

A meta-regression analysis on the effects of parenting programs for children with disabilities in Korea

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Abstract

This study was conducted to analyze the effects of parenting programs for children with disabilities through meta-regression analysis of experimental studies published in Korea. Twenty-two studies with a randomized or non-randomized control group pre-post test design were included in the analysis. Parenting programs had a significant effect on parenting stress ($ES = -1.08$, $p < .001$, $I^2 = 67.4\%$), parenting efficacy ($ES = 0.72$, $p < .001$, $I^2 = 58.0\%$) and self-esteem ($ES = 0.58$, $p = .016$, $I^2 = 0$). The meta-regression analysis showed that research designs and therapy providers had different effects on dependent variables. Results support that parenting programs are helpful for parents of children with disabilities in reducing parenting stress and improving parenting efficacy, and self-esteem.

Keywords: Children with disabilities, meta-analysis, parenting.

1. Introduction

Most parents have great expectations on their forthcoming children before their births. However, upon giving birth of children with disabilities, parents will eventually experience negative feelings - the sense of loss, anger, shock, sadness, inactivity, etc - that cause confusion on the parents' roles. In addition, the disabilities are not temporary symptoms but lifelong conditions. Since the problems become various and complicated in the process of protecting, parenting, and educating these children as they grow, children with disabilities themselves may be the cause of the parents' negative feelings including strong parenting stress as well as other physical, emotional, and socioeconomic stresses (Gallagher *et al.*, 1983).

Parenting stress is the stress that parents experience during the courses of parenting, which negatively affects the interactions between children and their mothers while inhibiting their growth and development. Abidin conceptualized parenting stress based on the stress theory of Lazarus and Folkman, suggesting that mothers' parenting stress is caused by the interactions among the individual characteristics of the mothers and the children, as well as

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environmental factors related to parenting behaviors (Abidin, 1990). Especially, parents of children with disabilities suffer from more parenting stress than normal children's parents, which can be added and affect the quality of parenting more as the children's age is younger, the parenting time is longer, and the level of disabilities is more severe (Gallagher *et al.*, 1983; Kim and Kang, 2010).

Parenting efficacy, also known as parents' efficacy, was developed using of Bandura's self-efficacy in the context of parenting. Parenting efficacy is the parents' faith in their ability to successfully or effectively execute parenting roles, and the acknowledgement of their capabilities as parents to solve the difficulties and problems related to parenting children. Parenting efficacy is affected by the variables of children, mothers, and surrounding environments. Since there is a tendency for parenting stress to decline as parenting efficacy increases, the role of parenting efficacy is very important for effective parenting and improving mothers' quality of life (Lee and Yoo, 2013; Johnston and Mash, 1989).

Meanwhile, parenting efficacy is affected by self-esteem. The births of children with disabilities impact the parents' self-efficacy negatively, increasing parenting stress and causing parents to react inappropriately to their new situation, resulting in lowered quality of parenting (Shim, 1997; Abelson, 1999). This is because people who have high levels of self-esteem take more active and efficient actions to manage stress, in addition to being more motivated to solve their problems (Zuckerman, 1989). Another reason why parenting stress, parenting efficacy, and self-esteem should be considered is that parents, particularly the mothers, have the closest relationship with children and also play a key role in caring for other family members which means that they may affect the developments of the brothers and sisters of the children with disabilities as well (Kim and Kang, 2010; Korea Disabled People's Development Institute, 2013).

Based on these observations, many experimental studies have been conducted to facilitate the adaptation processes of parents of children with disabilities by operating programs meant to control negative emotions such as parenting stress and depression while enhancing parenting efficacy and self-esteem (Table 2.1). Systematic investigations and meta-analyses on the programs related to the parenting of children with disabilities have been conducted in other countries to apply the effective interventions after confirming the effectiveness of the programs systematically upon the results of the experimental studies (Tellegen and Sanders, 2013; Singer *et al.*, 2007; Lee *et al.*, 2012; Kim and Choi, 2012; Choi, 2012). While there have been some Korean studies such as 22 publications related to meta-analysis on experimental intervention programs for reducing parenting stress (Yi, 2014) and meta-analysis on the variables of parenting efficacy (Lee and Yoo, 2013), no meta-analysis that considers various variables including parenting stress, parenting efficacy, and self-esteem in parenting of parents of children with disabilities has been conducted in Korea.

This study was performed to investigate the overall effectiveness of the programs related to the parenting of parents of children with disabilities in Korea and to provide practical data based on Korean practices, by using meta-analysis to investigate the scope, direction, and degree of the dependent variable explanations by independent variables. The utilization of meta-regression analysis was due to its advantage in solving the heterogeneity issue among existing publications through the usage of independent variables, which has been the challenge of existing meta-analyses (Egger *et al.*, 1997). The results of this study, which analyze and evaluate the accumulated effectiveness of various programs related to the parenting of children with disabilities, can provide the evidence-based intervention data necessary for

clinical practices and the local community, and may contribute to the further development and execution of programs related to parenting children with disabilities. In addition, if the effect size of the studies are not satisfied homogeneity, it is need to compare and contrast several strategies for understanding heterogeneity. A meta-regression analysis was used to estimate the effect size in order to identify the covariates in heterogeneity.

