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Examination of Single Subject Studies Conducted on Individuals with Disabilities by Using Self Management Strategies: A Meta Analysis Study*

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Abstract

Individuals with disabilities need to learn to control their own behaviors to rank among in the community. Self-management strategies are developed for this purpose. These strategies include antecedent cue regulation, self-instruction, self-monitoring, self-evaluation, and self-reinforcement. In the literature, there are researches about the effectiveness of self-management strategies on teaching various behaviors to individuals with disabilities. In this study 40 single-subject research articles conducted with individuals with disabilities and published in peer-reviewed journals in between 1999-2008 have been examined. Articles primarily have been descriptively analyzed and then examined by use of meta-analysis as the computation of effect-size. Examining the findings of the descriptive analysis, it is found out that the most commonly used strategy is self-monitoring and strategies are mostly used for people aged between 7 and 17, which is referred to as school age. The PND score obtained in the studies that were examined was found as 87.23% on average for the behaviors that were wished to be increased, compared with PZD score an average of 43.96% for the behaviors that were desired to be decreased. According to the PND and PZD scores, it is possible to say that self-management strategies are effective for those behaviors that are desired to be increased, but they are doubtful/unstable in managing behaviors that are desired to be decreased. Findings have been interpreted and discussed by considering the literature and suggestions have been submitted for the implications and future researches.

Key Words

Self-Management Strategies, Antecedent Cue Regulation, Self-Monitoring, Self-Instruction, Self-Evaluation, Self-Reinforcement, and Meta-Analysis

Individuals with disabilities need to be able to control their own behaviors to achieve independence successfully and to share a common environment with other people at school, work, and home and in society (Bigge, Stump, Spagna, & Silberman, 1999). There is an agreement in the literature that self management strategies are developed to enable the individuals with disabilities to control their own behaviors are effective on teaching many skills and behaviors. Self management strategies provide maintenance and generalization and thus they can be easily applied for use by individuals with disabilities (Baer, Fowler, & Carden Smith, 1984; McDougal & Brady, 1998; Yücesoy Özkan, 2009). Self-management can be defined as the responses made by people in order to maintain or change their own behaviors (Dickerson & Creedon, 1981) or the process used by people to control their own behaviors (Browder & Shapiro, 1985). Self management strategies are effective and efficient strategies used to enhance the abilities of students, involving antecedent cue regulation, self-instruction, self-monitoring, self-evaluation and self-reinforcement (Brooks, Todd, Tofflemoyer, & Horner, 2003; Kerr

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& Nelson, 1998; McLaughlin, 1984; Schloss & Smith, 1994).).

Previous studies have reported that self management strategies are effective strategies and provide positive results for individuals with disabilities (Lee, Simpson, & Shogren, 2007; Lienerman, & Reid, 2006; Sutherland & Synder, 2007). The stronger aspects of self management strategies include reducing the dependency of individuals on other people and increasing their responsibilities, enabling them to develop self-trust (Lee et al., 2007), enhancing their quality of life (Wehmeyer, Agran, & Hughes, 2003), contributing to the generalization of what is learnt to natural conditions (Koegel, Koegel, Harrower, & Carter, 1999), and increasing the time available for learning (McDougal & Brady, 1998). In addition, self-management strategies can be effectively used in the class, frequently after being taught to students only once, they are easy to apply, and require only limited teacher effort and time (McLaughlin, Krappman, & Welsh, 1985). In addition, self management does not require the suspension of school operations, which is of considerable benefit for teachers in comparison to other strategies (Blick & Test, 1987; McLaughlin, 1984; Prater, 1994).

In many studies, it is suggested that self-management strategies are effective methods and provide positive results for people with disabilities (Lee et al., 2007; Lienerman and Reid, 2006; Sutherland & Synder, 2007). Nevertheless, studies seeking effective methods for people with disabilities are still continuing. These studies increased pace, especially with the "No Child Left Behind" Act (NCLB, 2002) which came into force in 2002 in the United States of America (U.S.A.) , which required all schools to use evidence-based interventions in special education. Evidence-based interventions are those for which there is sufficient research data demonstrating their effectiveness; the fundamental step to determine these effective interventions is to carry out meta-analysis studies (Parker, Hagan-Burke and Vannest, 2007).

