Visual Activity Schedules and Incentive Charts for Children With Processing Difficulties: Improving Executive Functioning

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Author Note

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Abstract

The purpose of this three-week long study was to evaluate the effectiveness that Visual Activity Schedules (VAS) and Incentive Charts (IC) have in improving Executive Functioning (EF) in children with processing delays for independent handwashing hygiene. Participants consisted of six children, four males and two females, aged 4 to 6 years old who previously received Speech Therapy services at a small therapy placement agency in New York. The study focused on deficits in processing delays concentrating on handwashing sequences through a child-friendly VAS with matching Velcro pictures. The VAS was easily manipulated by participants based on cognitive and fine motor abilities. VAS has been demonstrated to increase on-schedule and on-task behaviors with modeling, cueing, and visual stimuli. Baseline study indicated across participants that independent handwashing for personal hygiene had its limitations due to multiple delays and disorders each child presented with plus multiple distractions (i.e., playing with water). Results from all six children yielded outcomes that support the success of a Visual Schedule to aid in sequencing and completing actions independently. Limitations to the current study and recommendations for future studies are discussed.

Keywords: visual activity schedule, incentive chart, executive functioning, processing delays, personal hygiene

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Visual Activity Schedules and Incentive Charts for Children With Processing Difficulties: Improving Executive Functioning

Processing delays (i.e., auditory, visual, and sensory) are forms of neurodevelopmental disorders where an individual's brain has difficulty receiving information and developing a response. These delays produce impairments through personal, social, academic, or occupational functioning (American Psychiatric Association, 2013). According to Knight et al. (2015), Visual Activity Schedules (VAS) teach various skills, including transitioning between behaviors, reducing problem behaviors, and increasing, maintaining, and generalizing social skills. Using Incentive Charts (IC), a tool to monitor behavior through a checklist or stickers, along with an intangible reinforcement, a type of reward given that does not possess monetary value and utilized after an achievement, allows individuals the opportunity to improve Executive Functioning (EF). Berk (2018) defines EF as cognitive operations and strategies that enable individuals to achieve goals in challenging situations.

Piaget's Cognitive-Developmental Theory consists of four stages where a child's knowledge grows as they explore and manipulate their world through the central concept of adaptation, or heritable traits to survive in one's environment. According to Jean Piaget, Swiss psychologist known for his research on child development, the development period between 2 to 7 years old is the preoperational stage of growth and development. In this stage, preschool children present early sensorimotor discoveries through symbols while their language development transpires (Berk, 2018). This information supports the notion that children could benefit from manipulatives and incentives (i.e., VAS and IC) to achieve desired tasks during the preoperational stage of development. Children with processing delays do not have typical development, meaning skills that align with specific age brackets as the child grows. Utilizing

VAS and IC may increase their development and behaviors to achieve developmental milestones. Children with processing difficulties (i.e., auditory, visual, and sensory) experience a delay in comprehending information but can benefit from positive manipulatives and incentives to achieve desired tasks and goals.

EF skills make way for behaviors that are needed for an individual to plan and achieve their goals. As mentioned in the article '7 Executive Functioning Skills Your Child Should Have' from Hill Learning Center, skills related to EF include proficiency in adaptable thinking, planning, self-monitoring, self-control, working memory, time management, and organization (2019). These skills are considered essential to developmental growth, beginning in early childhood and progressing through adulthood. The study's goal was to increase each child's EF through the use of the VAS and IC. Adaptable thinking, the ability to be self aware of different situations and to be able to decide on the best one, allows the child to problem-solve or adjust to the task of handwashing. Planning involves using the VAS to follow an action plan, aiding in an increase in cognitive development. Self-monitoring permits the child to see how well they perform the task through keeping record of behavior, which the Speech-Language Pathologist (SLP), Jean Marx, also validates. Self-control empowers the child to follow the task of handwashing through the different steps of the VAS. Working memory and short-term memory used with perceptual and linguistic processing, is utilized through the repetitive actions of handwashing through the VAS to store the learned task and later put it to use. Time management enables the child to complete the handwashing task for an appropriate duration, such as singing the ABCs, to ensure cleanliness and independent personal hygiene. Lastly, organization refers to the child's ability to keep thoughts organized, allowing them to maintain a systematic method consistently through learned behaviors.

In this paper, we will look at the impact VAS and IC have on the behaviors of children between the ages of 4 to 6 years old for the task of independent handwashing. Independent hygiene during the 2019-2021 pandemic of COVID-19 (SARS-CoV-2) has become a necessary part of preventative safety for all populations across the globe. Handwashing is a critical element for proactive preparedness affecting each person on this planet. Centers for Disease Control and Prevention (CDC) suggests that washing hands prevents illness and the spread of infection to others. Handwashing with soap and water protects 1 in 3 children from illness, and it is estimated that washing hands can reduce disease-associated deaths by 50% (2016). Children with processing delays between the ages of 4 to 6 might not comprehend the severity of this act; however, visual conditioning and incentives lead to independent handwashing while having fun through positive reward. Additional studies will allow researchers the opportunity to prevent a variety of diseases from being acquired or spread to others.

Literature Review

This literature review possesses information to previous comparable research through VAS, IC, EF, and an array of disorders and delays in children. The referenced articles provide knowledge into the research of the different variables tested in the study. This overview will allow for better comprehension of the study.

The review of past research demonstrates that VAS effectively improves habits, behaviors, and independence in children and the effectiveness of IC in the form of social rewards. Intangible and incentive rewards include placing a sticker on a chart each time a correct behavior is completed and awarding that behavior with verbal recognition as an acknowledgement for a job well done. The literature review will include research on disorders and delays that will explain why VAS and IC help children improve EF.

Visual Activity Schedule Articles

Knight et al. (2015) investigated the use of VAS to increase and maintain a variety of skills for individuals with autism spectrum disorder (ASD). A comprehensive review of academic articles was composed evaluating different qualities of VAS using evidence-based criteria. The authors compiled 16 previously conducted studies that met the investigative needs for VAS amongst those with ASD. The overall goal of the study was to determine if the use of VAS would aid in increasing and maintaining multiple skills for individuals who were previously diagnosed with ASD. Each study met the following criteria to be considered: single case research or group design, at least one participant was diagnosed with ASD, VAS investigated on certain dependent variables (on-task, on-schedule, transition behavior), and previously published in a peer-reviewed journal. A total of 56 individuals combined, consisting of children and adolescents with ASD, were considered for the research. Of this total, 49 were males, and seven were females ranging from 3 to 21 years old. Environments utilized for students in the study took place in general educational settings (i.e., classroom, school) and the more commonly used, self-contained classrooms. VAS was utilized during play activities (i.e., video games, academic activities, daily living tasks). Most images were presented one at a time with instruction for the child to follow a task. Ultimately, the collective decision amongst researchers showed that using VAS through various photos and videos was highly influential on individuals with ASD to increase learned skills and behaviors.

Zimmerman et al. (2017) conducted a study on three children not presenting with ASD or intellectual disabilities, using constant time delay (CTD). With CTD, no delay occurs between the command and prompt during the period a new skill is first learned. The researchers measured challenging behaviors and engagement through A-B-A-B withdrawal designs. According to Kirk

(2017), an A-B-A-B research design is a four phase design utilized to determine if specific interventions effectively change a person's behavior. During each of the four phases, repeated measurements such as engagement and attendance were obtained of the participant's behavior, starting with a baseline. The children who participated in the study were considered at-risk for social delays. Classroom teachers determined potential candidates through multiple criteria: interferes with classroom tasks, low engagement levels, consistent attendance, the child could match 2-D pictures to 3-D objects, and above-average rating on the Social Skills Improvement System Rating Scales (SSRS), a questionnaire to evaluate social skills for individuals ranging from kindergarten to twelfth grade. The three children with social delays (Child A being a Hispanic male aged 43-months, Child B being a Black female aged 51-months, and Child C a White female aged 52-months) were tested in a classroom environment. Sessions consisted of 10 minutes of exposure to VAS during morning free play. VAS were presented on laminated cardstock with Velcro down the middle to show different icons, ranging from different routines such as building a house with blocks to multiple verbal tasks. Overall, all participants in the study engaged with each VAS they were presented with; however, it took numerous sessions to do so. During the baseline examination, the children did not engage fully with the VAS presented; however, participation increased from 90-100% during the duration of the 24 sessions. This article is beneficial to the conducted research because participants were roughly the same age and faced developmental challenges and delays. The researchers showed the use of VAS to be beneficial to independence and growth for developmental milestones.

Johnson et al. (2018) studied two individuals to increase their independence in vocational tasks amongst multiple school settings (i.e., an office, the cafeteria, and the library). One participant had an intellectual disability where she needed the assistance of hearing aids and

glasses, while the other suffered from a traumatic brain injury (TBI). The study took place in the students' middle school environment, starting in the classroom. Both students were presented with an iPod Touch, allowing them the opportunity to hear and see videos and photos. This device was utilized to show both participants video models to depict the tasks from start to finish. The participants had the opportunity to pause, play, and repeat each video presented at their leisure. The child presenting with an intellectual disability initially completed 0% of the cafeteria tasks and 0-9% of the library tasks. However, after four weeks of maintenance, she rapidly accelerated, causing an immediate positive change in all tasks. The TBI participant was unable to complete any of the tasks initially. However, after four sessions, his abilities increased to 100% and were maintained moving forward. The games, being age-appropriate and user-friendly, are similar to that of a VAS. Video schedules helped both participants as they were more likely to relate and comprehend the videos. Instead of using individual pictures to learn a task or behavior, the researchers implemented video. Ultimately, both students found video scheduling effective in learning vocational tasks while in a school setting and could maintain the learned behaviors moving forward.

Cirelli et al. (2016) investigated the use of VAS on two males with at-risk attention-deficit/hyperactivity disorder (ADHD), possessing difficulty while working independently. The study involved children with the same or similar disorder, utilizing both VAS and IC. The classroom teachers referred the children for the study through the public school's Intervention and Referral Services (I&RS) program. The members of this program assist children struggling with learning behaviors or health difficulties while in a school environment. The first child, a 9-year-old male in the second grade, experienced difficulty staying on task and following day-to-day directions. The researchers evaluated the child with the Conners' Teacher Rating Scales-

Revised (CTRS-R:S). Results showed he possessed cognitive delays and hyperactivity, being at risk for ADHD. The second child was a 7-year-old male in the first grade who became easily distracted and possessed a short attention span. With a previous Individualized Education Plan (IEP) and learning disability already in place, the I&RS program also conducted the CTRS-R:S, suggesting he too was at risk for ADHD. Each session took place in the classroom, and the VAS consisted of worksheets to be completed during the day. The boys who participated demonstrated teacher prompts and replications of previous and current VAS tasks. During baseline testing, each child showed approximately 50% improvement using VAS; however, after teacher intervention, each showed a significant improvement of 96-100%. While utilizing VAS, the two participants engaged in a classroom environment with other children, which helped each gain more independence from the presenting disorders and delays.

