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An Analysis of the Use of Social Stories in Teaching Social Skills to Children with Autism Spectrum Disorders*

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Abstract

Social stories play a significant part in the teaching skills and behaviors to children with ASD who lack social skills. The purpose of this study is to analyze studies in which social stories were used for teaching social skills to individuals with Autism Spectrum Disorders (ASD). The present study includes a descriptive review and meta-analysis of single-subject studies that met the criteria. In all studies, social validity, maintenance, and generalization data were collected in 56.25%, 50%, and 31.25% of the respective studies. Although most studies showed that social stories were effective in teaching social skills to children with ASD in the descriptive study, in the meta-analytic study, the mean of Percantage of Non-overlapping Data (PND) scores for all studies was 63.43%, with a range of 0% to 100%. Results suggest that social stories should not yet be considered as evidence based practice for teaching social skills to individuals with ASD. However, social stories seem to be a promising practice that warrants future research. Results will be discussed extensively and future directions for research and practice will be addressed.

Keywords

Autism Spectrum Disorders, Single Subject Design, Social Skills, Social Stories, Social Story Interventions.

The DSM-IV (Diagnostic and Statistical Manual of Mental Disorders) defines ASD as a neurodevelopmental disorder marked by deficits in three core areas: communication, social interaction, and repetitive and restricted interests (American Psychiatric Association, 2000). However, the newly published DSM-5 changes the definition of ASD to specify deficits in just two core areas: social communication and repetitive and restricted interests (American Psychiatric Association, 2012). This change highlights the importance of social relatedness as being a key core deficit in ASD.

Children with ASD display limitations with the non-verbal behavior necessary for social interaction. They are not able to develop age-appropriate peer relationships and they show limitations in sharing interest, success and pleasure with others and they

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display limited social-emotional behaviors (Hall, 2009; Kırcaali-Iftar, 2007; Thompson, 2007). One of the most pronounced deficiencies of children with ASD are with social skills such as initiating and responding to conversation, changing a routine, understanding how other people may feel or think, and responding appropriately in a social situation, as these things hinder social interaction with peers and those in their environment (Chamberlain, Kasari, & Rotheram-Fuller, 2007; Cotugno, 2009; Reichow & Volkmar, 2010; Schneider & Goldstein, 2010). Inappropriate social behaviors might also adversely impact a student's ability to carry out tasks and engage with others. The deficits in social behaviors might become more apparent, more distinctive and more critical when individuals with ASD reach school-age and adulthood. All in all, owing to the fact that social skills are an important aspect of our routine lives, improving social functionality is one of the most important intervention measures for individuals with ASD (Heward, 2013; Weiss & Harris, 2001). Because of this importance, the social skills of children with ASD have been a focus of researchers for the last decade.

A variety of evidence based interventions can be used for teaching social skills (National Autism Center [NAC], 2009; Rust & Smith, 2006). One of these evidence based interventions used for teaching social skills to children with ASD is social stories (Ali & Frederickson, 2006; Gray, 2002; NAC, 2009). Over the past decade social stories have become a popular intervention strategy. Social stories were first developed by Carol Gray in 1991 with the aim of developing the social skills of children with ASD. Social stories are short stories which explain cues and appropriate responses to significant situations in a social context (Gray, 2002; Gray Center, 1998), and they may be prepared in a written or visual form (Gray, 2002). In this context, social stories play an important role for children with ASD in better understanding social situations and acquiring independence (Heward, 2013; Schneider & Goldstein, 2010).

Social stories are different from other instructional stories as they are shorter than other stories used for instruction and emphasize the student's perspective because they are written from the perspective of the student using first person language (Gray, 2000; Gray & Garand, 1993). A social story can consist of these types of sentences: *(i)* descriptive (i.e., provides information about the social setting, who is involved, and why they are doing it), *(ii)* perspective (i.e., provides information about the internal states of others), *(iii)* affirmative (i.e., expresses a commonly shared value), *(iv)* directive (i.e., provides information about what a student should do in the situation), *(v)* control (i.e., sentences written by the student which help them identify strategies to remember the story), and *(vi)* cooperative (i.e., provides information about what others will do to assist the student) (Gray, 2002). These sentences should be written in ratio. The basic social story ratio consists of two to five descriptive, perspective, and affirmative sentences for every directive sentence (Gray, 2002; Gray & Garand, 1993).

When the literature is examined, it can be seen that social stories have been used effectively to teach social skills to children with ASD (Bernard-Ripoll, 2007; Crozier & Tinconi, 2007; Kuoch & Mirenda, 2003; Ozdemir, 2008; Quilty, 2007; Quirmbach, Lincoln, Feinberg-Gizzo, Ingersoll, & Andrews, 2009; Schneider & Goldstein, 2010). There are several reasons why using social stories is effective. These are: *(i)* social stories are visual, *(ii)* the same story can be used repeatedly with a student, *(iii)* stories are cost and time-effective, *(iv)* the stories are created to draw the necessary attention from the student, *(v)* the stories focus on other people's thoughts and actions, *(vi)* the stories are easy to write and apply, and *(vii)* the stories are considered to be an effective and acceptable intervention by teachers and families (Barry & Burlew, 2004; Crozier & Tincani, 2005; Delano & Snell, 2006; Gray Center, 1998; Ozdemir, 2008). Social stories have been recommended as a promising practice for students with ASD (Ali & Frederickson, 2006). While the emerging literature regarding social story is promising, more evidence is clearly needed to establish its effectiveness as a viable intervention approach for individuals with ASD (Kokina & Kern, 2010; Test, Richter, Knight, & Spooner, 2011).

When the findings of the research in the literature regarding social stories were examined, it can be stated that most did not provide sufficient experimental control, follow-up, or generalization, and they did not consider the treatment fidelity. However, according to the research findings, there was a relationship between social stories and a limited number of social validity findings (Ali & Frederickson, 2006; Rust & Smith, 2006; Sansosti & Powell-Smith, 2004). Sansosti and Powell-Smith (2004) concluded that the empirical base of support for social story effectiveness at that time was limited. There was insufficient data to indicate that social stories alone would be powerful enough to build, maintain, and generalize academic, social,

or self-help skills in children with autism. The most recent review in literature is by Test et al. (2011), which analyzed 28 studies. Overlapping analysis was calculated for 10 out of 28 studies. Test et al.'s analytical study was planned with research models using a strong functional relationship (ABAB, multiple baseline and multiple probe models). Of the 28 examined studies, 17 involved social stories and additional interventions, while 11 presented social stories alone. Agreement data were collected from 46.4% of the examined studies thus indicating that in more than half of the studies, agreement of the intervention was not questioned. Although the examined research was carried out using research models with a strong functional relationship, it was stated that in most of them, the experimental controls were not sufficient, and the maintenance, generalization and social validity data were not collected. Test et al. (2011) found that social stories are not yet considered as evidence based practice due to the lack of research supporting their effectiveness when they are used in isolation. Specifically, the research that does exist has presented mixed results and left many questions unanswered. The other researchers concluded that there is sufficient evidence that social stories intervention has promise and warrants further support. They reviewed and found that the majority of studies with multiple participants employed other interventions alongside social stories; thus, they could not determine if the social stories interventions were effective without the addition of other interventions such as verbal, physical prompts, and visual supports (Ali & Frederickson, 2006). The use of social stories has been popularized, widely discussed and recommended in the literature. Currently, there is not enough research that independently examines the use of social stories to fit the criteria of evidence based practices. A common conclusion of the reviewed literature is the necessity for further research with experimental control related to the effectiveness of social stories. Furthermore, details of how the interventions had been applied were not examined. Recommendations regarding the interventions were limited.