A meta-analysis by Ma (2006) examined the effectiveness of self-management strategies by reviewing 61 articles conducted with individuals showing normal development and individuals with disabilities. The review found that the effect size of self-management strategies is .61 according to the percentage of non-overlapping data (PDN), and .87 according to the percentage of data points exceeding median (PEM) The conclusion of the review was that self-management strategies can be regarded as effective. Lee et al. (2007) conducted a meta-analysis of single subject studies that implemented self-management strategies in individuals with autism spectrum disorder. In this study, the findings of a total of 11 studies were analyzed and it was determined that self-management strategies were effective (PND: 81.9%) in increasing appropriate behaviors of individuals with autism spectrum disorder (Scruggs & Mastropieri, 1998). These studies are instructive for determining whether or not self-management strategies should be regarded as evidence-based interventions. However, there are a number of limitations to previous meta-analyses: the studies reviewed by Ma (2006) included individuals with normal development and individuals with disabilities, and descriptive analysis findings related these participants were not given in detail; a further limitation is the fact that the review by Lee et al. (2007) only examined 11 studies carried out with individuals with autism spectrum disorder. Therefore, there is a need to conduct meta-analyses using a larger number of studies in order to permit examination of the effectiveness of self-management strategies among people with different conditions.

In Turkey there is limited literature using self management strategies in individuals with disabilities (Sönmez & Yücesoy Özkan, 2010; Yücesoy Özkan, 2009). Therefore, this study was necessary to describe the studies using self management strategies, to show the effectiveness of self management strategies as a whole through meta-analysis and to pave new ways for further analysis. The aim of this study was to analyze the studies conducted using self management strategies in individuals with disabilities in the last decade (1999-2008), to evaluate the studies in terms of various variables and to determine the effect size obtained in the studies.

Method

In this study, descriptive analysis was used and in the analysis of the reviewed studies meta-analysis was employed. Descriptive analysis involves the analysis of studies conducted on the same research area according to a certain objective and criteria, and a descriptive summary of the results of the analysis (Greenhalgh, 1997). Meta analysis is a method that combines the results of independent studies carried out on the same research area and makes a statistical analysis of the collected results (Akgöz, Ercan, & Kan, 2004; Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2008). Meta-analysis involves quantitative summaries, which are produced by calculating the effect size. The ef-

fect size is (as cited in Dunst, Hamby and Trivette, 2004, Karasu, 2009) the magnitude-significance of the functional relationship between dependent and independent variable. While in group experimental studies, effect size calculation requires a statistical comparison between groups; in single subject research, it requires making a comparison between the baseline and intervention phase (Karasu, 2009).

Selection of the Studies

The following criteria were taken into account in the selection of the studies to be included in the scope of the present study: (a) the study should be published in refereed journals between 1999-2008, (b) the study should be carried out with subjects with disabilities, (c) the study should employ single subject research methods, and (d) the independent variable effect should be visually indicated on a graph.

Published full text articles on Academic Search Complete and ERIC database were reviewed and a manual review was performed at Anadolu University Library. As a result of the reviews, a total of 40 articles published in 16 journals was selected. These articles are indicated with (*) in the references section.

Descriptive Analysis Process

The articles selected after the review were evaluated in terms of (a) strategies used, (b) the subjects, (c) target behaviors, (d) setting and time, (e) data collection technique, (f) research design, (g) instructors and observers, (h) reliability data, (i) social validity, (j) maintenance and generalization, (k) study findings (Table 1).

The first stage of the evaluation process was to prepare an evaluation form considering the above mentioned categories. The articles were individually read and analyzed by the authors and were recorded in the form. The consistency towards the evaluators was tested by inter-rater reliability analysis. Since examination of the articles using the form prepared by the researchers depended on the skill of the raters, calculation of the reliability between the raters were deemed to be necessary (Gay, Mills, & Airasian, 2006). Reliability of the analyzed articles was calculated according to the following formula (Wolery, Bailey, & Sugai, 1988): [agreement / (agreement + disagreement) x 100]. Reliability was found to be 91% by the raters. The analyzed articles were reported in descriptive analysis using the frequency and percentages.

Meta Analysis Process

In meta-analysis process, percentage of non-overlapping data (PND) was calculated for the behaviors for which an increase was desired (Mastropieri & Scruggs, 1985-1986; Scruggs & Mastopieri, 2001; Scruggs, Mastropieri, Cook, & Escobar, 1986). PND calculation of each subject was made separately and independently for each condition and phase (in ABAB models) and then their arithmetic means were calculated to find the effect size of the study. A total of 232 PND calculations were made.