2. Methods

2.1. Study design

This is a meta-analysis study for understanding the overall effectiveness of programs in the study publications verifying the effectiveness of programs for controlling parenting stress, parenting efficacy, and self-esteem of Korean parents of children with disabilities. The R program with “metafor” package was used for conducting the overall effectiveness.

2.2. Selections of the subject literatures

To select the subject literatures for meta-analysis, we searched the literatures based on population, intervention, comparison, and outcome (PICO). The selection criteria were 1) the studies with the subject population (P) that were the parents who had the children with disabilities less than 18 years old, 2) the studies that were conducted with the interventions (I) to control parenting stress, parenting efficacy, or self-esteem, 3) the studies that had the control group (C) without intervention, and 4) the studies with the outcomes (O) measurements of parenting stress, parenting efficacy, or self-esteem after the experimental interventions, among the Korean studies that validated the effectiveness of the programs on the parenting in parents of children with disabilities as of November 2014 in the searching websites. Parenting programs for the parents of children with disabilities mean the programs that are conducted with the experimental interventions of the dependent variables including their parenting stress, parenting efficacy, and self-esteem in the subjects of the parents of children with disabilities, and the Korean studies mean the studies that were published in Korean language except for the abstract, and the subjects were Korean parents, in this study.

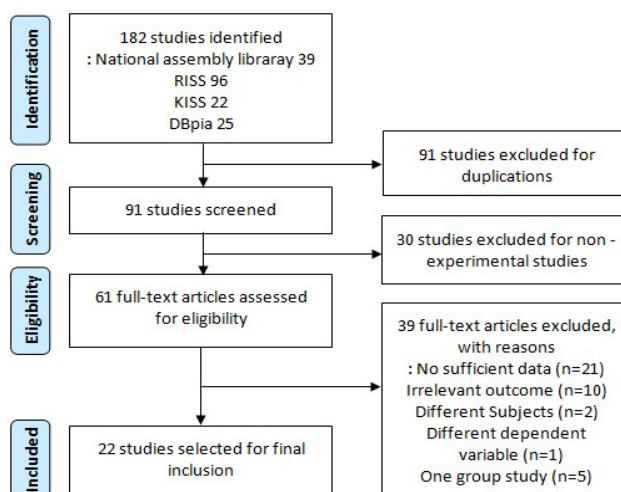


Figure 2.1 Flow of studies included from database search

2.3. Data collection of the subject literatures

To find the studies on the parenting programs in the subjects with the parents of children with disabilities in Korea, we checked MeSH terms, synonyms, and related terms to describe the parenting programs for the parents of children with disabilities in MeSH database of PubMed before the literature searching. Various combinations with ‘children with disabilities,’ ‘parents,’ ‘parenting,’ and ‘programs’ as the searching key words were searched in the databases of National Assembly library, Korea Education and Research Information Service (KERIS), Research Information Sharing Service (RISS), Korea Information Service System (KISS), and DBpia, preparing the first list of the studies on the parenting in parents of children with disabilities focusing on the scientific journals of pedagogy, psychology, and sociology, and nursing related journals where most of the studies on the parenting in parents of children with disabilities had been published. Eliminating 91 duplicated literatures upon manual checking on the title, publication year, and the authors among 182 literatures in the first list, we finalized 22 literatures that met the selection criteria of this study after reviewing the original literatures. Two investigators searched and selected the data independently during the course of literature searching, and decided the finals upon mutual reviewing the original literatures in case of inconsistent data (Figure 2.1).

