



MSc in Clinical Psychology

The effects of individualized teaching of school readiness skills to children in preschool with ADHD symptoms

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Forewords and acknowledgement

Submitted in partial fulfilment of the requirements for the degree of Master of Science in Clinical Psychology at Reykjavik University, this thesis is presented in the style of an article for submission to a peer-reviewed journal. The research that this thesis presents is the culmination of work over three semesters. In the first semester, a literature review was written about attention-deficit/hyperactivity disorder (ADHD) and the preschool life skills (PLS) program, and appropriate permits were obtained from collaborators, the Icelandic data protection authority, and the National bioethics committee in Iceland. In the second semester, a draft of two sections for the thesis, research method and results, were written. Data collection took place in the second and third semester, from November 2018 until May 2019. In the third semester, the final draft of the thesis was written. The work of this thesis will be submitted to a peer-reviewed journal and Berglind Sveinbjörnsdóttir will be co-author.

The purpose of this study was to implement the PLS program using individualized teaching to children with ADHD symptoms. The researcher evaluated the effectiveness of the program in decreasing problem behavior and acquisition of PLS, as well as typical responses in certain life skills situations and number of ADHD symptoms. The results of this study will hopefully advance future research in this field, benefit preschools and elementary schools, and lead to further individualized programs for children with ADHD and problem behavior.

I want to thank my supervisor, Berglind Sveinbjörnsdóttir, for her guidance for the past two years. Additionally, I want to thank the teachers and other staff members at the participating preschool for their warm welcome. Special thanks to Anna Þóra Ragnars for her patience, enjoyable collaboration, her dedication, and the effort she put in this project. Lastly, I want to thank my family, friends, and classmates for the support and encouragement for the past two years.

Abstract

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common behavioral disorder diagnosed among children and adolescents and is associated with wide range of health and developmental risks, emotional and behavioral disorders, lack of social skills, and academic underachievement. The purpose of this study was to evaluate the effectiveness of the preschool life skills (PLS) program in decreasing challenging behavior and acquisition of PLS using individualized teaching to children with symptoms of ADHD. A 5-year old girl in preschool was taught individually eight PLS, divided into three units of instruction following, functional communication, and tolerance skills. Teaching included instructions, modeling, role-play, and feedback/descriptive praise. Various situations that presented an opportunity for the participant to display appropriate PLS or engage in problem behavior were set up throughout the school day. The PLS program was effective in increasing PLS and skill achievement was only evident when teaching targeted each unit of skills.

Keywords: Preschool life skills (PLS), school readiness skills, attention-deficit/hyperactivity disorder (ADHD), behavioral intervention, individualized teaching, instruction following, functional communication, tolerance

The effects of individualized teaching of school readiness skills to children in preschool with ADHD symptoms

ADHD is a behavioral and an emotional disorder usually occurring in early childhood and adolescence (World Health Organization, 1993) and is one of the most common behavioral disorder diagnosed among children and adolescents (Baldursson, Magnússon, Haraldsson, & Halldórsson, 2012; Gelfand & Drew, 2003). ADHD is characterized by inattention, hyperactivity, and impulsivity (American Psychiatric Association, 2013). Symptoms can vary between individuals but are most often characterized by difficulties with sustaining attention, instruction following, completing activities, waiting, excessive talking and moving, social intrusiveness, and interrupting conversations or activities (American Psychiatric Association, 2013; Baldursson et al., 2012).

In addition to these symptoms ADHD is associated with wide range of health and developmental risks, such as cognitive and academic difficulties, aggression, and anger, (Kelly, 2009). Children with ADHD are often seen as hostile, uncooperative, and aggressive (Gelfand & Drew, 2003). They often have difficulties with social interactions, especially with peers, are more likely to have few close friends, and to interact with younger children than with peers. Finally, children with ADHD are more likely to be academic underachievers and the likelihood increases as severity of symptoms increases (Barry, Lyman, & Klinger, 2002; Daley & Birchwood, 2010).

Because of the symptoms and risks associated with ADHD, children diagnosed with ADHD have to face multiple difficulties in daily activities for the most part of their life (Baldursson et al., 2012), e.g., in school where children all ages spend majority of their day. Most children spend their first few years in preschool. After preschool, or around 6 years old, they transition to elementary school, where school attendance is mandatory for all children ages 6 to 16 (Compulsory school act, 2008). The elementary school environment entails new