As for the behaviors in which a decrease was desired, percentage of zero data (PZD) calculations were made (Scruggs, Mastropieri, & Casto, 1987). PZD calculation of each subject was made separately and independently for each condition and phase (in ABAB models) and then their arithmetic means were calculated to find the effect size of the study. A total of 40 PZD calculations were made; since there was no data at zero level, no calculation was made in 15 cases.

The following formula was used in reliability calculation (Wolery et al., 1988) to determine the reliability of the effect size scores: [agreement / (agreement + disagreement) x 100]. Inter-rater reliability was found to be 87% by the raters.

Table 1.
The Characteristics of Single Subject Researches Included in Descriptive Analysis and Meta-Analysis

No	Source	Strategy	Setting	Time	Target Behavior	Data Collection	Design	Reliability	Social Validity	M/G	PND PZD
1	Alberto, Taber, & Fredrick, 1999	SP/ACR	School Community	-	Aberrant Behaviors	IR	MPD RD	IOR	-	+/-	PZD 50.6 %
2	Koegel, Harrower, & Koegel, 1999	SM	Class	20 Minutes	Appropriate Schoolwork Performance Disruptive Behavior	IR	MBD	IOR	Social Comparison	+/-	PND 100 % PZD 33.2 %

3	Shimabukuro, Prater, Jenkins, & Edelen-Smith, 1999	SM	Class	-	On-Task Behavior Academic Productivity Academic Accuracy	MTSR PPR	MBD	IOR	-	-/-	PND 91.1 %
4	Taber, Seltzer, Heflin, & Alberto, 1999	SP/ACR	Class	30-35 Minutes	Decrease Teacher Prompts	ER	MPD WD	IOR	-	-/-	PZD 46.5 %
5	Todd, Horner, & Sugai, 1999	SM SE SR	Class	10 Minutes	Problem Behavior On-Task Behavior Work Completion	RS IR PPR	MBD RD	IOR	-	-/-	PND 98.7 % PZD 29.1 %
6	Browder & Minarovic, 2000	ACR SM	Home Library	-	Sight Word Read Comprehension Initiate Job Task	___	MPD	IOR & PR	Subjective Evaluation	-/-	___
7	Embregts, 2000	SM SE SR	Residential Facility	20-40 Minutes	Inappropriate Social Interaction	PIR	MBD	IOR & PR	-	+/-	PZD 21.2 %
8	Gumpel & Golan, 2000	SM	Afterschool Club	30 Minutes	Game Playing Social Skills	MTSR	ATD	IOR	-	+/+	PND 100 %
9	Hughes, Rung, Wehmeyer, Agran, & Hwang, 2000	SP/ACR Peer Tutoring	School	13 Minutes (mean)	Social Interaction (Conversational Initiation)	ER IR	MBD	IOR	Subjective Evaluation Social Comparison	+/+	PND 88.6 %
10	Mancia, Tankersley, Kamps, Kravits, & Parrett, 2000	SA SM SR	Class	4 to 6 Times Per a Day	Repetitive Behaviors	IR	MBD	IOR	-	-/-	PZD 6.9 %
11	Wolfe, Heron, & Goddard, 2000	SM	Resource Room	10 Minutes	On-Task Behavior Written Language Performance	IR PPR	RD	IOR & PR	Subjective Evaluation	-/-	PND 57.4 %
12	Bambara & Gomez, 2001	SI SR	Community Residence	20 Minutes	Problem Solving	TAR	MPD	IOR	-	+/+	PND 100 %
13	Gilberts, Agran, Hughes, & Wehmeyer, 2001	SM	Class	15 Minutes	Classroom Survival Skills	CL	MBD	IOR &PR	Subjective Evaluation	+/-	PND 97.5 %
14	Mitchem, Young, West, & Benyo, 2001	SMN Package Peer-Assisted	Class	45 Minutes	Appropriate Class Behaviors	DR IR	MBD	IOR & PR	Subjective Evaluation	+/-	PND 91.31 %
15	Bakken Firman, Beare, & Lyod, 2002	SM	Resource Room	8-20 Minutes	On-Task Behavior	MTSR	MID	IOR	-	-/-	PND 74.1 %
16	Copeland, Hughes, Agran, & Wehmeyer, 2002	SM SE	Class	At Least Once Per Week	Worksheet Completion	PPR	MBD	IOR, IRR & PR	Subjective Evaluation	-/+	PND 96.8 %

