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The effectiveness of technology supported education to prevent sexual abuse in children with autism spectrum disorder

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Highlights

- Prevalence of sexual abuse is higher in children with autism than their peers
- Children with autism can learn targeted abuse prevention skills after training
- The use of technology assisted instruction is so effective in teaching sexual abuse prevention skills to children with autism
- Children with autism can maintain and generalize the target behaviors across conditions

Article Info: Research Article

Keywords: *Abuse, autism spectrum disorder, sexual abuse, sexual abuse prevention training program, technology supported education.*

Abstract

This study aimed to evaluate the effectiveness of technology-supported sexual abuse prevention training provided to children with Autism Spectrum Disorder (ASD). In addition, the social validity of the research was investigated based on the opinions of the mothers of the children participating in the research. The study was conducted with 4 male subjects with ASD between the ages of 8-13. A multiple probe design with probe conditions across subjects, one of the single-subject research models, was used in the study. Based on the findings regarding the effectiveness of the intervention it was concluded that technology-supported sexual abuse prevention training was effective in teaching sexual abuse prevention knowledge and skills to children with ASD. At the knowledge level, all subjects learnt the names of private body parts, the places where underwear can be removed, and the concepts of good and bad touch and at the skill level, they learnt to say "No" and leave the setting and to report the situation to a trusted person. It was also observed that all subjects maintained the target knowledge and skills and generalized them to different instruments, settings and people 2, 4 and 8 weeks after the end of instructional sessions. The social validity findings of the study showed that the mothers of the subjects expressed positive opinions about the study.

1. Introduction

The most common type of developmental disability, autism spectrum disorder (ASD) is the least understood developmental disability and still remains a mystery due to its yet unknown aspects and undetermined exact causes (Chez, 2008). Children with ASD may not know the most basic concepts about their bodies, appropriate sexual behaviours and sexual expressions (Brown-Lavoie et al., 2014). In addition, these children may not be able to investigate and acquire a lot of information about sexuality and exhibit appropriate behaviours through social interactions with themselves or others, mass media or regular school-based education programs like their peers with normal development (Littner et al., 2017). In the absence of sexual education, these children frequently engage in inappropriate sexual behaviors that disregard privacy such as undressing and masturbating regardless of whether the environment is appropriate; opening and entering closed doors without knocking, touching private body parts in public and talking about sexual behaviors in public (Stokes & Kaur, 2005). Therefore, children with ASD should be taught skills and

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concepts as early as possible such as private body parts, good-bad touch, body privacy, private areas, places where clothes can be removed and dressing appropriately according to time and place. They also should be taught circle of trust, allowing and getting permission, protecting personal space, coping with deception, refusing unauthorized physical contact (saying no, walking away and reporting) and accepting rejection. It is crucial that children with ASD receive training so that they can participate in society without any problems, recognize who they are, display appropriate behaviors, use correct language, dress appropriately or take off and change their clothes in appropriate settings, notice changes in their bodies or emotions, protect their health by following hygiene rules, and most importantly, live in safety away from sexual abuse. Otherwise, children with ASD may not be able to comprehend and express inappropriate behaviors due to the shortcomings in their social and communication skills, may exhibit higher level of inappropriate sexual behaviors compared to their peers with normal development, may face the risk of being victimized and may be victims of abuse at higher rates (Brown-Lavoie et al., 2014; Howlin & Clements, 1995; Mansell et al., 1996; Sobsey & Doe, 1991; Travers & Tincani, 2010).

Cases of sexual abuse are increasing dramatically today. The rate of exposure to abuse, especially of children with special needs, is four to ten times higher than their normally developing peers (West & Gandhi, 2006). According to the World Health Organization data, 26% of children (18% of the female children and 8% of male children) in the world are sexually abused (World Health Organization, 2018). Although numerical data show that the proportion of sexually abused females is much higher, much more research is needed on the prevalence of male sexual abuse, as male victimization is underreported in the general population (Cermack & Molidor, 1996). In addition, adopted foster males are equally at risk of sexual abuse as females, and these victimized boys may tend to be involved in crime in the future (Euser et al., 2016). It is thought that children with ASD in particular are exposed to sexual abuse since they are not able to protect themselves due to lack of knowledge on sexual education and sexual abuse, lack of skills and experience to protect themselves, inability to distinguish sexual abuse from personal care, unawareness that the behavior of the offender is an attack or rape attempt. Also the children with ASD are exposed to sexual abuse because of lack of information about how to protect themselves in dangerous situations, lack of communication skills to tell others about the attack or abuse done to them, or to report this abuse in traditional ways and finally, because of their need to be valued, accepted and to give and receive affection above the usual level (Bryen et al., 2003; McCabe et al., 1994; Topçu, 2009). Therefore, individuals with ASD are victims of abuse at much higher rates since the abusers think that the individuals with ASD will not be able to talk about this or report the abuse (Bryen et al., 2003).

In addition to the parents and the relatives of the children with ASD, special education teachers, school bus drivers, psychologists, physiotherapists, occupational therapists, medical doctors, especially psychiatrists, pediatricians and gynecologists, scouts and camp leaders are among those who sexually abuse children with special needs (Groce, 2005; Topçu, 2009). The settings where children are exposed to sexual abuse are highly diverse and often include the home of the abuser and the victim, open spaces, workplaces, vehicles, schools and other closed areas, social institutions and care homes (Gallagher, 1999; Metin et al., 2014; Urazel et al., 2017). Investigation of sexual abuse cases showed that sexual abuse is not specific to certain people and settings, and it can occur in a wide variety of places and can be committed by people of all socioeconomic levels, since it is not linked to any socio-demographic group (Hedin, 2000; Urazel et al., 2017).