demands, new academic challenges, new expectations, and new peer group (Ladd & Price, 1987). Therefore elementary teachers need to be prepared for certain difficulties in the school environment with children diagnosed with ADHD. Teachers also need to be aware of their student's well-being, where children who feel less comfortable in school and exhibit challenging behavior are more likely to be absent from school, negatively perceived by teachers, rejected by peers, and more anxious than children who feel comfortable in school. With this demanding elementary school environment, the preschool years are an important part of preparing children for these challenges where certain skills are required (Daley & Birchwood, 2010). These skills can be categorized by social, behavioral, and academic skills, sometimes referred to as school readiness skills, and are necessary for children to have acquired before they enter elementary school. According to preschool and elementary school teachers, the most important school readiness skills are telling needs and thoughts, not being disruptive, following directions, taking turns, share, and be sensitive with others (Hálfðanardóttir, 2018; Lin, Lawrence, & Gorrell, 2003). Less important skills are naming colors, shapes, letters, and numbers, problem solving, and finishing tasks. Some symptoms of ADHD can hinder children acquiring certain school readiness skills, where some of the most common symptoms are social intrusiveness, difficulties with instruction following, and inattention (American Psychiatric Association, 2013; Baldursson et al., 2012). Therefore it is important to teach children with ADHD school readiness skills.

As was mentioned before, symptoms of ADHD can vary between individuals. Therefore individualized treatment is considered to be most effective (Gelfand & Drew, 2003), more likely to lead to reduction in negative effects of symptoms, and improve quality of life (Shaw et al., 2012). Clinical guidelines recommend behavioral and psychosocial interventions as first choice of treatment of ADHD for children of preschool age before psychopharmacological treatment (Baldursson et al., 2012; National Institute for Health and

Care Excellence, 2019). Psychopharmacological treatment, specifically psychostimulants, has been shown to be effective in reducing restlessness, inattentiveness, and impulsiveness, decreasing aggression, and increasing compliance (Taylor et al., 2004). The course time of psychostimulants can vary from several hours to lasting throughout the day, depending on dose size, and responsiveness to the medication also varies depending on type and dose size (Pelham et al., 2001; Rapport, Denney, DuPaul, & Gardner, 1994). Some individuals experience adverse effects of psychostimulants, e.g., sleeplessness, nervousness, emotional instability, and appetite reduction. Therefore the risk of medications should be considered before prescribing psychostimulants to preschool-aged children (Subcommittee on Attention-Deficit/Hyperactivity Disorder, Steering Committee on Quality Improvement and Management, 2011). Behavioral intervention consists of multiple techniques where the goal is to modify the environment and teach skills to promote behavior change (Gelfand & Drew, 2003). One form of behavioral intervention is social skills training. Such training includes teaching children to share and follow game rules, accept negative consequences, use assertive communication, problem solving, and emotional control (Pfiffner & McBurnett, 1997). This kind of training involves teaching necessary skills for appropriate peer interaction that children with ADHD often lack and to reduce impulsiveness, intrusiveness, and hyperactivity (American Psychiatric Association, 2013; Baldursson et al., 2012). Teaching appropriate social skills may reduce the occurrence of problem behavior and prevent development of more severe problem behavior (Hanley, Heal, Tiger, & Ingvarsson, 2007; Luczynski & Hanley, 2013). Social skills training for children with emotional and behavioral disorders contribute to higher academic achievement for about 65% of students (Gresham, 2015), reduces problem behavior in the school environment (Lewis, Sugai, & Colvin, 1998), and increases peer related social skills (Pfiffner & McBurnett, 1997).

An example of a social skills training is the PLS program developed by Hanley, Heal, Tiger, & Ingvarsson (2007). The main feature of this preventive approach is teaching appropriate social skills to children in situations in preschool where problem behavior is likely to occur (Hanley et al., 2007; Luczynski & Hanley, 2013). If appropriate social skills are taught and children engage in more acceptable social behavior to obtain attention and access to objects, it can reduce the likelihood of problem behavior, e.g., gaining teacher's attention by saying his/her name or calling out "teacher" instead of yelling or hitting the teacher. The PLS program consists of thirteen skills, divided into four units (Hanley et al., 2007). These thirteen skills were derived from the functional assessment and treatment literature, and from the school readiness literature. These four units are instruction following, functional communication, tolerance for delay, and friendship skills, each includes two to four related skills. The teaching is divided into three tiers (Luczynski & Hanley, 2013). First, teaching is provided classwide, second, teaching is provided with smaller groups that are at risk of developing severe problem behavior, and third, teaching is implemented individually and intensively.