17	Embregts, 2002	SM Video Feedback	Residential Facility	35-40 Minutes	Appropriate and Inappropriate Social Behaviors	ER	RD	IOR & PR	Subjective Evaluation	-/-	——
18	Hughes, & colleagues, 2002	SM	Class	90 Minutes	Correct Social Response Correct Written Responding	PIR CER PPR	MBD	IOR	Subjective Evaluation	+/+	PND 100 %
19	O'Reilly, Lancioni, Gardiner, Tiernan, & Lacy, 2002	SMN Problem Solving	Class Resource Room	2 Days	Asking for Help Following Instruction	CER	MBD	IOR & PR	Subjective Evaluation	-/-	PND 100 %
20	O'Reilly, Tiernan, & Colleagues, 2002	SM	Class	3 Classes	On-Task Behavior	PIR	MBD	IOR	Subjective Evaluation Social Comparison	-/-	PND 100 %
21	Brooks, Todd, Tofflemoyer, & Horner, 2003	SM SR	Class Resource Room	1-2 Times a Day	Academic Engagement Work Completion	IR	MBD WD	IOR	-	-/+	PND 80,7 %
22	Embregts, 2003	SM Video and Graphic Feedback	Residential Facility	Meal Time	Increase Appropriate Behaviors Decrease Inappropriate Behaviors	PIR	MBD	IOR & PR	-	+/-	——
23	Wehmeyer, Yeager, Bolding, Agran, & Hughes, 2003	SP/ACR SM SE SR	Class	One Per Day	Increase Appropriate Behaviors Decrease Inappropriate Behaviors	PIR	MBD	-	Subjective Evaluation	+/-	PND 100 % PZD 26.9 %
24	Coyle & Cole, 2004	SM	Class Therapy Room	10-15 Minutes	Off-Task Behavior	MTSR	WD	IOR	-	+/-	PZD 44.1 %
25	Cancio, West, & Young, 2004	SMN Package	Home School	Homework Time	Math Homework Completion and Accuracy	PPR	MBD	IOR & PR IRR	Subjective Evaluation	-/-	PND 70 %
26	Apple, Billingsley, & Schwartz, 2005	SM Video Modeling	Class	30 Minutes	Social Behavior	ER	MBD	IOR & PR	Subjective Evaluation	-/+	PND 96.2 %
27	Agran et al., 2005	SM	School	15 Minutes	Following-Direction	TAR	MBD	IOR & PR	Subjective Evaluation	+/-	PND 97.6 %
28	Harris, Friedlander, Saddler, Frizzelle, & Graham, 2005	SM	Class	15 Minutes	On-Task Behavior Spelling Words	MTSR PPR	MBD	IOR	Subjective Evaluation	-/-	PND 78.3 %
29	Rock, 2005	SM	Class	1 Hour	On-Task Behavior Off-Task Behavior Problem Behavior	MTSR PPR	MBD RD	IOR	-	-/-	PND 89.5 % PZD 25.9 %

30	Amato-Zech, Hoff, Doepke ve 2006	SM	Class	15 Minutes	On-Task Behavior	PIR	RD	IOR	Subjective Evaluation	-/+	PND 97.9 %
31	Lienemann & Reid, 2006	SMN Package	Class	___	Expository Writing	PPR RS	MBD	IOR IRR	___	+/-	PND 100 %
32	Nies & Belfiore, 2006	SE	Class	20 Minutes	Words Spelling	PPR	AAT	IOR & PR	Subjective Evaluation	+/+	PND 100 %
33	Reid & Lienemann, 2006	SMN Package	School Hallway	___	Narrative Writing	PPR RS	MBD	IOR & PR	___	+/-	PND 100 %
34	Stahr, Cushing, Lane, & Fox, 2006	SM Extinction	Class	10 Minutes	On-Task Behavior	PIR	MBD WD	IOR	Subjective Evaluation	-/-	PND 65.9 %
35	Todd & Reid, 2006	SM	Park	2 Days a Week	Physical Activities	PIR	CCD	IOR	___	-/-	PND 88.6 %
36	Rock & Thead, 2007	SM	Class	45 Minutes	On-Task Behavior Math Performance	MTSR PPR	MTRD	IOR	Subjective Evaluation	-/-	PND 78.1 %
37	Sutherland & Snyder, 2007	SM Peer Tutoring	Class	___	Disruptive Behaviors Active Responding Reading Fluency	ER DR CBM	MBD	IOR & PR	Subjective Evaluation	+/-	PZD 66.7 % PND 28.3 %
38	Lane et al., 2008	SMN Package	Class	___	Writing Performance	___	MBD	IRR & PR	Subjective Evaluation	+/-	PND 100 %
39	Loftin, Odom, & Lantz, 2008	SM Peer Tutoring	School	20-30 Minutes	Social Initiation Social Interaction Repetitive Motor Behaviors	PIR	MBD	IOR & PR	Subjective Evaluation	+/+	PND 100 % PZN 16.6 %
40	Stotz, Itoi, Konrad, & Alber-Morgan, 2008	SM/SG	Resource Room	4 Days a Week	Writing Performance	PPR	MBD	IOR & PR IRR	Subjective Evaluation	+/-	PND 65.5 %