Kang and Chang (2019) conducted a study on four children, three males and one female, in special education classes with intellectual disabilities (ID) that presented difficulty performing everyday tasks such as independent personal hygiene. Researchers used the Kinect V2 sensor to make handwashing into a game to have each child learn the task. The first child was 12 years old in the sixth grade with verbal delays. The second child was 11 years old in the fifth grade with communication and concentration difficulties. The third child was 12 years old in the sixth grade, who also possessed limited verbal skills and ignored hand hygiene. The last child was 10 years old in fourth grade, unable to comprehend oral instructions and had difficulty in social situations. The researchers established baselines by assessing how each child can wash their hands independently. The teachers then observed the recordings to instruct the children, further showing how to perform the task properly. The game was titled *Soap and Water!*. It outlined 15 steps for the participants to follow handwashing protocols, ranging from turning on the water,

applying soap, and drying hands. Rather than using a traditional VAS with individual photos on a board with step-by-step direction, researchers decided to use a motion-controlled game. Still having visual learning effects, the participants learned the hygiene task by watching and doing the steps themselves. Once gameplay was introduced, each child's independence for the task of handwashing significantly increased 96 to 98%. The maintenance phase of monitoring also showed significant retention of the tasks by 78 to 86% for each child due to the game being interactive.

Watson and DiCarlo (2015) introduced a VAS to a single 5-year-old male to complete a series of three different tasks while in his kindergarten classroom to aid in his independence. His class contained 22 students, 10 males and 12 females, located within a suburban area. The children varied from ages 5 to 7 years old and ranged within typical development The child in the study, a Black male, aged 5 years and 11 months, was immersed in a kindergarten environment for 7 months and had difficulty following basic routines. During the classroom's morning, mealtime, and afternoon routines, the boy was observed to see how many tasks could or could not be independently completed. The morning routine consisted of a prompt by the teacher to greet one another, go to their assigned seat, set up their desk, and begin independent reading materials. Mealtime routine consisted of washing hands then either going to the lunch line or sitting at a table to eat. The afternoon routine included children packing up their desks for the day, putting items in their backpacks, and getting all the teacher's assigned materials. Three VAS, each with step-by-step directions and photos, were created for the boy as written routines, so the child understood classroom expectations. The three daily routines were listed on the schedule (i.e., greet teacher, go-to the chair, take off the jacket, check for notes, read, hand in

notes to the teacher, put the lunchbox away, read). The schedules helped the child complete tasks independently and not have to request additional instruction.

Incentive Chart Articles

Wang et al. (2017) investigated monetary and social rewards on children to determine if utilizing a reward system aids task completion. All participants received 15 Chinese Yuan, an honor certificate, and social rewards for their time and achievements. Using monetary incentive delay (MID) and social incentive delay (SID) task paradigms, the researchers' goal was to investigate how these reward processes affect cognitive performances from a developmental perspective. Participants consisted of 30 children, 15 males and 15 females, aged 8 to 16, were recruited from local primary and middle schools. The baseline response time was measured with participants not knowing what the experiment was to entail. The researchers instructed each participant to respond to different shapes or target figures (either a triangle or a square) and informed participants to press the correct button identifying each figure once it appeared. During the formal experiment, researchers informed participants the study offered rewards and identified what participants would earn upon completion. The experiment consisted of two tasks, MID and SID tasks, similar to the baseline testing. The reward parameters consisted of no reward, low reward, or high reward, depending on the answer. Ultimately, researchers discovered males showed faster response with high reward than a lower one, whereas females responded fast under all reward conditions. The children showed higher motivation for social reward versus monetary reward.

Krach et al. (2016) studied the different behaviors amongst children in an elementary school utilizing positive behavioral intervention supports (PBIS). The researchers evaluated charts from 10 classrooms in the school, and each teacher compiled data per child. The study

consisted of 169 students across ten classrooms (30 kindergarteners, 37 first graders, 27-second graders, 23 third-graders, 36 fourth graders, and 16 fifth graders). All students were African American and were roughly an even number of males and females. The PBIS model provides social, emotional, and behavioral services to children and multi-tiered interventions in a school setting. Through behavioral management charts (BMC), educators collected data to document positive and negative behaviors along with a verbal description of said behavior. The teachers documented behaviors through charting via pencil and paper or utilized an online tool, Class Dojo, a free positive classroom management tool. Behaviors were documented as positive, negative, or neutral in both charting tools during day-to-day classroom tasks. Ultimately, when using the paper and pencil method, teachers often tracked more negative behaviors than positive ones, whereas, in the digital method, they tracked more positive behaviors. This study allowed teachers and school psychologists to see which behavioral documentation and charting methods showed to be most effective for students to exhibit more positive behaviors in the classroom. VAS seemed to be more effective than incentive charts for children to learn and complete behaviors.

Rock and Hailemariam (2017) conducted an experimental design to evaluate how *The Caterpillar Game*, a classroom management system used in school settings, affected children presenting with disruptive behavior. Participants in the study consisted of a female teacher and 21 students, nine females and 12 males, in a first-grade classroom ranging from ages 6 to 8 years old. The teacher utilized *The Caterpillar Game*, reward cards, and a student observation form for the study. *The Caterpillar Game* consisted of a visual chart of a caterpillar with multiple body segments and a Velcro butterfly. Four cards showed what potential intangible rewards students could earn. The student observation form measured the students' behavior in intervals for every

10 minutes of observation. *The Caterpillar Game* was utilized during classroom activities. When any of the students in the class engaged in positive behaviors, the teacher would move the butterfly up one segment of the caterpillar. If disruptive behavior presented, the teacher would move the butterfly down, making the students one less segment away from receiving reward cards. If all segments were complete by the end of the day, meaning the butterfly went from the tail to the caterpillar's head, students would be able to pick a reward card to engage in an activity (i.e., *Simon Says, Follow the Leader*). The study was conducted for eight weeks and was influential in creating long-term positive behaviors in the classroom.

Executive Functioning Articles

Messer et al. (2018) investigated previously collected data from children in two preceding studies with typical development. Overall, 159 participants ranging from ages 6 to 12 years old participated. The investigation into the factor structure of EF ultimately led to two investigations. One study focused on specific language impairment (SLI) and the other developmental coordination disorder (DCD). Criteria for both studies certified that each child was of typical development. Children participating were given BAS-II Matrices, Clinical Evaluation of Language Fundamentals-4-UK (CLEF-4-UK), and the Test of Word Reading Efficiency (TOWRE). All children were recruited from schools in London with low to middle ranges of socioeconomic status and showed typical levels of English-speaking skills. Children in the SLI study participated in testing, consisting of 3 to 8 sessions at 3 ½ hours each between school and home. The children in the DCD study participated in 5 to 6 sessions of 45 minutes to 1 hour each at school. The researchers measured EF tasks consisting of using pairs of tests for both verbal and non-verbal. Executive working memory, inhibition, switching, fluency, and

planning were all measured. Findings showed that both verbal and non-verbal variables failed to support the argument that language ability affects EF abilities during a task performance level.

Kapa and Erikson (2020) conducted a study to determine the relationship between EF and learning words amongst preschoolers with and without developmental language disorder (DLD). Participants consisted of 82 preschool-aged children with various ethnic backgrounds aged between 4 to 5 years old. Half of the preschoolers presented with DLD, 15 females and 26 males, while the other half showed typical development, 15 females and 26 males. Children with DLD and those with typical development were exposed to 10 pseudo words consisting of familiar and unfamiliar objects. The objective was to comprehend and recognize the words being tested while completing EF tasks such as sustained selective attention, short-term memory, working memory, inhibition, and shifting. A certified SLP completed the standardized testing amongst all participating children and researchers established a positive relationship between EF and word learning in both groups. Inhibition and short-term memory also presented with positive predictors of word learning in regression models. Ultimately, children with DLD performed inferior during word learning than those without.

McGonigle-Chalmers and McCrohan (2018) investigated children, aged 12 to 15 years old, with ASD to identify the nature of impaired EF. A total of 16 non-verbal children (15 males and one female) and 16 neurotypically controlled children (11 males and five females) were administered different computer sequencing games. One was self-generated, while the other was learned and followed. Tasks consisted of a free and fixed search. The free search was a self-ordered task using icons as shapes on a touch screen. The objective was to click each item once in any order, but they moved to unanticipated places. The fixed search required participants to complete a fixed sequential order across multiple levels. The computerized game, *FLASH*,

consisted of shapes, and each game was intended to be entertaining for visual and auditory feedback. Participants with ASD showed significant impairment during the first task, while neurotypical children showed more significant positive impacts. While the results showed some particular problems with self-organizing, researchers needed a more inclusive sampling of participants to fully expose the different aspects of ASD. Children with ASD were tested to see if certain visual aids would help retain new skills and showed more difficulty in free sequencing. Researchers suggested that if the test were to be conducted again, they would use a wider variety of subjects.

Berenguer et al. (2017) investigated two objectives on children with high-functioning autism spectrum disorder (HFA) and typical development. The first objective was to compare Theory of Mind (TOM) skills, meaning one's mental capacity to understand other people's behaviors, EF, and pragmatic competence (PC), ability to use language correctly in an appropriate way, and the second objective was to measure their role in social functioning through TOM, EF, and PC. A total of 89 children participated in the study, 52 with typical development in social functioning roles and 37 with a previous ASD diagnosis, ranging from ages 7 to 11 years old. Participants were 79.7% males, whereas 20.3% were females. Tests were conducted to prevent potential daily difficulties and long-term outcomes (i.e., isolation, not sharing, not making friends). TOM tests consisted of a verbal (combining questions about first and second-order beliefs) and contextual tasks (showing images in different social contexts). The researchers used the Children's Communication Checklist Second Edition (CCC-2) to test communicative competence, which contained 70 items under 10 subscales measuring different communication aspects (i.e., speech, syntax, semantics, pragmatics, and behaviors). Teachers completed the Behavior Rating Inventory of Executive Function (BRIEF) to determine EF levels. A total of 86

items were used to rate EF through observation of behavior in a school setting. Finally, researchers monitored the socialization domain via Vineland Adaptive Behavior Scales (VABS-II) and an interview for parents/guardians to evaluate their child's social competence and adaption through multiple areas (i.e., communication, life socialization, and motor skills). The results indicated that children with ASD responded very well between the uses of TOM, EF, and PC as their socialization and language increased.

