



Effect of a Social Support Program for Mothers of Children with Precocious Puberty: A Preliminary Quasi-Experimental Study



Jaeyoung Lee, RN, PhD^a, Min Jung Kwak, MD, PhD^b, Hyeon Ok Ju, RN, PhD^{c,*}

^a Department of Nursing Science, Kyungsung University, Busan, Republic of Korea

^b Department of Pediatrics, Pusan National University Hospital, Busan, Republic of Korea

^c Department of Nursing, Dong-A University, Busan, Republic of Korea

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ABSTRACT

Purpose: The purpose of this study was to evaluate the effects of a social support program on the stress, anxiety, guilt, and life satisfaction levels among Korean mothers of children with precocious puberty.

Design and methods: A non-equivalent control group and a non-synchronized design were used in this quasi-experiment study. Thirty-four mothers (divided into equal-sized experimental and control groups), 32–47 years of age, with children aged 6–11 years old, were recruited from a pediatric outpatient department at a national university hospital. The experimental group was involved in four sessions of a 4-week social support program. Descriptive statistics were used for demographic characteristics. Chi-square tests and *t*-tests were used to evaluate group differences.

Results: The program significantly reduced mothers' stress and guilt and significantly increased their life satisfaction. No significant differences in changes in anxiety were reported between the groups.

Conclusions: This study confirms that the social support program was a useful nursing intervention for Korean mothers of children with precocious puberty, which can be extensively applied to help mothers in similar situations.

Practice implications: The preliminary study findings may inform healthcare professionals to develop effective interventions to promote psychosocial well-being of mothers of children with precocious puberty through strengthening their social support and to further improve the quality of life of children with precocious puberty and their families.

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Background

Excessive nutrient intake, child obesity, environmental hormones, and stress have accelerated the onset of puberty worldwide (Rhie & Lee, 2015). When a child's body begins to mature at an abnormally early age, it is termed precocious puberty (Rhie & Lee, 2015). Precocious puberty is defined as puberty that occurs before age 8 in girls and age 9 in boys (Latronico, Brito, & Carel, 2016). In Korea, the annual incidence of precocious puberty in girls significantly increased from 3.3 in 2004 to 50.4 in 2010 per 100,000 girls; whereas, in boys, it gradually increased from 0.3 in 2004 to 1.2 in 2010 per 100,000 boys (Kim, Huh, Won, Lee, & Park, 2015). Precocious puberty can cause early growth of pubic hair, early breast or genital development, menarche, increased bone age, and reduced final height (Rhie & Lee, 2015). It can also lead to negative emotions and conflict with parents due to the discrepancy

between biological and emotional maturity (Williams, Soliman, Barrett, & Klein, 2018).

The treatment of precocious puberty takes place over several years from the time of diagnosis (Rhie & Lee, 2015). The most common type of precocious puberty is central precocious puberty, which results from the premature activation of the hypothalamic-pituitary-gonadal axis. It mimics physiological pubertal development but at an inappropriate chronological age (Latronico et al., 2016). Gonadotropin-releasing hormone agonists (Gn-RHa) are the standard treatment. In addition, precocious puberty requires thoughtful evaluation of historical and physical examination findings, assessment of individuals' maturation rate, and hormonal measurements (Fuqua, 2013).

Discontinuing the treatment for precocious puberty should be considered in the light of normal pubertal development, age of menarche, and final adult height in children (Carel et al., 2009). Rhie and Lee (2015) reported terminating treatment at 12–12.5 years of bone age for girls and 13 of years bone age for boys. Because precocious puberty affects children at approximately 12–13 years old, mothers

* Corresponding author at: Department of Nursing, Dong-A University, 32, Daesingongwon-ro, Seo-gu, Busan 49201, Republic of Korea.
E-mail address: enfanju@dau.ac.kr (H.O. Ju).

frequently become responsible for treating and managing their children's lifestyle (Lim & Kim, 2013). Fathers were excluded from this study because, in stereotypical Korean culture, the mother serves as the child's primary caregiver (Lee & Lee, 2018). Since mothers of children with precocious puberty may be more likely to have conflicts with their children owing to the children's physical problems and negative emotions, they may experience trouble raising their children (Lim & Kim, 2013; Williams et al., 2018). Therefore, mothers feel stressed (Schoelwer et al., 2015), guilty, anxious, receive unwanted attention and negative views from others, and struggle due to a lack of social support (Lim & Kim, 2013). Consequently, it is necessary to devise ways to enhance the support systems for mothers of children with precocious puberty and reduce their stress, anxiety, and guilt.