KÖV: Kendine Önuyaran Verme	Kİ: Kendini İzleme	KYV: Kendine Yönerge Verme	KD: Kendini Değerlendirme	KP: Kendini Pekiştirme	KY: Kendini Yönetme
AZAK: Anlık Zaman Örneklemi Kaydı	ZAK: Zaman Aralığı Kaydı	BZAK: Bütüncül Zaman Aralığı Kaydı	PZAK: Parçalı Zaman Aralığı Kaydı	OK: Olay Kaydı	SK: Süre Kaydı
KOK: Kontrollü Olay Kaydı	KÜK: Kalıcı Ürün Kaydı	BAK: Beceri Analizi Kaydı	KL: Kontrol Listesi	DÖ: Dereceleme Ölçeği	MDD: Müfredat Temelli
DG: Değerlendiriciler Arası Güvenirlik	UG: Uygulama Güvenirliği	GAG: Gözlemcilerarası Güvenirlik	ÖVY: Örtüşmeyen Veri Yüzdesi	SVY: Sıfır Veri Yüzdesi	İ/G: İzleme/ Genelleme
DUM: Dönüşümlü Uygulamalar Modeli	UDUM: Uyarlamalı DUM	DÖM: Değişen Ölçütler Modeli	TÇM: Tersine Çevirme Modeli	ÇBM: Çoklu Başlama Modeli	ÇYM: Çoklu Yoklama Modeli

Results

The managing strategies that were used alone or in combination in the selected articles were determined. It was found that the most commonly used strategy was self-monitoring. This strategy was used alone in 55% (n=22) of the studies and in combination with other strategies in 30% (n=12) of the studies. Self-monitoring has positive effects on target behavior. The studies revealed that if the behavior recorded during the self monitoring process was a positive one, there was an automatic increase in the behavior; if the recorded behavior was a negative one, then there was an automatic decrease in the behavior (as cited in Peterson & Tenenbaum, 1986, Alberto & Troutman, 1995; as cited in Workman, 1982, Alberto & Troutman, 1995). In addition, self-monitoring strategy is widely preferred in maintenance of acquired behaviors (Agran, King-Sears, Wehmeyer, & Copeland, 2003; Alberto & Troutman, 1995). Thus, these two characteristics clearly indicate why self monitoring strategy was widely used.

It was found that antecedent cue regulation was used alone in 7.5% (n=3) of the studies and in combination with other strategies in 7.5% (n=3) of the studies. Self-instruction was used alone in 5% (n=2) of the studies and in combination with other strategies in 10% (n=4) of the studies. Self evaluation was used alone in 2.5% (n=1) of the studies and in combination with other strategies in 12.5% (n=5) of the studies. Self reinforcement was not used alone in any of the studies; this strategy was used in combination with other strategies in 25% (n=10) of the studies. This finding is consistent with the ones indicating that self reinforcement is generally used to extend the scope of self-monitoring and self-evaluation (Agran et al., 2003; McDougal & Brady, 1998; Sugai & Tindal, 1993). In this study, it can be suggested that self reinforcement can be easily used to support other strategies that it should absolutely be included in the self management process and that self monitoring or self evaluation in particular would not be meaningful at all without self reinforcement.

It was found out that self-management strategies were used in combination with other strategies such as video feedback and video modeling (n=4), determining goals (n=3) and peer tutoring (n=3).