Table 2.1 Descriptive summary of studies for meta-analysis

ID	Author (year)	Design	Subjects	Disability Children			Sample		Name	Interventions			Dependent variables	Scale	Result
				Type of disabilities	Age (year)	Exp. (n)	Con. (n)	Format		Provider	Weeks/Number of sessions/Min				
1	Cho (2004)	NRCT	Mo	AU, MR, PI	7-12	15	15	Psychological Adjustment Training Program	Group	Counselor+Special educator	4/8/120	PS	Holroyd (1974), QRS	NSC	
2	Cho (2010)	NRCT	Mo	DD (AU) 1-2grade	3-5	10	10	Program for Psychological Adaptation	Group	Psychologist	4/8/90	PS	Abidin (1990), PSI/SF	-	
3	Choi (2004)	NRCT	Mo	DD (CD, DD, DR, etc)	3-7	13	12	Cognitive-Behavioral Parent Training Program	Group	Clinical psychologists	8/8/90	PS PE	Abidin (1990), PSI Gibaud-Wallston & Wandersman (1978), PSOC	- NSC	
4	Chung (2006)	RCT	Mo	unclear	unclear	10	10	Group Art Treatment	Group	Art therapist	10/10/100	PS	Abidin (1990), PSI/SF	-	
5	Chung (2009)	NRCT	Mo	DD, MR, ID	6-7	10	10	Parent Education Program	Group	Special educators	16/13/150	PS	Abidin (1990), PSI/SF	-	
6	Han (2010)	RCT	Mo	AU, DS, ID	9-14	3	3	Sand Tray for Self-Growth	Group	Counselor +Psychologist	5/10/120	PS SE	Abidin (1990), PSI/SF Rosenberg (1965), SES	- +	
7	Kang (2011)	NRCT	Pa	AU, DR, MR	2-6	8	8	Parenting Support Program for Parent Empowerment	Group +Individual	Special educators	24/12/120	PE	Gibaud-Wallston & Wandersman (1978), PSOC	Mo; + Fa; NSC	
8	Kim (2002)	NRCT	Mo	DD (CP, DR, DS, MR) 1-2grade	3-8	10	8	Responsive Interaction Program	Group	Clinical psychologists	12/12/105	PS	Abidin (1990), PSI	-	
9	Kim (2006)	NRCT	Mo	DD, MR, etc.	8-9	6	6	Dance/Movement Therapy Program	Group	Special educator	6/12/80	PS	Yoon (1992), MSI + Abidin (1990), PSI/SF	-	
10	Kim (2008)	NRCT	Mo	AU, MR	ES	12	12	Active Parenting Today	Group	Special educator	12/12/120	PS	Holroyd (1974), QRS	-	
11	Kim (2010)	NRCT	Mo	DD, LD, MR	9-14	10	10	Family Support Program to Facilitate Inclusion	Group	Special educator	20/11/120	PS PE	Abidin (1990), PSI Choi (2002), PSES	- +	
12	Kim (2012)	NRCT	Pa	CP	1-4	13	13	Family Support Program	Group	Clinical psychologists	24/9/unclear	PS	Kim & Kang (1997), PSS	-	
13	Kim (2013)	NRCT	Pa	AU, MR, etc.	3-5	18	15	Modular Parent Education	Group	Special educators	5/11/180	PE	Park, Seo & Kim (2011), CCSFS	+	
14	Kwak (2010)	NRCT	Mo	DD	5-9	9	9	Cognitive-Behavioral Group Art Therapy	Group	Art therapist	10/10/90	PS	Abidin (1990), PSI/SF	-	
15	Lee (2006)	NRCT	Mo	DD (ADHD, AU, BD, MR, PI)	6-13	6	6	Self-Growth Group art Therapy	Group	Special educator	10/20/90	PS	Abidin (1983), PSI	-	
16	Park (2007)	NRCT	Mo	BL 1-3grade	1-5	10	10	Home Visit Family Support Program	Individual	Special educators	12/12/80	PE	Gross & Rocissano (1988), TCQ	+	
17	Park (2011)	NRCT	Pa	ADHD	8-9	13	13	Parents Training Program	Group	Counselor +Psychologists	10/10/60	PS PE	Abidin (1990), PSI/SF Gibaud-Wallston & Wandersman (1978), PSOC	NSC +	
18	Park (2012)	NRCT	Mo	ID	ES	12	12	Training Program "Becoming a Happy Mo"	Group	Psychologist	10/10/60	PS PE	Abidin (1983), PSI Gibaud-Wallston & Wandersman (1978), PSOC	- +	
19	Ryu (2014)	NRCT	Mo	DD	2-7	23	23	Solution-Focused Group Counseling Program	Group	Psychologist	6/6/120	PE	Rosenberg (1965), SES Gibaud-Wallston & Wandersman (1978), PSOC	+ +	
20	Shin (2012)	RCT	Mo	AU, BL, ID, PI, etc.	0-17	10	10	Encouragement Group Counseling	Group	Special educator	8/8/120	PS SE	Holroyd (1974), QRS Rosenberg (1965), SES	- +	
21	Shin (2014)	NRCT	Mo	DD	3-9	12	9	Behavioral Parent Training	Group	Clinical psychologists	12/12/110	PE PS	Teti & Gelfand (1991) MSSES Abidin (1995), K-PSI-SF	NSC NSC	
22	Wang (2013)	RCT	Mo	DD (AU, ID)	unclear	10	10	Cognitive Behavioral Therapy	Group	Psychologists	6/12/120	PE	Gibaud-Wallston & Wandersman (1978), PSOC	+	

Note. Exp.=Experimental group; Con.=Control group; RCT=Randomized controlled trials; NRCT=Non-randomized controlled trials; Fa=Father; Mo=Mo; Pa=Parents; ADHD=Attention deficit hyperactivity disease; AU=Autism; BD=Behavioral disorder; BL=Brain lesion; CD=Communication disorders; CP=Cerebral palsy; DD=Developmental disabilities; DR=Developmental retardation; DS=Down syndrome; ID=Intellectual disabilities; LD=Learning Disabilities; MR=Mental retardation; ES=Elementary school; PI=Physical Impairments; K-PSI-SF=Korean-Parenting Stress Index-Short Form; PS=Parenting Stress; PSI=Parenting Stress Index; PSI/SF=Parenting Stress Index/Short Form; QRS=Questionnaire on Resource and Stress; MSI=Maternal Stress Index; PSS=Parenting Stress Scale; PE=Parenting Efficacy; MSSES=Maternal self-efficacy scale; CCSFS=Core Competency & Self-Perception Scale; PSOC=Parenting Sense of Competence; PSES=Parenting Self-Efficacy Scale; TCQ=Toddler Care Questionnaire; SE=Self-Esteem; SES=Self-Esteem Scale; NSC=None Significant Changes

2.4. Quality assessment of the subject literatures

The Risk of Bias for Nonrandomized Studies (RoBANS) tools developed by National Evidence-based Healthcare Collaborating Agency were used for NRCTs, and The Cochranes Risk of Bias tools were used for RCTs (Kim *et al.*, 2011). With regard to the quality assessment, the authors including 2 professors in Nursing and one professor in Statistics conducted the pilot test with two literatures, and then they assessed each item of bias risk as 'low,' 'high,' and 'uncertain.' For those items that were not consistent, they reviewed together on the original contents, relevant items, and opinion deduction process and made conclusion upon three investigators' agreement after the thorough discussion on the differences.