Kersten et al. (2018) investigated the similarities and differences of results from traditional memory paradigms and the Pearson-Action Conjunction (PAC) test. The PAC tests memory when an action is performed, and a type of memory source is tested. Two separate experiments were conducted for this study. The first experiment consisted of 58 young adults, with a mean age of 20.63, and 50 older adults, with a mean age of 72.4. Their participation rewarded them with a $20 gift card to a local supermarket. Each was presented with video clips where a female actor was seated at a desk. Each person was then asked if they saw the female in the video, followed by a rating scale of just guessing, pretty sure, and sure. Overall, the older participants scored higher than the young adults. The second experiment was also a memory test where participants engaged in videos showing multiple behaviors. A total of 63 young adults, with mean ages of 19.80, and 46 older adults, with mean ages of 76.41, participated for the same $20 gift card reward. The participants watched videos to test memory, similar to the previous experiment; however, they were physically presented with the same items that were shown in videos. Each person was asked if they had seen this item in the video, and they utilized the same rating scale. Overall, the research between the memory paradigm and PAC showed remembering the sources of actions has involved different cognitive apparatuses with all participants.

Summary and Research Question

Knight et al. (2015) investigated the use of VAS on children with ASD and discovered that various methods of photos and videos were found to be highly effective in learning new tasks. Zimmerman et al. (2017) studied children who presented with challenging behavior through VAS to increase said behavior during free play at school. Johnson et al. (2018) examined two individuals to see if they can increase their independence through video activity schedules and ultimately found that the iPod Touch was very effective in doing so. Cirelli et al. (2016) investigated two children with ADHD using VAS to determine the effectiveness of use to increase independent classroom work to find that each showed a significant improvement. Kang and Chang (2019) tested several children to see how they react and behave regarding independent personal hygiene, discovering a game that increased each child's independence and maintenance. Watson and DiCarlo (2015) used a VAS for three different classroom tasks to help a child's independence and ultimately helped so much that he no longer requested help from his teacher. Wang et al. (2017) investigated to see if monetary and social rewards would be effective in determining if using a reward system helps in task completion, which proved they did. Krach et al. (2016) studied behaviors amongst elementary school children through BMC and Class Dojo to see which better documented positive behaviors. Rock and Hailemariam (2017) used *The Caterpillar Game* to increase positive classroom behaviors through intangible reward. Messer et al. (2018) investigated previously conducted studies regarding EF. They discovered that verbal and non-verbal children failed to support the argument that language affects EF abilities during tasks. Kapa and Erikson (2020) found that children with typical development versus those with DLD performed better at tasks of EF. McGonigle-Chalmers and McCrohan (2018) investigated children with ASD to identify the nature of impaired EF, and it was shown that visual aids helped retain new skills. Berenguer et al. (2017) studied children with HFA and typical

development to compare TOM skills, EF, and PC and showed that each increased social functioning when exposed to different tasks. Kersten et al. (2018) discovered that testing between the memory paradigm and PAC provided evidence that remembering the sources of one's actions has to do with different cognitive apparatuses amongst different people.

The literature reviewed suggests that outside stimuli affects the behaviors of an individual's daily functioning. The current research aims to address any concerns or missing information from the literary review. Therefore, the current study's research question will use VAS and IC to increase the rate of independent and habitual handwashing in children ages 4 to 6 years old who possess processing difficulties. In the study, two independent variables were presented: visual schedules and incentive charts. VAS involved Velcro worksheets to help children learn the activity of handwashing. IC included placing a sticker on a chart each time the child completed the correct behavior. The dependent variable is independent and habitual handwashing. The outcome will show children can use previously learned behaviors from the VAS and IC to recall the habitual process of handwashing successfully. In the study, EF refers to mental processes that enable the child to focus on, remember instructions, and complete multiple tasks successfully (i.e., using the toilet then washing hands).

Method

The participants in the study consisted of six children between ages 4 to 6 years old, four males and two females, presenting with an array of processing delays to determine the impact that VAS and IC have on EF. Two independent variables were presented: visual schedules and incentive charts. VAS (see Appendix I) involved Velcro picture worksheets to help children learn the activity of handwashing. IC (see Appendix J) included placing a sticker on a chart each

time the child completes the correct behavior, followed by an intangible reinforcement. The dependent variables are independent and habitual handwashing.

Jean Marx MS CCC-SLP TSSLD, SLP supervisor of a small therapy placement agency in New York in Port Jefferson Station, NY, granted the researcher permission to utilize the facility, its materials, and applicable children for the study (see Appendix A).

Participants

This study consisted of six children previously receiving Speech Therapy services at a small therapy placement agency in New York, an agency that provides pediatric therapy services for children ages birth through 18 years old in need of Speech Therapy, Occupational Therapy (OT), Physical Therapy (PT), Parent Training, Special Instruction (SI), and Applied Behavior Analysis (ABA) services. Previously, the researcher worked at the facility as an Early Intervention Billing Coordinator for four years and learned extensive information on each of these services. As a Billing Coordinator, the researcher completed billing through New York State, school districts, and insurance companies. Due to daily interaction with the licensed staff and children receiving services, the researcher decided to pursue a Master of Science in Psychology through Purdue University Global after completing a program to become a Registered Behavior Technician (RBT).

Children chosen to become research participants previously received Speech Therapy services through a small therapy placement agency in New York, possessed processing delays (i.e., auditory, visual, and sensory), and were selected by the agency's licensed SLP supervisor Jean Marx MS CCC-SLP TSSLD. Participants consisted of middle-class socioeconomic status and Caucasian. Some children possessed a Preschool educational background while others had

none. This data was collected from the Demographic Questionnaire (see Appendix E) presented to the parent/guardian before the study took place.

Children not asked to participate were those with a diagnosis, signs, or symptoms of autism spectrum disorder (ASD), which a neuropsychologist would diagnose, any child receiving ABA, SI, or Parent Training services, children younger than four years old and older than six years old. Other conditions related to the research that would not allow a child to participate in the study consisted of speech-related delays such as articulation, phonology, or speech-language impairment (SLI).

Participants learned about the study through a verbal discussion and a letter provided to the child and their parents/guardians from their licensed SLP. The SLP determined which children on their caseload were eligible for the study and presented the request to the parent/guardian of each child through the Parental Consent Form. If the parents/guardians and children each agreed to participate, they had to complete and submit the Parental Consent and Verbal Assent for Children forms for completion (see Appendix B and C) Children were screened by their SLP and were only be considered for the study if they presented with processing delays.

Measures

In the study, independent variables included VAS and IC and dependent variables included independent and habitual handwashing. The VAS involved a Velcro worksheet with seven different pictures to help children learn the activity of handwashing (see Appendix H). The IC included placing a sticker on a child-friendly chart (see Appendix I) each time they completed the seven steps of correct handwashing behavior. The child immediately chose an intangible reinforcement after completing the VAS and IC. These reinforcements consisted of, but were not

limited to, the use of materials in the sensory gym such as the ball pit, rock wall, playground, or choice of a game, for the first few minutes of their session, depending on completion of VAS tasks. The children used previously learned behaviors gained through the VAS and IC to recall the habitual process of handwashing successfully. EF refers to the mental processes that enable the child to focus attention, remember instructions, and complete multiple tasks successfully and independently.

Reinforcement assessment included prior knowledge of participants' likes and dislikes from previous speech lessons, parent intake, and professional observation of the child (free operant observations). Clients were able to bring an activity or game of their choice to sessions to be used (i.e., pokemon cards, Paw Patrol characters, trucks). Additionally, the child could choose to use any equipment on the property if available (i.e., ball pit, rock wall, outdoor playground). The operant preferences either changed daily or stayed consistent, depending on the ranking or order of choice. The SLP offered various rewards for the participant to choose from after the IC was complete.

Pre-Study Reinforcement Assessment

According to Cooper et al., the activities that a person engages in most often when choosing freely among behaviors will often serve as effective reinforcers when made contingent on engaging in low-probability behaviors (2007). The SLP engaged with each child to determine their interests based on observation and parent intake. As the child was observed, the individual behaviors they engaged in acted as reinforcers. This is referred to as free operant observation. Free operant behaviors can change daily or at a moment's notice (Dalphonse, 2021); the SLP had to be flexible in recognizing the possible reinforcer for that day. Reinforcers were presented orally or visually for the child to use a multi-sensory approach to a choice. The assessment was

conducted during previous Speech-Language activities as the participants possessed a previous rapport with the SLP before the study. The SLP was able to determine the participant's likes, dislikes, and motivators.

Each child's parent/guardian was presented with a Pre-Study Reinforcement Assessment (see Appendix F) before the study to complete. The assessment form asked the parent/guardian to describe in order from 1 to 5 (1 being most desirable and 5 being least desirable) the items or activities their child prefered most favorably to be used as positive reinforcement to this study. For example, tangible items (i.e., toys, Play-Dough), intangible items (i.e., a story, music), or equipment located in the sensory gym (i.e., rock wall, ball pit). After the parent completed the form, the SLP then determined the top five items each child found to be most interested in using as a positive reinforcer. Each day, the SLP determined which item(s) would be best to use as positive reinforcement by observation based on the assessment form's parent/guardian's answers.

Demographics Questionnaire

The researcher created the demographic questionnaire (see Appendix E) to assess the characteristics of all six participants consisting of ten questions: a combination of multiple-choice and fill-in-the-blank completed by the licensed SLP. Questions included socio-demographic and critical content related to the research question. Jean Marx, MS CCC-SLP TSSLD reviewed and approved the survey. The following questions are listed on the survey: 1. What is the child's race/ethnicity? 2. What is the child's gender identity? 3. What is the child's age in years and months? 4. What is the highest level of education the child has attained? 5. How many family members does the child live with? Are there siblings? If yes, siblings, younger or older? 6. What is the child's Speech-Language diagnosis? 7. What is the intensity of services provided for this child (i.e., days and minutes per week)? 8. Does this child receive any

additional services (i.e., OT, PT, SI, ABA)? 9. Can the child wash their own hands independently? 10. Other/comments for the licensed Speech Pathologist to document. Data collected by the SLP has been compiled for statistical analysis by the researcher (see Appendix D and E).