Regardless of the degree to which they are affected by autism, children with ASD have very good coding and decoding skills and can learn despite certain disabilities. Structured instructional strategies such as teacher-directed instruction, progressive assistance and fading of prompts, multiple repetitions and breaking the information into small pieces are among the most effective strategies in teaching children with ASD (Arick et al., 2004; Scheuermann & Webber, 2002). In addition, it is observed that children with ASD respond to direct instruction and discrete trials instruction format (Iovannone et al., 2003). Studies showed that individuals with ASD pay more attention to visual stimuli in addition to auditory stimuli in learning processes (Quill, 1997). For this reason, visual-spatial teaching content presented with materials such as

photographs, pictures, prints, printouts, videos and animations are useful in the learning and teaching processes of children with autism.

It is reported that practices in which children with ASD actively participate in role activities and reinforcement and shaping processes are more effective (Daro, 1994; Davis & Gidycz, 2000; Kenny et al., 2008; MacIntyre & Carr, 2000; Zwi et al., 2007). In addition, it is emphasized that videos should be used in teaching the content, so that the desired information and dialogues can be acquired more easily, since videos will support role activities, which are important components of the programs. The inclusion of technology and computers in training supports the service providers and service recipients. In addition, service providers and experts in the field often emphasise the shortcomings of the technology (Demir et al., 2022; Sani-Bozkurt, 2021). The use of technology in scientifically based practices supports and facilitates processes such as a) evaluating the participant, b) presenting the sessions, c) undertaking the sessions based on data, d) ensuring application reliability and e) documenting the sessions (Coyle et al., 2007). Although the abuse prevention programs carried out with the support of technology have been successful so far by leading to the expected results in preventing abuse, it is reported in the literature that there is an important need for the use of technology together with scientifically based practices in the prevention of abuse (Self-Brown et al., 2017). The international literature includes studies conducted at the level of knowledge and skills (Curtiss & Ebata, 2016; Gkogkos et al., 2019; Kenny et al., 2012; Pugliese et al., 2019; Stankova & Trajkovski, 2020; Visser et al., 2017) to protect children with ASD from sexual abuse. However, there are very few studies in the national literature on the protection of children with ASD from sexual abuse. While there is only one study by Süzer (2015) in which the effectiveness of the social story method was examined in teaching the skills of protection from sexual abuse to individuals with ASD, there are two studies by Kutlu (2016) and Akmanoğlu and Tekin-İftar (2011) in which children with ASD were taught the skill of escaping from the abduction attempts of strangers within the scope of safety skills. Therefore, since the number of studies conducted to prevent sexual abuse of children with ASD is rather limited, new studies are needed in this field. The current study was born out of the need for research on how to provide children with ASD with skills to protect against sexual abuse.

2. Purpose of the Study

Compared to their peers with normal development, children with ASD need more training in the field of sexual development as well as in other developmental areas. Children with ASD with no training in this area may face more problems such as sexual abuse. Therefore, it is of great importance to develop and implement educational programs to support the sexual development of children with ASD and prevent sexual abuse. Sexual abuse prevention programs prepared for children with ASD provide these children with the required behaviors to avoid sexual abuse. Although several sexual abuse prevention programs exist for individuals with ASD in the literature, the studies report many shortcomings in the existing sexual abuse prevention programs and emphasize the need for programs that make use of technology. Based on these needs, the current study aimed to evaluate the effectiveness of technology-supported sexual abuse prevention training for children with ASD, by considering the previously identified shortcomings and the required features for these programs as cited in the literature.

3. Methodology

3.1. Participants

Two types of participant groups were included in the study. The first group consisted of child participants and the second group consisted of participants who set traps.

3.1.1. Child participants

Child participants were 4 male subjects with ASD between the ages of 8-13 who were receiving education in different special education and rehabilitation centers in Izmir province. The families of the participants stated that the child participants had training needs for sexual education and protection from sexual abuse. The prerequisites determined for inclusion in the study were as follows; (a) visual perception, (b) ability to

follow simple instructions such as come, take, give, look, bring, etc., (c) ability to direct attention to visual and auditory stimuli for at least five minutes, (d) ability to listen to a short story and answer the questions asked about this story, (e) not having received previous training on the prevention of sexual abuse. All participants were included in the study by providing the specified prerequisite skills.

3.1.2. Participants setting traps

Volunteer people who were familiar or unfamiliar to the children were used as trap setters in this study in the instruction and assessment sessions focusing on teaching how to avoid abusive requests for kissing and sitting on someone's lap. Attention was paid to the fact that trap setters were of different genders and ages in order for the children to generalize the skill to different people. In addition, at least two of the trap setters for each child were familiar to the child and at least one of them was unfamiliar. Children's teachers and caregivers, security guards at the university, university personnel, and relatives of the researcher were used as trap setters, and these individuals were trained prior to the study. At the training sessions trap setters were firstly modelled by the researcher about the correct responses they should give, then the trap setters were asked to indicate what to do according to the participant's correct and incorrect responses.

3.2. Setting and Instruments

The research was conducted in a classroom located on the sixth floor of İzmir Demokrasi University. In addition to this classroom, corridors, toilets, elevators, different classrooms and stairs on the same floor of the university were used for role-playing activities. Generalization data were obtained on benches in front of the university, on the street, in the park and in the researcher's vehicle. The research utilized the following materials: a laptop computer, 12 two-dimensional animations focusing on how to avoid abusive requests for kissing and sitting on someone's lap; digital pictures and picture cards prepared in line with the opinions of field experts for teaching the names of the private body parts, places where underwear can be removed, good and bad touch, a handheld camera and tripod capable of HD recording, an action camera, reinforcers selected for the participants (blue, yellow, red and green colored toy cars, toy planes, football player playing cards, crayons), tools used in setting traps (ball, toy car, mobile phone, tablet, car key, children's magazine, toy plane), data recording forms and pens.