The PLS program has been effective in decreasing problem behavior and increasing school readiness skills in preschool environments with larger groups (≥ 10) (Beaulieu, Hanley, & Roberson, 2012; Gunning, Holloway, & Healy, 2018; Hanley, Fahmie, & Heal, 2014; Hanley et al., 2007), smaller groups (< 10) (Hálfðanardóttir, 2018; Luczynski & Hanley, 2013; Luczynski, Hanley, & Rodriguez, 2014), and in one-on-one teaching (Falligant & Pence, 2017; Francisco & Hanley, 2012; Kraus, Hanley, Cesana, Eisenberg, & Jarvie, 2012). The program has also been implemented in preschool settings with children with autism spectrum disorder and developmental disorders (Falligant & Pence, 2017; Francisco & Hanley, 2012; Pelletier, 2018). A search of relevant literature yielded no researches evaluating the effects of the PLS program in one-on-one teaching specifically with children

with ADHD. These children often lack necessary school readiness skills that are important for successful transition from preschool to elementary school (American Psychiatric Association, 2013; Baldursson et al., 2012) and intervention for ADHD is considered most effective when individualized (Gelfand & Drew, 2003). Thus the PLS could be a good treatment option for children diagnosed with ADHD. With implementation of the program the focus should be on teaching necessary school readiness skills in preschool with individualized teaching that children with ADHD often have difficulties with (American Psychiatric Association, 2013; Baldursson et al., 2012; Barry et al., 2002; Daley & Birchwood, 2010), and thus promoting better mental health and more successful school attendance (Daley & Birchwood, 2010; Gresham, 2015; Ladd & Price, 1987; Lewis et al., 1998; Pfiffner & McBurnett, 1997).

The purpose of this study was to implement the PLS program using individualized teaching and evaluate the effectiveness of the program in decreasing challenging behavior and acquisition of PLS with children with ADHD symptoms. Typical responses in certain life skills situations and number of ADHD symptoms were assessed before and after individualized teaching.

Method

Participants

The participant was a 5-year-old girl, called Linda, who exhibited symptoms of ADHD (number of symptoms on ADHD-rs, IA: 8 of 9; HI: 9 of 9). She was currently being assessed for ADHD and was nominated by a psychologist at her municipality. Linda was enrolled in a full-time preschool program, i.e. approximately 8 hr per weekday.

Several inclusion and exclusion criteria applied for participation. The inclusion criteria was following: Participants 1) had been referred to or were currently being assessed by a psychologist at the participant's municipality for ADHD, 2) were at risk for a diagnosis

of ADHD. The exclusion criteria was following: Participants 1) had previous ICD-10/DMS-5 diagnosis for ADHD, 2) had previous ICD-10/DMS-5 diagnosis of intellectual disabilities, developmental disorders, or other behavioral/emotional disorders, 3) participated in a behavioral intervention at their preschool, 4) had prescription of psychostimulant treatment for ADHD.

Settings

The study took place at Linda's preschool. The preschool was open between 7:30 a.m. and 5 p.m. every weekday, with exceptions on statutory holidays and teacher conference days. The class consisted of five teachers, a social educator, and 42 children (ages 5 to 6) divided into three groups. The classroom was divided into five separate areas, three small playing areas and two bigger group areas with tables and chairs. The classroom's daily schedule, i.e., group time, playtime, and mealtime, was similar on weekdays, with occasional exceptions. Evocative situations were set up in the participant's classroom throughout the school day. These include various situations that present an opportunity for the participant to display appropriate PLS or engage in problem behavior and resemble situations that occur normally in a classroom.

Individualized teaching sessions were conducted in a small room (4 m by 4 m) next to the classroom, which contained chairs, a table, teaching materials, and toys. Individualized teaching was conducted one-to-three times per week, each session lasting approximately 15- to 30-min. The individualized teaching sessions consisted of the participant, the researcher, and the main teacher. The researcher was a master's student in clinical psychology.

Dependent Variables

The dependent variables were symptoms of ADHD, acquisition of PLS, and problem behavior. Symptoms of ADHD were derived from DSM-5/ICD-10 (American Psychiatric Association, 2013; World Health Organization, 1993) and defined as abnormality of

attention, activity, and impulsivity for age and developmental level. PLS were defined as three units of eight target skills (adapted from Hanley et al., 2007; Hanley & Road, n.d.; Luczynski & Hanley, 2013) and problem behavior was defined as error of omission or error of commission (see Table 1 for definitions of each skill and problem behavior).