2.5. Methods of data analysis

Characteristics of the studies applied to the parenting programs for parents of children with disabilities were analyzed using the frame of 14 items including study design, study subjects, type of disabilities, age of children with disabilities, sample size, type of interventions, intervention conditions, intervention providers, intervention frequency, intervention period, intervention time, dependent variables, index, and results. We investigated the mean values for intervention time per each by intervention type, total application frequency, and a total number of application weeks.

Figure 3.1 shows forest plot of the calculated results with standardized effect size using the differences of mean, standard deviation, and sample size between the test groups and control groups in the subjects of 22 selected studies. Selected study subjects were estimated by unbiased estimators because of the small sample size resulting in overestimation risk of standardized mean values.

After predicting the effect size of each study, we estimated integrated prediction value by integrating the effect size of each study. The statistical models to calculate integrated prediction value are divided into two models, fixed effect model and random effect model, depending on the heterogeneity of the study characteristics. Cochran's Q -test and Higgins' I^2 statistics were used for the heterogeneity assessment among the studies. Since the power of Cochran's Q -test was low, we provided with Higgins' I^2 statistics simultaneously and assessed the heterogeneity among the studies based on I^2 statistics. To investigate the publication biases of the study literatures, we reviewed the funnel plot with Egger's test to check the hypothesis of the funnel plot symmetry (Egger *et al.*, 1997). Fail-safe number (Nfs) was used to verify the reliability on the effect size.

If there was heterogeneity among each study, the characteristics of the study subjects or the studies could be considered to play the role of effect modifier. In this case, we reviewed whether heterogeneity of each study by the characteristics appeared through meta-analysis with the co-variant of these characteristics. The mathematical model of meta-regression analysis is as follows;

$$Y_i = \theta + \beta_1 x_{1i} + \cdots + \beta_m x_{mi} + \epsilon_i$$

where $Y_i, \theta, i = 1, \dots, k$ mean of effect size of i -th individual study, same effect size, individual study, respectively: ϵ_i means sampling error in the i -th study which follows the normal distribution with mean value of 0 and variance of σ_i^2 . In this study, we investigated the factors to impact the statistical heterogeneity by meta-regression analysis, and predicted the

effect size in case of specific covariate through predicted meta-regression analysis. In case of one covariate, meta-regression model is the same to meta-ANOVA.

2.6. Ethical consideration

This study is the meta-analysis of the literatures of the experimental studies, therefore, the study subjects were not recruited. The study was reviewed by Institutional Review Board and informed of review exemption (IRB No. 1040198-141119-HR-067-01).

3. Results

3.1. General characteristics

The subjects for this study analysis were totally 22 literatures and their general characteristics were shown in Table 2.1. Not limited the publication year for the article searching, all these studies had been published since 2002. In terms of the subjects in the studies, 4 cases (18.2%) were parents, while 18 cases (81.8%) were mothers. The age of the children with disabilities was diverse from 0 to 17 years old. Regarding the type of disabilities, most of them were developmental disorders except for 1 (4.5%) without specific description, with 4 studies (18.2%) of single disorder (autism, cerebral palsy, ADHD, intellectual disability), 3 studies (13.6%) describing only as a developmental disorder, and 14 studies (63.7%) of multiple types of disorder. The studies with the number of total subjects over 25 including test group and control group were 6 cases (27.3%) while 16 cases (72.7%) less than 25 subjects. For the types of intervention, the individual intervention was performed in 1 case (4.5%), while group intervention in 20 cases (91.0%) and the combination of individual and group interventions in 1 case (4.5%). Seven cases (31.8%) were with less than 8 weeks of the intervention period, 12 cases (54.6%) with 8 weeks or more and less than 20 weeks, and 3 cases (13.6%) with 20 weeks or more. The specialties of the intervention providers were 4 cases (18.2%) of clinical psychologists, 4 (18.2%) of psychologists, 9 (40.9%) of special educators, 2 (9.1%) of art therapists, and 3 (13.6%) of interdisciplinary teams. Interdisciplinary teams consisted of counselors + special educators, and counselors + psychologists, etc. In terms of intervention frequency, 11 cases (50.0%) were once a week, 6 (27.3%) were twice a week, and 5 (22.7%) were once a week or more. 17 literatures were about the studies to control parenting stress, 10 were to control parenting efficacy, 3 were to control self-esteem, and 8 out of these dealt with two or more dependent variables. Among 17 literatures dealing with parenting stress, PSI (Parenting Stress Index) by Abidin was used as the measurement tool in 11 studies (64.7%), with versions of 1983, 1990, and 1995 in 2, 8, and 1 studies, respectively. Among 10 literatures dealing with parenting efficacy, Parenting Sense of Competence (PSOC) by Gibaud-Wallston & Wandersman was used in 6 studies (60%) as the measurement tool. Self-Esteem Scale (SES) by Rosenberg was used in all 3 literatures dealing with self-esteem. Upon the study results, 14 studies (82.4%) showed a significant reduction in parenting stress among total 17 studies that dealt with parenting stress. 7 studies (70.0%) showed a significant increase in parenting efficacy among total 10 studies that dealt with parenting efficacy, and 1 study showed a significant increase of the mothers while showed no significant changes in the parenting efficacy of the fathers. In all 3 studies dealing with self-esteem, a significant increase of parents' self-esteem was found.