Data Collection Sheets

The licensed SLP utilized the data collection sheets to keep track of handwashing daily throughout the duration of the study. Each data collection sheet possessed enough space for 10 dates of data. If additional data sheets were needed, the SLP had the option to print more out for use. Datasheets were to be filled out only by the specified SLP participating in the study, Jean Marx MS CCC-SLP TSSLD. Each form contained a designated space for the SLP to document each child's name and age, so datasheets could easily be referenced. When data was collected, the SLP indicated the date and time of each session, marked off on completed tasks from VAS from one to seven, jotted notes about the VAS intervention, and their signature/initials. The SLP referenced the VAS and the datasheet to check which of the tasks were completed correctly while writing notes regarding areas not addressed or missed. Each datasheet contained instructions for the SLP to follow, and they were also given training before beginning the study to ensure they fully understood the vocabulary and task. The SLP signed or initialed the datasheet after each trial was completed. Before the study, the SLP completed a baseline datasheet for the first week of their child's session. See Appendix F. The baseline datasheet contained the same layout and information as the intervention datasheet, see Appendix G, but was used for the SLP to document initial findings for the researcher to compare data upon completion of the data collection.

The SLP documented baseline data collection for one week before the start of the study measuring the number of times each child attempted handwashing steps without knowledge of the VAS or IC. Baseline testing assisted in measuring the behavior before intervention to see if the intervention led to an increase in the correct handwashing behavior. After the baseline data was collected, the SLP demonstrated the VAS and explained the IC to each child while documenting data on the datasheet by previewing the VAS with the child before trials, explaining each picture, and how the handwashing procedure should proceed. Throughout the study, the SLP continued monitoring and documenting the child's actions pertaining to the VAS (i.e., if the child missed a step or did not want to participate). After the three week duration of the study was complete, the SLP utilized the last session to indicate how each child performed overall and documented their growth and progress with structured observations of targeted activities.

Setting and Materials

The experiment took place at a small therapy placement agency in New York in the restroom in the facility's main lobby, following New York State CDC guidelines for COVID-19. Modeled after a standard restroom, presented with a toilet, sink, mirror above the sink, automatic paper towel holder, hand soap, and door to close for privacy. The restroom did not have windows, and the floor was lined with an off-white tile that flowed halfway up the walls. The remainder of the walls were painted off-white. The light switch, located on the wall immediately to the right upon opening the restroom door, rested at a mutual height for both children and adults to reach. An electronic soap dispenser, located to the left of the sink and mounted on the wall, was used for contactless soap dispensing. The paper towel dispenser, also electronic and contactless, allowed for the minimal spread of germs, also being at a mutual height. A step stool

was available for any child unable to reach the sink themselves, to be provided by the SLP if needed. Step-by-step instructions for handwashing using the designed VAS were mounted on the wall at the child's height for ease and convenience.

Interventions utilized for the study consisted of the VAS and IC to have the child independently wash their hands following the VAS step-by-step to ensure all actions were performed correctly. Once all steps were completed, each child received a sticker for their IC to place in any area of their choosing. Children chose stickers from various options in the sticker bin to place on their chart. Immediately following the IC, the child picked an intangible reward (i.e., ball pit, rock wall, playground, or game) to reinforce their behaviors performed with the VAS. This reinforcement took place during the first five minutes of the child's Speech-Language Therapy session if fully completed, or for one minute if not fully followed.

Additional materials needed for the study consisted of hand soap, paper towels, a step stool, and stickers. The small therapy placement agency in New York provided necessary supplies for all restrooms, including hand soap and paper towels. The step stool was property of the small therapy placement agency in New York and supplied to any child who needed it to reach the appropriate height for the sink for proper functioning with assistance from the SLP. Stickers were provided by the SLP and originate from a community sticker bin. Stickers ranged in various varieties such as flowers, trucks, and gender-neutral options, ensuring something for everyone and allowing the child to decide on the sticker of their choice.

Researcher Training

The researcher educated and trained the SLP before the study to ensure their complete understanding of the experiment by educating all steps involved along with each form used and what they entailed. It is also important to note that the research did not interfere with the SLP

and daily lessons with each child. The SLP met with the researcher to discuss the research question and all aspects of the study, allowing any questions to be answered. The SLP was trained to collect baseline data by observing how each child washed their hands and shown how to monitor the daily handwashing tasks from the VAS. The SLP was educated about the use of IC as they needed to allow each child to pick out a sticker once the task was fully completed. The SLP was familiar with the datasheet and IC before the study began so that no confusion could alter any of the acquired data.

Procedures

Upon arrival at the small therapy placement agency in New York, the parent/guardian sent a text message to the SLP informing them of their arrival. Due to COVID-19 and the CDC's guidelines and regulations, parents/guardians could not enter the facility as regulations had been set in place to minimize the number of people in the building. Parents/guardians were asked to remain in their cars in the parking lot for the duration of the child's therapy session. In case of an emergency, the parent/guardian would be asked to come into the facility. The SLP took the child's temperature and documented it on the Suffolk County COVID-19 health form, signed by the child's parent/guardian. The client and SLP then proceeded directly to the restroom to wash hands before entering the therapy rooms. The SLP directed the child into the restroom, located in the main lobby and turned on the light. If the child was too short and unable to reach the sink, they had the option to use an available step stool to stand on while being monitored by the SLP for safety.

The handwashing VAS was located on the wall at the child's height, just to the left, underneath the contactless soap dispenser. After one week of baseline data retrieval, the SLP then demonstrated the task of handwashing aligning to the order of the VAS then asked the child

to complete the same task independently. For the remainder of the sessions, each child was instructed to complete the VAS task of handwashing upon entering the sensory gym throughout the 3-week study. The SLP provided assistance if needed through verbal cues and hand-over-hand (HOH) prompting, requiring the SLP to physically manipulate the child's hands.

The VAS consisted of seven steps on a Velcro laminated sheet that hung on the restroom wall. The different steps were able to be moved around by removing the Velcro adhesive. The chart was titled *Wash Your Hands*. Step one indicated turn on the water, which showed a visual photo of the faucet being turned on. The SLP aided in this process to ensure the child used the water at a comfortable temperature, avoiding burns. Step two visually informed the child to wet their hands, showing a photo of hands being rubbed together under the running faucet. The SLP monitored to ensure the water temperature was comfortable enough for the child and the water was evenly coated on the hands. Step three visually showed the child to place soap onto hands, and the visual photo showed soap being dispensed onto hands while water was still running. The soap dispensers at the small therapy placement agency in New York were contactless and ran off a sensor, so the child merely had to place their hands underneath for the soap to be dispensed. Step four visually showed the child to rub both hands together with the photo showing hands being rubbed together with bubbles near the running water. The SLP ensured the child rubbed their hands together while singing a song, such as the ABCs, so hands were cleaned thoroughly for more than 30 seconds. Step five visually showed the child rinsing the soap off their hands and is portrayed in the VAS as placing hands underneath the running water. The SLP again tested to ensure the water was at a comfortable temperature to avoid any burns. Step six visually showed the child to turn off the water and the VAS visually portrayed the hands turning off the faucet. The SLP assisted some children with this step if they could not reach the faucet. Step seven

visually showed the child the final step and directed them to dry their hands off with a paper towel. The small therapy placement agency in New York used a contactless paper towel dispenser, like the soap, so the child had to wave their hand before the dispenser for a paper towel to be dispensed automatically, only taking 1-2 towels.

When each child completed the task of handwashing using the VAS, they exited the restroom and the SLP turned off the lights. Each child immediately headed to a treatment room with their designated SLP for their 30-minute Speech Therapy session and reward. During and after the handwashing task, the SLP documented the child's actions on a data sheet. The datasheet consisted of an easy-to-use grid that the SLP completed for each child to fill in the service date, notes, observations of the handwashing task, and lastly, their signature/initials. After the child entered the treatment room, the SLP presented them with an IC suitable for children ages 4 to 6 where the child could pick from various stickers in the sticker bin to award their performance with positive reinforcement. The sticker of their choosing was placed on any of the boxes on the IC.

To reinforce the positivity of the handwashing task performed by VAS, the child had the option to choose from an array of intangible activities utilizing materials in the gym, such as the rock wall, ball pit, playground, and games. This took place immediately following placement of a sticker on the IC for the first 5-minutes of the child's Speech-Language Therapy session if the task was fully completed. The reinforcement for all participants, regardless of the effectiveness of VAS or IC, was implemented for each child. If the child completed the seven steps of the VAS correctly, they received 5-minutes of reinforcement activity of their choice. If the child did not complete all seven steps during that day, they received 1 minute of reinforcement with a verbal cue to complete all seven steps of the VAS in order to achieve 5-minutes of a desired

reinforcement activity. Regardless of completing the task, the child could engage in positive reinforcement for steps completed and participation. However, the SLP informed the child that they fell short of positively reaching all seven tasks while the child reviewed the VAS in the therapy room.

Data Management

The researcher stored all electronic data on an encrypted flash drive and not on any computer hard drive. The researcher will retain the data set and related files for a minimum of five years after the study completion in case questions arise about the analyses. After five years, the researcher will destroy the data using the current Department of Defense data destruction standards. The researcher will likely choose an affordable technique, such as encryption, pending technology at the time.

Statistical Analysis

The researcher conducted data analysis immediately upon completion of data collection from the SLP in the study. Descrip`tive statistics were used, including frequencies, mean, range, standard deviation, skewness, and kurtosis. The researcher collected all data on an Excel spreadsheet to assess the relative size of variance among group means compared to average variance within groups (Kim, 2014).

Compiled data on the Excel spreadsheet was documented whether the child completed the task or not. If completed correctly, with little to minimal assistance, the SLP indicated a +. If the task was not completed in full, requiring prompting assistance, the SLP indicated - highlighted in red. The symbols and colors can be clearly identified so readers can quickly determine correct or incorrectly completed tasks.

Results

Participant and Demographic Characteristics

The study consisted of six child participants, 67% males and 33% females. Children ranged in ages from 4 years and 2 months to 5 years and 1 month old, presenting with a mean age of 4.53 years old. All participants in the study were White, living in a middle-class income household. Children were previously diagnosed with an array of Speech and Language disorders (i.e., preschooler with a language disability (PLD), expressive language delay, receptive delays, childhood apraxia of speech (CAS), speech and language delay (SLD), speech sound disorder (SSD), and phonological delay). Of the children, 83% have siblings, 33% were twins, and 17% were only children.

Child A, a 4.8-year-old White male, attended Pre-K while living with his parents and one younger brother. The child was previously diagnosed with expressive language delay and received Speech Therapy services two days a week for 30 minutes in an individual session alongside OT. Child A required visual and verbal cues to wash hands independently before the intervention of the study.

Child B, a 4.2-year-old White male, possessed no educational background and lived at home with his parents, one twin sister (twin was Child F in the study), and an older sister. Having had a previous diagnosis of expressive language delay and receptive delay, this child received Speech Therapy services three times a week for 30 minutes in an individual session and also received OT services. Before the study, Child B was unable to wash his hands independently.

