiveness. For example, if their conclusion stated that "4 out of 5 participants increased their target behaviors," an average was calculated out of this statement and demonstrated 80 percent results as effective. For ineffectiveness, the criteria were focused on the sample meeting less than 70 percent mastery level. Richling et al. (2023) mentioned that most Board Certified Behavior Analysts (BCBA) professionals in the ABA field use performance criteria of 80-100%. I chose these criteria to mirror the standard practice in ABA with my clients. The coding process followed. I scanned all the discussion portions of each study line-by-line to find relevant information for the research. I found and reported themes and insightful results found in each conclusion.

Funding Sources and Conflicts of Interest

The researcher reviewed funding sources and the author's statements regarding conflicts of interest. All funding was provided for the studies by public educational institutions (i.e.,

Towson University), rehabilitation research institutions (i.e., Council for Exceptional Children Division on Career Development and Transition Graduate Research Scholarship, National Institute on Disability, Independent Living, and Rehabilitation Research), or foundations (i.e., Dan Marino Foundation) that aid initiatives for research in ASD-centered treatments. Lastly, all authors stated their lack of a conflict of interest, except Custer et al. (2021), Day-Watkins et al. (2018), and Stauch & Plavnick (2020). These three studies are affiliated with public postsecondary institutions and internationally accredited associations (e.g., the University of Houston and the Association for Behavior Analysis International). This information was utilized as a potential source of bias.

RESULTS

Search Procedures

The initial search for the study yielded 41 articles focused on video modeling, social narratives, and naturalistic interventions targeting social and vocational skills. After finalizing the inclusion criteria, 13 articles met the criteria. However, one was disqualified for lacking the desirable intervention in its intervention package. After one more search, fourteen studies made it to the final round of the systematic review. They were examined altogether for the conclusion of this project after a final search was conducted (see Figure 1). PRISMA 2020, (Page et al., 2021) indicates that systematic review should not be more than five years. Although this study does not meet this standard, I decided to include an additional year because of the paucity of research available. Thus, articles published since 2018 were included. Furthermore, the studies were all published in English in the United States and at a state or internationally-affiliated university.

Sample Characteristics

The study characteristics had inclusive figures: there were a total of 84 participants, with 20 females and 64 males, ranging in age from 16-38 years old (see Table 1). One exception to this was Day-Watkins et al. (2018), who did not report using age but rather education levels (e.g. undergraduate and graduate students). The mean and median of the age ranges could not be fully calculated properly without the specific data (Burke et al., 2018; Day-Watkins et al., 2018). Burke et al., (2018) also failed to report individual ages, instead opting for age ranges. However, the mean, median, and standard deviation were 20.9, 19, and 4. 46 without including (Burke et al., 2018) and (Day-Watkins et al., 2018). Articles reported education backgrounds as 11 individuals attending high school (i.e., Bross et al., 2021; Gregori et al., 2021; Staunch &

Plavnink, 2020); 11 high school graduates (i.e., Bross et al., 2019; Bross et al., 2020; Bross et al., 2021; Custer et al., 2021; Ferguson et al., 2020; Tagavi et al., 2020; Wilson, 2023), 13 attending a transition program (i.e., Bross et al., 2020; Kellems et al., 2020; Staunch & Plavnink, 2020), 13 attending a university as undergraduate students (i.e., Bross et al., 2021; Day-Watkins et al., 2018; Deter & Vernon, 2020; Ferguson et al., 2020; Gregori et al., 2021; Tagavi et al., 2020); 2 attending university as graduate students (i.e., Day-Watkins et al., 2018); and three college graduates (i.e., Bross et al., 2020; Bross et al., 2021; Custer et al., 2021). Burke et al. (2018) did not report educational background information on the participants in the study. Finally, the sample racial makeup consisted of 29 individuals of Caucasian descent, 2 of African American descent, and 3 of Asian descent. Four articles did not report any racial background of their sample (i.e., Custer et al., 2021; Day-Watkins et al., 2018; Deter & Vernon, 2020). Kellems et al. (2020) and Burke et al. (2018) reported only data using percentages.