3.3. Research Model

The research was designed as quantitative research with multiple probe design with probe conditions across subjects, one of the single-subject research models. This is a research model in which the effect of an independent variable on a dependent variable is examined on at least three participants (Ledford & Gast, 2018). Since internal validity in single-subject research models are threatened by some factors, the research should be designed in a way that factors other than the independent variable can be controlled (Tekin-İftar, 2012). For this reason, the following measures were taken to control the possible external factors that may affect the result of the study: a) it was requested in the interviews with the teachers and families of the children that no teaching on the prevention of sexual abuse and sexual education be given to the children until the current study was completed; no cartoons, tablet or phone applications and TV should be watched regarding these topics and no books should be read on the topic. b) by implementing the research every day of the week, the research was completed as soon as possible to reduce the maturation effect, c) inter-observer reliability and application reliability data were collected in 30% of all sessions so that measurement did not affect internal validity, d) the research was started with four subjects against the possibility of subject loss, e) children who did not participate in teaching activities with the implementer as subjects were selected for this study to prevent the effect of previous experiences on the experimental process. Furthermore ethical approval of the research has been obtained and the participants of the study and their parents have been informed about all processes of the study and their legal rights.

3.4. Dependent Variable

The study had two dependent variables. The first dependent variable of the study was the level of knowledge of children with ASD on sexual abuse. The second dependent variable was the learning level of children with ASD to avoid sexual abuse. In measuring the level of child knowledge about sexual abuse, the child

was asked the following questions and the child was given 5 seconds to react and the answers given by the child were recorded in the data recording form. The questions were asked in this order: placing the picture card in front of the child "What are the private body parts, tell me or show me"; by having the child look at the ten picture cards in front of him and having him point with his finger "Tell me or show me where we can take off our underwear", and by looking at the pictures of good and bad touch "Tell me what kind of touch this is". Correct responses provided by the child within the response range were recorded as "+"; incorrect responses and no response were recorded as "-". To measure the learning level of children regarding the skills and behaviors of saying "no", getting away from the environment and reporting the situation to a trusted adult, which pointed to the ability to avoid sexual abuse, the participants' scores were recorded by using a scoring chart ranging from 0 to 4, which was used by Lumley et al. (1998) and Chodan et al. (2017) in the literature. Figure 1. and Figure 2. present the scales used to measure the level of knowledge and skill in the research.

3.5. Independent Variable

Technology-assisted sexual abuse prevention training was the independent variable of the research. Technology-assisted sexual abuse prevention training consists of four main components: basic concept presentations such as the names of the private body parts, places where underwear can be removed and good and bad touch; animation examples; role-playing activities in the classroom and real life applications. While developing the technology-assisted sexual abuse prevention training, the training content was identified by examining the contents of the previous sexual abuse prevention studies in the literature, the opinions of 10 experts with doctorate degrees in the field of special education were sought, and the current teaching package was created in line with the recommendations of the experts. The main components that make up the educational content were presented respectively in the same teaching session, via the direct instruction method, which is one of the effective methods in teaching children with ASD, supported with technology. A 15.4-inch laptop computer was utilized in the presentation of the teaching package in which direct instruction method was used with technology support. First, the researcher explained the private body parts to each subject separately by showing the drawings of the private body parts on the male and female body on the laptop computer. After teaching the private body parts, the subjects were shown 5 pictures on the computer screen about the places where underwear can be taken off and the teaching continued. Then, 10 pictures depicting good and bad touch were shown to the subjects. After working with the visuals related to good and bad touch, a total of 12 animations specially prepared for the topics were shown during the training and in each training session included two animations related to the request to kiss, followed by two animations related to asking the child sit on someone's lap. Six of the animations included abuse attempts related to kissing and the other six depicted abuse attempts related to having them sit on someone's lap along with the correct responses that the subject should give in such instances such as saying "No", getting away from the environment and telling someone about this situation. After the animations were shown, role-playing activities, the last component of the training, were carried out in the classroom and in real life settings in the institution where the study was conducted. In the presentation of the teaching package, the researcher used the direct instruction method, and while providing clues to the child as a model at the beginning, the researcher systematically faded the clues and enabled the subject to react independently.

3.6. Experimental Process

The experimental process of the study consisted of pre-test and post-test sessions, probe, instruction, generalization and follow-up sessions. All the sessions were conducted with one-on-one instructional arrangement. The response interval was set as five seconds. Verbal reinforcers were used to reinforce the correct responses of the subjects in the probe, instruction, generalization and follow-up sessions. In all sessions, the subjects' participation behaviors and correct responses were reinforced verbally (e.g., well done, you are great, etc.) with a fixed rate reinforcement schedule. The instruction sessions were continued until stable data were obtained for the subject.

3.7. Pre-test and Post-test Sessions

A pre-test was administered before the study and a post-test was administered after the end of the study to measure subjects' knowledge levels and the differences in the knowledge levels were evaluated by comparing the scores obtained from these tests. The pre-test and post-test sessions were carried out one-on-one with the subjects in the classroom on the sixth floor of İzmir Demokrasi University. In these sessions, the subjects were asked the questions in the knowledge level assessment tool and the answers given by the subjects were recorded on the form. In these sessions, no clue or reinforcement was given to the subjects and errors were not addressed or corrected.

3.8. Full Probe Sessions

The first full probe session was conducted to collect baseline data on the behavior of all subjects. The full probe sessions were conducted immediately before starting the instruction sessions with a subject and when the criterion was met in instruction. In all full probe phases, a total of three trials were conducted to present the target stimulus to be acquired for each subject.