Child C, a 4.4-year-old White female, did not attend Pre-K but would spend weekdays with grandparents as a form of daycare, although she lived at home with her parents. She was an only child with a diagnosis of PLD and CAS and received Speech Therapy services three times a week for 30 minutes as individual sessions. This child also received Occupational Therapy,

Physical Therapy, and communicated with an Augmentative and Alternative Communication Device (AAC) to express her wants and needs. Child C could not wash hands independently before the study. She had possible undiagnosed Cerebral Palsy (CP) and was born with only one kidney.

Child D, a 5.1-year-old White male, did not attend Pre-K or Daycare and lived with his parents, had one sibling, and was previously diagnosed with PLD and SLD. He received Speech Therapy services three times a week for 30 minutes as an individual session and did not receive any additional services. Before the study, Child D was unable to wash his own hands independently.

Child E, a 4.5-year-old White male, attended Pre-K and lived with his parents, two siblings, and was diagnosed with PLD and a phonological delay. He received Speech Therapy services two times a week for 30 minutes as an individual session and also received Occupational Therapy. Child E could not independently wash his own hands before the study.

Child F, a 4.2-year-old White female, had no educational background. She lived at home with her parents, one twin brother (twin was Child B in the study), and one older sister. She had a diagnosis of PLD, expressive language delay, and SSD receiving Speech Therapy services three times a week for 30 minutes with individual services. She also received Occupational and Physical Therapy services. Before the study, Child F could not independently wash her own hands.

Baseline Testing

Baseline testing was held 2 to 3 times per week, depending on the intensity of services, for approximately 5 minutes each session for one week. During initial baseline testing, children were unaware of the VAS and IC until the actual intervention began. The SLP led each child into the restroom before the day's Speech Therapy session began to observe if they could

independently wash their own hands. Verbal and visual cues, along with HOH assistance were provided to all. Although the SLP referenced the VAS compared to how the child washed their hands, correct or incorrect behavior was not monitored. This assessment was to establish a starting point to compare collected data once the study was finalized.

The SLP documented the child's baseline data collection on the Baseline Data Chart for SLP. If the action(s) were correctly performed, the step would be checked off on the data collection sheet. If not completed or done incorrectly, the SLP aided with verbal, visual, and HOH support while documenting notes and data. During baseline assessment, verbal prompting was used to redirect each child back to the task at hand, if necessary. Occasionally, distractions (i.e., splashing/playing with the water, too many bubbles) prevented some participants from completing tasks.

Intervention Testing

Similar to baseline data collection, intervention testing was held 2 to 3 times per week, depending on the intensity of services, for approximately 5 minutes each session for a total of three weeks. Before each child worked on the task handwashing, the SLP verbally and visually showed and explained each of the seven steps allowing the child to match the pictures to the VAS board to comprehend each picture’s meaning. The SLP also informed each child that upon completing the task, a sticker would be given from the sticker bin for their IC and they would also have free play of their choice as an incentive reward, depending if completed in full or not. The SLP led each child into the restroom individually before their daily Speech Therapy session, ensuring proper documentation as the child proceeded, checking if it was correctly completed or not while also providing notes on each step if necessary (i.e., splashing, reversing steps, aggressiveness with paper towel dispenser, etc.).

The SLP documented the intervention testing on the Data Chart for SLP form. If any child became distracted, the SLP had to intervene with verbal or visual cues and HOH. The SLP then checked which steps were completed independently or indicated which was not while providing notes. Prompting was used to redirect if necessary.

Independent Data Per Child

Data was collected by the SLP on datasheets then documented on an Excel spreadsheet by the researcher. If a task was completed correctly, with little to minimal assistance a + was indicated a + and the task was not completed in full, requiring prompting or assistance - was indicated highlighted in red. The + and - symbols and colors were used as they were easy to read and allow the reader to quickly determine correct or incorrectly completed tasks.

Child A

The data for Child A is displayed in Figure 1.

Baseline Data Collection		
VAS Steps	7/27/21	7/30/21
Step 1	+	+
Step 2	+	+
Step 3	-	-
Step 4	-	+
Step 5	-	-
Step 6	-	-
Step 7	-	-

Intervention Data Collection						
VAS Steps	8/3/21	8/6/21	8/10/21	8/13/21	8/17/21	8/20/21
Step 1	+	+	+	+	+	+
Step 2	+	-	+	+	+	+
Step 3	+	-	+	+	+	+
Step 4	+	+	+	+	+	+
Step 5	+	+	+	+	+	+
Step 6	-	-	-	-	+	+
Step 7	+	+	+	+	+	+

Figure 1.

Baseline and intervention data were collected every Tuesday and Friday from 11-11:30 am between July 27th, 2021, through August 20th, 2021, for Child A. During baseline sessions, Child A showed extreme impulsivity as he wanted to play and splash in the water. The SLP reported she had to provide multiple verbal cues to stop splashing, and he did not know how to wash his own hands independently. On the first day of intervention, August 3rd, 2021, Child A completed steps 1 through 5 using the VAS correctly and independently. On step 6, he required

visual and verbal cues to turn off the water and complete step 7 independently. In the following session, Child A completed steps 1, 4, 5, and 7 independently and needed SLP intervention for the remaining steps. The following two sessions mirrored the first, as Child A only needed assistance with step 6; however, he became very impulsive with getting soap on his hands and needed visual cues. His last two sessions were completed in full independently using VAS. Child A began with a success rate of 86%, dropping to the lowest of 57% on day 2 and increasing to 100% independent handwashing with a mean success rate of 86% for the VAS intervention.

Child B

The data for Child B is displayed in Figure 2.

Baseline Data Collection			
VAS Steps	7/26/21	7/27/21	7/28/21
Step 1	-	-	-
Step 2	-	-	-
Step 3	-	-	-
Step 4	-	-	-
Step 5	-	-	-
Step 6	-	-	-
Step 7	-	-	-

Intervention Data Collection									
VAS Steps	8/2/21	8/3/21	8/4/21	8/9/21	8/10/21	8/11/21	8/16/21	8/17/21	8/18/21
Step 1	-	-	-	+	+	+	+	+	+
Step 2	-	-	-	+	+	+	+	+	+
Step 3	-	-	-	+	+	+	+	+	+
Step 4	-	-	-	+	+	+	+	+	+
Step 5	-	-	-	-	+	+	+	+	+
Step 6	-	-	-	-	+	+	+	+	+
Step 7	-	+	+	+	+	+	+	+	+

Figure 2.

Baseline and intervention data were collected every Monday, Tuesday, and Wednesday from 1:30-2 pm between July 26th, 2021, through August 18th, 2021. During Baseline data collection, Child B did not attempt any independent handwashing skills. He needed verbal cues as no steps were completed correctly. On the first date of intervention, August 2nd, 2021, Child B identified photos on the VAS but could not sequence them. He needed maximum visual and verbal cues for steps 1 through 7 from the SLP with HOH assistance. The following two sessions were similar, except he understood step 7, where he could independently grab a paper towel to dry his hands. Child B's fourth session showed a significant improvement, needing assistance on steps 5 and 6. However, he put too much soap on his hands and kept playing with the bubbles,

needing verbal cues to stop and rinse the soap. During the last five sessions, Child B independently completed all seven steps from the VAS with minimum verbal cues from the SLP. He was fascinated by the automatic paper towel dispenser, often taking too many towels but went from maximum to moderate verbal and visual cues. Child B began with a success rate of 0%, slightly increasing to 14% on days 2 and 3 then increased to 100% independent handwashing for the last five days with a mean success rate of 75% for the VAS intervention.

Child C

The data for Child C is displayed in Figure 3.

Baseline Data Collection			
VAS Steps	7/26/21	7/27/21	7/29/21
Step 1	-	-	-
Step 2	-	-	-
Step 3	-	-	-
Step 4	-	-	-
Step 5	-	-	-
Step 6	-	-	-
Step 7	-	-	-

Intervention Data Collection									
VAS Steps	8/2/21	8/3/21	8/5/21	8/9/21	8/10/21	8/12/21	8/16/21	8/17/21	8/19/21
Step 1	-	-	+	+	+	+	+	+	+
Step 2	-	+	+	+	+	+	+	+	+
Step 3	-	-	+	+	+	+	+	+	+
Step 4	-	-	+	+	+	-	+	+	+
Step 5	-	-	+	+	-	+	-	+	+
Step 6	-	-	+	+	-	-	+	+	+
Step 7	-	-	+	+	+	+	+	+	+

Figure 3.

Baseline and intervention data were collected every Monday, Tuesday, and Thursday from 4:30-5 pm between July 26, 2021, through August 19, 2021, for Child C. During baseline sessions, Child C could not wash her own hands and would stand facing the sink waiting for help. The SLP provided HOH assistance for all three baseline days. On the first day of intervention, August 2, 2021, Child C identified pictures on the VAS but needed HOH assistance from the SLP as she stood and waited for help during each step. Her second session showed a slight improvement as she completed step 2 independently; however, she could not perform the other six steps without assistance. During the following two days, the child did not need any assistance with the VAS as she followed the steps; however, she showed a decline on days five through seven, needing visual and verbal cues to complete several tasks. Child C's last two days

improved as she did not need any assistance from the SLP and completed the entire VAS independently with no cues. Child C began with a success rate of 0%, then expanded while fluctuating on the remainder of the study. She then increased to 100% independent handwashing for the last two days with a mean success rate of 80% for the VAS intervention.

Child D

The data for Child D is displayed in Figure 4.

Baseline Data Collection			
VAS Steps	7/26/21	7/28/21	7/29/21
Step 1	+	+	+
Step 2	+	+	+
Step 3	-	-	-
Step 4	-	-	-
Step 5	-	-	-
Step 6	-	-	-
Step 7	-	-	-

Intervention Data Collection									
VAS Steps	8/2/21	8/4/21	8/5/21	8/9/21	8/11/21	8/12/21	8/16/21	8/18/21	8/19/21
Step 1	+	+	+	+	+	+	+	+	+
Step 2	+	+	+	+	+	+	+	+	+
Step 3	-	-	+	+	+	+	+	+	+
Step 4	-	-	-	-	-	-	-	-	-
Step 5	-	-	-	-	-	-	-	-	-
Step 6	-	-	-	-	-	-	+	+	+
Step 7	-	-	-	-	+	+	+	+	+

Figure 4.