Table 1

Definitions of three units of eight skills and problem behavior

Dependent variables	Definition
Unit 1. Instruction following skills	
Skill 1: Responding appropriately to name	Within 2 seconds, the child will stop competing behavior, orient toward speaker, and say "Yes".
Skill 2: Complying to simple-step instructions	Within 3 seconds, the child will initiate completion of the instruction and will complete the instruction in a timely manner.
Skill 3: Complying to multi-step instructions	Within 3 seconds, the child will initiate completion of the instruction and will complete the instruction in a timely manner.
Unit 2. Functional communication skills	
Skill 4: Requesting assistance from an adult	The child will complete task or request assistance by saying "Can you help me, please" (with appropriate tone and voice volume) within 45 seconds of instruction delivery.
Skill 5: Requesting attention from an adult	The child will recruit attention by saying "Teacher" or the adult's name (with appropriate tone and volume) without engaging in excessive physical contact (i.e., no more than 3 light taps).
Skill 6: Requesting access after obtaining attention from an adult	Within 10 seconds of reaching adult, the child will say "Teacher" or the adult's name to gain adult's attention, wait for a response, and then request access to the area or material in the form of "May I have..." or "Can you pass me the..."
Unit 3. Tolerance skills	
Skill 7: Tolerating delay from an adult	The child will say "Okay", and wait patiently for 30-90 seconds for the adult-mediated event.
Skill 8: Tolerating denial from an adult	The child will say "Okay" and continue the activity it was previously engaged in.
Error of omission	
No response	The child does not respond to instructions.
Approximation of the pre-defined skill	The child does not complete the pre-defined skill.
Error of commission	
Verbal behavior	E.g., Saying no, shouting, cursing, inappropriate language.
Disruptive behavior	E.g., Throwing, tearing, or kicking objects, eloping.
Aggressive behavior	E.g., Kicking, hitting, spitting, scratching, biting, throwing objects towards someone.

Measurements

Indirect measures. Two types of questionnaires were administered to parents and teachers before and after implementation of the PLS program. The ADHD rating scale (ADHD-rs) was used to measure symptoms of ADHD as perceived by parents and teachers. A questionnaire about PLS (PLS-Q) was used to measure parents and teachers perception of the participant's responses in certain life skills situations. In addition, a question about concerns for the participant's adjustment in elementary school was asked (*Do you have concerns about how the child will adjust to a more demanding elementary school environment, where there are more students in the classroom, and more students per teacher?*), scored on a 5-point Likert scale, range 0 to 4 (0 = *No worries*, 4 = *Very worried*).

ADHD-rs is an 18-item screening questionnaire that assesses symptoms of ADHD among children and adolescents (4-to-18 years) (Magnússon, Smári, Grétarsdóttir, & Brándardóttir, 1999). The list has two dimensions, inattention and hyperactivity-impulsivity, each consisting of nine items. Symptoms of ADHD are defined as abnormality of attention and activity-impulsivity for age and developmental level of the participant, i.e., six or more symptoms on each dimension scored by teachers and parents (American Psychiatric Association, 2013; World Health Organization, 1993). Scores on the questionnaire have been reported to have good reliability and validity (Pappas, 2006; Sigurjónsdóttir, 2010).

PLS-Q includes 24 statements (adapted from Hanley et al., 2007; Hanley & Road, n.d.) about participant's typical responses in certain life skills situations, divided into two dimensions, positive response and negative response (e.g., **Situation:** *You call the child's name. Positive response:* *The child stops what he/she is doing, looks to you, and says "Yes". Negative response:* *The child does not respond*). The statements are scored on a 5-point Likert scale, range 0 to 4 (positive response dimension, 0 = *never*, 4 = *always*; negative

response dimension, 0 = *always*, 4 = *never*). The items are summed to create a total score, range 0-96, higher scores indicates more positive responses.

Direct measures. PLS and problem behavior were measured with direct observation. Data were collected by the researcher and the participant's teachers for each skill across three settings; pre-teaching, individualized teaching, and post-teaching sessions. During all sessions, data were recorded if the participant emitted the target skill, an error of omission, or an error of commission. Performance-based acquisition criteria was used and defined as if the participant engaged in correct responding of the target skill for at least 85% of trials in a given session over three nonconsecutive sessions.

Procedure

Appropriate permission for the study was obtained from the Icelandic data protection authority, the National bioethics committee in Iceland (approval no. VSN-18-110), a psychologist and head of the department of education at the participant's municipality, the principal and teachers at the participating preschool, and parents. Data collection was conducted from November 2018 until May 2019. Before and after implementation of the individualized teaching, parents and teachers were asked to answer the PLS-Q and the ADHD-rs.

Pre-teaching sessions. An evocative situation was set up by a teacher or the researcher and a correct response, an error of omission, or an error of commission was recorded, i.e., one trial. The participant received 3-9 trials in one session over one-to-three days for each unit of skills. Individualized teaching was implemented if the participant did not meet the acquisition criteria.

Individualized teaching sessions. Individualized teaching consisted of the participant, the researcher, and a teacher, and included instructions, modeling, role-plays, and feedback/descriptive praise (Hanley et al., 2007; Luczynski & Hanley, 2013) (see Figure 1

for teaching procedure). The participant received 4-8 trials to practice the skill in each teaching session before the skill was tested in post-teaching sessions. If the first four responses were correct, the practice session ended.