3.9. Daily Probe Sessions

In the daily probe sessions, only the data related to the behavior of the subject for whom the instructional study was conducted were collected before the instruction was given. Daily probe sessions were conducted until the subjects showed at least 100% correct responses in three consecutive sessions. During the daily probe sessions, each correct response was verbally reinforced (e.g., well done) by the practitioner using a continuous reinforcement schedule. At the same time, the incorrect responses of the subjects in the daily probe sessions were ignored and the next trial was started. The correct responses of the subject in the daily probe sessions were taken into consideration to determine the subject's performance in the skill.

3.10. Instruction Sessions

Technology-supported sexual abuse prevention training was used during the instruction sessions. In these sessions, the technology-supported sexual abuse prevention training was used seven days a week using direct teaching method, first to teach the private body parts, places where underwear can be removed and good and bad touch at the knowledge level, and immediately afterwards, to teach the behaviors of saying "No", getting away from the environment and reporting the situation to a trusted adult at the skill level.

3.11. Generalization and Follow-up Sessions

Generalization sessions were to assess generalization across instruments, people and settings. The generalization study was conducted as pre-test and post-test. Generalization data were collected in the pre-test session immediately after the first full probe phase and in the post-test session after the completion of the instructional activities and the final full probe session. A scenario similar to the ones used in the full probe and daily probe sessions or a completely different scenario was evaluated with different settings, instruments and people. Subjects' incorrect responses were ignored, while correct responses were verbally reinforced at the end of the session (e.g., well done, very good, you are great, etc.). Follow-up sessions were conducted 2, 4 and 8 weeks after the last probe session to assess whether each subject was able to perform the acquired behavior.

3.12. Reliability

Prior to intervention, an independent observer, an expert with PhD degree in the field of special education, was trained to collect data on target behavior and the procedures for implementing the intervention. The observer collected inter-observer reliability data and treatment integrity data during at least 30% of each experimental session for each participant. More specifically, the observer collected reliability data for 30% of probe, 30% of instruction, 30% of follow-up, and 50% of generalization sessions for all participants. The observer watched the video recordings of the sessions selected by random assignment among all sessions. Inter-observer reliability data were analyzed using the following formula: agreement/ (agreement + disagreement) x 100 (Kazdin, 1982). Based on the inter-observer reliability data that were collected in

probe, instruction, follow-up, generalization and follow-up of generalization sessions was calculated as 94% (range, 90-100). Treatment integrity data were collected to determine whether the independent variable was implemented as planned during probe, instruction, follow-up, generalization and follow-up of generalization sessions just like the inter-observer reliability data, and it was determined that the researcher conducted the study as planned and carried out all sessions at 100% reliability level.

3.13. Social Validity

To collect social validity data, semi-structured interview questions were developed by seeking the opinions of five experts with doctorate degrees in the field of Special Education to determine the opinions of the mothers of the subjects participating in the study about the teaching of the skills. The mothers answered the questions in writing. According to the social validity data, the families of the subjects who participated in the research regarded the research to be very beneficial, effective and useful; they stated that after this training on preventing sexual abuse, there were positive changes in the behaviors of all the subjects, the subjects were more cautious regarding behaviors such as kissing and sitting on someone's lap, they said "No" and walked away from the environment and reported the situation to a trusted person. Mothers also believed that not only children with special needs but all children with normal development should receive this training. All mothers stated that the probability of their children being sexually abused was between 90% and 100% before the training, one mother stated that this probability decreased to 0% and the other three mothers stated that this probability decreased to 30% after this training. They reported feeling safer and less anxious when sending their children to school, park or outside after this training.

4. Findings

Subjects' knowledge and skill levels before and after the training were analyzed. The study examined and analyzed the subjects' performances on the names of private body parts, places where underwear can be removed and the concept of good-bad touch at the knowledge level and their performances regarding their behaviors at the skill level when someone requested to kiss them or wanted them to sit on their lap. Descriptive statistics were used to analyze the performances exhibited by the subjects at the knowledge level. Table 1. and Table 2. present and interpret subjects' performance percentages at the stages of acquisition, retention and generalization for each concept at each level of knowledge. Figure 1. provides subjects' acquisition, retention and follow up performances at the skill level; Table 3. presents the generalization findings across environments at the skill level and Table 4. displays the generalization findings across people. In addition, Table 5. lists the duration of the instruction sessions for all subjects.

Figure 1. shows the percentage of independent requests for the subjects named Taner, Burak, Kaan and Ahmet during probe, instruction, generalization and follow-up sessions. The data were analyzed in terms of experimental effects such as level, trend, immediacy and variability. In addition, visual analysis, Tau-U was used to evaluate the practical significance of differences between phases (Parker et al., 2011). Tau-U was selected because it accounts for non-overlap of data and data trend in both baseline and intervention phases. Calculations for each child were derived using a web-based application created by Vannest et al. (2011) that included a Tau-U calculator. Effect-sizes can be interpreted according to the following range of Tau-U scores: weak or small effects: 0–.65; medium to high effects: .66–.92; large or strong effects: .93–1.0 (Parker et al., 2011).

4.1. Findings Regarding Subjects' Knowledge Level Acquisition and Retention

Table 1. presents subjects' performances on acquiring and retaining the concepts at the knowledge level. Analysis of Table 1 showed that that the performance level of all the subjects regarding the names of private body parts was 0% at the pre-test level. Analysis of subjects' performance regarding the places where underwear can be taken off showed that three subjects performed 0% in the pre-test session and one subject performed 40% by pointing to the toilet and bathroom in all three trials. The pre-test performances of the subjects regarding good and bad touch showed that all four subjects performed at 0% level. In general, the baseline performances of almost all subjects regarding the three concepts at the knowledge level were quite low. Analysis of subjects' post-test performances showed that all subjects performed at the level of 100%

for all concepts; therefore, it can be argued that the performances of all subjects regarding the names of private body parts, places where underwear can be taken off and good-bad touch increased significantly.