It was found that only 17.5% (n=7) of the analyzed studies presented data on the levels of using self management strategies in addition to target behaviors, while 82.5% (n=33) of the studies presented no data on the utilization level of self-management strategies. It is important to collect data on the use of self management (Hughes et al., 2002). According to the definition made by Heward (1987), self-management behaviors should be fulfilled and a change should take place in the target behavior to realize self-management (Yücesoy Özkan, 2009). Thus, further studies might be planned to determine the level of using self management strategies in combination with the changes in the target behavior.

Subjects

Of all the participants (N=148), 73% (n=108) was male and 27% (n=40) was female (Table 2).The findings obtained in the study were consistent with the findings of Ma (2006) and Lee et al. (2007). These findings indicate that diagnose ratio is higher in males than in females having disabilities, particularly intellectual disabilities (Eripek, 2009; Kocaoğlu, 1991).

It was observed that 27.5% (n=11) of the studies was conducted on two subjects; 27.5% (n=11) was on three subjects; and 45% (n=18) was on 4-10 subjects. A total of three or a higher number of subjects in the studies have a positive impact on the validity of the studies. This situation can be considered as a strong aspect for the conducted studies.

The age of the subjects varied in the 5-68 age range. Mean age was 13.6. In three studies, it was noted that the subjects were attending at primary school; however their ages were not exactly indicated. Therefore, these subjects were not included in mean age calculation. It was observed that 3% (n=4) of the subjects was in the 3-6 year age range; 41% (n=61) was in the 7-12 age range, 47% (n=70) was in the 13-17 age range and 9% (n=13) was above the age of 18. The findings reveal that self management strategies can be easily used for individuals from almost every age group but that the strategies are generally used for the individuals at school age (7-17 ages) (88%). Considering the limited use of self management strategies in pre-school period (3-6 age) (3%), it can be stated that there is a need for studies on pre-school age individuals.

Table 2.
Participants' Characteristics

Participant Characteristic	**f**	**%**
Number		
1	7	17,5
2-4	21	52,5
5 and over	12	30,0
	(n=40)	(Σ=100)

Age		
0-6	2	5,0
7-12	20	50,0
13-17	18	45,0
18 and over	7 (n=47)*	17,5 (Σ=117)***
Sex		
Male	108	73,0
Female	40 (n=148)**	27,0 (Σ=100)
Diagnosis		
Intellectual Disability	16	40,0
Autism Spectrum Disorder	13	32,5
Learning Disability	12	30,0
Emotional And Behavioral Disorder	11	27,5
Attention Deficiency and Hyperactivity Disorder	10	25,0
Hearing, Visual and Physical Disability	7	17,5
Severe and Multiple Disability	4	10
Language and Speech Disorder	3 (n=76)*	7,5 (Σ=190)***

* The total number is over 40.
** The total number of subjects participating in the study.
*** The total percentage is over 100.

The subjects were diagnoses with mild and moderate level of intellectual disability in 40% (n=16) of the studies, with autism spectrum disorder in 32.5% (n=13) of the studies, with learning difficulty in 30% (n=12) of the studies, with emotional and behavioral disorder in 27.5% (n=11) of the studies, with attention deficiency and hyperactivity disorder in 25% (n=10) of the studies, with other disabilities like hearing, sight and health problems in 17.5% (n=7) of the studies, with severe and multiple disability in 10% (n=4) of the studies and with language and speech disorder in 7.5% (n=3) of the studies. Although the findings reveal that the majority of the subjects were diagnosed with a mild and moderate intellectual disability and autism spectrum disorder, it was found that individuals from approximately all disability groups were included in the studies. This finding clearly indicates that self management strategies are effectively used in individuals with different disabilities.

It was observed that in 60% (n=24) of the studies the subjects were attending to general school, 32.5% (n=13) was attending to special school, 2.5% (n=1) was attending to both general and special school and 5% (n=2) was not attending to any school at all. Of all the subjects who were attending to general school, 8.5% (n=2) was at preschool level, 79% (n=19) was at primary education level and 12.5% (n=3) was at secondary education level. In 33% (n=8) of the studies, the subjects who were attending to general school benefited from special education services; in 4% (n=24) of the studies, they benefited from vocational training.