3.2. Quality assessment for the methodology of the subject literatures

The quality of 4 RCT literatures was evaluated by the generation of randomized allocation orders, hiding allocation orders, blinding the subjects as well as the investigators, blinding the results, insufficient result data, selective reports, and other biases. The bias level was low in the generation of randomized allocation orders, hiding allocation orders, blinding the subjects, and blinding the results, and it was uncertain in blinding the investigators since there was no comment in all 4 literatures. The bias level was also low in insufficient result data and selective reports because no report was interpreted on these. For other biases, all 4 were shown to be low upon the decision of the intervention protocol provisions. The quality of 18 NRCT literatures was evaluated by the selections of the subject groups, confounding variables, intervention (exposure) measurement, blinding the results, insufficient data, and selective result report. In terms of the selections of the subject groups, intervention (exposure) measurement, blinding the results, insufficient data, and selective result report, they showed relatively low level of bias. 15 literatures showed the low level of bias in terms of confounding variables, while 3 were decided uncertain due to no comment on the pairing, homogeneity test, or correction.

3.3. Meta-analysis of the subject literatures

The analysis results of individual study effect size and integrated effect size by dependent variables are as follows. For the study literatures by dependent variables, 17 were on parenting stress, 10 on parenting efficacy, and 3 on self-esteem. There was statistical heterogeneity in parenting stress and parenting efficacy, so they were analyzed by random effect model while self-esteem was analyzed by fixed effect model upon confirming the homogeneity among the study literatures.

3.3.1. Meta-analysis of parenting stress

In case of parenting stress, there was the modest level of statistical heterogeneity with Cochran's $Q=49.12$ ($p < .001$) and $I^2=67.4\%$. Hence, the effect size was calculated by random effect model, resulting in .08 (95% CI: -1.50~0.65) statistically significant ($Z=-4.94$, $p < .001$). Upon Egger's test results, funnel shape showed symmetry ($Z=-1.40$, $p=.050$), plotting the literatures within the funnel reflecting no publication bias generally. Fail-safe number (Nfs) was 454.

3.3.2. Meta-analysis of parenting efficacy

In case of parenting efficacy, there was the modest level of statistical heterogeneity with Cochran's $Q=21.41$ ($p=.011$) and $I^2=58.0\%$. Hence, the effect size was calculated by random effect model, resulting in 0.72 (95% CI: 0.31~1.14) statistically significant ($Z=3.44$, $p < .001$). Upon Egger's test results, funnel shape showed symmetry ($Z=0.49$, $p=.622$), plotting the literatures within the funnel reflecting no publication bias generally. Fail-safe number (Nfs) was 99.

3.3.3. Meta-analysis of self-esteem

In case of self-esteem, it demonstrated homogeneity with Cochran's $Q=0.68$ ($p=.712$) and $I^2=0$. Hence, the effect size was calculated by fixed effect model, resulting in 0.58 (95% CI: 0.11~1.06) statistically significant ($Z=2.41$, $p=.016$). Fail-safe number (Nfs) was 3.

3.3.4. Investigation of the statistical heterogeneity by meta-regression analysis

Because the effect sizes of parenting stress and parenting efficacy among the studies were heterogeneous, the factors to impact the effect size as the dependent variable were investigated by meta-regression analysis. The independent variables considered in the meta-regression analysis were publication years of individual studies, study designs, study subjects, types of disabilities, intervention providers, and so on as seen in Table 2.1. Since over-fitting issue could be occurred in case of the applications of all the independent variables previously considered in meta-regression analysis, major factor results selected by the selection methods of variables were dealt in this study. As you can see the funnel shape in Figure 3.2, general publication bias was decreased more than before meta-regression analysis. Black squares and lines in Figure 3.1 represent the effect size with 95% confidence interval (CI) in each study literatures, and grey diamonds represent the predicted effect size with 95% CI in the homogeneous sub-groups obtained from meta-regression analysis. 95% CI of sub-groups is placed within 95% CI of the effect size in each study article, therefore, the heterogeneity issue among the study literatures can be considered to be resolved by meta-regression analysis.