In this study, the intervention of social stories used for teaching social skills, their subjects, environment, research model, range of sentences in the social story, maintenance, generalization, social validity, inter-observer and treatment fidelity, and information regarding how the data related to the selected social skills were collected, the characteristics of carrying out the intervention and how social validity data were gathered was collected and analyzed. This study is different from other reviews in terms of the reasons for selecting social skills, how the data related to the selected social skills were collected, and how social validity data were gathered. Besides these things, the range of sentences in the social story, the characteristics of the intervention of social stories and the characteristics of carrying out the intervention were discussed using a limited number of reviews. In addition, 32 research articles on the use of social stories for teaching social skills were examined. By making recommendations for more detailed research, this study will make a contribution to practitioners, enabling them to make higher quality interventions.

The aim of this study was to examine and analyze the studies which have used social stories to teach social skills to children with ASD. Therefore, answers were sought to the following questions:

- What were the characteristics of the subjects included in the study?
- In what kind of environment was the research carried out?
- What target skills were taught and for what reasons were they selected?
- What means of data collection and evaluation were used for the target skills?
- Who carried out the research?
- What research models were used?
- What ranges of sentences were used in the social stories?
- What independent variables were used in the intervention of social stories?
- Was the use of social stories in teaching target skills effective according to the results of the research?
- Were data given in the research regarding the follow-up and generalization, social validity, inter-observer agreement and treatment fidelity?
- What was the mean of the PND scores of the intervention, maintenance and generalization phases?

Method

Research Model

This research is a descriptive and meta-analytical study. Descriptive analysis is supported by the PND. In this study, research related to social stories in teaching social skills to children with ASD was examined and the obtained findings were analyzed.

Area of Research

The following criteria were considered in the selection of articles included in the research:

- The articles were published in peer-reviewed journals between 1991 and 2011.
- Experimental studies related to individuals showing ASD were examined.
- Dependent variables of social skills and independent variables related to social stories were examined (Only studies related to social stories were included in the review. Studies involving the use of storytelling and narrative therapy were excluded).
- Articles that presented social stories alone and social stories with additional interventions were examined.
- Articles about studies on the effectiveness and efficacy of social stories using a single-subject design were examined.
- Articles which used a single-subject design with a demonstration of the experimental control (i.e., multiple baseline, multiple probe) and graphically displayed baseline and intervention data to allow for calculation of the PND were examined.
- Case studies conducted with social stories were examined.

Data Collection

In this research, an electronic search was carried out using the key words "social story," "autism," "ASD with social story," and "social story interventions" in English (EBSCO-Host; Academic Search Complete, ERIC and Google). Some articles could not be reached on this database. To identify additional articles, researchers conducted searches by hand of peer-reviewed journals that were identified most frequently through electronic searches including: *Autism, Education and Training in Autism and Developmental Disabilities, Exceptional Children, Journal of Autism and Developmental Disorders, Journal of Positive Behavior Interventions, Focus on Autism and Other Developmental Disabilities, Intervention in School and Clinic, Journal of Special Education, Topics in Early Childhood Special Education*. In the descriptive study a total of 49 articles were accessed of which 32 met the above-mentioned criteria and were thus examined. In the meta-analytical section of the study, 22 articles met the criteria.

Data Analysis

In the descriptive study, ten categories were defined: *(i)* subject characteristics, *(ii)* environment, *(iii)* selected social skill and reasons for selection, *(iv)* means of data collection and evaluation used for the selected skill, *(v)* practitioner, *(vi)* social story intervention and effectiveness, *(vii)* research model, (*viii)* maintenance and generalization, *(ix)* social validity, and *(x)* inter-observer agreement and treatment fidelity. The results obtained from the research were analyzed in these categories. These categories were examined by two reviewers and the results were analyzed. Disagreements were resolved by consensus between two reviewers.

In the meta-analytical study, a total of 22 studies were included in the study. PND scores were calculated for intervention, maintenance, and generalization. Researchers calculated inter-rater reliability for 8 of the 22 studies (at least 30%). To establish inter-rater reliability for the coding procedure and the PND analysis, the two authors independently coded each study and compared results. Inter-rater agreement was obtained by dividing the total number of agreements by the total number of agreements plus disagreements, and multiplying by 100. Inter-rater agreement for study features was 100%.

Especially, single-subject studies are typically interpreted by the visual inspection of graphed data. Such visual inspection of single subject studies can be subjective and the objective aggregation of results is problematic. Calculation of the PND has been suggested as an alternative. For twenty-five years, quantitative synthesis of single-subject research using the PND method has continued to deliver coherent, valid summaries of relevant research, in a wide variety of subject areas. When PND is used appropriately, it remains the most versatile and meaningful of the various methods proposed and has led to the most sensible conclusions to date (Scruggs & Mastropieri, 2013). Scruggs and Mastropieri (2001) argue that the use of PND is preferable to the use of a conventional effect size (ES) in synthesizing single-subject research for two primary reasons. First, ES computations are derived theoretically from procedures used in inferential statistics. This is problematic because the data derived from single-subject research is non-independent, thereby violating a primary assumption of inferential statistics, independence. Second, many single subject studies include relatively few data points which may inflate the ES, thus making interpretations difficult at best.

According to Scruggs and Mastropieri (2001), PND scores above 90 represent very effective intervention scores, scores from 70 to 90 represent effective interventions, scores from 50 to 70 represent interventions with low or questionable effectiveness, and scores below 50 represent ineffective interventions.

The PND scores were calculated from each of the graphs provided in the studies and aggregated into summarized scores for each study. For ABAB designs, PND scores were calculated for the baseline and intervention phases for each participant (i.e., total number of non-overlapping data points were divided by total number of intervention data points). For multiple baseline or probe designs, separate PND's were calculated for each behavior, and then the individual PND's were averaged to obtain the total score for the study. PND scores were calculated for intervention effects, maintenance effects, and generalization effects. Maintenance and generalization effects were measured by calculating the PND between the baseline and maintenance/generalization phases. PND's could not be calculated for 10 (45.45%) single subject studies that employed designs that did not allow a functional relation to be determined (i.e., AB, ABAC, ABC).

Results

The purpose of this study was to examine and analyze the studies in which social stories were used to teach social skills to individuals with ASD. In this study, the results obtained from research related to social stories for teaching social skills were explained in the relevant categories. In addition, the obtained results were reported in detail together with the results given in the tables. A brief analysis is shown in Table 1 and Table 2.