Social support refers to the psychological and material resources provided by a social network to benefit an individual's ability to cope with stressful events (Cohen, Janicki-Deverts, Turner, & Doyle, 2015). Raising a child with an abnormality can be a stressful experience; therefore, it is necessary to provide mothers with social support to help them effectively cope with various situations (Wright, Cohen, Carey, Weiss, & Gold, 2002). In a previous meta-analysis, attending a social support program reduced the stress and anxiety levels in mothers of sick children, hospitalized children with/without critical illness, premature infants, children with cancer, as well as enhanced their coping skills (Doupnik et al., 2017). In a meta-analysis of 12 studies, the combined intervention effects of social support and education significantly reduced parent anxiety and stress (Doupnik et al., 2017).

Objective

Most studies on precocious puberty have focused on its diagnosis (Kim et al., 2015) and treatment (Cho, Yoon, & Moon, 2014; Rhie & Lee, 2015), as well as the related psychological characteristics (Williams et al., 2018). In addition, studies that have been conducted among mothers of children with precocious puberty have predominantly been phenomenological in nature (Lim & Kim, 2013) or focused on emotional factors (Schoelwer et al., 2015) and quality of life (Lee & Kim, 2017). Therefore, it is warranted to develop a nursing intervention program for these mothers. For children with precocious puberty to grow into healthy adults, it is appropriate to devise a method to promote positive coping behaviors among their mothers. In this study, a

social support program was developed for mothers of children with precocious puberty, and its effectiveness was analyzed with the aim of promoting the mental, psychological, and emotional (or holistic) health of the children and their families.

Conceptual framework

This study was based on the Buffering Model for Social Support (Cohen et al., 2015). In this model, social support has been theorized to produce positive outcomes through the buffering effects during an individual's evaluation of a stressful event (Cohen & Syme, 1985; Cohen & Wills, 1985). Social support has been hypothesized to protect against the pathogenic effects of stress and the potential of stressful events to elicit psychological distress, depression, and anxiety (Cohen et al., 2015). Further, social support is one of the main resources that has been shown to contribute to coping with stress, particularly for parents dealing with unique situations (Findler, Jacoby, & Gabis, 2016), such as having children with precocious puberty (Synovitz & Chopak-Foss, 2013).

The basic framework for this research is shown in Fig. 1. We hypothesized that social support provided for mothers of children with precocious puberty would have buffering effects in stressful situations associated with raising such children, which would thus reduce mothers' stress, anxiety, and guilt (Cho et al., 2014; Lee & Kim, 2017; Lee & Lee, 2018; Lim & Kim, 2013), as well as increase their life satisfaction. Social support can be distinguished by its structural and functional aspects (Cohen, Mermelstein, Kamarck, & Hoberman, 1985). Structural aspects include social networks such as colleagues and experts (Rodriguez & Cohen, 1998). Functional aspects include appraisal, emotional, informational, and instrumental factors (House, 1981). Based on this conceptual framework, we hypothesized the following:

Hypothesis 1. There would be stress score differences between the experimental group that participated in the social support program and the control group that did not.

Hypothesis 2. There would be anxiety score differences between the experimental group that participated in the social support program and the control group that did not.

Hypothesis 3. There would be guilt score differences between the experimental group that participated in the social support program and the control group that did not.