Study Characteristics

The articles had notable characteristics regarding experimental designs and settings (see Table 1). The most common experimental design, utilized by seven studies (Bross et al., 2019; Bross et al., 2020; Bross et al., 2021; Custer et al., 2021; Deter & Vernon, 2020; Kellems et al., 2020; Wilson, 2023), was a multiple baseline, with two others using a concurrent-multiple-baseline design (Ferguson et al., 2020; Gregori et al., 2021). Singular studies used an AB design (Day-Watkins et al., 2018), a nonconcurrent-multiple-baseline design (Tagavi et al., 2020), a linear mixed model design (Burke et al., 2018), multiple probes with probe conditions (Staunch & Plavnink, 2020), and a concurrent multiple-probes-across-participants design (Munandar et al., 2021). The settings were categorized on a 1-5 scale, with code 1 given for studies conducted at home, 2 for high school, 3 for university, 4 for office, and 5 for others. Examples of office

settings used in studies were nonprofits, satellite offices, or healthcare agencies. For other studies, settings utilized included communal gathering spots like cafes, retail stores, amusement parks, Meals on Wheels, and a nursing home.

Dependent Variables

The dependent variables used in the review had interesting combinations and approaches. Six of the studies used a combination of dependent variables (Bross et al., 2021; Custer et al., 2021; Day-Watkins et al., 2018; Gregori et al., 2021; Kellems et al., 2020; Wilson, 2023). The dependent variables were focused on module-based instruction, skills programs, software programs, telecoaching, planning, and peer intervention together with a type of video modeling. The measures focused on the frequency of social interactions, in-person observations or recordings, frequency of target behaviors, interview style questions, conversation skills, customer service phrases, or conversation-initiation skills.

Measurements

Eight of the 14 studies in this review had generalization measures, while nearly 75 percent (nine studies) had a maintenance measurement or were addressed. Most studies that measured generalization and maintained did so similarly to their baseline data collection procedures. Fidelity was measured in eleven studies, with Burke et al. (2018) reporting that the curriculum and script used had a predictable structure and offered fidelity to the study. Social validity was measured by all except four studies (Burke et al., 2018; Day-Watkins et al., 2018; Ferguson et al., 2020; Staunch & Plavnink, 2020), and most were assessed through the use of surveys or interviews by caretakers. Only two studies measured interobserver agreement (IOA) (Burke et al., 2018; Ferguson et al., 2020). Multiple researchers in each study measured most IOA.

Effectiveness

Eleven out of 14 studies had a 100% effectiveness, showing that all participants had an increase in their social interactive target behaviors (see Table 2). Custer et al. (2021) showed about 80% effectiveness in their results. This study is classified as effective according to the criteria set for the research. The average score of the total target behaviors was calculated for this effective result. Specifically, the study reported that four out of five participants demonstrated improvements in their conversation performances with peers, and all participants reported satisfaction and enjoyment with the group training portion of the study. The study reported several positive outcomes. For example, a participant could extinguish one target behavior following intervention and kept it going through the maintenance, generalization, and follow-up phases. The study also reported some errors made and alterations to the initial plan. For example, one error the experimenters made was not giving feedback to a participant. However, the feedback during the following sessions did not alter the outcome overall. Additionally, an alteration was made with another participant's intervention. The experimenter initially met with the participant for an individual practice session. Then, the experimenter altered the intervention to engage in a competing response (i.e., place hands in pocket or under legs), which decreased her target behavior of inappropriate gestures.

Two out of 14 studies were classified as ineffective. Bross et al. (2021) showed about 62.5% effectiveness in their results. Specifically, the study showed that five out of eight participants increased their social interactions, such as social activities centered on special interests, using online modules, and tele-coaching. These special interests focused on family, friends, or special groups like the Boys Scouts of America. During their social outings, the participants enjoyed activities involving shopping, cookouts, bowling, and attending art

museums and college-sponsored events with peers. The study was deemed ineffective using the set criteria.

Additionally, Wilson (2023) showed 66% fairly effective results in their data collection. The study reported two participants with a slight increase in their target behaviors after the introduction of video modeling in a community-based program, together with a third participant who did not show an increase and was concluded as ineffective. Only one participant made sufficient increases in the target behavior from a baseline mean score of 63.19% to 83.4% post-intervention.