It was observed that the subjects maintained their performance levels on all three concepts they acquired at the knowledge level in the follow-up sessions conducted after 2, 4 and 8 weeks. Among the subjects, only Taner's performance decreased in the third follow-up session after 8 weeks regarding good and bad touch, but he could still perform at the level of 80%.

Table 1.

Subjects' knowledge level acquisition and retention performances

Subject	Pre-test			Post-test			1st Follow up			2nd Follow up			3rd Follow up		
	PBP	PUT	GBT	PBP	PUT	GBT	PBP	PUT	GBT	PBP	PUT	GBT	PBP	PUT	GBT
Taner	0	0	0	100	100	100	100	100	100	100	100	100	100	100	80
Burak	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100
Kaan	0	40	0	100	100	100	100	100	100	100	100	100	100	100	100
Ahmet	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100

PBP: Private Body Parts **PUT:** Places where underwear can be taken off **GBT:** Good and Bad Touch

4.2. Findings regarding the generalization of subjects' level of knowledge across instruments and people

The generalization findings regarding subjects' level of knowledge across instruments and people were similar to the effectiveness findings. Examination of the generalization performances across instruments presented in Table 2. showed that the pre-test performance of all the subjects regarding the names of private body parts, places where underwear can be taken off and good-bad touch was 0%. Among the subjects, only Kaan's pre-test performance regarding the places where underwear can be taken off was at a low level with 40%. All subjects performed at the 100% level in the post-test, 1st follow-up, 2nd follow-up and 3rd follow-up sessions regarding the names of private body parts, places where underwear can be taken off and good-bad touch, but Taner performed at the 80% level in the 3rd follow-up session by providing two incorrect answers in each trial regarding the concepts of good-bad touch.

Tablo 2.

Generalization findings regarding subjects' level of knowledge across settings, people and instruments

Subject	Pre-test			Post-test			1st Follow up			2nd Follow up			3rd Follow up		
	PBP	PUT	GBT	PBP	PUT	GBT	PBP	PUT	GBT	PBP	PUT	GBT	PBP	PUT	GBT
Across Settings															
Taner	0	0	0	100	100	100	100	100	100	100	100	100	100	100	80
Burak	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100
Kaan	0	40	0	100	100	100	100	100	100	100	100	100	100	100	100
Ahmet	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100
Across Instruments															
Taner	0	0	0	100	100	100	100	100	100	100	100	100	100	100	80
Burak	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100
Kaan	0	40	0	100	100	100	100	100	100	100	100	100	100	100	100
Ahmet	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100
Across People															
Taner	0	0	0	100	100	100	100	100	100	100	100	100	100	100	80
Burak	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100
Kaan	0	40	0	100	100	100	100	100	100	100	100	100	100	100	100
Ahmet	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100

PBP: Private Body Parts **PUT:** Places where underwear can be taken off **GBT:** Good and Bad Touch

The pre-test results of the subjects for all three concepts at the knowledge level were found to be low and there was a significant increase in the performance of the subjects for each concept after the instructional process. In addition, it was observed that the subjects maintained their performances without a significant decrease in the follow-up sessions after the end of the instruction process. The subjects learnt these skills permanently by generalizing the concepts to prevent sexual abuse at the knowledge level to different environments, people and tools.

4.3. Findings regarding subjects' skill level acquisition, retention and follow-up

Figure 1. presents the data on the effectiveness of the technology-supported training, developed for individuals with ASD to prevent sexual abuse, on their acquisition, maintenance and follow up of behaviors at the skill level such as saying "No" to the abusive requests for kissing and sitting on someone's lap, getting away from the environment and reporting the situation to a trusted adult.

Examination of Figure 1. showed that Taner did not exhibit the correct responses in the probe sessions conducted for the abusive requests for kissing and sitting on someone's lap. In the instruction phase, there was an improvement in the tendency and level of both target behaviors, Taner received zero points for responding to the abusive request of sitting on someone's lap in the first four sessions but received two points in the fifth session. In addition, Taner responded correctly at the level of two points for responding to the abusive request of kissing in the fourth session, and in the seventh, eighth and ninth instructional sessions, he responded at a level that met the criterion and received four points for both skills. In the follow-up sessions organized 2, 4 and 8 weeks after the end of the instructional sessions, Taner maintained his ability to protect himself from both sexual abuse situations with the highest score of four points. The Tau-U effect size for Taner, was 1.00 (90% CI [.399, 1.00]) for baseline-intervention comparison. A Tau-U effect size of 1.00 indicates 100% non-overlap, demonstrating a strong improvement.

In the baseline phase, it was observed that Burak did not respond correctly to both abusive requests and received zero points in the full probe sessions for responding to the abusive requests of kissing and sitting on someone's lap. In the instruction phase, there was an improvement in the tendency and level of both target behaviors, Burak received zero points for responding to both abusive requests (kissing and sitting on someone's lap) in the first two sessions, received two points by saying "No" for behaviors in the third instruction session, and received four points for accurately responding to both abusive requests by responding at a level that met the criterion in the fourth, fifth and sixth instruction sessions. In the follow-up sessions organized 2, 4 and 8 weeks after the instruction sessions were terminated, Burak maintained his ability to protect himself from both sexual abuse situations with the highest score of four points. The Tau-U effect size for Burak, was 0,75 (90% CI [.197, 1.00]) for baseline-intervention comparison. A Tau-U effect size of 0,75 indicates 75% non-overlap, demonstrating medium to high improvement.

In the baseline phase, it was observed that Kaan did not exhibit the correct responses for requests in the full probe sessions conducted for the abusive requests of kissing and sitting on someone's lap. In the instruction phase, there was progress in the tendency and level of both target behaviors, Kaan received zero points for responding to the abusive requests of kissing and sitting on someone's lap in the first two sessions, but in the third, fourth and fifth instruction sessions, he responded at a level that met the criterion and received four points for both skills. In the follow-up sessions held 2, 4 and 8 weeks after the instruction sessions were terminated; Kaan maintained his ability to protect himself from both sexual abuse situations with the highest score of four points. The Tau-U effect size for Kaan, was 0,75 (90% CI [.197, 1.00]) for baseline-intervention comparison. A Tau-U effect size of 0,75 indicates 75% non-overlap, demonstrating medium to high improvement.