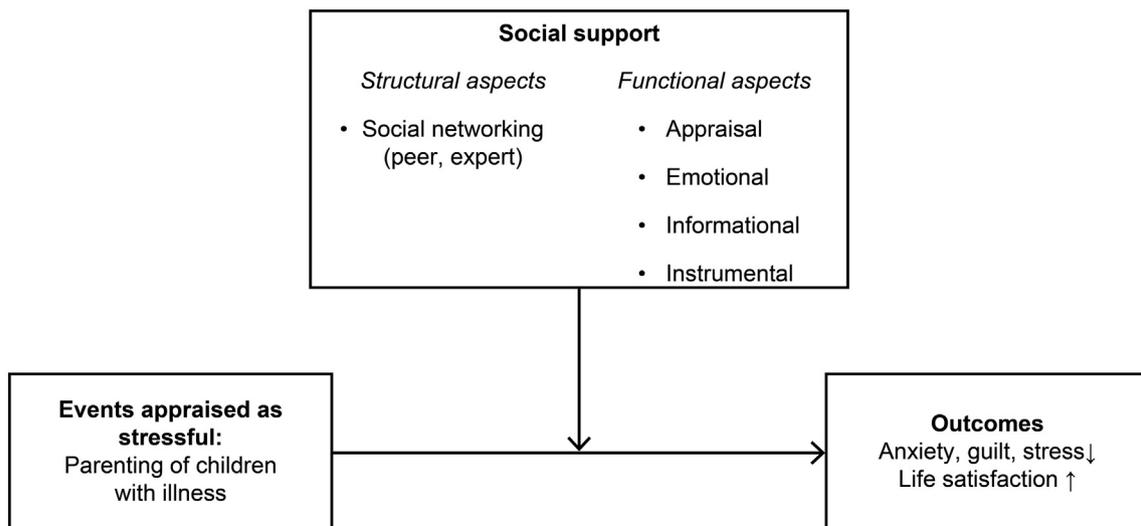


Fig. 1. The conceptual framework of this study: Based on the Stress-Buffering Model (Cohen & Wills, 1985).

Hypothesis 4. There would be life satisfaction score differences between the experimental group that participated in the social support program and the control group that did not.

Methods

Research design

This study was a quasi-experimental study with a non-equivalent control group pre-test post-test non-synchronized design, as there was a need to prevent diffusion and contamination before the start of the experimental intervention. Data collection was completed for the control group first; then, data were collected from the experimental group. As outlined in Fig. 2, we reviewed the electronic medical records and ensured participants met the inclusion criteria. After informing the participants of the objective, design, and intervention procedure of the study, we sought the voluntary consent of mothers who visited a pediatric outpatient department for their child. Thirty-four mothers were enrolled in the study.

The number of participants was calculated using G-power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009) and was determined to be 52 after examining a prior study that tested the effects of social support programs for mothers of children with chronic diseases (Cho & Kim, 2002). The previous study performed a *t*-test for two population groups (effect size = 0.80, level of significance = 0.05, and statistical power = 0.80). To confirm homogeneity among participants, and prevent the effect of the experiment from dissipating, the experiment was conducted in a single tertiary general hospital. To test the validity of the sample size, post-hoc power was calculated also using G-power 3.1. A post-hoc power of 0.99 was obtained for the main variable of this study (stress) when the level of significance was set at 0.05, and a two-sided test was used; therefore, the sample size was sufficient.

Social support program

The social support program for mothers of children with precocious puberty was systematically developed according to the steps outlined by the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model (Bamrara & Chauhan, 2018). In the Analysis stage, a