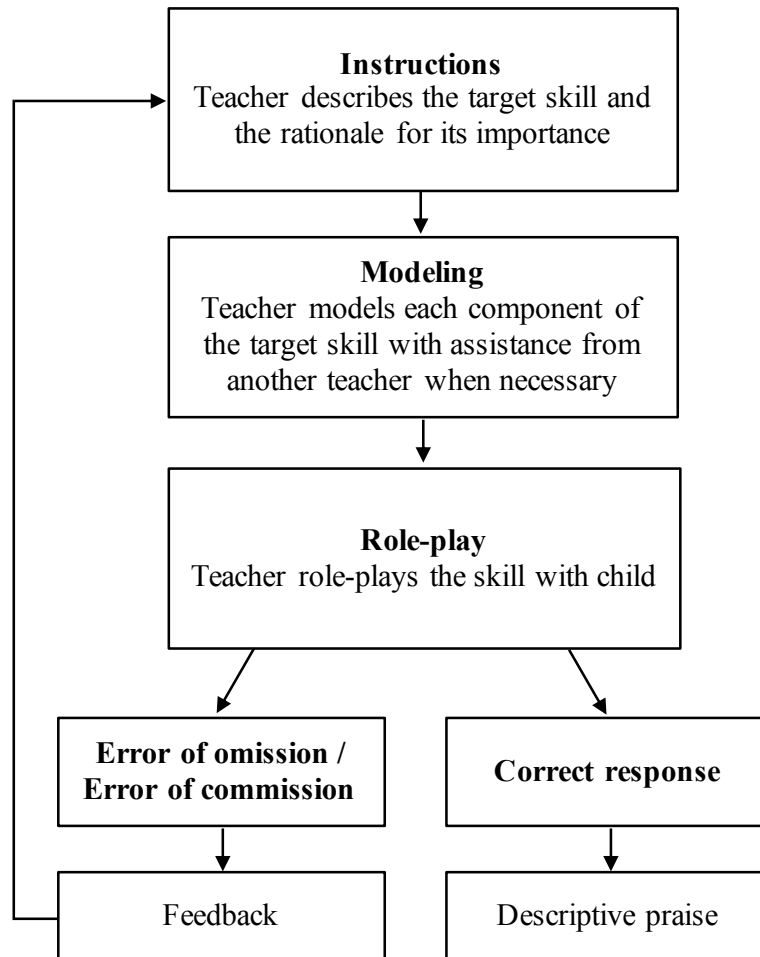


Figure 1. Procedure of individualized teaching session.

Post-teaching sessions. After individualized teaching session, the skill was tested in post-teaching sessions. Evocative situations in post-teaching sessions were identical to evocative situations in pre-teaching sessions. The participant received 3-9 trials in one session over one-to-three days for each unit of skills. Individualized teaching of a skill ended when the participant met the acquisition criteria and the next skill was taught.

Experimental Design

A multiple baseline design across behavior (Barlow, Nock, & Hersen, 2009) was used for each participant to evaluate the impact of the PLS program on skill achievement and

problem behavior. Multiple baseline design was chosen to evaluate the effects of the intervention, where behavior change is evident only when the intervention variable targets each behavior. Absence of generalization effects from one behavior to another supports the effects of the intervention. This design is effective when the target behavior is irreversible.

Interobserver Agreement

Interobserver agreement (IOA) was collected by the researcher or the teacher across all three settings. An agreement between the teacher and the researcher was defined as scoring the same response across the three response categories during pre-teaching, individualized teaching, and post-teaching sessions. IOA was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100 (presented in percentage). IOA was collected during 46% of pre-teaching sessions, agreement averaged 85% (range 0% to 100%), during 33% of individualized teaching sessions, agreement was 100%, and during 56% of post-teaching sessions, agreement averaged 88% (range 50% to 100%).

Social Validity

After implementation of the PLS program, stakeholders, i.e., the main teacher and the principal, were asked to rate the acceptability of the program, the teaching methods used, and the amount of behavior change. The questions were open ended, about overall acceptability of the teaching, the importance and improvement of certain skills, and pros and cons with implementation of the program.

Results

Before individualized teaching, parents and teachers reported that they were very worried about how Linda would adjust to a more demanding elementary school environment. After individualized teaching, parents and teachers reported that they had moderate concerns about how Linda would adjust to a more demanding elementary school environment.

Descriptive statistics for the ADHD-rs and the PLS-Q, pre- and post-teaching, are depicted in Table 2, i.e., raw score, standard deviation from mean score for age, number of symptoms, and total score.

Table 2

Descriptive statistics for the ADHD-rs and PLS-Q, from parents and teachers, pre- and post-teaching

	ADHD-rs Inattention (IA)			ADHD-rs Hyperactivity- impulsivity (HI)			PLS-Q
	Raw score	SD	n of symptoms	Raw score	SD	n of symptoms	
Parent							
Pre	22	4.95	8	23	3.74	9	38
Post	12	3.07	3	14	2.81	5	51
Teacher							
Pre	21	3.89	8	23	3.43	9	32
Post	7	1.58	1	11	2.25	3	78

Note. ADHD-rs = The ADHD rating scale; PLS-Q = The PLS Questionnaire.