Baseline and intervention data were collected every Monday, Wednesday, and Thursday from 9:30-10 am between July 26th, 2021, through August 19th, 2021, for Child D. During baseline data collection, Child D repeatedly played with water, not washing his hands. All three baseline days required maximum verbal cues to finish washing hands, but he completed steps 1 and 2 independently. During intervention data collection, beginning on August 2nd, 2021, Child D independently completed steps 1 and 2 but was easily distracted and liked to make a mess playing in the water. For steps 3 through 7, he could identify the pictures on the VAS but needed HOH assistance. Day two of intervention was similar, except the child struggled to get soap on his hands and did not want to turn off the water requiring maximum verbal cues. The child was distracted by the paper towel dispenser, and SLP had to assist him with getting only one and physically moving away from the sink. The next few days, Child D's handwashing skills increased as he could independently complete steps 1 through 3 but still required cues and HOH

for the remaining steps. By his last data collection date, Child D was able to independently complete steps 1, 2, 3, 6, and 7, still needing cues and HOH assistance for steps 4 and 5. Child D began with a success rate of 29% and slightly increased each day for the remainder of the study. Hee then increased to 71% independent handwashing for the last three days with a mean success rate of 59% for the VAS intervention.

Child E

The data for Child E is displayed in Figure 5.

Baseline Data Collection		
VAS Steps	7/27/21	7/29/21
Step 1	-	-
Step 2	-	-
Step 3	-	-
Step 4	-	-
Step 5	-	-
Step 6	-	-
Step 7	-	-

Intervention Data Collection						
VAS Steps	8/3/21	8/5/21	8/10/21	8/12/21	8/17/21	8/19/21
Step 1	+	+	+	+	+	+
Step 2	+	+	+	+	+	+
Step 3	+	+	+	+	+	+
Step 4	+	+	-	+	+	+
Step 5	+	+	-	+	+	+
Step 6	+	+	+	+	+	+
Step 7	+	+	+	+	+	+

Figure 5.

Baseline and intervention data were collected every Tuesday and Thursday from 10-10:30 am between July 27th, 2021, through August 19th, 2021, for child E. During baseline data collection, this child required maximum assistance from the SLP as he had difficulty identifying what needed to be done. The intervention began on August 3rd, 2021, and Child E understood all steps on the VAS. He was able to model and execute all seven steps independently for the first two sessions. During his third session, Child E required HOH assistance and verbal cues to complete steps 4 and 5. However, for the remainder of the study, Child E completed all seven VAS steps independently with mild verbal cues and proper sequencing. Child E began with a success rate of 100% and increased daily during the study; however, he dropped to 71% on day

three. He then increased to 100% independent handwashing for the last three days with a mean success rate of 95% for the VAS intervention.

Child F

The data for Child F is displayed in Figure 6.

Baseline Data Collection			
VAS Steps	7/26/21	7/27/21	7/28/21
Step 1	-	-	-
Step 2	-	-	-
Step 3	-	-	-
Step 4	-	-	-
Step 5	-	-	-
Step 6	-	-	-
Step 7	-	-	-

Intervention Data Collection									
VAS Steps	8/2/21	8/3/21	8/4/21	8/9/21	8/10/21	8/11/21	8/16/21	8/17/21	8/18/21
Step 1	-	-	-	+	+	-	-	+	+
Step 2	-	-	-	+	+	-	-	+	+
Step 3	-	-	-	-	-	-	-	-	-
Step 4	-	-	-	-	-	-	-	+	-
Step 5	-	-	-	-	-	-	-	-	-
Step 6	-	-	-	-	-	-	-	-	-
Step 7	-	-	-	+	+	-	-	-	+

Figure 6.

Baseline and intervention data were collected every Monday, Tuesday, and Wednesday from 11:30-12 am between July 26, 2021, through August 18, 2021, for Child F. During each baseline session, Child F presented with difficulty as she stood in the bathroom waiting for help by the sink needing HOH assistance for all seven handwashing steps. Intervention with VAS began on August 2, 2021, and although the SLP went over all VAS steps with the child, she required maximum visual and verbal cues to proceed, same as baseline testing and did not follow the VAS. The following two days, Child F could identify the photos; however, she required HOH assistance for each step. During days four and five of intervention, the child could complete steps 1, 2, and 7 independently; however, she required maximum visual and verbal cues for in-between steps. Day six and seven, the child regressed as she could not follow the VAS photos and needed HOH assistance for all steps. On day 8, Child F independently completed steps 1, 2, and 4 but needed verbal, visual, and tactile cues requiring HOH. On day nine, she completed steps 1, 2, and 7 using the VAS independently but was distracted during all other steps, requiring HOH assistance. Child F started with a success rate of 0% for three days,

then increased to 43% for days four and five. She then decreased to 0% again for days six and seven, increasing back to 43% independent handwashing for the last two days with a mean success rate of 22% for the VAS intervention.

Combined Data

Combined calculations comparing the first day of VAS intervention versus the last day and throughout the three-week study were significant for all children. Each child showed fluctuations with progress between steps 1 through 7 using the VAS; however, all showed an improvement of 70% overall.

	Step 1														
	8/2/21	8/3/21	8/4/21	8/5/21	8/6/21	8/9/21	8/10/21	8/11/21	8/12/21	8/13/21	8/16/21	8/17/21	8/18/21	8/19/21	8/20/21
Child A	+				+		+			+		+			+
Child B	-	-	-			+	+	+			+	+	+		
Child C	-	-		+		+	+		+		+	+		+	
Child D	+		+	+		+		+	+		+	+	+	+	
Child E	+			+			+		+					+	
Child F	-	-	-			+	+	-			-	+	+		

	Step 2														
	8/2/21	8/3/21	8/4/21	8/5/21	8/6/21	8/9/21	8/10/21	8/11/21	8/12/21	8/13/21	8/16/21	8/17/21	8/18/21	8/19/21	8/20/21
Child A	+				+		+			+		+			+
Child B	-	-	-			+	+	+			+	+	+		
Child C	-	+		+		+	+		+		+	+		+	
Child D	+		+	+		+		+	+		+		+	+	
Child E	+			+			+		+			+		+	
Child F	-	-	-			+	+	-			-	+	+		

	Step 3														
	8/2/21	8/3/21	8/4/21	8/5/21	8/6/21	8/9/21	8/10/21	8/11/21	8/12/21	8/13/21	8/16/21	8/17/21	8/18/21	8/19/21	8/20/21
Child A	+				+		+			+		+			+
Child B	-	-	-			+	+	+			+	+	+		
Child C	-	-		+		+	+		+		+	+		+	
Child D	-		-	+		+		+	+		+		+	+	
Child E	+			+			+		+			+		+	
Child F	-	-	-			-	-	-			-	-	-		

	Step 4														
	8/2/21	8/3/21	8/4/21	8/5/21	8/6/21	8/9/21	8/10/21	8/11/21	8/12/21	8/13/21	8/16/21	8/17/21	8/18/21	8/19/21	8/20/21
Child A	+				+		+			+		+			+
Child B	-	-	-			+	+	+			+	+	+		
Child C	-	-		+		+	+		+		+	+		+	
Child D	-		-	-		-		-	-		-		-	-	
Child E	+			+			-		+			+		+	
Child F	-	-	-			-	-	-			-	+	-		

	Step 5														
	8/2/21	8/3/21	8/4/21	8/5/21	8/6/21	8/9/21	8/10/21	8/11/21	8/12/21	8/13/21	8/16/21	8/17/21	8/18/21	8/19/21	8/20/21
Child A	+				+		+			+		+			+
Child B	-	-	-			-	+	+			+	+	+		
Child C	-	-		+		+	-		+		+	+		+	
Child D	-		-	-		-		-	-		-		-	-	
Child E	+			+			-		+			+		+	
Child F	-	-	-			-	-	-			-	-	-		

	Step 6														
	8/2/21	8/3/21	8/4/21	8/5/21	8/6/21	8/9/21	8/10/21	8/11/21	8/12/21	8/13/21	8/16/21	8/17/21	8/18/21	8/19/21	8/20/21
Child A	-				-		-			-		+			+
Child B	-	-	-			-	+	+			+	+	+		
Child C	-	-		+		+	-		+		+	+		+	
Child D	-		-	-		-		-	-		+		+	+	
Child E	+			+			+		+			+		+	
Child F	-	-	-			-	-	-			-	-	-		

	Step 7														
	8/2/21	8/3/21	8/4/21	8/5/21	8/6/21	8/9/21	8/10/21	8/11/21	8/12/21	8/13/21	8/16/21	8/17/21	8/18/21	8/19/21	8/20/21
Child A	+				+		+			+		+			+
Child B	-	+	+			+	+	+			+	+	+		
Child C	-	-		+		+	+		+		+	+		+	
Child D	-		-	-		-		+	+		+		+	+	
Child E	+			+			+		+			+		+	
Child F	-	-	-			+	+	-			-	-	+		

Discussion

The study hypothesized that VAS and IC would positively impact handwashing on children between the ages of 4 to 6 years old to improve independent hygiene and EF. Results from all six participants support the hypothesis regarding the acquisition of learned behaviors through the VAS, with each child showing an increase in the task of independent handwashing. Additionally, all children participating in the study looked forward to the VAS before each Speech Therapy session knowing they would receive a sticker for their IC and an intangible reinforcement when completed.

Implications

The three-week study using a VAS for independent handwashing for personal hygiene to increase EF was conducted with four males and two females aged 4 to 6 years old. The use of the VAS for handwashing proved successful for children with processing delays, as evident in Figures 1 through 6. However, independent success varied due to each child's diagnosis or delay.

The research suggested a child-friendly VAS with matching Velcro pictures that matched could be easily manipulated by this age demographic. The SLP used these pictures to engage the children making the activity more like a game than a task. Children did not feel this was a daunting assignment, which implies that child-friendly VAS may be used in other learning activities other than just handwashing.

The study did not show many significant, meaningful, or unusual results. During baseline testing, some children stood in the bathroom, not knowing what to do while others were familiar with the concept of handwashing. Some children were unable to complete the task without sequencing (i.e., did not turn off the water, did not dry hands, etc.). The data collected showed a vast improvement for most children in completing the seven steps of handwashing with the VAS with a 70% overall increase for all six children. However, not all participants were able to complete all seven steps independently. Overall, EF for personal hygiene and the purpose of handwashing improved with all 6 participants since baseline testing after the intervention was complete.

The study was conducted in a middle-class socioeconomic demographic location in Port Jefferson, New York. All participants were of the same middle-class socioeconomic demographic and White between the ages of 4 to 6 years old, living in Suffolk County, New York. Parents did not accompany children upon entering the facility nor during their VAS study and Speech Therapy services due to New York State COVID-19 restrictions and guidelines.