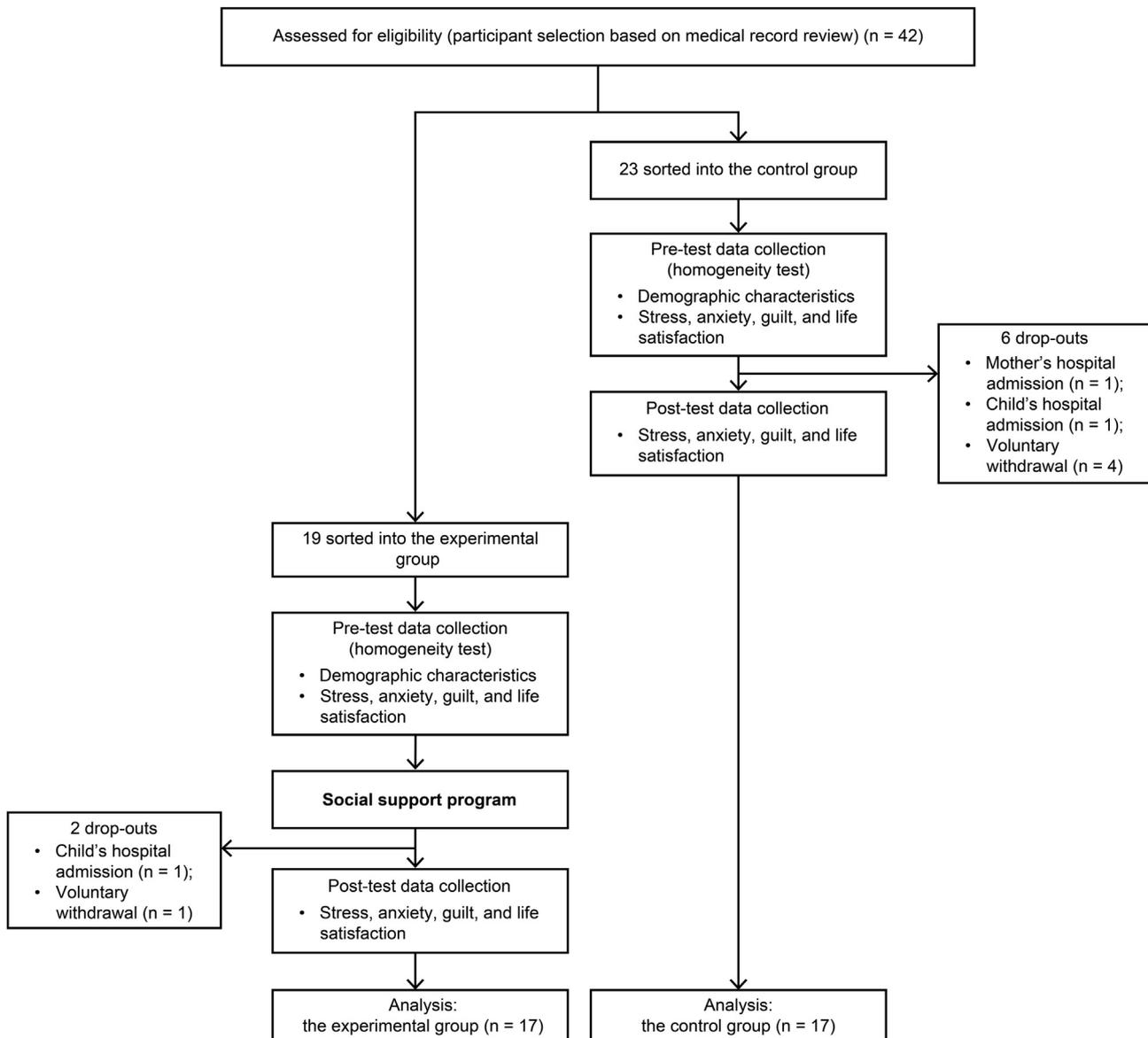


Fig. 2. Study flowchart.

literature review was performed, and in-depth interviews were conducted with mothers. The literature review was conducted to evaluate similar studies of social support programs that involved mothers of children with chronic diseases. In the Design stage, the number of program sessions, session contents, and the number of participants were determined based on the results obtained during the Analysis stage, and the program sessions were composed accordingly. In the Development stage, the program contents were verified by eight experts (three pediatric nursing professors, one pediatric endocrinologist, two pediatricians, and two clinical nurses), and a preliminary survey was administered to five mothers of children with precocious puberty before the final program was developed. In the Implementation stage, the program was implemented with mothers of children with precocious puberty. Finally, in the Evaluation stage, the effects of the program were evaluated.

Once completed, the social support program for mothers of children with precocious children consisted of four sessions, each lasting 90 min. Each session covered all factors that were functional and structural aspects of social support. Each session consisted of three basic phases: Introduction, Development, and Conclusion. The Introduction phase lasted five minutes. Participants and health professionals introduced themselves to each other to build trust. The Developmental phase involved a 30-min education and counseling session with an expert pediatric nurse and a 50-min self-help group meeting. During the education session, participants were provided with information that was derived from an analysis of the educational needs of mothers of children with precocious puberty (Lee, Joo, & Kwak, 2015). The self-help group meeting consisted of three steps: bond formation, interaction, and conclusion. Each meeting included three to six participants. Researchers facilitated the meetings by directly participating in them as experts. The Conclusion phase took five minutes. Participants shared their

feelings about the program, promised to attend the next session, and completed the program for the day. Table 1 shows the method used, content, and time schedule for each program session.

Participants

Mothers of children with precocious puberty who were receiving treatment at Pusan National University Hospital in Busan Metropolitan City in South Korea were recruited for this study. The control group was visited from June to July 2015, and the experimental group was visited from August to September 2015 at the pediatric outpatient hospital department. During the period, patients who visited the hospital were given consent to participate in the study. Social support intervention was performed in groups of three to six participants from the experimental group. The inclusion criteria were as follows: mothers aged 18 years or older, who were the primary caregiver of children with precocious puberty, whose children were diagnosed with precocious puberty >3 months ago, whose children did not have any other concerns apart from precocious puberty, who could answer the given questionnaire in an appropriate manner, and who could attend all program sessions (for the experimental group). Exclusion criteria were as follows: being illiterate; being enrolled in other nursing intervention programs.