Target Behaviors

It was found that in 70% (n=28) of the studies, the behaviors for which an increase was desired were determined as target behaviors, in 12.5% (n=5) of the studies the behaviors for which a decrease was desired were determined as target behaviors and in 17.5% (n=7) of the studies both types of behaviors were determined as target behaviors. These findings suggest that the strategies are particularly useful to increase appropriate behaviors (Agran et al., 2003; Ma, 2006). However, considering that if the behavior analyzed in self management process is a negative one, there is an automatic decrease in the mentioned behavior (as cited in Peterson & Tenenbaum, 1986, Alberto & Troutman, 1995; as cited in Workman, 1982, Alberto & Troutman, 1995); so studies can also be designed to decrease inappropriate behaviors.

Setting and Time

Of all the evaluated studies, 67.5% (n=27) was conducted in classrooms and 15% (n=6) was conducted in the play room, dining room, source room, cafeteria and corridor (total 82.5%, n=33) of the schools attended by the subjects. This finding supports those of the study carried out by Ma (2006). A total of 10% (n=4) of the studies was conducted in community homes where the subjects were living; 7.5% (n=3) was conducted in social environments like parks, libraries and restaurants and 5% (n=2) was conducted at home and in other settings. Although the procedures were conducted in different environments like community homes, parks and libraries, it can be noted that self management strategies are mainly used in educational settings. When this finding was combined with the study results that noted 60% of the subjects in the study was attending to general school, it can be inferred that self management strategies can be easily used in general classrooms where mainstreaming has been applied. That the subjects in the studies were carried out in natural environments enhances the strong aspects of the studies.

Furthermore, it was reported that in 77.5% (n=31) of the studies, the procedures were carried out in

periods of at least two days a week and every day a week. However, in 22.5% (n=9) of the studies, no information was available on the times when the procedures were carried out.

Data Collection Technique

In analyzed studies, different data collection techniques were used depending on the target behaviors. 50% (n=20) of the studies used partial and/or total time interval recording, 32.5% (n=13) used event recording and/or controlled event recording 20% (n=8) used permanent product recording, 12.5% (n=5) used momentary time sampling, % (n=2) used time recording. In 20% (n=8) of the studies, other data collection techniques like control list, rating scale and task analysis were used.

Research Design

It was found that 57.5% (n=23) of the studies used multiple baseline design, 17.5% (n=7) used AB models in combination with other models, 15% (n=6) used ABC design, 5% (n=2) used multiple probe design, 2.5% (n=1) used adapted alternating treatments design and 2.5% (n=1) used ABAB model.

Instructors and Observers

While 37.5% (n=15) of the studies reported that the interventions were made by the instructors, 30% (n=12) reported no data on the interventions. The interventions were made by the teachers in 15% (n=6) of the studies, by the undergraduate or graduate students in 10% (n=4) of the studies, by the peers in 5% (n=2) of the studies and by the therapists in 2.5% (n=1) of the studies. Although 83% of the studies were conducted at schools, that the procedures were not conducted by the teachers is an important limitation. Since self management strategies are mainly applied in the classrooms, it can be suggested that particularly preschool teachers, primary education teachers and special education teachers should be informed about the use of self management strategies through pre-service or in-service trainings.

It was found that trained independent observers served as the observer in 32.5% (n=13) of the studies; the researchers in 25% (n=10) of the studies; undergraduate or graduate students in 25% (n=10) of the studies; research assistants in 5% (n=2) of the studies. In 12.5 % (n=13) of the studies there was no data on the observers.

Reliability Data

In 97.5% (n=39) of the studies, inter-observer reliability and/or inter-rater reliability data were collected. However, there were no available data on reliability only in 2.5% (n=1) of the studies. It is noted that inter-observer reliability and/or inter-rater reliability data varied in 71-100% range.

In 40% of the studies (n=16), procedural reliability data were collected and procedural reliability data were found to be in 72-100% range in all studies. However, no procedural reliability data were collected in 60% (n=24) of the studies. It can be stated that in the process of teaching self management strategies, procedural reliability data should be collected to check whether the instructor controls all variables apart from the ones related with teaching and to what extent he/she reliably applied instruction sessions. Procedural reliability data should be collected in future research.

Social Validity

Along with the increasing use of self management strategies in recent years, social validity findings also gain gradual importance. In 60% (n=24) of the evaluated 40 studies, social validity data were collected; however in 40% (n=16) no social validity data were collected. It was observed that in 92% (n=22) of the studies collecting social validity data, the data was collected by subjective evaluation. In 4% (n=1) data were collected by making normative comparison and in 4% (n=1) data were collected both by subjective evaluation and normative comparison. In addition, it was found that social validity findings were mainly positive. This can be associated with the increased importance given to social validity, along with the introduction of quality of life concept (Yücesoy Özkan, 2009). Furthermore, collection of social validity data in the majority of the studies increases the quality of the studies.