DISCUSSION

This systematic review aimed to portray the effectiveness of video modeling specifically for IwASD in transitional and postsecondary educational settings. Unfortunately, because of restrictions focused on the criteria originally set, the research question and overall purpose of the study were not able to be answered or fulfilled satisfactorily. Because video modeling was not the exclusive intervention in each study but rather a component in each treatment package, the findings in the review were inconclusive. To adequately address the research question, the exclusion criteria should have outlined disqualifications. Specifically, the exclusion criteria focusing on video modeling should have been a requirement in each intervention package only. A clarification should have been added from the beginning stating that only video modeling must be used without any supplementary interventions. Nonetheless, the collection of studies yielded from the search and coding procedures did provide some useful data for consideration.

Twelfth out of 14 studies reported a positive outcome according to the criteria. The results of the review showed interesting patterns in both the manner of measurement and type of video modeling used in each study. Three out of 14 studies used an online module format, either self-paced or facilitated in-person, and included video modeling. Three out of 14 studies used video feedback as their main type of intervention or as a part of an intervention package. Burke et al. (2018) used a virtual interactive training agent that specifically targeted intervention skills, and both Day-Watkins et al. (2018) and Kellems et al. (2020) used two types of video modeling (video-feedback and video with voice-over instruction) in their approaches.

The behaviors targeted by the studies aimed to increase social interactions with peers. Seven out of 14 studies focused on social interactions targeting conversational skills. Specifically, Kellems et al. (2020) focused on conversation initiation skills. Ferguson et al.

(2020) focused on conversation skills (i.e., on-topic conversational contributions and responses) and nonverbal behaviors (i.e., eye contact, and active listening). Deter & Vernon (2020) focused on questions-asking initiation (questions asked, perseverative discussions, awkward pauses, and affect/interest). Furthermore, Tagavi et al. (2020) focused on increased conversation fluidity and on-topic questions asked. Similarly, Gregori et al. (2021) focused on questions asking, nonengagement, and verbal response. Day-Watkins et al. (2018) focused on target behaviors like appropriate proximity when to approach others, and greetings and small talk. Custer et al. (2021) focused on physical proximity, utterances (i.e., duration of speaking), positive feedback, nonverbal behaviors (i.e., gestures, orientation), questions, and inappropriate laughter.

Five of 14 studies focused on social interactions, targeting interviewing and customer service skills. Two out of the five studies focused on interviewing skills. Burke et al. (2018) focused on interview skills, and Munander et al. (2021) focused on increasing story-telling skills in job interviews. Staunch & Plavnick (2020) focused on vocational and social skills like small talk. Bross et al. (2019) and Bross et al. (2020) focused on customer service skills. Bross et al. (2020) replicated a single-case study. Lastly, Bross et al. (2021) focused on planning social interactions for individuals with ASD. Wilson (2023) focused on communicational skills in a community-based program.

The objectives of the studies were not all addressed or approached in the same way. Nine out of 14 studies had a research question, and five out of 14 studies had only a purpose statement to guide their research. Out of the nine research questions, all studies held a research question focusing on intervention-behavioral effects, five studies held a research question focusing on social validity, and two studies held a research question focusing on acceptability and feasibility. Tagavi et al. (2020) was the only study with a research question focusing on the participant's

confidence and peer social desirability. Furthermore, 4 out of 14 studies held purpose statements focusing on the intervention-behavioral effects of their study. Ferguson et al. (2020) use a purpose statement focusing on intervention-behavioral effects, feasibility, and acceptability.

Furthermore, the studies in this systematic review had interesting points that should be considered in future reviews. Both Bross et al. (2021) and Day-Watkins et al. (2018) discussed the easy accessibility of video modeling for those who need it, which is an important point to make when there is always a need for additional resources in communities with disabilities. Ferguson et al. (2020) mentioned a lack of community resources for parents and families of IwASD. Thus, creating easily accessible and low-cost video models could be the answer to address this need.

Although qualitative data is not apart of this review, Burke et al. (2018) mentioned that participants prefer virtual environments, but the intervention would work best together with further explicit training. A combination of video modeling and another intervention works best to increase social interactions. Custer et al. (2021) agreed with this by sharing that computer-based intervention would be an effective intervention to acquire the skills, but further practice with feedback would be needed. Wilson (2023) discussed the need for opportunities like community-based programs to allow improvement in complex communication skills like eye contact. Bross et al. (2020) suggested the usage of coworkers without disabilities as social support to practice social interactions with IwASD essentially. Additional social interaction opportunities and practice would be an effective way to help increase this behavior.