Practitioners may use the study findings to help the population of interest for various planned tasks (i.e., getting dressed, toilet training, transitioning schedule.) to improve EF and self-growth for children who have difficulty processing multi-step activities. VAS can be used in schools, at home, for recreation, and in any aspect of life where a child may need to develop learned skills through different modalities (i.e., visual and tactile). The study utilized children with various delays, which indicates a VAS has minimal limitations to disability or capability if the child has cognitive and fine motor abilities.

Similarities and Differences

The intervention of VAS showed an increase in the independent task of handwashing

for all six participants. Compared to baseline sessions, each child showed improvements that required fewer visual cues, verbal cues, and HOH assistance. Independence for each child increased through both studies due to the interactive photos and guided steps to follow. This supports the notion that Kang and Chang (2019) have speculated with their study as it used a motion-controlled game, similar to a VAS where the child viewed the photos and steps for the independent task of handwashing.

Each child also showed interest in the ICs and rewards, similar to Rock and Hailemariam's (2017) study using *The Caterpillar Game*, a visual chart of rewards at the end of each school day if the students behaved correctly. The stickers received in the study and the intangible reward were a high motivation for all children to perform the handwashing task. Whether the child completed the task or not, they received a sticker and intangible reward; however, the reward varied if the task was completed in full. Ultimately, the reward incentive aided in a decrease of disruptive and incomplete behaviors.

McGonigle-Chalmers and McCrohan (2018) administered computer sequencing games to identify the nature of impaired EF in children. Similar to the conducted study, a VAS was used to improve EF in children with multiple speech delays and disorders. Overall, the use of an interactive variable assisted in a significant increase of each child’s EF so they could independently complete the personal hygiene task of handwashing.

Limitations

There were multiple unforeseen limitations in the study as the children sometimes became distracted. The facility had one restroom in the lobby, which caused a slight delay in waiting for a turn to wash hands, causing some impulsivity in a few children. Some children enjoyed splashing in the water, while others were distracted by the electronic soap and paper

towel dispensers. These dispensers were noisy for some, while others found them entertaining.

Although all children were within the same age group, each child possessed different delays and disabilities (i.e., PLD, expressive language delay, receptive delays, CAS, SLD, SSD, and phonological delay), impacting cognitive deciphering for the seven steps of the VAS.

Delays and Disorders

Preschoolers with a language disability (PLD) apply to children between the ages of 3 to 5 years old who have not yet started kindergarten; they have difficulty following multi-step or straightforward directions and understanding questions. They possess difficulty learning words or forming sentences. Some children may have difficulty speaking clearly (ASHA, 2021). In the study, 67% of children presented with PLD (Child C, D, E, and F).

Expressive language delay is described as children having difficulty reciprocating information via speech and other forms of communication. They tend to have a difficult time expressing themselves through speech, writing, and even sign language (ASHA, 2021). In the study, 50% of children presented with expressive language delay (Child A, B, and D).

Receptive delays pertain to children when they present with difficulty comprehending several components of language and verbally communicating independent thoughts (ASHA, 2021). In the study, 17% of children presented with receptive delays (Child B).

Childhood apraxia of speech (CAS) is a diagnosis where the neurological muscle memory does not connect properly from the brain to the mouth to formulate phonemes necessary for intelligible connected speech. The child knows what they want to say; however, it is not what is being vocalized; it is how the brain tells the mouth's muscles to

function. This causes the child to have difficulty appropriating oral-motor musculature and articulators to produce targeted phonemes necessary to produce coarticulated intelligible discourse (ASHA, 2021). In the study, 17% of the children had CAS (Child C).

Speech and language delay (SLD) is when a child is not developing speech and language at an expected rate of developmental milestones affecting 10% of preschool children. This may be caused due to slowed development, an intellectual disability, or hearing loss (FamilyDoctor, 2021). In the study, 17% of children presented with SLD (Child D).

Speech sound disorder (SSD) is when a child has difficulty with perception, motor production, or phonological representation of speech sounds and segments. Developmental milestones and age-appropriate sounds determine the severity of the delay (ASHA, 2021). In the study, 17% of children presented with SSD (Child F).

Phonological delay is a speech sound disorder; however, the child would present with a pattern of speech development that should have disappeared six months or earlier (SLT, 2021). Typically, the child would be trying to produce an ‘adult sound’ they perceive incorrectly (i.e., fumb for thumb). In the study, 17% presented with a phonological delay (Child E).

Conclusions

Findings from the study offer suggestions for further research. A study involving the same actions, perhaps through an iPad as a video, may be more effective for some children versus the Velcro VAS. It would be interesting to see how children received the information through an electronic device rather than a static printed photo hanging on the wall. The intervention results may increase through video, or perhaps some children would not

comprehend the VAS as everyone learns differently. Someone modeling the handwashing behavior could film each step showing the child as they proceed through the task to imitate. This could reduce the amount of prompting and HOH used for redirection. This type of video intervention may be beneficial for teaching multiple behaviors besides handwashing, such as brushing teeth, getting dressed, and taking a shower.

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Appendix A
Letter of Authorization from Research Site

Redacted for Privacy Reasons

Appendix B
Consent for Participation in Research: Parent

Purdue University Global
Consent for Participation in Research
"Visual Activity Schedules and Incentive Charts for Children With Processing Difficulties: Improving Executive Functioning"

CONCISE SUMMARY

The purpose of this study is to determine if the use of Visual Activity Schedules and Incentive Charts improve Executive Functioning in children with processing difficulties. The duration of the study will be for 3 weeks at New York Therapy Placement Services. Children with developmental delays that meet the criterion with parental consent, will be required to model handwashing from a Speech Language Therapist using a Visual Schedule for visual cues in the step-by-step process for the benefits of personal hygiene during COVID-19. Incentive Charts after handwashing will promote positive reinforcement for a job well done. The Incentive Chart rewards will be monitored by the Speech Language Therapist working with the specified child. Potential benefits would be that children can use independent Executive Functioning of a learned behavior that is necessary during the COVID-19 pandemic and thereafter. Potential risks for the participants may include allergies to hand soap or paper towels used at the facility depending on each individual.

Why am I being asked?
You are being asked to be a participant in a research study about the use of Visual Activity Schedules and Incentive Charts to see if Executive Functioning improves the use of independent handwashing in your child for the purpose of personal hygiene during COVID-19 and thereafter. This research study is being conducted by Kerri Marx, a Master's of Science in Psychology student at Purdue University Global and Jean Marx, MS CCC-SLP TSSLD., Licensed Speech Therapy Supervisor at New York Therapy Placement Services. We ask that you read this form and ask any questions you may have before agreeing to be in the research.

What is the purpose of this research?
There will be a Visual Activity Schedule near all New York Therapy Placement Services' sinks that will guide your child through the process of handwashing. Once the Visual Activity Schedule is completed by your child, they will receive a sticker on an Incentive Chart. This will reward them for properly completing the task and positive reinforcement, thus improving Executive Functioning and processing for the simple task of handwashing without reminders.

What procedures are involved?
Upon entering the sensory gym, your child will independently use the sink to wash their hands using the Visual Activity Schedule. Everyone entering the facility is required to wash their hands in compliance with CDC guidelines for COVID-19. The length of time for handwashing will be determined by the energy or activity level of your child's motivation for that day. The Speech Language Pathologist working with your child will take data on each step of his or her independent actions while handwashing. During the first week of this study, the Speech Language Pathologist will give visual, verbal, and hand over hand cues when necessary. After

the first week, your child will be responsible to follow the Visual Activity Schedule that has been introduced to them and data will be collected.

Are there benefits to taking part in the research?
Your child participating in this study will learn to independently wash their hands for personal hygiene purposes. This will reduce the risk of infections, colds, and the potential contraction of COVID-19. Carryover for handwashing at New York Therapy Placement Services may improve spontaneous handwashing outside the facility in his or her own environment.

What about privacy and confidentiality?
The only people who will know that your child is a research subject would be members of the research team. No information about you, your child, or provided by you during the research, will be disclosed to others. When the results of the research are published, no information will be included that would reveal your identity. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law.

Can I withdraw from the study?
You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study.

Whom should I contact if I have questions?
The researcher conducting this study is Kerri Marx. You may ask any questions you have. You may contact the researchers at: Phone: (631) 255-2480. You may also contact the researcher's thesis adviser, Dr. Gabrielle Blackman PhD, at gblackman@purdueglobal.edu.

What are my rights as a research subject?
If you feel you have not been treated according to the descriptions in this form, or you have any questions about your rights as a research subject, you may contact the Institutional Review Board (IRB) at Purdue University Global through the following representative: Susan Pettine, IRB Chair, Email: spettine@purdueglobal.edu

Signature of Subject **(You may keep a copy of this form for your information and your records)**
I have read (or someone has read to me) the above information. I have been given an opportunity to ask questions and my questions have been answered to my satisfaction. I agree to participate in this research. I have been given a copy of this form.

_____ _____
Signature Date

_____
Printed Name

_____ _____
Signature of Researcher Date (must be same as subject's)

Appendix C
Consent for Participation in Research: Child

Purdue University Global
Verbal Assent Script for Child Subjects
"Visual Activity Schedules and Incentive Charts for Children With Processing Difficulties: Improving Executive Functioning"

CONCISE SUMMARY

The purpose of this study is to determine if the use of Visual Activity Schedules and Incentive Charts improve Executive Functioning in children with processing difficulties. The duration of the study will be for 3 weeks at New York Therapy Placement Services. Children with developmental delays that meet the criterion with parental consent, will be required to model handwashing from a Speech Language Therapist using a Visual Schedule for visual cues in the step-by-step process for the benefits of personal hygiene during COVID-19. Incentive Charts after handwashing will promote positive reinforcement for a job well done. The Incentive Chart rewards will be monitored by the Speech Language Therapist working with the specified child. Potential benefits would be that children can use independent Executive Functioning of a learned behavior that is necessary during the COVID-19 pandemic and thereafter. Potential risks for the participants may include allergies to hand soap or paper towels used at the facility depending on each individual.

Hi. My name is Kerri Marx. I'm a student at Purdue University Global. Right now, I'm trying to learn if the use of Visual Activity Schedules and Incentive Charts will help improve Executive Functioning in children with processing difficulties. I would like to ask you to help me by being in a study, but before I do, I want to tell you what will happen if you say "yes" to helping me.

First, I will show you pictures of how to wash your hands. The pictures will have Velcro pieces to move so you can follow each step as you go along with the pictures. When we're all done, you will get a sticker for a job well done.

Your guardian says it is okay for you to be in my handwashing study, but if you don't want to be in the study, you don't have to be. You may choose to stop at any time. Whatever you choose to do is okay, and you and your family will not get into any trouble if you decide to stop being in the study. If there is anything you don't understand you should tell me so I can explain it to you.