Maintenance and Generalization

Although maintenance data were collected in 59% (n=20) of the studies, there was no available maintenance data in the remaining 50% (n=20). As for the generalization data, it was found that 70% (n=28) of the studies did not collect generalization data while only 30% (n=12) did collect generalization data. Only 17.5% (n=7) of the studies used maintenance data and generalization data simultaneously. The maintenance and generalization of the skills/behaviors acquired by the individuals with disabilities is of great importance (Eripek, 2009). Considering this situation, the findings regarding

maintenance and generalization are challenging. It can be noted that the studies had a serious limitation in terms of maintenance and generalization.

Effect Size

PND and PZD scores were calculated to determine the effect size for all studies included in this study (Table 3 and Table 4).

Table 3.
Means and Standard Deviations of PND Scores for Intervention Characteristics

	PND		
Variable	**n**	**M**	**SD**
Strategy			
Self-monitoring	20	85,30	18,65
Self-prompt	1	88,60	0
Self-instruction	1	100,00	0
Self-evaluation	1	100,00	0
Self-management package	9	88,62	11,48
Target Behavior			
Desired behavior	26	89,00	13,01
Undesired behavior	6	86,08	26,11
Design			
Multiple baseline design	20	91,12	17,20
Multi treatments design	6	78,00	13,54
Withdrawn design	1	97,91	0
Adapted alternating treatments design	1	72,22	0
Mixed	4	83,70	12,09
Maintenance			
Yes	16	91,80	18,50
No	16	85,20	13,00
Generalization			
Yes	11	95,34	6,20
No	21	91,00	18,68
Social Validation			
Yes	22	86,80	18,55
No	10	92,30	8,76

n: Research number
M: Arithmetic mean
SD: Standard deviation

Mean PND score for all studies carried out to increase appropriate behaviors was 88.50% (range 28.30-100%). According to the criteria introduced by Scruggs and Mastropieri (1998), it can be suggested that self management strategies are effective in increasing appropriate behaviors. 33 studies used self management strategies in order to increase desirable behaviors. It can be noted that self management strategies are mainly used for behaviors for which an increase is desired and that self management strategies are effective in increasing those behaviors.

Table 4.
Means and Standard Deviations of PND Scores for Intervention Characteristics

	PZD		
Variable	**n**	**M**	**SD**
Strategy			
Self-monitoring	6	31,18	19,48
Self-instruction	2	48,55	5,69
Self-management package	3	27,83	4,98
Target behavior			
Undesired behavior	11	33,42	16,35
Design			
Multiple baseline design	6	28,58	18,90
Mixed	5	39,24	9,86
Maintenance			
Yes	7	37,68	17,71
No	4	28,32	12,80
Generalization			
Yes	3	39,43	13,00
No	8	31,17	16,90
Social Validation			
Yes	3	36,73	21,60
No	8	32,18	13,67

n: Research number
M: Arithmetic mean
SD: Standard deviation

Mean PZD score for all studies carried out to decrease inappropriate behaviors was 33.42% (range 6.9-66.71%). It can be noted that according to the criteria of Scotti, Evans, Meyer and Walker (1991) self management strategies are suspect/unstable in decreasing inappropriate behaviors. The fact that only 11 studies used self management strategies for the behaviors for which a decrease was desired can be explained with less frequent use of these strategies for these behaviors. Self management strategies were found to be effective in the studies that used these self management strategies for these behaviors. The effectiveness of the strategies is clearly indicated via graphical analysis. Since the behaviors for which a decrease was desired did not decrease to zero (0%) level and the studies including these behaviors need zero level data point to make PZD calculation, effect size of the self management strategies were found to be low. As for examined studies, it would be appropriate to evaluate these studies in their own context to determine the effectiveness of the strategies used.

This study was limited to the review of 40 studies using self management strategies in individuals with disability in the last ten years. Based on this study, the following studies can be analyzed; (a) the studies including only one self management strategy, (b) the studies including only the individuals falling in one disability group, and (c) the studies including the appropriate or inappropriate behaviors.

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References marked with an asterisk (*) indicate studies used in the meta-analysis.

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