Implications for Video-Based Interventions

There are several implications and application recommendations meant for this review. In the educational setting, the review can give additional information regarding video modeling to

special education teachers and other professionals like school psychologists. They can use video modeling to teach peer interactions, teach social skills, and work on individualized educational program goals with students who receive special education services. Behavior specialists can support general education teachers by providing video models to teach their students social skills in whole-group settings. This is a great way to use the intervention in a group contingency and still address the target behaviors needed to support their classrooms. Also, student disability services at the college level can use video modeling to help students with ASD collaborate with their classmates and professors for a successful postsecondary academic career.

In the clinical setting, clinicians and professionals like behavioral therapists can use video modeling to provide direct services. They can show tailed videos to help clients learn new skills or overcome phobias. A BCBA can also use video modeling for parent training to ensure that parents seamlessly mimic the intervention in the clinical setting at home. Video modeling can also be used for services provided via telehealth. The intervention can reach rural areas to help clients who are not able to access behavioral health clinics or professionals easily. Lastly, video modeling can be used in the workforce. Job coaches or managers can use video modeling to train IwASD alongside other employees on company procedures and customer service standards.

Limitations of the Study

The limitations in this review were in areas lacking peer reviews, interrater reliability, or external auditor. Additionally, the criteria used in the review were a limitation. The criteria were exclusively defined for transitional-age IwASD, typically within the age range of 16-22 years old. However, considering that individuals may conclude their postsecondary education at different points, this narrow age range could not be tied down as the main focal point during the research for relevant studies. Additionally, the criteria in the initial search looked for video

modeling to be used, but it was not specified or required to be the sole intervention in the study. Further, the lack of diversity in the participants was a limitation when conducting this review. Even with the expanded criteria changes, the sample was still not diverse enough for a comprehensive conclusion. Lastly, there was a limitation with coding. A manual like the "What Works Clearinghouse" could have been a more effective way to approach this review portion.

Future Research

Further research is needed to address some notable disproportionalities. For example, 20 females and 64 males participated in this systematic review. Thus, addressing this concern with more balanced gender participation within the sample characteristics would be something to examine. Additionally, the background, specifically the racial makeup of the sample, had some notable disparities. The data revealed 29 individuals of Caucasian descent, two of African American descent, and three of Asian descent, accounting for about 40% of the overall sample. It would be important in future replications if all studies disclosed or reported their sample racial backgrounds to have an inclusive statistical report. Additionally, future research or replication should address the sample sizes of every study when calculating their results. An equal sample size would ensure that all results are consistent and the conclusions are reliable.

CONCLUSION

The purpose of this systematic review was to evaluate the effectiveness of video modeling in increasing social interactions with IwASD in transitional or postsecondary educational settings. The conclusion was that video modeling, along with an unspecified intervention, appeared to be efficacious. Furthermore, it was an inconclusive study since video modeling alone was not effective or successful in their treatment area. The findings from this review make it clear that video modeling is an effective intervention. However, additional research is needed to properly assess the effectiveness of video modeling in a wider range of participants, settings, and additional conditions like larger group settings. Twelve out of 14 studies had positive outcomes according to the criteria in this review, with an average of about 85%. The results give a level of certainty, with 11 out of 14 studies reporting fidelity assessments and 10 out of 14 reporting a social validity assessment.

Thanks to qualitative data from some studies, participants enjoyed using technology-based or computer-based interventions like video modeling to increase their social interactions with peers and others. Using video modeling alone would not be the most successful intervention to utilize with an individual with ASD. All the studies used video modeling and additional interventions to combine and collect participant data. Due to this noticeable feature, it is safe to conclude that video modeling and other interventions work effectively from this review. In conclusion, the effectiveness of using video modeling as an intervention to increase social interactions with IwASD in transitional programs or postsecondary settings was not answered, and the review was inconclusive. However, additional findings and highlights were addressed in this review that add to the literature.

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Table 1.