Pre-teaching, Linda's scores on the ADHD-rs were over criteria based on age and developmental level for inattention and hyperactivity-impulsivity. Scores on the PLS-Q indicated low number of positive responses in certain life skills situations where the highest possible score is 96. Post-teaching, Linda's scores on the ADHD-rs were below criteria based on age and developmental level for inattention and hyperactivity-impulsivity. Scores on the PLS-Q indicated medium to high number of positive responses in certain life skills situations.

Linda's overall performance for each unit of skills and performance for each skill in evocative situations are depicted in Figure 2, where each unit is depicted in a separate panel in the order in which the units were taught.

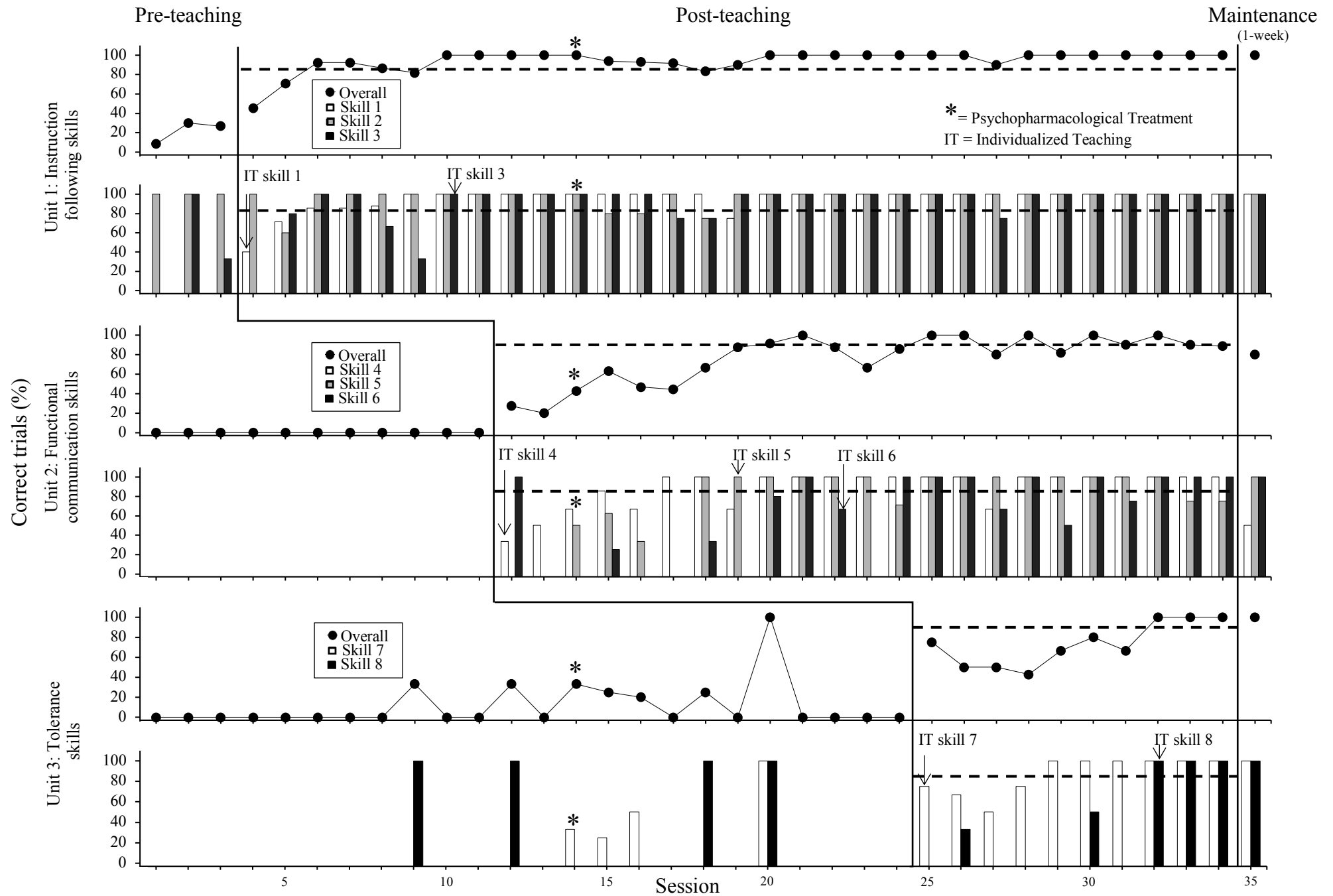


Figure 2. Percentage of correct trials in evocative situations. The horizontal dashed line indicates the 85% acquisition criteria.