Table 1
An Analysis of Literature Related to the Use of Social Stories for Teaching Social Skills

Author(s)	Subjects	Environment	Target skills	Data collection and evaluation	Practitioner	Sentence types	Intervention components	Design	Mainte-nance	Gener-aliza-tion	Social validity	Interobserver agreement	Treatment fidelity
Hanley-Hochdorfer, Bray, Kehle, & Elinoff (2010)	Autism Asperger 6-12 years 3 boys 1 girl	School	Verbal initiations	Event recording	No data	Descriptive, directive, perspective, affirmative	Social story alone	Multiple Baseline	(+)	(-)	(+)	(+)	(+)
Litras, Moore, & Anderson (2010)	Autism 3 years 1 girl	Home	Verbal greeting initiations	Event recording	Parent	Descriptive, directive, perspective, affirmative	Social story+video model	Multiple Baseline	(+)	(+)	(+)	(+)	(+)
Okada, Ohtake, & Yanagihara (2010)	Autism 14 years 1 boy	Class	Adaptive behavior	Partial interval recording	Teacher	Descriptive, perspective	Social story+ photograph	ABCDE	(-)	(-)	(-)	(+)	(-)
Schneider & Goldstein (2010)	Autism 5-10 years 3 boys	Class	On-task behavior	Interval recording	Researcher	Descriptive, directive, perspective	Social story+visual support	Multiple Baseline	(+)	(-)	(-)	(+)	(+)
Mancil, Haydon, & Whitby (2009)	Autism 6-8 years 2 boys 1 girl	Class	Problem behavior	Event recording	Teacher	Descriptive, directive, perspective	Social story with paper format and computer format	ABABCBC	(+)	(+)	(+)	(+)	(+)
Reichow & Sabornie (2009)	Autism 11 years 1 boy	Class	Verbal initiations	Event recording	No data	No data	Social story+picture	ABAB	(-)	(-)	(-)	(+)	(-)
Chan & O'Reilly (2008)	Autism 5-6 years 2 boys	Class	Social interaction, appropriate hand raising inappropriate vocalizations	Event recording	No data	No data	Social story alone	Multiple Probe	(+)	(-)	(+)	(+)	(+)
Dodd, Hupp, Jewell, & Krohn (2008)	PDD-NOS 9-12 years 2 boys	Home	Compliment-giving	Event recording	Parent	Descriptive, directive, perspective, affirmative, control cooperative	Social story+ photograph	Multiple Baseline	(+)	(-)	(+)	(+)	(+)
Ozdemir (2008)	Autism 7-9 years 3 boys	Class	Reducing inappropriate behavior	Partial interval recording	Teacher	Descriptive, directive, perspective	Social story+picture	Multiple Baseline	(+)	(-)	(+)	(+)	(+)
Sansosti & Powell-Smith (2008)	Asperger 6-10 years 3 boys	School	Social communication	Partial interval recording	Teacher/ Para-professional	No data	Social story+ computer assisted video model	Multiple Baseline	(+)	(+)	(+)	(+)	(+)
Scattone (2008)	Asperger 9 years 1 boy	Medical center	Conversation, communication	Partial interval recording	Researcher	Descriptive, directive, perspective	Social story+video model	Multiple Baseline	(-)	(+)	(+)	(+)	(+)

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Bernard-Ripoll (2007)	Asperger 9 years 1 boy	Home	Recognition of emo-tions and identification of appropriate actions	Event recording	Researcher	Descriptive, directive, perspective, cooperative	Social story+video model	AB	(-)	(+)	(-)	(-)	(-)
Crozier & Tincani (2007)	Autism 3-5 years 3 boys	Class	Appropriate sitting talking, playing with peers,	Duration/ Event recording	Teacher	Descriptive, directive, perspective	Social story alone and verbal prompting	ABAB and Multiple Element	(+)	(-)	(+)	(+)	(+)
Quilty (2007)	Autism 6-10 years 2 boys 1 girl	School	Reducing inappropriate behaviors	Event recording interval record-ing	Para-profes-sional	Descriptive, directive, perspective, affirmative	Social story+ photograph	Multiple Baseline	(+)	(-)	(-)	(+)	(-)
Reynhout & Carter (2007)	Autism 8 years 1 boy	Class	Reducing inappropriate behaviors	Partial interval recording	Researcher/ Teacher	Descriptive, directive, perspective	Social story and verbal prompting, photograph	ABC	(+)	(+)	(+)	(+)	(+)
Delano & Snell (2006)	Autism 6-9 years 3 boys	Class	Social engagement with peers	Duration record-ing	Teacher	Descriptive, directive, perspective, affirma-tive	Social story+Pic-ture symbol	Multiple Probe	(+)	(+)	(+)	(+)	(+)
Sansosti & Powell-Smith (2006)	Asperger 9-11 years 3 boys	School	Social engagement	Partial interval recording	Researcher/ Caregiver	Descriptive, directive, perspective	Social story+Pic-ture symbol	Multiple Baseline	(+)	(-)	(-)	(+)	(+)
Scattone, Tingstrom, & Wilczynski (2006)	Autism 8-13 years 3 boys	Class	Initiating social com-munication	Partial interval recording	Teacher	Descriptive, directive, perspective	Social story alone	Multiple Baseline	(-)	(-)	(+)	(+)	(+)
Crozier & Tincani (2005	Autism 8 years 1 boy	Class	Reducing inappropriate behaviors	Event recording	Researcher	Descriptive, directive, perspective	Social story alone and verbal prompting	ABAC	(+)	(-)	(+)	(+)	(+)
Adams, Gouvou-sis, Vanlue, & Waldron (2004)	Autism 7 years 1 boy	No data	Reducing inappropriate behaviors	No data	Parent	Descriptive, directive, perspective, cooper-ative	Social story alone	ABAB	(-)	(-)	(+)	(+)	(-)
Agosta, Graetz, Mastropieri, & Scruggs (2004)	Autism 6 years 1 boy	School	Reducing inappropriate behaviors	No data	Teacher	Descriptive, directive, perspective	Social story+pic-ture prompt+ reinforcement	ABCA	(-)	(-)	(-)	(-)	(-)
Barry & Burlew (2004)	Autism 7-8 years 1 girl 1 boy	Class	Choice and play skills	No data	Teacher	Descriptive, directive, perspective, control	Social story+ prompting+ photograph	Multiple Baseline	(-)	(-)	(-)	(+)	(-)

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Ivey, Heflin, & Paulo (2004)	PDD-NOS 5-7 years 3 boys	Home/ Clinic/ Hospital campus	Novel events on-task behaviors	Event recording	Parents	Descriptive, directive, perspective, control cooperative	Social story+digi-tal photograph	ABAB	(-)	(-)	(+)	(+)	(+)
Bledsoe, Myles, & Simpson (2003)	Asperger 13 years 1 boy	Class	Meal time skills: Spill-ing food, wiping mouth	Event recording	Researcher	Descriptive, directive, perspective	Social story alone	ABAB	(-)	(-)	(-)	(+)	(-)
Kuoch & Mirenda (2003)	Autism 3-6 years 3 boys	Home/ School	Appropriate behaviors	No data	No data	Descriptive, directive, perspective, affirma-tive, control	Social story + pictures+ verbal prompting	ABA/ ACABA	(+)	(-)	(-)	(+)	(+)
Brownell (2002)	Autism 6-9 years 4 boys	Class	Echolalia, following directions, use of loud voice	Event recording	Researcher	Descriptive, directive, perspective	Traditional social story and social story+music presentation	ABAC/ ACAB	(-)	(-)	(-)	(-)	(-)
Lorimer (2002)	Autism 5 years 1 boy	Home	Reducing inappropriate behaviors	Event recording	Mother/ Therapist	Descriptive, directive, perspective, control	Social story+ symbol	ABAB	(-)	(-)	(-)	(+)	(-)
Scattone, Wilczynski, Edwards, & Rabian (2002)	Autism 7-15 years 3 boys	School	Reducing inappropriate behaviors	Partial interval recording	Teacher	Descriptive, directive, perspective, affirma-tive, cooperative	Social story alone	Multiple Baseline	(-)	(-)	(+)	(+)	(+)
Thiemann & Goldstein (2001)	Autism 6-12 years 5 boys	School	Social communication	Event recording	Researcher	Descriptive, directive, perspective	Social sto-ry+video feedback	Multiple Baseline	(+)	(+)	(+)	(+)	(+)
Hagiwara & Myles (1999)	Autism 7-9 years 3 boys	School	Hand washing, on task	No data	Researcher teacher, para-profes-sionals	Directive, perspective	Social story+ computer based format+verbal and physical prompt	Multiple Baseline	(-)	(+)	(-)	(+)	(-)
Norris & Dattilo (1999)	Autism 8 years 1 girl	Class	Social interaction	Interval record-ing	Researcher	Descriptive, directive, perspective, control	Social stories+ picture symbol	AB	(-)	(-)	(-)	(+)	(+)
Kuttler, Myles, & Carlson (1998)	Autism/ Fragile X 12 years 1 boy	Class	Tantrum	Event recording	No data	Descriptive, directive, perspective	Social story+pic-ture schedule, reinforcement, token system	ABAB	(-)	(+)	(-)	(+)	(-)