Measures

Stress

Stress was measured using a stress measurement tool for mothers of children with chronic diseases (Kim, 1988). Of the 34 questions on the original tool, 18 were removed as they focused on children with moderate-severity chronic diseases, and four were subjected to minor word changes to make them more appropriate for mothers of children

Table 1
Outline of the social support program for mothers of children with precocious puberty.

Session	Method ^a (time, min)	Contents	Social support		Time (min)
			Structural aspects	Functional aspects	
1	Education and expert counseling (30)	Participants were introduced to the overall program content and schedule Participants were provided with information about puberty and precocious puberty Participants interacted with experts in a question-and-answer session Educational materials were distributed	Expert	Informational	90
	Self-help group (50)	Participants introduced themselves to promote a sense of community Participants built trust in others through conversations and interactions Participants formed a chat room using a mobile messenger app Participants were given an explanation about relaxation therapy Participants were introduced to meditation—a relaxation technique—and performed it themselves Booklets and CDs on meditation were distributed	Peer	Emotional Instrumental Emotional Appraisal	
2	Education and expert counseling (30)	Participants were provided with information about eating habits and exercise for children with precocious puberty Participants interacted with experts in a question-and-answer session Educational materials were distributed	Expert	Informational	90
	Self-help group (50)	Participants shared information and stories about child obesity Participants interacted through conversations and by encouraging one another Participants meditated for emotional stability Participants promoted positive self-evaluation by sharing the feelings they had during meditation	Peer	Emotional Instrumental Emotional Appraisal	
3	Education and expert counseling (30)	Participants were provided with information about lifestyle management of children with precocious puberty Participants interacted with experts in a question-and-answer session Educational materials were distributed	Expert	Informational	90
	Self-help group (50)	Participants interacted through conversations and by encouraging one another	Peer	Emotional Instrumental Emotional	
4	Education and expert counseling (30)	Participants were provided with information about how to properly communicate with children with precocious puberty Participants interacted with experts in a question-and-answer session Educational materials were distributed	Expert	Informational	90
	Self-help group (50)	Participants shared information and stories about their children's stress levels Participants interacted through conversations and by encouraging one another	Peer	Emotional Instrumental Emotional	

^a 10 minutes per session were devoted to the introduction and conclusion phase.

with precocious puberty. Content validity index (CVI) was measured by experts (two child nursing professors, a pediatric endocrinologist, and a pediatric neurologist) giving the item a relevance rating of 4 to evaluate the validity and reliability of the revised stress tool. All CVI item scores were >0.8.

The revised stress tool consisted of 16 questions, which were rated on a five-point scale from 0 points for *never* to 4 points for *very often*. Total scores ranged 0–64, with higher scores indicating higher perceived levels of stress. The tool had a Cronbach's α of 0.99 at the time of its development (Kim, 1988), and the Cronbach's α was 0.80 in this study.

Anxiety

Anxiety was measured using the Korean-Beck Anxiety Inventory, which is a Korean version of Beck's Anxiety Scale (Lee, Lee, Hwang, Hong, & Kim, 2016). This tool's validity was verified in Korean (Lee et al., 2016). The tool consists of 21 questions rated on a four-point scale from 0 points for *not at all* to 3 points for *very true*. Total scores ranged 0–63, with higher scores indicating higher levels of anxiety. The tool had a Cronbach's α of 0.91 at the time of its development (Lee et al., 2016), and the Cronbach's α was 0.73 in this study.

Guilt

Guilt was measured using a tool developed to measure the guilt experienced by mothers of children with rare hereditary metabolic diseases (Kwon, Choi, & Kim, 2008). The validity of this tool was verified through CVI and factor analysis at the time of development (Kwon et al., 2008). The tool consists of four questions rated on a five-point scale: 1 point for *not at all* to 5 points for *very true*. Total scores ranged 4–20, with higher scores indicating higher guilt. The tool had a Cronbach's α of 0.88 at the time of its development (Kwon et al., 2008), and the Cronbach's α was 0.78 in this study.