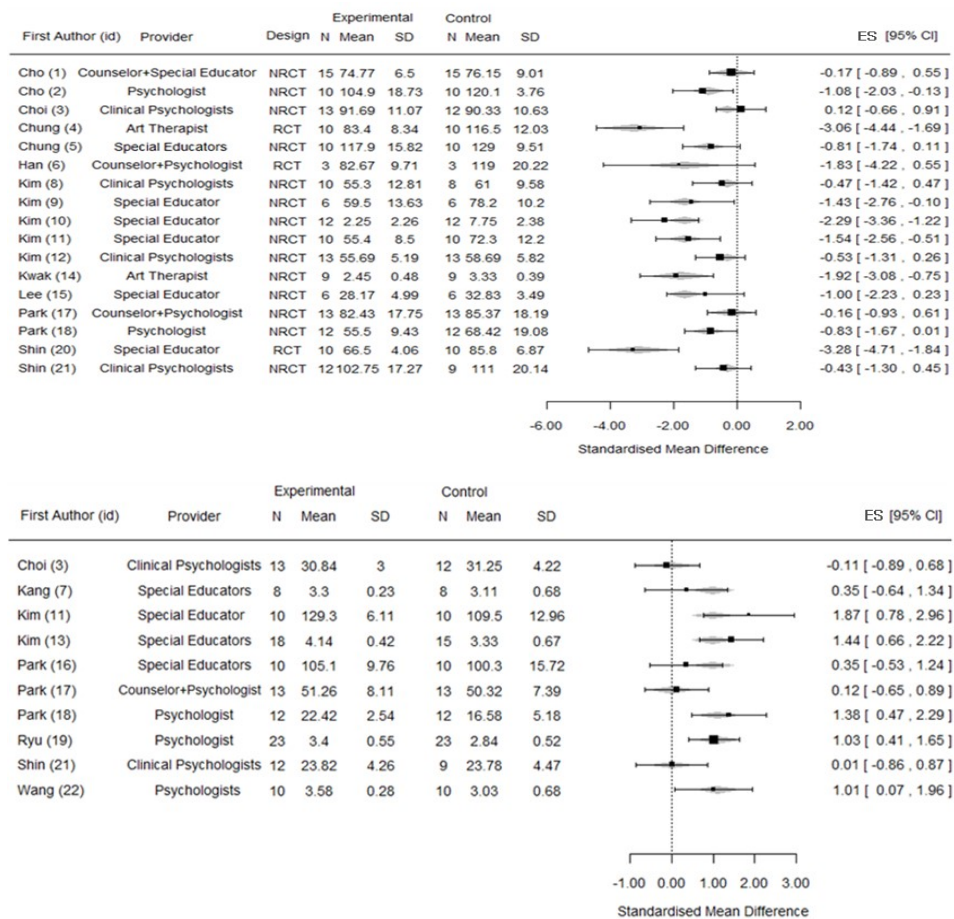


Figure 3.1 Forest plot of effect size and 95% CI by parenting stress & parenting efficacy on meta-regression analysis (Top : Parenting Stress, Bottom : Parenting efficacy)

Upon meta-regression analysis results on parenting stress, the factors to impact to the statistical heterogeneity were study design and intervention providers (Table 3.1). I^2 was 0 and R^2 was 100% in the results of meta-regression analysis, which explained the effect size well as the dependent variable of the study design and intervention providers, and resolved the statistical heterogeneity, too. Predicted regression coefficient of the independent variable, the study design was -1.48, which represented the low level of parenting stress in RCTs compared to NRCTs ($Z=-2.74, p=.006$). The intercept was the cases that the specialties of the intervention providers were counselors + special educators in NRCT design while the effectiveness was not significant statistically ($Z=-0.47, p=.640$). Even in case that the specialties of the intervention providers were psychologists, counselors + psychologists, and clinical psychologists, it did not show the statistical significance since it included 0 within 95% CI. On the other hand, in case of art therapists and special educators as the specialties of the intervention providers, regression coefficient was .61 and .47, respectively, to show the significant difference (art therapists: $Z=-2.57, p=.010$, special educators: $Z=-3.19, p=.001$). That is, predicted effect sizes of parenting stress in NRCT design were -1.78 in art therapists, -1.64 in special educators, -0.90 in psychologists, -0.31 in clinical psychologists, -0.18 in counselors + psychologists, and -0.17 in counselors + special educators, which showed relatively less effectiveness on the reduction of parenting stress in the intervention providers with counselors than in the intervention providers with the other specialties.