Study Characteristics in Chronological Order

Reference	Experimental Design	Sample Characteristics	Transition or Education Level	Setting (1-5)	Effectiveness (-,+)
Burke et al. (2018)	Linear Mixed Model with Random Intercept Design	(19-31) Age Range 7 Female, 25 Male 8 African American 1 Biracial, 13 Caucasian, 10 Hispanic	N/A	3	+
Day-Watkins et al. (2018)	AB Designs Replicated Across Participants	(N/A) Age Range 3 Female (N/A) Racial Background	2 Graduate Student 1 Undergraduate Student	3	+
Bross et al. (2019)	Multiple-Baseline Design Across Behaviors	(18) Age Range 1 Male 1 Caucasian	1 High School Graduate	5	+
Bross et al. (2020)	Multiple-Baseline Across Behaviors Design	(18-26) Age Range 1 Female, 4 Male 5 Caucasian	2 High School Graduate 1 College Graduate 2 Transitional Program	5	+
Deter & Vernon (2020)	Multiple-Baseline Across Participants Design	(18-22) Age Range 1 Female, 2 Males (N/A) Racial Background	3 Undergraduate Student	3	+

Reference	Experimental Design	Sample Characteristics	Transition or Education Level	Setting (1-5)	Effectiveness (-,+)
Ferguson et al. (2020)	Concurrent Multiple-Baseline Across Participants Design	(18-26) Age Range 5 Males 5 Caucasian	1 High School Graduate 2 Transitional Program 2 Undergraduate Student	3	+
Kellems et al. (2020)	Multiple-Baseline Across Dyads Design	(18-20) Age Range 2 Female, 4 Male N/A Racial Background	6 Transitional Program	2	+
Munandar et al. (2021)	Concurrent Multiple-Probe Across Participants Design	(19-38) Age Range 1 Female, 3 Male 1 African American 3 Caucasian	4 Undergraduate Student	3	+
Staunch & Plavnink (2020)	Multiple-Probe Design with Probe Conditions (Ledford and Gast 2018) Across Behaviors and Replicated Across Participants	(16-18) Age Range 2 Male 1 African American 1 Caucasian	1 High School Student 1 Transitional Program	4	+
Tagavi et al. (2020)	Nonconcurrent Multiple-Baseline Across Participants	(20-26) Age Range 3 Male 3 Caucasian	1 High School Graduate 1 Undergraduate 1 Graduate Student	3	+

Reference	Experimental Design	Sample Characteristics	Transition or Education Level	Setting (1-5)	Effectiveness (-,+)
Bross et al. (2021)	Multiple-Baseline Across Participants Design	(17-26) Age Range 1 Female 7 Male 1 Asian, 1 Caucasian	3 High School Student 2 High School Graduate 2 College Graduate 1 Undergraduate	1,4,5	-
Custer et al. (2021)	Multiple-Baseline Design Across Behaviors	(17-33) Age Range 1 Female, 4 Male (N/A) Racial Background	3 High School Graduate 1 Undergraduate 1 College Graduate	3	+
Gregori et al. (2021)	Concurrent Multiple-Baseline Design (MBD) Across Participants	(14-22) Age Range 3 Asian 1 Caucasian	2 High School Students 2 Undergraduate	3,5	+
Wilson (2023)	Multiple-Baseline Design with Replication Across Participants	(22-30) Age Range 1 Female, 2 Males 3 Caucasian	3 High School Graduate	3	-

Notes. N/A not available. The settings were categorized using a 1-5 code where 1=home, 2=high school, 3=university, 4=office, and 5=other (e.g., cafes, retail stores, amusement parks).

This table displays information regarding the characteristics of each study in this review. The table reports on references, experimental design, sample characteristics, transition or education level, setting, and effectiveness.

Table 2.