Table 2
Mean of PND Scores with Social Stories

No	Reference	Intervention PND	Maintenance PND	Generalization PND
1.	Hanley-Hochdorfer et al. (2010)	19.02% Ineffective	38.54% Ineffective	No Data
2.	Litras et al. (2010)	75.21% Effective	100% Very effective	86.66% Effective
3.	Schneider & Goldstein (2010)	40.90% Ineffective	No Data	No Data
4.	Reichow & Sabornie (2009)	93.75% Very effective	100% Very effective	100% Very effective
5.	Chan & O'Reilly (2008)	87.82% Effective	100% Very effective	No Data
6.	Dodd et al. (2008)	63.88% Questionable	100% Very effective	No Data
7.	Ozdemir (2008)	100% Very effective	100% Very effective	100% Very effective
8.	Sansosti & Powell-Smith (2008)	71.63% Effective	100% Very effective	No Data
9.	Scattone (2008)	76.66% Effective	100% Very effective	No Data
10.	Crozier & Tincani (2007)	71.66% Effective	83.33% Effective	No Data
11.	Quilty (2007)	0% Ineffective	0% Ineffective	No Data
12.	Delano & Snell (2006)	87.77% Effective	70.95% Very effective	88.88% Effective
13.	Sansosti & Powell-Smith (2006)	55.84% Questionable	50% Questionable	No Data
14.	Scattone et al. (2006)	58% Questionable	No Data	No Data
15.	Adams et al. (2004)	20.62% Ineffective	No Data	No Data
16.	Barry & Burlew (2004)	98.33% Very effective	No Data	No Data
17.	Ivey et al. (2004)	50% Questionable	No Data	No Data
18.	Lorimer et al. (2002)	42.85% Ineffective	No Data	No Data
19.	Scattone et al. (2002)	87.69% Effective	No Data	No Data
20.	Thiemann & Goldstein (2001)	58.53% Questionable	34.48% Ineffective	21.66% Ineffective
21.	Hagiwara & Myles (1999)	35.33% Ineffective	No Data	No Data
22.	Kuttler et al. (1998)	100% Very effective	No Data	No Data

Subject Characteristics

A total of 70 subjects were examined regarding social stories for teaching social skills to individuals with ASD. The subjects were evaluated in terms of diagnosis and age. The diagnoses of the environment subjects included in the study were found to be 85.71% autism, 5.71% Asperger's syndrome and 8.57% PDD-NOS. The age groups of the subjects were 31.42%, 0-6 years; 57.14%, 7-12 years; and 5.71%, 12-15 years. No adults were included in the study. In 5.71% of the studies, no age was reported for the subjects.

Environment

When the research was examined with respect to the learning environment, it was seen that 78.26% of the studies were conducted in a school, institution or health center environment (Agosta et al., 2004; Barry & Burlew, 2004; Chan & O'Reilly, 2008; Crozier & Tincani, 2005, 2007; Delano & Snell, 2006; Hanley-Hochdorfer et al., 2010; Okada et al., 2010; Ozdemir, 2008; Quilty, 2007; Reichow & Sabornie, 2009; Reynhout & Carter, 2007; Sansosti & Powell-Smith, 2006, 2008; Scattone, 2008; Scattone et al., 2002; Scattone et al., 2006; Thiemann & Goldstein, 2001) while 12.50% were conducted in the home (Bernard-Ripoll, 2007; Dodd et al., 2008; Litras et al., 2010; Lorimer et al., 2002). Only 6.12% were conducted in multiple settings (Ivey et al., 2004; Kuoch & Mirenda, 2003). 3.12% did not report their setting (Adams et al., 2004).

Selected Social Skills and Reasons for Selection

When the research was examined with respect to the social skills being taught, 56.25% were for initiating verbal communication and social interaction skills (Barry & Burlew, 2004; Bernard-Ripoll, 2007; Bledsoe et al., 2003; Chan & O'Reilly, 2008; Crozier & Tincani, 2007; Delano & Snell, 2006; Dodd et al., 2008; Hanley-Hochdorfer et al., 2010; Kuoch & Mirenda, 2003; Litras et al., 2010; Norris & Dattilo, 1999; Quilty, 2007; Reichow & Sabornie, 2009; Sansosti & Powell-Smith, 2006, 2008; Scattone, 2008; Scattone et al., 2006; Thiemann & Goldstein, 2001), 31.25% for reducing inappropriate behavior (Adams et al., 2004; Agosta et al., 2004; Crozier & Tincani, 2005; Kuttler et al., 1998; Lorimer, 2002; Mancil et al., 2009; Okada et al., 2010; Ozdemir, 2008; Quilty, 2007; Reynhout & Carter, 2007; Scattone et al., 2002) and 9.37% were related to on-task behavior (Hagiwara & Myles, 1999; Ivey et al., 2004; Schneider & Goldstein, 2010).

When the reasons were examined for selecting the social skills aimed to be taught, it was reported that the reason for 68.75% of the selected skills was that the performance of the participating subjects and teachers' views of the subjects' performance

were considered to be insufficient. No reason was reported for the selection of skills for the participating subjects in 25% of the studies (Barry & Burlew, 2004; Delano & Shnell, 2006; Dodd et al., 2008; Kuoch & Mirenda, 2003; Ozdemir, 2008; Scattone, 2008; Scattone et al., 2002; Thiemann & Goldstein, 2001).

Data Collection and Evaluation for the Selected Social Skills

When the research was examined in terms of the data collection and evaluation used for the social skills, it was seen that 31.25% used interval recording (Norris & Dattilo, 1999; Okada et al., 2010; Ozdemir, 2008; Reynhout & Carter, 2007; Sansosti & Powell-Smith, 2006, 2008; Scattone, 2008; Scattone et al., 2002; Scattone et al., 2006; Schneider & Goldstein, 2010), 43.75% used event recording, (Bernard-Ripoll, 2007; Bledsoe et al., 2003; Brownell, 2002; Chan & O'Reilly, 2008; Crozier & Tincani, 2005; Dodd et al., 2008; Hanley-Hochdorfer et al., 2010; Ivey et al., 2004; Kuttler et al., 1998; Litras et al., 2010; Lorimer, 2002; Mancil et al., 2009; Reichow & Sabornie, 2009; Thiemann & Goldstein, 2001) and 3.12% used duration recording (Delano & Snell, 2006). Both event and duration recording were used in 3.12% of the research (Crozier & Tincani, 2007). Both event and interval recording were used in 3.12% of the research (Quilty, 2007). However, in 15.62% of the research, the means of data collection and evaluation were not recorded (Adams et al., 2004; Agosta et al., 2004; Barry & Burlew, 2004; Hagiwara & Myles, 1999; Kuoch & Mirenda, 2003).