Do you have any questions for me now?
• Yes •No
If yes: _____

Would you like to be in my study?
•Yes •No

_____
Child's Voluntary Response to Participation •Yes •No

Child's Name: _____

Appendix D
Survey Development Plan

Objective	Operational Definition	Number and Type of Items
To assess the child's race/ethnicity	I define race/ethnicity as distinctive physical traits and classifications of groups of people.	I will measure this objective through Q1 in the questionnaire by asking if the child is American Indian or Alaskan Native, Asian/Pacific Islander, Black or African American, Hispanic, White/Caucasian, Multiple ethnicity/Other, or Prefer Not to Answer.
To assess the child's gender identity	I define gender identity as one's personal sense of gender towards themselves.	I will measure this objective through Q2 in the questionnaire by asking if child is Female, Male, Transgender, Non-binary/non-conforming, Other, or Prefer Not to Answer.
To assess the child's age	I define age as the overall duration of the child's existence.	I will measure this objective through Q3 in the questionnaire by asking how many years and months old the child is.
To assess the child's highest level of education	I define levels of education as the different educational chapters the child may have experienced.	I will measure this objective through Q4 in the questionnaire by asking if the child has attended Pre-K, Daycare, None, Other, or Prefer Not to Answer.
To assess how many family members the child lives with	I define family members lived with as who else lives in the household with the child.	I will measure this objective through Q5 in the questionnaire by asking how many family members the child lives with, If there are any siblings – if so how many, Are siblings younger or older, Other, or Prefer Not to Answer.
To assess the child's Speech Language Diagnosis information	I define the Speech Language diagnosis as what did the Licensed Speech Pathologist delays or disorders diagnose the child with in order for them to receive services.	I will measure this objective through Q6 in the questionnaire by asking the Speech Language Pathologist to indicate the child's diagnosis or they have the option to check Other, or Prefer Not to Answer,

To assess the intensity of services provided for the child	I define the intensity of services as how many days per week and minutes per session the child receives services as per their IEP.	I will measure this objective through Q7 in the questionnaire by indicating how many days per week the child receives services and how many minutes each session is, If the child receives Group Services (more than 1 child in a session), Other, or Prefer Not to Answer.
To assess if the child receives additional services	I define additional services as other services besides Speech Language Therapy on their IEP.	I will measure this objective through Q8 in the questionnaire by asking if the child receives any of the following: Occupational Therapy (OT), Physical Therapy (PT), Special Instruction (SI), Applied Behavior Analysis (ABA), Other, or Prefer Not to Answer.
To assess if the child can wash their own hands independently	I define independent hand washing as the child can perform the act of handwashing from turning on the water, rubbing soap on hands, rinsing soap off, and drying hands.	I will measure this objective through Q9 in the questionnaire by indicating Yes, No, Other, or Prefer Not to Answer.
To assess any additional information or comments	I define additional information or comments as information the Speech Language Pathologist feels is necessary for the researcher to know for the study.	I will measure this objective through Q10 in the questionnaire by leaving blank spaces for the Speech Language Pathologist to fill in any comments or indicate Prefer Not to Answer.

Appendix E
Demographic Questionnaire

Demographic Questionnaire

To be completed by Licensed Speech Language Therapist

Child's Name: _____

1. What is child's race/ethnicity?
   - ☐ American Indian or Alaskan Native
   - ☐ Asian/Pacific Islander
   - ☐ Black or African American
   - ☐ Hispanic
   - ☐ White/Caucasian
   - ☐ Multiple ethnicity/Other (please specify): _____
   - ☐ Prefer Not to Answer

2. What is child's gender identity?
   - ☐ Female
   - ☐ Male
   - ☐ Transgender
   - ☐ Non-binary/non-conforming
   - ☐ Other (please specify): _____
   - ☐ Prefer Not to Answer

3. What is child's age? Years _____ Months _____

4. What is the highest level of education child has attained?
   - ☐ Pre-K
   - ☐ Daycare
   - ☐ None
   - ☐ Other (please specify): _____
   - ☐ Prefer Not to Answer

5. How many family members does child live with? _____
   - ☐ If siblings, how many? _____
   - ☐ If siblings, older/younger? _____
   - ☐ Other (please specify) (i.e., twins, triplets, etc.): _____
   - ☐ Prefer Not to Answer

6. What is child's Speech Language diagnosis?
   - ☐ _____
   - ☐ _____
   - ☐ _____
   - ☐ None
   - ☐ Prefer Not to Answer

7. What is the intensity of services provided for child?
   - ☐ Days per week: _____ Minutes per session: _____
   - ☐ Group services: Y/N

- ☐ Other (please specify): _____
- ☐ Prefer Not to Answer

8. Does this child receive any additional services?
   - ☐ Occupational Therapy (OT)
   - ☐ Physical Therapy (PT)
   - ☐ Special Instruction (SI)
   - ☐ Applied Behavior Analysis (ABA)
   - ☐ Other (please specify): _____
   - ☐ Prefer Not to Answer

9. Can child wash their own hands independently?
   - ☐ Yes
   - ☐ No
   - ☐ Other (please specify): _____
   - ☐ Prefer Not to Answer

10. Other/Comments?
   - ☐ _____
   - ☐ _____
   - ☐ _____
   - ☐ Prefer Not to Answer

Appendix F
Pre-Study Reinforcement Assessment

Pre-Study Reinforcement Assessment

To be completed by the participant's Parent/Guardian

Child's Name: _____

Please describe in order from 1 to 5 (1 being most desirable and 5 being least desirable) the items or activities your child prefers most favorably. These items may be used as reinforcement to this study.

1. _____
2. _____
3. _____
4. _____
5. _____

These items may be tangible (i.e., toys, Play Dough), intangible (a story, music), or equipment at the sensory gym.

Appendix G
Baseline Data Chart for SLP

Child's Name: _____ Age: _____

This data collection sheet is to be completed by the Licensed Speech Language Therapist collecting data for the handwashing study for baseline data
Prior to beginning the study, collect informatoin for the Baseline data on the sheet below
-Step 1: Indicate the date and time of data collection for baseline data
-Step 2: Check off each of the steps completed by the child on the handwashing Visual Activity schedule for baseline data. If the child misses a step, do not check the box.
-Step 3: Document any notes necessary to data collection (i.e., if the child is having an off day) for baseline data
-Step 4: Initial under SLP initials for baseline data
***Keep this datasheet confidential to protect the identity of each participant.**
•Upon completion of the study, all datasheets will be given to the researcher, Kerri Marx, and then destroyed.

DATE/TIME	BASELINE DATA COLLECTION NOTES	SLP INITIALS
	☐ 1	
	☐ 2	
	☐ 3	
	☐ 4	
	☐ 5	
	☐ 6	
	☐ 7	

Appendix H
Intervention Data Chart for SLP

Child's Name: _____ Age: _____

This data collection sheet is to be completed by the Licensed Speech Language Therapist collecting data for the handwashing study

For each session during the three-week study, please fill out the datasheet below. Each datasheet contains 10 spaces, however, additional sheets may be printed if necessary.

-Step 1: Indicate the date and time of data collection

-Step 2: Check off each of the steps completed by the child on the handwashing Visual Activity schedule. If the child misses a step, do not check the box.

-Step 3: Document any notes necessary to data collection (i.e., if the child is having an off day)

-Step 4: Initial under SLP initials

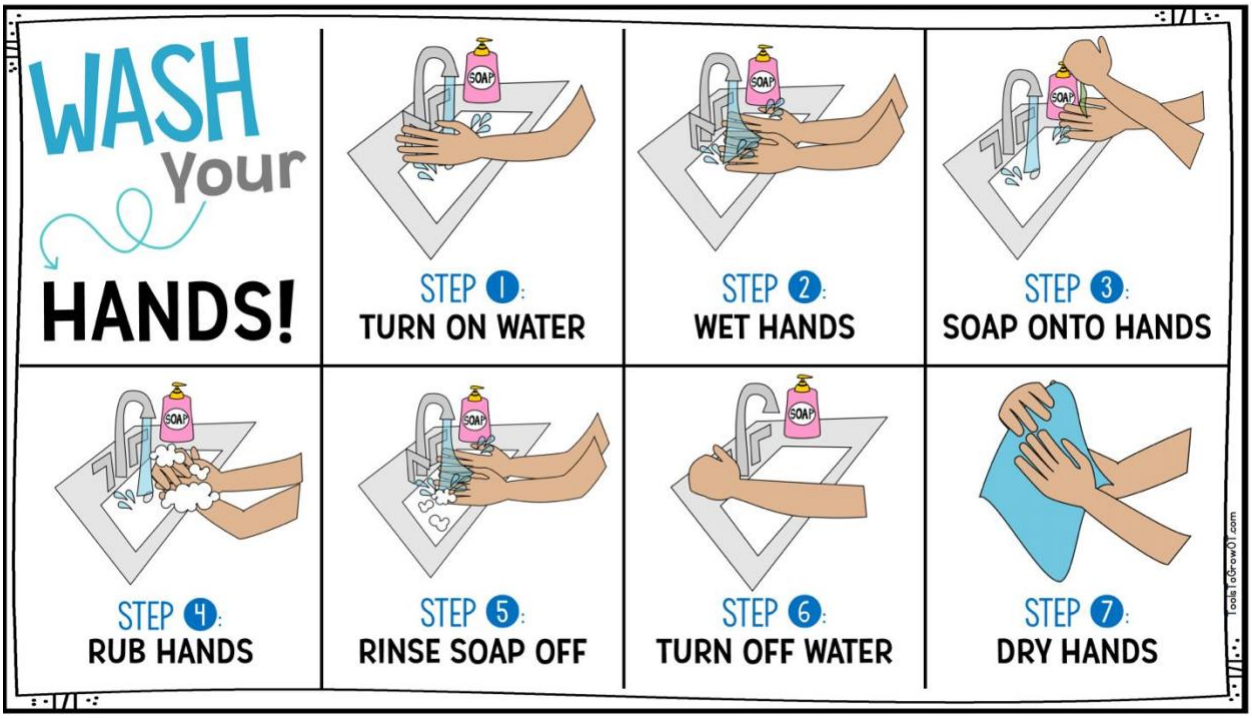
***Keep this datasheet confidential to protect the identity of each participant.**

***Upon completion of the study, all datasheets will be given to the researcher, Kerri Max, and then destroyed.**

DATE/TIME	INTERVENTION DATA COLLECTION NOTES	SLP INITIALS
	☐ 1	
	☐ 2	
	☐ 3	
	☐ 4	
	☐ 5	
	☐ 6	
	☐ 7	

Appendix I

Visual Activity Schedule



Appendix J

Incentive Chart