Study Purpose/Research Questions, Interventions, and Results in Chronological Order

Reference	Study Purpose/Research Question	Intervention	Results
Burke et al. (2018)	This project examined whether a Virtual Interactive Training Agent (ViTA) system would improve job interviewing skills in individuals with autism and developmental disabilities (N=32).	Virtual Interactive Training Agent (ViTA) System	32 out of 32 (100%)
Day-Watkins et al. (2018)	The present study examines the use of BST with VMVO to train participants to implement a social skills training intervention for adults with autism spectrum disorder (ASD).	Behavior Skills Training (BST) and Voice-Over Video Modeling (VOCM) Intervention	3 out of 3 (100%)
Bross et al. (2019)	1. To what extent can a video modeling intervention increase the verbalization of customer service phrases by a young adult with HFA employed as a cashier? 2. What is the social validity of a video modeling intervention to teach customer service skills to a young adult with HFA employed as a cashier?	Video Modeling Intervention and Positive Reinforcement	1 out of 1 (100%)
Bross et al. (2020)	1. Does VM increase verbalization of job-specific customer service phrases for young adults with ASD in community employment settings? 2. Does a VM intervention improve the quality of	Video Modeling Intervention, Positive Reinforcement	5 out of 5 (100%)

Reference	Study Purpose/Research Question	Intervention	Results
	delivery of job-specific customer service phrases for young adults with ASD? 3. What is the social validity of the VM intervention for improving job-specific customer service phrases as reported by young adults and their coworkers, job coaches, and/or supervisors?		
Deter & Vernon (2020)	The current study examined the effects of a video-feedback intervention that targeted a key social conversational skill making social initiations to one's conversational partner.	Video-Feedback and Conversational Practice Intervention	3 out of 3 (100%)
Ferguson et al. (2020)	The primary aim of this investigation was to explore the feasibility, acceptability, and preliminary efficacy of the SKILL Program.	Socialization Knowledge for Individuals with Limited Language (SKILL) Program	5 out of 5 (100%)
Kellems et al. (2020)	1. What are the effects of combining explicit instruction with video modeling and video feedback in teaching adults with disabilities to initiate a conversation? 2. How socially valid is an intervention package consisting of explicit instruction, video modeling, and video feedback for teaching adults with developmental disabilities to initiate a conversation?	Video Modeling, Video Feedback, and Explicit Instruction	6 out of 6 (100%)
Munandar et al. (2021)	1. Does VBI improve story-telling ability in answering PBDI questions during mock job	Video-Based Intervention (VBI), Video Modeling, and Video-Feedback	4 out of 4 (100%)