In the baseline phase, it was observed that Ahmet exhibit the correct responses in the probe sessions and received zero points in the full probe sessions conducted for the abusive behaviors of kissing and sitting on someone's lap. In the instruction phase, there was progress in the tendency and level of both target behaviors, Ahmet received zero points for responding to the abusive requests of kissing and sitting on someone's lap in the first three instruction sessions, received two points by saying "No" to both requests in the fourth instruction session, and received four points for responding at a level that met the criterion in the

fifth, sixth and seventh instruction sessions. In the follow-up sessions organized 2, 4 and 8 weeks after the instruction sessions were terminated, Ahmet maintained his ability to protect himself from both sexual abuse situations with the highest score of four points. The Tau-U effect size for Ahmet, was 0,75 (90% CI [.197, 1.00]) for baseline-intervention comparison. A Tau-U effect size of 0,75 indicates 75% non-overlap, demonstrating medium to high improvement.

In the follow-up sessions held 2, 4 and 8 weeks after the termination of the instructional sessions, it was observed that all participants maintained the skill of protecting themselves from both sexual abuse situations at 100% level with the highest score of four points. In addition, in the follow-up of generalization across skills held 2, 4 and 8 weeks after the end of the instruction, it was found that all participants scored four points for the skills of protection from sexual abuse that were not specifically taught, such as protecting themselves from abusive behaviors such as touching the chest, touching the buttocks, touching between their own legs and touching someone between the legs, respectively, and thus generalized the taught skills to protect from abusive behaviors such as kissing and sitting on someone's lap to different skills that were not taught.

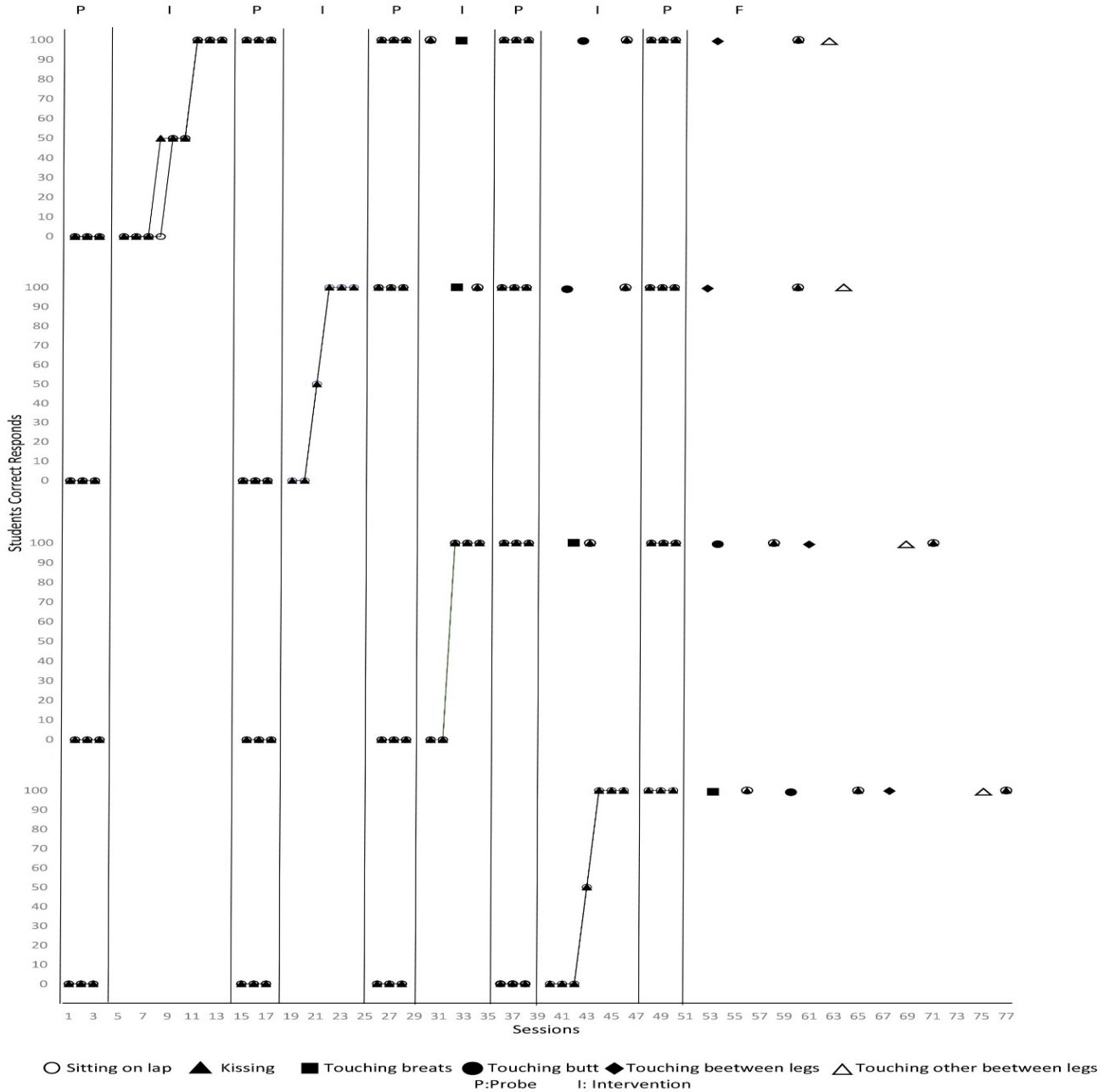

Figure 1. The effectiveness of technology-supported education on acquiring the ability to protect against sexual abuse

4.4. Generalization findings regarding subjects' skill level across settings and people

Table 3. provides the data on subjects' generalization of the behaviors of saying "No" to the requests of kissing and sitting on someone's lap, walking away from the environment and reporting the situation to a trusted adult to different environments while Table 4. provides the data on generalizing these behaviors to different people.