Practitioner

Who applied the research was examined as an independent variable (social story and/or additional intervention). It was seen to have been applied by a researcher in 25% of the studies (Bernard-Ripoll, 2007; Bledsoe et al., 2003; Brownell, 2002; Crozier & Tincani, 2005; Norris & Dattilo, 1999; Scattone, 2008; Schneider & Goldstein, 2010; Thiemann & Goldstein, 2001), by a teacher in 28.12% (Agosta et al., 2004; Barry & Burlew, 2004; Crozier & Tincani, 2007; Delano & Snell, 2006; Mancil et al., 2009; Okada et al., 2010; Ozdemir, 2008; Scattone et al., 2002; Scattone et al., 2006), by the parents in 12.50% (Adams et al., 2004; Ivey et al., 2004; Litras et al., 2010), and by a paraproffesional in 3.12% (Quilty, 2007). The practitioners were mother-therapists and teacher-paraproffesionals in %15.62 of the studies, (Lorimer et al., 2002; Sansosti & Powell-Smith, 2006, 2008). However, it was not reported who applied the research in 15.62% of the studies (Chan & O'Reilly, 2008; Hanley-Hochdorfer et al., 2010; Kuttler et al., 1998; Reichow & Sabornie, 2009).

Research Design

In examining the effectiveness of social stories in teaching social skills to individuals with ASD, 43.75% used a multiple baseline (Barry & Burlew, 2004; Dodd et al., 2008; Hagiwara & Myles, 1999; Hanley-Hochdorfer et al., 2010; Litras et al., 2010; Ozdemir, 2008; Quilty, 2007; Reynhout & Carter, 2007; Sansosti & Powell-Smith, 2006, 2008; Scattone, 2008; Scattone et al., 2002; Scattone et al., 2006; Schneider & Goldstein, 2010; Thiemann & Goldstein, 2001) and only 6.25% used a multiple probe (Chan & O'Reilly, 2008; Delano & Snell, 2006). Varieties of AB were used in 46.87% of the studies (Adams et al., 2004; Agosta et al., 2004; Bernard-Ripoll, 2007; Bledsoe et al., 2003; Brownell, 2002; Crozier & Tincani, 2005; Kuoch & Mirenda, 2003; Kuttler et al., 1998; Lorimer et al., 2002; Mancil et al., 2009; Norris & Dattilo, 1999; Okada et al., 2010; Reichow & Sabornie, 2009; Reynhout & Carter, 2007) and 3.12% used an ABAB design with a multiple element (Crozier & Tincani, 2007).

Range of Sentence Types in Social Stories

While 87.50% of the examined studies used descriptive and directive sentences (Adams et al., 2004; Agosta et al., 2004; Barry & Burlew, 2004; Bernard-Ripoll, 2007; Bledsoe et al., 2003; Brownell, 2002; Crozier & Tincani, 2005, 2007; Delano & Snell, 2006; Dodd et al., 2008; Hanley-Hochdorfer et al., 2010; Ivey et al., 2004; Kuoch & Mirenda, 2003; Kuttler et al., 1998; Litras et al., 2010; Lorimer, 2002; Mancil et al., 2009; Norris & Dattilo, 1999; Okada et al., 2010; Ozdemir, 2008; Quilty, 2007; Reynhout & Carter, 2007; Sansosti & Powell-Smith, 2006; Scattone, 2008; Scattone et al., 2002; Scattone et al., 2006; Schneider & Goldstein, 2010; Thiemann & Goldstein, 2001), 90.62% used perspective sentences (Adams et al., 2004; Agosta et al., 2004; Barry & Burlew, 2004; Bernard-Ripoll, 2007; Bledsoe et al., 2003; Brownell, 2002; Crozier & Tincani, 2005; Crozier & Tincani, 2007; Delano & Snell, 2006; Dodd et al., 2008; Hanley-Hochdorfer et al., 2010; Ivey et al., 2004; Kuoch & Mirenda, 2003; Kuttler et al., 1998; Litras et al., 2010; Lorimer, 2002; Mancil et al., 2009; Norris & Dattilo, 1999; Okada et al., 2010; Ozdemir, 2008; Quilty, 2007; Reynhout & Carter,

2007; Sansosti & Powell-Smith, 2006; Scattone, 2008; Scattone et al., 2002; Scattone et al., 2006; Schneider & Goldstein, 2010; Thiemann & Goldstein, 2001), 18.75% used control sentences (Barry & Burlew, 2004; Dodd et al., 2008; Ivey et al., 2004; Kuoch & Mirenda, 2003; Lorimer et al., 2002; Norris & Dattilo, 1999), 21.87% used affirmative sentences (Delano & Snell, 2006; Dodd et al., 2008; Hanley-Hochdorfer et al., 2010; Kuoch & Mirenda, 2003; Litras et al., 2010; Quilty, 2007; Scattone et al., 2002), and 15.62% used cooperative sentences (Adams et al., 2004; Bernard-Ripoll, 2007; Dodd et al., 2008; Ivey et al., 2004; Scattone et al., 2002). In 9.37% of the studies, the types of sentences used were not reported (Chan & O'Reilly, 2008; Reichow & Sabornie, 2009; Sansosti & Powell-Smith, 2008).

The Effectiveness of Social Stories

The research related to social stories was examined in three categories of studies: on the effectiveness of social stories presented alone, studies on the effectiveness of social stories with additional interventions, and comparative studies. 18.75% of the research was studies on the effectiveness of social stories presented alone, (Adams et al., 2004; Bledsoe et al., 2003; Chan & O'Reilly, 2008; Hanley-Hochdorfer et al., 2010; Scattone et al., 2002; Scattone et al., 2006). All examined research showed that social stories were an effective intervention for teaching social skills to individuals with ASD. Studies on the effectiveness of social stories with additional interventions comprised 65.62% of the examined research. Studies by Bernard-Ripoll (2007), Litras et al. (2010) Sansosti and Powell-Smith (2008) and Scattone (2008) examined the effectiveness of social stories using a video model for teaching social skills and the results showed that these interventions were effective in teaching all of the social skills. Other researchers changed the delivery of social stories. For example, Hagiwara and Myles (1999) used a multimedia approach combining social stories, visual symbols, and computer-based instruction. Additionally, taking into consideration the meta-analytic findings of the current study, the mean PND of the effectiveness of social stories presented alone was 57.46% with a range of 19.02% to 87.82% and the mean PND of the effectiveness of social stories with additional interventions was 65.66% with a range of 0% to 100% of all studies.

Comparative studies comprised 15.62% of the research (Brownell, 2002; Crozier & Tincani, 2005, 2007; Mancil et al., 2009; Reynhout & Carter, 2007). For example, Brownell (2002) studied traditional social stories and the use of social stories combined with music therapy, which makes it difficult to attribute effects to social story books. There was no clear difference between the two interventions. Either form of the social story was successful in reducing the target behaviors of each subject. One of these studies was a comparison by Crozier and Tincani (2005) on the effectiveness of reducing inappropriate behavior with the presentation of social stories alone and social stories with verbal cues. The other study by Reynhout and Carter (2007) compared the intervention of social stories with visual cues and the intervention of social stories with verbal cues for the reduction of inappropriate behavior. The results of the Crozier and Tincani (2005) study determined that the intervention of social stories with verbal cues was more effective than the intervention of social stories alone. In the Reynhout and Carter study (2007) it was stated that both the intervention of social stories with verbal cues and with visual cues were effective in the reduction of inappropriate behavior. Crozier and Tincani (2007) compared social stories alone and social stories with verbal prompts for teaching talking with peers. The results indicated that the social story alone had little effect on one subject talking to his peers. When verbal prompts were added, the subject demonstrated higher levels of the target behavior compared to the baseline and social story alone condition. The other study by Mancil et al. (2009) compared a social story presented in two formats used on three elementary age students with autism. The results were slightly better for the PowerPoint format than for the paper format. The results were maintained in the training setting and were generalized to another setting with a single verbal prompt. In the meta-analytic process for comparison studies, the PND could not be calculated for some studies that employed designs that did not allow a functional relation to be determined (i.e., ABC, multiple element).