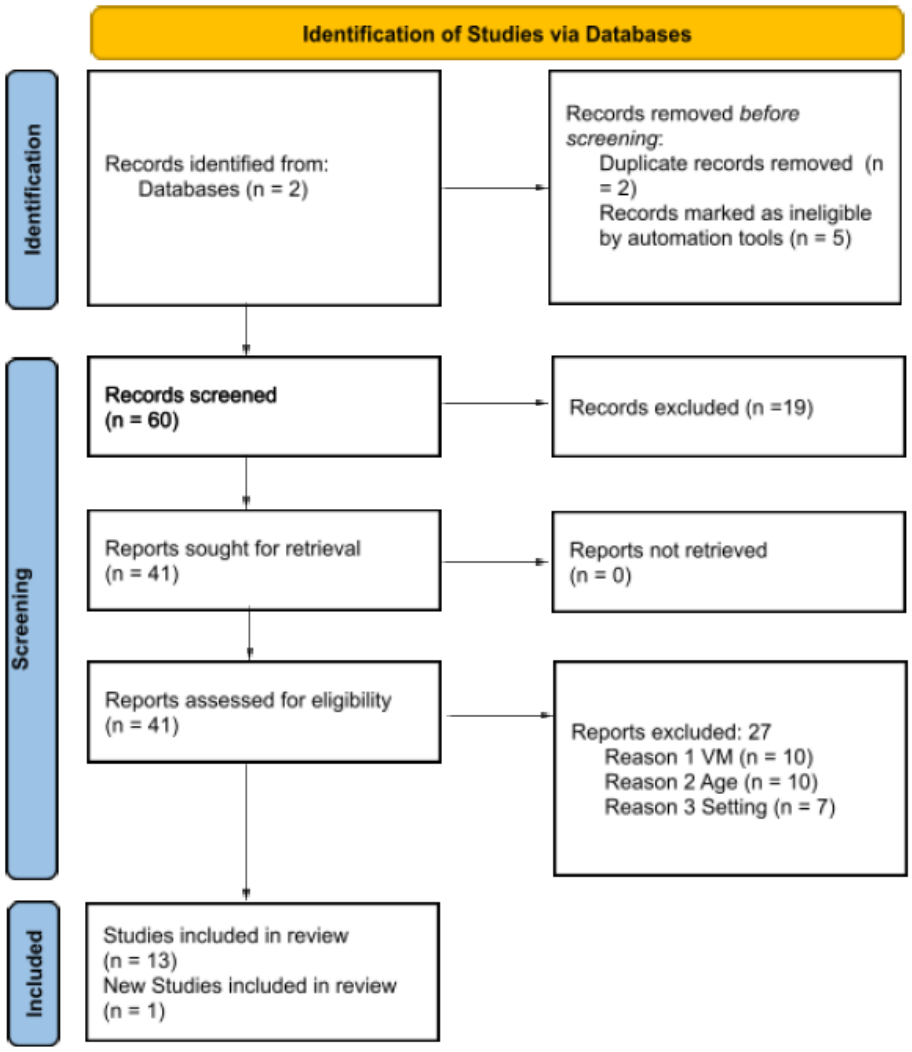
Reference	Study Purpose/Research Question	Intervention	Results
	interviews among college students with autism? 2. How do college students with autism rate the acceptability, feasibility, and effectiveness of VBI as a tool to improve job interviewing skills?		
Staunch & Plavnink (2020)	1. Does video modeling lead to the acquisition of vocational skills for adolescents with ASD when implemented in a vocational setting? 2. Does video modeling lead to the acquisition of social skills for adolescents with ASD when implemented in a vocational setting?	Video Modeling Intervention, Feedback	2 out of 2 (100%)
Tagavi et al. (2020)	1. Will a video-feedback intervention decrease the number of long, awkward pauses young adults make in a conversation with a TD peer? 2. Will a video-feedback intervention increase the number of on-topic questions young adults make in a conversation with a TD peer? 3. Will participation in this intervention lead to an increase in peer ratings of social desirability for these individuals? 4. Will these individuals increase their confidence in their own social communication skills as well as find the intervention acceptable	Video-Feedback Intervention, Check-in, and Check-out	3 out of 3 (100%)

Reference	Study Purpose/Research Question	Intervention	Results
	and enjoyable?		
Bross et al. (2021)	1. To what extent do young adults with ASD increase the number of planning steps described on vignettes to demonstrate knowledge of planning social activities as a result of the ASD On The Go intervention package? 2. What is the social validity of the ASD On The Go intervention package as reported by young adults with ASD? Finally, a supplementary question based on self-report was 3. To what extent do young adults with ASD increase their participation in weekly social activities as a result of the ASD On The Go intervention package?	ASD On The Go Modules, Planning Activity Checklist, and Tele-coaching Intervention	5 out of 8 (62.5%)
Custer et al. (2021)	The purposes of the current study were to evaluate the effectiveness of this approach for promoting the acquisition, maintenance, and generalization of conversation skills, to determine if the approach would be acceptable to adults with ASD, and to assess the social validity of the outcomes through peer evaluations.	Computer-Based Instruction (CBI), and Practicing with Peers Intervention	4 out of 5 (80%)
Gregori et al. (2021)	1. Is there a functional relation between the implementation of instructional modules and increases in the frequency of	Telecoaching and Online Instructional Modules	4 out of 4 (100%)

Reference	Study Purpose/Research Question	Intervention	Results
	targeted conversation skills for high school and college students with ASD? 2. Is there a functional relation between the implementation of telecoaching and improvements in targeted conversation skills beyond what was achieved with instructional modules alone for high school and college students with ASD? 3. How do high school and college students with ASD perceive the acceptability and feasibility of a social skills intervention package consisting of online instructional modules and tele-coaching?		
Wilson (2023)	1. Does video modeling support social-communication skill acquisition for autistic adults in a community-based fitness group? 2. Does visual attention to the video during intervention appear to correspond to increased impact of the intervention on social-communication gains?	Video Modeling Intervention, and Reminders	2 out of 3 (66%)

Note. This table displays information regarding the purpose/research question, intervention, and results of each study in this review. The results category showed number of participants that showed improvement in target behavior and percentages.

Figure 1
PRISMA 2020 Flow Diagram



From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al., (2021)