Life satisfaction

Life satisfaction was measured using the Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985). This tool's validity was verified in Korean patients (Lim, Lee, & Suh, 2010). The tool consists of five questions rated on a seven-point scale: from 1 point for *not at all* to 7 points for *very true*. Total scores ranged 5–35, with higher scores indicating higher levels of life satisfaction. The tool had a Cronbach's α of 0.87 at the time of its development (Diener et al., 1985), and the Cronbach's α was 0.86 in this study.

Data collection

Data were collected between June and July 2015 for the control group, and between August and September 2015 for the experimental group. To prevent experimental bias, data were first collected from the control group. Pre-test data were initially collected, and a post-test was performed four weeks after the pre-test (Fig. 2). After completion of the post-test by the control group, the pre-test for the experimental group was performed. Thereafter, the experimental group received a social support program for four weeks. A post-test was performed immediately after the program was terminated.

Data analyses

All collected data were analyzed using SPSS v21 (IBM Corp., 2012). Mothers' general characteristics, stress, anxiety, guilt, and life satisfaction scores were expressed as frequencies, percentages, means, and standard deviations. Independent *t*-tests, chi-square tests, and Pearson's correlations were performed as pre-tests to assess the homogeneity between the control and experimental groups. The normality of the resulting scores in the control and experimental groups were tested using Kolmogorov-Smirnov and Shapiro-Wilk tests. An independent *t*-test was performed after normality was confirmed.

Ethical considerations

This study was approved by the Institutional Review Board of Dong-A University (HR-016-04). All participants received a research participation consent form outlining the purpose and contents of this study. Further, they were informed that participation was not compulsory, and that they may withdraw from participation at any point during the research period. We obtained written consent from participants who understood the purpose of this study and voluntarily consented to participate before conducting the research.

Results

Pre-test of homogeneity

Tables 2 and 3 show the results of the pre-test of homogeneity of participants' demographic characteristics. No significant differences in mothers' age, marital status, religion, education level, employment, monthly income, and menarche age were observed between the experimental and control groups (Table 2). No significant differences in children's sex, age, height, weight, age at diagnosis, treatment duration, and the incidence of premature birth or small-for-gestational-age were observed between the two groups (Table 3).

Table 4 shows the results of the homogeneity of the outcome variables at pre-test. No significant differences in the level of stress, anxiety, guilt, and life satisfaction were observed between the two groups.

Correlations between outcome variables

Table 5 shows the correlations between outcome variables.

Hypothesis validation

Table 6 summarizes the effects of the program on mothers' stress, anxiety, guilt, and life satisfaction. Notably, although mothers' stress, guilt, and life satisfaction scores were significantly changed after the intervention, there was no significant difference in the anxiety scores between the two groups.

Table 2

Homogeneity of mothers' demographic characteristics across groups ($N = 34$).

Variables	Classification	Experimental group ($n = 17$)		Control group ($n = 17$)		χ^2/t	p^a
		n (%) or $M \pm SD$	n (%) or $M \pm SD$	n (%) or $M \pm SD$	n (%) or $M \pm SD$		
Age (years)		39.35	± 2.26	40.94	± 4.08	1.40	0.170
Marital status	Married	17	(100.0)	17	(100.0)	0.00	1.000
	Single or divorced	0	(0.0)	0	(0.0)		
Having a religion	Yes	12	(70.6)	9	(52.9)	1.12	0.290
	No	5	(29.4)	8	(47.1)		
Education level	<High school	4	(23.5)	4	(23.5)	0.00	1.000
	\geq College	13	(76.5)	13	(76.5)		
Employment	Employed	7	(41.2)	6	(35.3)	0.13	0.724
	Unemployed	10	(58.8)	11	(64.7)		
Monthly income (US dollars)	<2000	7	(41.2)	3	(17.7)	2.49	0.288 ^b
	2000–3000	2	(11.8)	4	(23.5)		
	>3000	8	(47.1)	10	(58.8)		
Menarche age (years)		13.35	± 1.17	12.71	± 1.36	–1.49	0.147

M = mean; SD = standard deviation.

^a Independent groups *t*-test or a chi-square test.

^b Fisher's exact test.

Table 3
Homogeneity of children's demographic characteristics across groups (N = 34).