According to Table 3., Taner, Burak, Kaan and Ahmet did not provide any correct responses against the abusive requests for kissing and sitting on someone's lap in all of the sessions held in the street, park and car (across settings). However, all subjects generalized the behavior of saying "No" and walking away from the environment and reporting the situation to a trusted adult, the target skill against the traps for abusive requests for kissing and sitting on someone's lap, to the street, park and car environments in the post-test sessions in the 1st, 2nd and 3rd follow-up sessions in all three trials and responded correctly at 100% level.

Table 3.

Generalization findings of subjects' skill level across settings

Subject	Pre-test			Post-test			1st Follow up			2nd Follow up			3rd Follow up		
	Str	Par	Car	Str	Par	Car	Str	Par	Car	Str	Par	Car	Str	Par	Car
							Across Settings								
Taner	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100
Burak	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100
Kaan	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100
Ahmet	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100

According to Table 4., none of the subjects provided any correct responses in all the three trials for the skills to protect from the abusive requests for kissing and sitting on someone's lap in all of the sessions with three different people (two familiar and one unfamiliar person) in generalizing the skill across people in the pre-test sessions. The subjects Taner, Burak and Kaan generalized the behavior of saying "No", walking away from the environment and reporting the situation to a trusted adult, the target skill in protecting from the abusive requests for kissing and sitting on someone's lap, to three different people in the post-test sessions, in the 1st, 2nd and 3rd follow-up sessions in all three trials and responded correctly at 100% level. On the other hand, Ahmet met the criterion 100% by scoring four points in the post-test and the 1st follow-up session, and he met the criterion 100% by not falling into the traps of two familiar people in the 2nd and 3rs follow-up sessions, but he only received two points by saying "No" the abusive requests for kissing and sitting on someone's lap from an unfamiliar person, and he could not meet the criterion 100%.

Table 4.

Generalization findings of subjects' skill level across people

Child	**Trap**	**Pre-test**	**Post-test**	**1. follow up**	**2. follow up**	**3. follow up**
Taner	Familiar person	0	100	100	100	100
	Unfamiliar person	0	100	100	100	100
Burak	Familiar person	0	100	100	100	100
	Unfamiliar person	0	100	100	100	100
Kaan	Familiar person	0	100	100	100	100
	Unfamiliar person	0	100	100	100	100
Ahmet	Familiar person	0	100	100	100	100
	Unfamiliar person	0	100	100	50	50

4.5. Data regarding the duration of subjects' instruction process

Table 5. presents the findings regarding the duration of the instruction sessions for the subjects participating in the study. According to Table 5, the instruction sessions varied between 129 minutes 30 seconds and 213 minutes 29 seconds for the subjects. While Kaan learned in the shortest time, Taner needed longer time to learn. For all subjects, the longest instruction session was the first one, while the shortest instruction session was the last one. It can be argued that children acquired the skills in an average of 164 minutes and 15 seconds.

Table 5.

Duration of instructional sessions for subjects

	Number / Duration of Instructional Sessions									
Child	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Total**
Taner	30 min 48 sec	20 min 45 sec	30 min 45 sec	27 min 53 sec	30 min 44 sec	30 min 43 sec	30 min 40 sec	30 min 43 sec	10 min 28 sec	213 min 29 sec
Burak	32 min 23 sec	30 min 43 sec	27 min 52 sec	18 min 17 sec	14 min 50 sec	13 min 50 sec				139 min 2 sec
Kaan	30 min 43 sn	30 min 37 sec	30 min 40 sec	20 min 45 sec	16 min 45 sec					129 min 30 sec
Ahmet	31 min 15 sec	29 min 29 sec	26 min 48 sec	21 min 35 sec	22 min 15 sec	18 min 15 sec	11 min 35 sec			161 min 12 sec

5. Conclusion And Discussion

The findings show that technology-supported training used in this study was very effective in helping the participants to acquire the necessary skills to protect themselves from sexual abuse, and that the participants generalized the obtained knowledge and skills to different instruments, settings and people by maintaining them 2, 4 and 8 weeks after the end of the instruction. Therefore, the effectiveness findings of the study are consistent with the findings of other studies examining the effect of instruction on sexual abuse prevention skills (Curtiss & Ebata, 2016; Gkogkos et al., 2019; Kenny et al., 2012; Pugliese et al., 2019; Stankova & Trajkovski, 2020; Süzer, 2015; Visser et al., 2017). In addition, this study is consistent with the results of studies which evaluated the safety skills escaping from abduction attempts for self-protection (Akmanoğlu & Tekin-İftar, 2011; Kutlu, 2016). Therefore, it was concluded that the use of technology together with scientifically based practices in the prevention of sexual abuse is highly effective as stated in the literature (Coyle et al., 2007; Self-Brown et al., 2017). This study is considered to be a well-planned study that can contribute to the literature because it incorporates the elements that a sexual abuse prevention program should include as emphasized by Chodan et al. (2017) and Lumley & Miltenberger (1997).