Given the PND calculations regarding the effectiveness of the intervention with social stories, 27.27% of the 22 total studies (n = 6) were ineffective interventions (Adams et al., 2004; Hagiwara & Myles 1999; Hanley-Hochdorfer et al., 2010; Lorimer et al., 2002; Quilty, 2007; Schneider & Goldstein, 2010), 22.72% of studies (n = 5) were questionable interventions (Dodd et al., 2008; Ivey et al., 2004; Scattone et al., 2006; Sansosti & Powell-Smith, 2006; Thiemann & Goldstein, 2001), 31.81% of studies (n = 7) were effective interventions (Chan & O'Reilly, 2008; Crozier & Tincani, 2007; Delano & Snell, 2006; Litras et al., 2010; Sansosti & Powell-Smith, 2008; Scattone, 2008; Scattone et al., 2002),

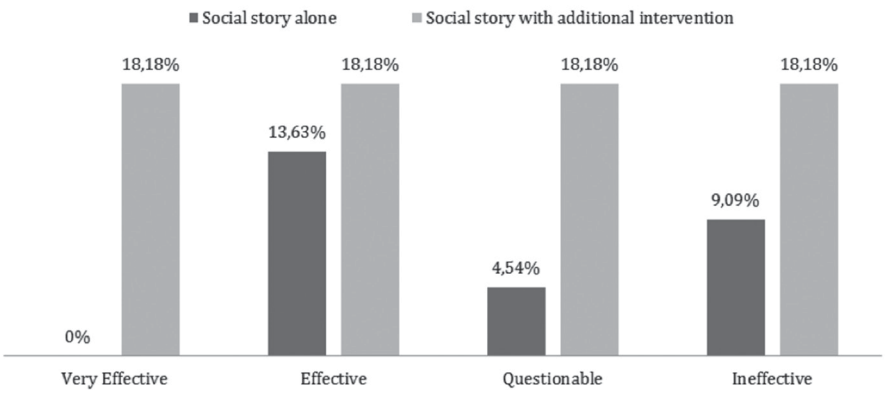

Figure 1. Effectiveness of Social Stories Alone and Social Stories with Additional Intervention

and 18.18% of studies (n = 4) were very effective interventions (Barry & Burlew, 2004; Kuttler et al., 1998; Ozdemir, 2008; Reichow & Sabornie, 2009).

When the PND for categories of social stories alone and social stories with additional intervention were compared in categories, it was seen that social stories alone were 0% very effective, 13.63% effective, 4.54% questionable and 9.09% ineffective. On the other hand, social stories with additional interventions were 18.18% in all categories (Figure 1).

Table 3
PND Categories for Comparison of Social Stories Alone and Social Stories with Additional Intervention

PND categories	Social story alone (n = 6)	Social story with additional intervention (n = 16)
Very effective	0%	25%
Effective	50%	25%
Questionable	17%	25%
Ineffective	33%	25%

It is noteworthy that most of the 22 studies (72.72%) were presented as social stories with additional intervention, and 27.27% of studies were presented as social stories alone. When social stories alone were taken into account, it was seen that 50% of 6 social stories alone were in the effective intervention categories, while 50% of 6 social stories alone were in the questionable and ineffective intervention categories. On the other hand, while 50% of 16 social stories with additional interventions were in the very effective and effective intervention categories, 50% of 16 social stories with additional interventions were in the questionable and ineffective intervention categories (Table 3).

In the effectiveness of all social stories intervention PND, the mean of ineffective interventions was 26.45% (range 0%-42.85%), the mean of questionable interventions was 57.25% (range 50%-63.88%), the mean of effective interventions was 79.77% (range 71.63%-87.82%), and the mean of very effective interventions was 98.02% (range 93.75%-100%). As a result, the mean PND scores for all studies was 63.43% with a range of 0% to 100%.

Maintenance and Generalization

Of the examined research, 50% of the studies were planned by collecting maintenance data related to that process (Chan & O'Reilly, 2008; Crozier & Tincani, 2005, 2007; Delano & Snell, 2006; Dodd et al., 2008; Hanley-Hochdorfer et al., 2010; Kuoch & Mirenda, 2003; Litras et al., 2010; Mancil et al., 2009; Ozdemir, 2008; Quilty, 2007; Reichow & Sabornie, 2009; Reynhout & Carter, 2007; Sansosti & Powell-Smith, 2006, 2008; Schneider & Goldstein, 2010; Thiemann & Goldstein, 2001). When the maintenance period was examined, it was seen that the maintenance data were collected between 2 to 9 weeks after the completion of instruction. Generalization data were collected in 31.25% of the examined studies (Bernard-Ripoll, 2007; Delano & Snell, 2006; Hagiwara & Myles, 1999; Kuttler et al., 1998; Litras et al., 2010; Mancil et al., 2009; Ozdemir, 2008; Reynhout & Carter, 2007; Sansosti & Powell-Smith, 2008; Scattone, 2008; Thiemann & Goldstein, 2001). In 18.75% of the studies both maintenance and generalization data were collected (Delano & Snell, 2006; Litras et al., 2010; Mancil et al., 2009; Reynhout & Carter, 2007; Sansosti & Powell-Smith, 2008; Thiemann & Goldstein, 2001).

Given the PND calculations regarding the effects of the maintenance with social stories, 13.63% of the 22 total studies (n = 3) were ineffective interventions (Hanley-Hochdorfer et al., 2010; Quilty, 2007;

Thiemann & Goldstein, 2001), 4.54% of studies (n = 1) were questionable interventions (Sansosti & Powell-Smith, 2006), 9.09% of studies (n = 2) were effective interventions (Crozier & Tincani, 2007; Delano & Snell, 2006), and 31.81% of studies (n = 7) were very effective interventions (Chan & O'Reilly, 2008; Dodd et al., 2008; Litras et al., 2010; Ozdemir, 2008; Sansosti & Powell-Smith, 2008; Scattone, 2008; Reichow & Sabornie, 2009). However, 40.90% of studies (n = 9) did not include maintenance data in a visual graph. According to the PND for the generalization effects of interventions, 4.54% of all studies (n = 1) were ineffective interventions (Thiemann & Goldstein, 2001), 9.09% of the studies (n = 2) were effective interventions (Delano & Snell, 2006; Litras et al., 2010), and 9.09% of the studies (n = 2) were very effective interventions (Ozdemir, 2008; Reichow & Sabornie, 2009). 77.27% of studies (n = 17) did not include generalization data in a visual graph or maintenance data.

With the effects of maintenance PND, the mean of ineffective maintenance data were 24.34% (range 0%-38.54%), the mean of questionable maintenance data were 50%, the mean of effective maintenance data were 77.14%, and the mean of very effective maintenance data were 100%. In the effects of generalization PND, the mean of ineffective generalization was 21.66%, the mean of effective generalization data were 87.77% (range 86.66%-88.88%), and the mean of very effective generalization data were 100%.