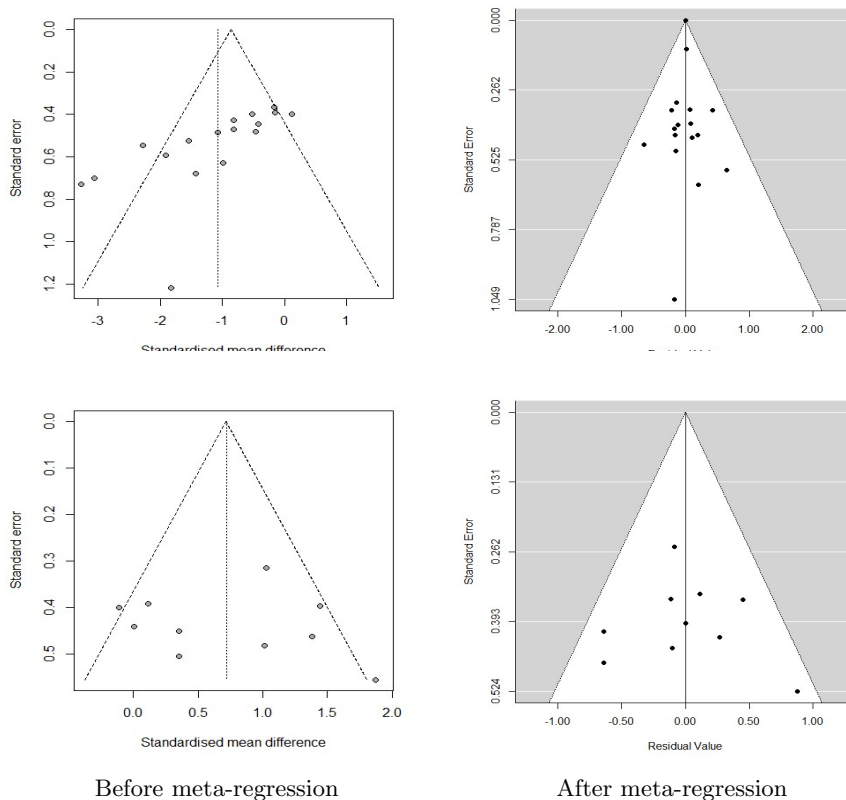


Figure 3.2 Funnel plot for parenting stress and parenting efficacy (Top : Parenting Stress, Bottom : Parenting efficacy)

The results of meta-regression analysis on parenting efficacy were in Table 3.1, demonstrating the important variable to impact to the effect size with intervention providers ($I^2=12.72\%$, $R^2=89.06\%$). Predicted Intercept after performing meta-regression analysis based on the clinical psychologists among the intervention providers means the effect size of the clinical psychologists. The differences of effect sizes in special educators and psychologists from those in clinical psychologists were higher by 0.99 and 1.11, respectively, which were statistically significant (special educators: $Z=2.77$, $p=.006$, psychologists: $Z=3.10$, $p=.002$). In other words, predicted effect sizes were 1.12 in psychologists, 0.99 in special educators, 0.01 in clinical psychologists, which showed the improvement of parenting efficacy in case of the intervention providers with psychologists and special educators, but not in the clinical psychologists ($Z=0.03$, $p=.979$).

Table 3.1 The result of meta-regression analysis for parenting stress & parenting efficacy

Dependent	Independent	Estimate	se	95% CI	Z	p
Parenting stress	Intercept	-0.17	0.37	(-0.89, 0.55)	-0.47	0.64
	Design (RCT)	-1.48	0.54	(-2.54, -0.42)	-2.74	0.006
	Art therapist	-1.61	0.63	(-2.83, -0.38)	-2.57	0.01
	Psychologist	-0.73	0.45	(-1.61, 0.16)	-1.61	0.108
	Counselor+Psychologist	-0.01	0.53	(-1.04, 1.03)	-0.01	0.992
	Clinical psychologist	-0.14	0.42	(-0.97, 0.69)	-0.32	0.747
Parenting efficacy	Special educator	-1.47	0.46	(-2.38, -0.57)	-3.19	0.001
	Intercept	0.01	0.26	(-0.49, 0.51)	0.03	0.979
	Special educator	0.99	0.36	(0.29, 1.69)	2.77	0.006
	Psychologist	1.11	0.36	(0.41, 1.81)	3.1	0.002

4. Discussion

Despite the fact that children with disabilities, considering that they are children, should be provided with extra concern and support in comparison to other people with special needs, they have been rather neglected in the Korean welfare system for the disabled as it has focused mostly on the needs of adults. In addition, the policies and services meant to comprehensively support the economic, educational, and socio-emotional difficulties and demands that the families experience in the courses of their parenting is feeble (Korea Disabled People's Development Institute, 2013). Many studies to support parenting in parents of children with disabilities have been conducted to improve these problems. This study aimed to provide evidence-based data for practically supporting the difficulties of these parents by performing the meta-analysis on Korean experimental studies conducted to control parenting stress, parenting efficacy, and self-esteem in the parents of children with disabilities.

The results identified a total of 22 Korean studies as having been conducted to reduce parenting stress and increase parenting efficacy and self-esteem in the parents of children with disabilities. Their study designs were RCTs with 4 literatures and NRCTs with 18, which assumed that they had allocated the subjects who had difficulties in participating primary study into the control groups mostly due to the nature of the parents of children with disabilities. From the quality assessment on the methodologies in the literatures, all RCTs were not described on the investigators' blinding, but were determined to have low level of bias in the generation of randomized allocation orders, hiding allocation orders, blinding the subjects, blinding the results, insufficient result data, selective reports, and suggestion of intervention protocol. 3 literatures among 18 NRCTs did not mention the

pairing, homogeneity test, or correction, however, they were determined to have the low level of bias in the other items. Since the risk of bias was low in all the studies, this study was appropriate in consolidating the study results.