Overall, 753 evocative situations were set up across 34 sessions (i.e., 175 trials in pre-teaching and 578 trials in post-teaching). Linda received 85 trials in 12 individual teaching sessions, with average of 1.71 sessions for each skill. Overall, the probability of a correct response pre-teaching was 10%, the probability of correct response in individualized teaching was 82%, and the probability of a correct response post-teaching was 84%.

During pre-teaching sessions, Linda did not meet 85% mastery criteria for unit 1, 2, and 3. Following teaching of skills in unit 1, correct responding steadily increased for unit 1 (top row) and responding for unit 2 (second row) and unit 3 (third row) remained at low levels. Following teaching of skills in unit 2, correct responding steadily increased for unit 2, responding for unit 1 remained at high levels, and responding for unit 3 remained at low levels. Following teaching of skills in unit 3, correct responding steadily increased for unit 3, and responding for unit 1 and unit 2 remained at high levels. During pre-teaching, the probability of error of omission was 90%, during individualized teaching the probability of error of omission was 18%, and during post-teaching the probability of error of omission was 16%. For all three settings, the probability of error of commission was 0%.

Linda received individual teaching for skills 1 and 3 in unit 1, skills 4, 5 and 6 in unit 2, and skills 7 and 8 in unit 3. Linda's performance on skill 2 met the 85% mastery criteria pre-teaching, therefore individualized teaching was not implemented for that skill. Correct responding for skill 3 steadily increased following teaching of skill 1, however performance did not meet mastery criteria so individual teaching was implemented. Correct responding for skills in unit 2 and unit 3 only met mastery criteria after individual teaching.

Linda started receiving psychopharmacological treatment, namely psychostimulants, at session 14 (see Figure 2, stars in each panel). Responding for unit 1 met the 85% acquisition criteria before psychostimulants. An increase in responding for skill 4 following

teaching was also evident before psychostimulants and responding for skills in unit 3 remained at similar levels before and after psychostimulants.

The overall results from the social acceptability measures were good. Stakeholders declared interest in implementing the program in their classroom and were likely to recommend this teaching program to other teachers. Both reported difficulties with managing the time to set up evocative situations and with data collection, specifically in the beginning of the intervention or on hectic school days. Stakeholders saw most improvement in skill 1, skill 3 and skill 7 post-teaching, and rated these skills as having most benefits for the child and the teacher. The teacher thought teaching of skill 4 and skill 5 overlapped, however teaching of all skills was necessary. Both parties evaluated that skill 1 was most important, followed by skill 2, skill 5, and skill 6.

Discussion

The purpose of this study was to evaluate the effectiveness of the PLS program in decreasing challenging behavior and acquisition of PLS, using individualized teaching to a girl with ADHD symptoms. Typical responses in certain life skills situations and number of ADHD symptoms were assessed before and after individualized teaching.

Before implementation of the program, Linda exhibited high number of symptoms of ADHD and low number of positive responses in certain life skills situations according to parents and teachers. After implementation of the program, Linda exhibited lower number of symptoms of ADHD and higher number of positive responses in certain life skills situations according to parents and teachers. This indicates that there was a change in parent's and teacher's perception of Linda's number of symptoms of ADHD and performance in certain life skills after individualized teaching.

Overall, there was an increase in the probability of correct responding after individualized teaching of the PLS and skill acquisition was evident after individualized teaching for each

unit. Linda met mastery criteria for complying to simple-step instructions (skill 2) before individualized teaching, however teaching was required for other instruction following skills (unit 1). This is compatible with previous research, where high levels of complying with simple-step (skill 2) and multi-step (skill 3) instructions and low levels of responding to name (skill 1) are evident before implementation of teaching (Hanley et al., 2014, 2007). Following individualized teaching of requesting assistance (skill 4) there was a slight increase in requesting attention (skill 5) and requesting access (skill 6). Each unit consists of related skills, where communication skills (unit 2) includes appropriately requesting access to preferred consequences. This might explain the increase in requesting attention (skill 5) and access (skill 6) following teaching of requesting assistance (skill 4), i.e., requesting gave access to preferred consequences, whether assistance, attention, or access.

Linda's performance is consistent with previous studies evaluating the effectiveness of the PLS on skill achievement (Beaulieu et al., 2012; Hanley et al., 2014, 2007; Luczynski & Hanley, 2013; Luczynski et al., 2014) and in one-on-one teaching (Falligant & Pence, 2017; Francisco & Hanley, 2012; Kraus et al., 2012). Linda received on average less than two individualized teaching sessions for each skill and each session lasted approximately 15-to 30-min. This indicates that individual teaching does not have to be time consuming and does not have to interfere with teacher's schedule.