Social Validity

Social validity data were collected in 56.25% of the studies using social stories for teaching social skills to individuals with ASD. Using an intervention evaluation scale, social validity data were collected from the teacher or parent in the experiment in 46.87% of the studies (Adams et al., 2004; Chan & O'Reilly, 2008; Crozier & Tincani, 2005, 2007; Dodd et al., 2008; Hanley-Hochdorfer et al., 2010; Ivey et al., 2004; Litras et al., 2010; Mancil et al., 2009; Ozdemir, 2008; Reynhout & Carter, 2007; Sansosti & Powell-Smith, 2008; Scattone, 2008; Scattone et al., 2002; Scattone et al., 2006). In 9.37% of the studies, social validity data were collected by both subjective and social comparison means (Delano & Snell, 2006; Mancil et al., 2009; Thiemann & Goldstein, 2001).

Inter-observer Agreement and Treatment Fidelity

In 90.62% of the studies, data related to inter-observer agreement were collected (Adams et al., 2004; Barry & Burlew, 2004; Bledsoe et al., 2003; Chan & O'Reilly, 2008; Crozier & Tincani, 2005, 2007; Delano & Snell, 2006; Dodd et al., 2008; Hagiwara & Myles, 1999; Hanley-Hochdorfer et al., 2010; Ivey et al., 2004; Kuoch & Mirenda, 2003; Kuttler et al., 1998; Litras et al., 2010; Mancil et al., 2009; Norris & Dattilo, 1999; Okada et al., 2010; Ozdemir, 2008; Quilty, 2007; Reichow & Sabornie, 2009; Reynhout & Carter, 2007; Sansosti & Powell-Smith, 2006, 2008; Scattone, 2008; Scattone et al., 2006; Schneider & Goldstein, 2010; Thiemann & Goldstein, 2001), and in 62.50% of the studies, data related to the treatment fidelity were gathered (Chan & O'Reilly, 2008; Crozier & Tincani, 2005, 2007; Delano & Snell, 2006; Dodd et al., 2008; Hanley-Hochdorfer et al., 2010; Ivey et al., 2004; Kuoch & Mirenda, 2003; Litras et al., 2010; Mancil et al., 2009; Norris & Dattilo, 1999; Ozdemir, 2008; Reynhout & Carter, 2007; Sansosti & Powell-Smith, 2006, 2008; Scattone, 2008; Scattone et al., 2006; Schneider & Goldstein, 2010; Thiemann & Goldstein, 2001). Data for both inter-observer agreement and treatment fidelity were collected in 62.50% of the studies (Chan & O'Reilly, 2008; Crozier & Tincani, 2005, 2007; Delano & Snell, 2006; Dodd et al., 2008; Hanley-Hochdorfer et al., 2010; Ivey et al., 2004; Kuoch & Mirenda, 2003; Litras et al., 2010; Mancil et al., 2009; Norris & Dattilo, 1999; Ozdemir, 2008; Reynhout & Carter, 2007; Sansosti & Powell-Smith, 2006, 2008; Scattone, 2008; Scattone et al., 2006; Schneider & Goldstein, 2010; Thiemann & Goldstein, 2001).

Discussion

In this study, an analysis was made of the studies related to the use of social stories in teaching social skills to children with ASD and the prominent findings were analyzed in each category according to the specified criteria. In the studies on the use of social stories in teaching social skills, 76% of the subjects were diagnosed with autism and 22% with Asperger's syndrome. Only one study was carried out on children with a diagnosis of autism and learning difficulties. Most of the studies were of young age groups with a diagnosis of ASD. There were no subjects over the age of 15 in the studies which used social stories. The early years of education are of the greatest importance for children with disabilities (Heward, 2013; Shonkoff & Meisels, 1990). Thus, most of the studies in literature have been performed on young age groups. Moreover, it can be said that the teaching of social skills to young children with ASD is just as

important as the teaching of social skills to adults with ASD. Therefore, there is a need for studies related to the use of social stories in the teaching of social skills to adolescents and adults with ASD.

When the research was examined with respect to environment, 78.26% of the studies were seen to be carried out in environments such as school, institutions or health centers, and 13.04% of the studies were carried out at home. Only one study was carried out both at school and in home. When the generalization of social skills is considered, it is of utmost importance for the child that the teaching is in a range of natural environments. Therefore, there should be studies oriented towards teaching in natural environments such as the home as well as school for teaching social skills through social stories.

The targeted social skills in the examined research were seen to be mostly for initiating communication, social interaction, conversational skills, play skills, and reducing inappropriate behavior. When these skills were examined, the targeted social skills were appropriate for the age of the subjects and a positive increase was seen in these skills. However, there were no studies related to the teaching of study skills through social stories to children with ASD, although these children may have difficulties coping with teasing or exclusion by their peers in inclusive environments because of their lack of study skills. Therefore, children with ASD often have a need for instruction in study skills and group skills. So, studies could be planned for the teaching of age-appropriate study skills in inclusive environments.

The intervention of social stories differs greatly. The research designs of these studies are also highly variable, ranging from single subject and case studies to variations of withdrawal designs and multiple baseline, multiple probe designs across participants or settings. A point of interest regarding the selected social skills is that in 30.43% of the studies no reason was given for the selection of the social skills to be taught. The targeted social skills were defined prior to these studies and subjects lacking in these skills participated in the study. Social skills are the skills by which an individual will have an increased acceptance by others in the contexts in which they find themselves, so it is of great importance that while deciding on the target skills to be taught, the views of the people around the individual are considered as well as the individual's own expectations within their own social context (Gül & Vuran, 2010). The reasons for selecting social skills were reported as being directly from the teacher's opinion or the student's performance in 31.58% of the studies. At this point, the consideration of the teacher's or parents' opinions is important in respect to selecting the priority and functional skills needed by the child participating in the study. This is highly significant in terms of the social validity of the study.

When the means of data collection and evaluation used for social skills in the research were examined, it was seen that 34.78% of the studies used partial interval recording, 34.78% used event recording, 4.34% used duration recording and 4.34% used both event and duration recording. The means of data collection for the selected skills were not reported in 13.04% of the studies. However, when it is considered that the majority of the studies were carried out using the principles of applied behavior analysis, this situation contradicts the principle of technology (Cooper, Heron, & Heward, 2007). To achieve reproducibility of the study, the reporting of the manner of data collection in teaching social skills through social stories is an important element.

The majority of the studies were seen to have been applied by a researcher or teacher. However, in 13.04% of the studies, it was not reported who applied the research. The literature review revealed that social stories are a practitioner-friendly and easy method (Crozier & Sileo, 2005; Delano & Snell, 2006; More, 2008; Scattone et al., 2002) and so are economical in terms of time and costs (More, 2008; Quirmbach et al., 2009). When this is taken into consideration, social stories for teaching social skills can be comfortably applied by teachers and particularly by parents, siblings or peers. Defining the practitioner characteristics and training is important from the aspect of reproducibility by other researchers and for facilitating the usage by practitioners.