The effect size in 17 study literatures on the parenting stress in parents of children with disabilities was confirmed to be strong with .08 (Cohen, 1977), which was lower than the effect size of -1.84 in the previous meta-analysis on the parenting stress in parents of children with disabilities in Korea (Yi, 2014) but higher than the size of -0.49 in an overseas study on the control of parenting and stress in the parents of children with developmental disorders (Singer *et al.*, 2007). We thus learned that Korean experimental studies were quite effective in controlling parenting stress. The effect sizes of parenting efficacy in 10 literatures and self-esteem in 3 literatures regarding parents of children with disabilities were revealed to be moderate levels of 0.72 and 0.58, respectively (Cohen, 1977). Although direct comparisons are difficult due to lack of reports among existing meta-analyses that include both parenting efficacy and self-esteem of parents of children with disabilities, it was shown in a Korean meta-analysis on parenting efficacy related variables (Lee and Yoo, 2013) that parenting stress showed the largest effect size in parenting efficacy, indicating a low level of perception on parenting efficacy in parents who felt high levels of parenting stress. In addition, there was a significant negative correlation between self-esteem and perceived stress in the mothers of children with disabilities (Kim and Kang, 2010), from which we may infer that Korean programs for enhancing parenting efficacy and self-esteem in parents of children with disabilities may have meaningfulness alike to programs for reducing parenting stress.

Upon meta-regression analysis in the studies on parenting stress as the dependent variable, the factors to impact to the statistical heterogeneity were study design and intervention providers. Parenting stress in the parents of children with disabilities was lower in RCTs than in NRCTs, and it decreased more in art therapists and special educators than in counselors + special educators as the intervention providers. Upon meta-regression analysis in the studies on parenting efficacy as the dependent variable, the factor to impact to the statistical heterogeneity was intervention providers. Special educators and psychologists enhanced the parenting efficacy in the parents of children with disabilities more than clinical psychologists. Though there was no previous study related to this, the type of study design needs to be considered from the early stage of the planning in further studies. Also, it is considered to conduct the study with randomization process for the test group and control group. If the study results were applied to the further studies, more effective outcomes could be produced to control the difficulties in parenting in the parents of children with disabilities and they could be utilized as the effective evidence to organize the interdisciplinary teams in the process of designing nursing intervention programs on parenting in the parents of children with disabilities.

The programs provided by top 5 studies that showed the highest level of effectiveness among the studies with the dependent variable of parenting stress were encouragement group counseling; group art therapy with reality therapeutic approach; active parenting programs; group art therapy applied by cognitive behaviour; and group program of self-growth utilizing sand tray, respectively. The programs provided by top 5 studies that showed the highest level of effectiveness among the studies with the dependent variable of parenting efficacy were the family support to facilitate integration; modular parents education; 'be a happy mother'; solution-oriented group counseling; and cognitive-behavioural therapies, respectively. The studies with the dependent variable of self-esteem were included in the above 10 studies

showing high level of effect sizes in the interventions of parenting stress and parenting efficacy with encouragement group counseling, group program of self-growth utilizing sand tray, and solution-oriented group counseling, and all 10 studies were provided by the programs in the group subjects. Although this was not validated by meta-regression analysis, it suggests that group educations may be more effective than individual approaches for the programs in the subjects of the parents of children with disabilities. This can be in line with the studies that group participation in the program may result in the potential new therapeutic effect which cannot anticipate in the individual therapy, and mutual interactions, supports, and expressing sympathy among the group members were effective to reduce the stress of the mothers (Table 2.1). In addition, organizing the nursing parenting programs in the parents of children with disabilities based on the programs proven as the high level of effect sizes, we could anticipate more positive study results to lower the mistakes or errors during the courses of the study. There were studies conducted with single group experiments due to the difficulty in selecting the subjects. Also, most of the previous studies revealed no significant difference pre and post-experiments in the control groups. Hence, we validated to compare the effect sizes by T values of correspondent data with predicted value by meta-regression model in 4 single group studies with the dependent variable of parenting stress in this study. Upon the validation results, the calculated effect sizes in all 4 literatures supported them, placing within 95

From these results, we confirmed that various programs to help parenting in the parents of children with disabilities were effective to reduce parenting stress and to enhance parenting efficacy and self-esteem. We conducted meta-analysis according to preferred reporting items for systematic reviews and meta-analyses (PRISMA) checklist (Liberati, 2009) to improve the quality, assessed the quality of the subject literatures using Cochrane Rob and RoBANS tools, and performed this study with the agreed data after the individual investigators' independent searching and coding processes to prevent from searching and recording errors.

This study results should be interpreted with the following limitations. The type of disabilities and the age of the subject children included in the analysis were not the same, the study subjects were focused on the mothers, and various measurement methods may affect the effect size since we focused on the variables. Furthermore, only Korean publications were included for the parenting programs in the parents of children with disabilities, therefore, it has the limitation to interpret and generalize the data.

5. Conclusions

We investigated the characteristics of the studies and performed meta-regression analysis by dependent variables including parenting stress, parenting efficacy, and self-esteem in the subjects with the experimental study literatures on the parenting in parents of children with disabilities published in Korean scientific journals. Upon the analysis of 22 experimental studies published from 2002 to November 2014, the provided programs reduced the parenting stress in parents of children with disabilities and improved their parenting efficacy and self-esteem, significantly. In addition, we found the statistically significant effectiveness by dependent variables in case of RCT design with the participations of art therapists, special educators, and psychologists. The results of this study can be used as the evidence data when the nursing programs are developed for caring children with disabilities and the welfare policies are prepared for the children with disabilities and their families.

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