It is known that 90% of sexual abuse incidents are committed by someone familiar to the child (Çeçen, 2007; Finkelhor, 2007; Çöpür et al., 2012). For this reason, in this study, all generalization and follow up sessions related to the protection skills from abusive requests for kissing and sitting on someone’s lap utilized at least two trap setters chosen from people familiar to the children such as the child's teacher, caregiver, academic staff of the institution, while one trap setter was unfamiliar and brought from outside by the researcher. Thus, the subjects were taught that they could be sexually abused both by people they know and by people they do not know, and therefore, they should say "No" to whoever abuse them and leave the environment and report this situation to an adult they trust. However, at the end of the study, while all subjects were able to generalize the target skills to everyone regardless of their familiarity, Ahmet was not able to generalize the target skills to unfamiliar people, although he generalized them to familiar people during the 2nd and 3rd follow-up sessions. In a similar study conducted by Gkogkos et al. (2019) in which sexual education was given to a child with ASD, it was observed that the subject exhibited the skills learned at a lower level in the follow-up sessions. In this context, the findings obtained from the current study are

consistent with the findings of the study conducted by Gkogkos et al. (2019). Similarly, it was observed that Taner made two incorrect responses in each trial and confused the types of good and bad touch in the generalization sessions across people, settings and instruments of the third follow-up session on good and bad touch 8 weeks later. This may result from the fact that younger children with higher levels of autism, forget the acquired behaviors when a long time has passed since the completion of instruction and that the people who set traps in the study were mostly chosen from people familiar to the children, so they may have thought that no harm would come from people they did not know. For this reason, it is extremely important and necessary to organize extra instruction sessions as reminder and compensatory sessions at certain intervals after all instruction sessions are completed to take follow-up data after a longer period of time to prevent forgetting of sensitive teaching contents such as protection from sexual abuse, especially in individuals with special needs, and to prepare teaching programs by selecting the trap setting participants from individuals who are both familiar and unfamiliar to the child.

It was observed in this study that the duration for instructional sessions varied for the subjects and it took a maximum of nine instructional sessions for the subjects to acquire the target behaviors. The subject Kaan, on the other hand, acquired the target behaviors after only five instructional sessions by exhibiting the target behaviors at a level that met the criterion 100%. It can be argued that the fact that the subjects acquired the skills of protection from abuse related to abusive requests of both kissing and sitting on someone's lap in such a short period of time may be due to the use of technology to introduce the content of training, the use of role-playing activities in the classroom environment and in real life environments, the fact that the teaching sessions were held every day of the week without interruption, and the selection and use of effective reinforcers according to the information received from the subjects' families and teachers. This finding coincides with the findings of Coyle et al. (2007) that technology facilitates the process of teaching children with ASD and enables learning to take place faster. In addition, another reason why Kaan acquired the target behaviors in a shorter period of time such may be related to the fact that Kaan was mildly affected by autism. In addition, it was found that the teaching sessions in the study lasted an average of 164 minutes and 15 seconds. The data show that the children gained the ability to protect themselves from sexual abuse in a period of 2 hours 44 minutes and 15 seconds, in other words, in less than three hours. This outcome was welcomed by the families of the subjects. In addition, this finding suggests that teachers can easily apply the current training program to their children with ASD.

In the generalization sessions conducted 2, 4 and 8 weeks after the end of the instruction for the skills that were not taught, such as touching the chest, touching the buttocks, touching between the legs and touching someone between the legs, all subjects performed at the level of four points for each generalization skill. This result shows that the subjects successfully acquired four different skills and generalized these skills although they were not directly studied during the instruction sessions. This performance of the subjects indicates that this study has a high level of generalisability. The fact that the abuse protection skills that were directly taught can be generalized by the subjects against different abuse situations indicates that a high level of protection can be provided against different types of abuse that may be encountered by the participants.

In conclusion, the use of technology together with scientifically based practices in the content of sexual abuse prevention training enables children with ASD to rapidly acquire target behaviours at the level of knowledge and skills and to generalise these skills to different people, instruments and settings by maintaining them after a period of two months. The acquisition of these skills by children is welcomed by their parents and makes them feel more secure.

6. Implications

This study is limited to four boys with autism spectrum disorder and the participants who trapped them. Therefore it can be recommended to conduct further studies based on the findings of this study. Firstly, the current study can be conducted by parents and teachers with children from different disability groups using a similar research design. The content of the current study can be adapted for preschool and high school children and conducted with children from different age groups and the responses and achievements of

various age groups can be evaluated. In the current study, close relatives of the subjects were not included among the trap setters, so in future studies, the reactions of the subjects can be measured by including close relatives as familiar people who may set traps. Finally, the training package used in the study can be implemented with a larger group of participants by conducting an experimental study and the effectiveness of this study carried out in a group training format can be investigated.

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Appendix 1. Assessment tool for sexual abuse knowledge level

Name of the child: **Date:**

1. What are the private body parts, tell me or show me .						
	1. Session		**2. Session**		**3. Session**	
Name of the private body part	**Correct**	**Incorrect**	**Correct**	**Incorrect**	**Correct**	**Incorrect**
a) Our mouths						
b) Our breasts/chests						
c) Between our legs						
d) Our buttocks						
Total score						
2. Tell me or show me in the photos where we can take off our underwear						
	1. Session		**2. Session**		**3. Session**	
Photos to show the child	**Correct**	**Incorrect**	**Correct**	**Incorrect**	**Correct**	**Incorrect**
Bathroom						
Street						
Toilet						
Market						
Own room						
Cafeteria						
Changing cabin						
Park						
Dressing room in a department store						
Classroom						
Total score						
3. Tell me what kind of touch this is						
	1. Session		**2. Session**		**3. Session**	
Visuals related to good-bad touch	**Correct**	**Incorrect**	**Correct**	**Incorrect**	**Correct**	**Incorrect**
1. Visual (good touch)						
2. Visual (good touch)						
3. Visual (bad touch)						
4. Visual (good touch)						
5. Visual (bad touch)						
6. Visual (bad touch)						
7. Visual (good touch)						
8. Visual (good touch)						
9. Visual (bad touch)						
10. Visual (bad touch)						
Total score						

Lo