The researcher administered all the individual teaching sessions, and could therefore have had an effect on responding in evocative situations, i.e., the researcher may have signaled that the participant should engage in certain behavior. Also, the main teacher set up most of the evocative situations, along with the researcher, so the teacher may also have signaled that the participant should engage in a certain behavior. The second teacher relieved the main teacher for several sessions (session 13 to session 17) and the participant engaged in similar levels of

target behavior. That supports generalization of skill acquisition, i.e., Linda exhibited PLS with two different teachers and the researcher.

ADHD is most often characterized by difficulties with instruction following, waiting, social intrusiveness, interrupting conversations, and more (American Psychiatric Association, 2013; Baldursson et al., 2012). Children with ADHD are at risk of social difficulties, uncooperativeness, impulsiveness, academic underachievement, and other health and developmental problems (Barry et al., 2002; Daley & Birchwood, 2010; Gelfand & Drew, 2003; Kelly, 2009; Ladd & Price, 1987). The PLS includes teaching of school readiness skills, e.g., compliance, requesting, and tolerance, that children with ADHD often have difficulties with, where their symptoms can hinder attribution of these skills. In this current study, a child exhibiting ADHD symptoms was individually taught these important school readiness skills. For Linda, the probability of PLS increased, the probability of problem behavior decreased, and skill acquisition maintained after individualized teaching (one week maintenance). Linda received a great number of teaching opportunities (i.e., 578 trials in post-teaching), which is entailed in the third tier teaching, that may have had an enhancing effect on skill acquisition and maintenance (Hálfdanardóttir, 2018; Luczynski & Hanley, 2013). There was a benefit of teaching Linda these important school readiness skills, according to direct and indirect measures, i.e., there was a clear increase in probability of compliance, requesting, and tolerance, and an increase in parent's and teacher's perception of Linda's performance in certain life skills after the individualized teaching.

During the intervention, Linda started receiving psychopharmacological treatment, namely stimulant medication, for ADHD symptoms. Correct responding for instruction following (unit 1) was acquired before stimulants that supports that the teaching was effective without stimulant medication. An increase in requesting assistance (skill 4) following teaching was also evident before stimulants, though the effects of the stimulants cannot be

excluded. However, tolerance skills (unit 3) remained at low levels before and after stimulants and improvement in tolerance was evident following individualized teaching. Psychopharmacological treatment targets restlessness, inattentiveness, impulsiveness, and non-compliance (Taylor et al., 2004), which are compatible with skills taught in the PLS program. Specifically, being attentive to own name, be less impulsive by requesting assistance, attention, and access from an adult, complying to instructions, and tolerating delay and denial. Participant's performance following individual teaching demonstrates the importance of behavioral intervention along with psychopharmacological treatment, the necessity of teaching these skills to children with ADHD symptoms, and not merely treating the symptoms with medication. However, the effectiveness of stimulant medication on skill achievement cannot be excluded, where teachers and the researcher saw an overall change in Linda's conduct after she started taking stimulant medication, i.e., she appeared less hyperactive and more compliant. Measuring the effects of stimulant medication was not a specific aim of this study, however several approaches have been used to evaluate effects pre- and post-prescription, for example questionnaires, i.e., ADHD-rs (Magnússon et al., 1999) or Strengths and Difficulties Questionnaire (SDQ) (Schworen et al., 2019), cognitive tests, assessment of behaviors associated with ADHD (Subcommittee on Attention-Deficit/Hyperactivity Disorder, Steering Committee on Quality Improvement and Management, 2011), or function. Positive effects of the stimulant medication on teaching and Linda's skill achievement cannot be ruled out. However, as was mentioned before, individualized teaching was followed by an increase in correct responding that supports the importance of teaching these school readiness skills.

The benefits of this individualized teaching were that Linda showed improvement in PLS and that teachers at the participating preschool reported good acceptability of the program. Their experience of the program was that not only did the behavior of the participant change

in the course of implementation, but the teachers also noticed a change in their approach towards other children in the classroom. They reported how important it is to teach these school readiness skills and saw most improvement in the child's tolerance for delay (skill 7). They also noticed an improvement in social interaction with the child after teaching of responding to name (skill 1).

Generalization of the skills across unfamiliar teachers and different settings (e.g., participant's home) or the maintenance of skills over longer periods (e.g., > 3 months) were not measured. The maintenance of the acquisition of instruction following skills (unit 1) throughout teaching of functional communication skills (unit 2) and tolerance skills (unit 3) suggest that responding of target skills are maintained over shorter periods (< 3 months). Further assessment of generalization and long term maintenance of the PLS program with children with ADHD symptoms are needed.

Preparing children with ADHD for more demanding elementary school environment, more complex social interactions, and difficulties in daily activities is important to promote more successful school attendance, acceptance by peers, and tolerance to difficulties in daily activities. Future research with this target group should focus on evaluating the effects of the PLS program on transitions from preschool to elementary school, the maintenance of skills in the elementary school environment, and impact on future difficulties these children face later in life.

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