The range of sentences used in social stories was not stated in 13.04% of the studies (Chan & O'Reilly, 2008; Reichow & Sabornie, 2009; Sansosti & Powell-Smith, 2008). In most of the studies a high frequency of descriptive, directive and reflective sentences were used and more rarely control, affirmative and cooperative sentences. When it is considered that variety in range of sentences in social stories in the teaching of targeted skills determines the effect of the intervention, every type of sentence serves a different purpose and plays a critical role for children with ASD. As children with ASD are particularly lacking in understanding the thoughts and feelings of others, describing the social situation in terms of what is expected of the child during the reading of the story and what kind of reaction is required,

is of critical importance in teaching social skills (Heward, 2013; Sansosti & Powell-Smith, 2006). In this context, descriptive, directive and reflective basic sentence types are particularly used in most studies. In addition, for children with ASD to be able to give appropriate reactions to social situations in the community, it is necessary to demonstrate behavior which will be accepted by the community. It is also important that during the demonstration of these behaviors, the children with ASD are able to socially interact and collaborate with parents and peers. Therefore, there is a need for studies related to high level social stories which have corroborative, controlling and collaborative types of sentences.

Of the examined research, 18.75% of the studies were about the effectiveness of social stories presented alone, 65.62% were about the effectiveness of social stories with additional interventions and 15.62% were comparative studies. In the descriptive study where social stories were presented alone, most studies showed that social stories were effective in teaching social skills to children with ASD. The mean PND of the effectiveness of social stories presented alone was 57.46% with a range of 19.02% to 87.82%, while the mean PND of the effectiveness of social stories with additional interventions was 65.66% with a range of 0% to 100% of all studies. According to this study, it is a significant finding that social stories alone are not as effective as social stories with additional intervention. At this point, the effectiveness of social stories with additional interventions may be caused by the additional intervention strategies. It is difficult to ascertain which components of a social story intervention contribute to the successfulness of an intervention. More research is needed to examine the effectiveness and efficacy of social stories alone and social stories with the use of additional intervention strategies.

Besides considering the results of the PND, the mean PND of all studies was 63.43%. The results of this study were consistent with previous findings regarding the questionable effectiveness of social story interventions for students with ASD. Most authors (i.e., Reynhout & Carter, 2006; Sansosti et al. 2004; Test et al., 2011) agree that social stories are a promising intervention. While social stories can be said to be effective, according to these meta-analytical findings, social stories have a questionable effectiveness. Results suggest that social stories should not yet be considered as an evidence based practice for teaching social skills to individuals with ASD. However, social stories seem to be a promising practice that warrants future research. The findings of this study are parallel to the findings that were revealed by Test et al. (2011), whose study was conducted approximately at the same time.

There are also a limited number of comparative studies on the teaching of social skills through social stories to children with ASD. While Crozier and Tincani (2005) reported that the use of social stories with verbal cues was more effective in reducing inappropriate behavior than social stories alone, Reynhout and Carter (2007) stated that both visual cues or verbal cues with social stories were effective in reducing inappropriate behavior. However, as the number of comparative studies is limited, there is still a need for further comparative studies on social stories to support these findings.

In 60.86% of the examined studies, maintenance data were collected. A noticeable point regarding maintenance data are that most of the studies did not define a maintenance process. Six studies defined a maintenance period between 2 and 9 weeks. When it is considered that normally developing children start to forget after 6 weeks, even though these periods seem to be appropriate for special needs children, they can be said to be short for permanence of learning and social validity (Gül & Vuran, 2010). Generalization data were collected in 26.08% of the studies. As a result the mean PND scores for maintenance and generalization had a range of 0% to 100% and 21.66%-100% respectively. While the mean PND of maintenance was 77.41%, the mean PND of generalization was 79.44%. However, most studies did not include maintenance data (40.90%) and generalization data (77.27%) using visual graphs. With maintenance and generalization, the mean PND may have been effective due to the fact that most studies did not include maintenance and generalization in a visual graph. Children with ASD experience difficulties in generalizing the targeted skills in different environments with different skills (MacDuff, Krantz, & McClannahan, 1993; Taylor & Harris, 1995). Further studies could be conducted to determine the effect of social stories on generalization. With regard to the subject of teaching social skills to children with ASD, it is of great importance that these skills have permanence and can be generalized.

Social validity data were collected in 65.21% of the studies on the use of social stories in teaching social skills to children with ASD. When this rate is considered in the context of the studies, it can be said that the concept of social validity is given importance. Taking this into consideration, social validity is one of the most important components

of the intervention. Subjective evaluation and social comparison are two methods for measuring social validity (Tekin-Iftar & Kırcaali-Iftar, 2006). In the subjective evaluation approach, social validity data are gathered from four types of consumers: direct consumers (the individuals undergoing behavioral changes, individuals developing the programs to be applied), indirect consumers (families of the participants in the intervention in question, other participants of the program), close community members (families of other students, relatives, etc), distant community members (politicians, researchers) (Vuran & Sönmez, 2008). To determine the significance of the results obtained from the research on the appropriateness of the teaching methods used to gain the desired target behavior, all the studies but one collected social validity data by using a subjective evaluation approach with questions to the direct consumers, such as parents and class teachers, with the intention of determining social validity. In only one study was social validity data gathered by both subjective evaluation and social comparative methods. When one considers that the main aim of social validity is to evaluate the importance of the change in behavior and the suitability of the methods used to bring about the change, the views and recommendations of the individual directly exposed to the intervention carry great importance in this context (Gül & Vuran, 2010). As the aim of all services directed towards special needs individuals is for them to independently reach a level close to that of their peers, it is necessary for the studies that teaching skills to special needs individuals to define how the service is measured. Since social validity data collection by means of social comparison is important, there is a need for further studies using social validity data collection by comparing the performance of children with ASD who have been taught targeted social skills with that of their peers.

Inter-observer agreement data were collected in 86.95% of the studies and treatment fidelity in 65.21% of the studies. Both inter-observer agreement data and treatment fidelity were collected in 65.21% of the studies. Particularly in the studies of a single subject, reliability is a significant characteristic for preventing problems. Thus, when inter-observer agreement regarding dependent variables is performed, the evaluation of reliability regarding independent variables increases the internal validity of the study (Thompson, 2006). Thus it would be helpful to have studies demonstrating the effectiveness of teaching targeted skills through internal validity. Because treatment fidelity was planned as an independent variable, when it is considered that data were collected with the aim of determining whether it had been applied or not, treatment fidelity can be said to be parallels with the effectiveness of the intervention. Taking these findings which have arisen from the research into consideration, various recommendations can be made for future studies.

The current study has some strengths in comparison to previous reviews. Specifically, this study included children diagnosed with Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS), which have rarely been included in previous reviews. Long-term maintenance data and social validity data gathered using a subjective evaluation or social comparison approach was assessed in the current study, while other reviews did not address how maintenance and social validity data were gathered.

Limitations

A few limitations should be noted. First, this study was limited to single subject and case studies. Group design studies were excluded. Second, only articles written in English were included. Third, the duration of intervention was not examined as a criterion. Finally, this analysis was based on a subset of studies that yielded the PND data.

Future Directions

Apart from individuals diagnosed with autism or Asperger's syndrome, groups with a different diagnosis could be featured in studies on the use of social stories for teaching social skills. In addition, apart from using social stories on children with ASD for initiating social interaction, play, and conversation skills as well as reducing inappropriate behavior, there could be a focus on different social skills such as study skills to increase appropriate social skills in community-based environments. High level social stories which have a wider range of sentence types can be used in teaching social skills to children with ASD. Studies regarding the teaching of social skills to children with ASD can be conducted with maintenance sessions lasting longer than two weeks or one month, in different environments, and with different materials and people for generalization. Future studies can be conducted which gather social validity data by means of both subjective evaluation and social comparison. In future studies, the effectiveness and productivity of the intervention of social stories in teaching social skills could and should be compared.

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