Variables	Classification	Experimental group (n = 17)		Control group (n = 17)		χ^2/t	p ^a
		n (%) or M ± SD		n (%) or M ± SD			
Sex	Male	3	(17.6)	1	(5.9)	1.13	0.601 ^b
	Female	14	(82.4)	16	(94.1)		
Age (years)		9.71	±1.49	9.71	±1.05	0.00	1.000
Height (cm)		142.09	±7.63	139.71	±10.74	−0.75	0.462
Weight (kg)		40.59	±10.20	39.78	±9.53	−0.24	0.813
Age at diagnosis (years)		8.24	±0.83	8.32	±1.13	0.26	0.797
Treatment duration (years)		1.26	±0.81	1.59	±0.71	1.27	0.212
Preterm infant/SGA	Yes	1	(5.9)	1	(5.9)	0.00	1.000 ^b
	No	16	(94.1)	16	(94.1)		

M = mean; SD = standard deviation; SGA = small-for-gestational-age.

^a Independent groups t-test or a chi-square test.

^b Fisher's exact test.

Discussion

The application of the social support program developed for mothers of children with precocious puberty in this study resulted in reduced stress and guilt and increased life satisfaction among participants. Social support can alleviate the negative effects of stress and enhance psychological adaptation. In this study, various social support factors—including both structural and functional aspects—were implemented based on social support theory. Consequently, in the intervention, we provided information to the mothers of children with precocious puberty based on their needs and promoted strengthened social bonds. Multi-component interventions are typically most effective for social support and well-being outcomes (Dam, de Vugt, Klinkenberg, Verhey, & van Boxtel, 2016), and the methodological quality and effectiveness of social support intervention studies are essential (Dam et al., 2016).

This section discusses the effect of the program on each variable of interest. First, the program effectively reduced participants' stress levels, supporting Hypothesis 1. This result is consistent with those from previous studies which reported that when social support was provided to parents of sick children, parental stress levels were reduced (Doupnik et al., 2017). In previous studies, the interventions took place over 3 months on average and ranged in duration from 2 weeks to 6 months (Lee & Hwang, 2013; Wilson, McKenzie, Quayle, & Murray, 2014). In this study, the social support program effectively reduced participants' stress in a short period in four sessions of expert education and self-help group meetings that were held over a 4-week period. This may be because all the factors of social support were provided at each session, and communication and interactions were effectively promoted while social support was continuously provided to enhance the effect of the intervention.

Second, the program did not significantly decrease participants' anxiety; therefore, Hypothesis 2 was rejected. This finding contradicts those of previous studies (Abdullah, Sapon, Nazli, & Puwasa, 2015; Doupnik et al., 2017; Yu et al., 2015). This discrepancy may be attributable to the fact that the anxiety scores of the mothers in this study were low compared with scores previously reported in Korean adults (Kim

et al., 2016), and an anxiety measurement tool was used to measure the overall anxiety level in this study (Lee et al., 2016). In addition, mothers of children with precocious puberty have been found to be anxious about the possibility of their children's failure to reach their full adult height, psychosocial maladjustment, increased incidence of genital cancer due to extended exposure to sex hormones (Lee et al., 2015), and the side effects of gonadotropin-releasing hormone agonists (GnRHa) therapy (Lim & Kim, 2013). Therefore, it seems that the intervention of this study did not affect participant anxiety.

Third, the program effectively decreased participants' guilt, supporting Hypothesis 3. The onset of precocious puberty is affected by genetic influences, inadequate eating habits, and lifestyle (Lim & Kim, 2013). Therefore, mothers may feel guilty since they may believe that the precocious puberty is their fault (Lim & Kim, 2013). However, through the education in social support programs, mothers could learn about proper eating and lifestyle habits and how to nurture their children. This type of support seems to help reduce guilt. Although previous studies have reported that mothers of sick children experience guilt (Fidler et al., 2016; Kwon et al., 2008; Skirton, 2006), few studies have directly investigated this. There is extensive clinical literature that has discussed guilt in the context of parenthood, showing that feelings of guilt often signal to parents that they have done something wrong (Fidler et al., 2016).

The results of the present study are consistent with that of a survey study, which reported that mothers of chronically ill children who attended self-help group meetings displayed lower levels of guilt than do those who did not (Kwon et al., 2008). Although education on a child's problem does not necessarily reduce the guilt experienced by his/her mother, mothers can learn to cope with the guilt by building supportive relationships with experts and by sharing their experiences and feelings with parents of children with similar conditions (Skirton, 2006).

Lastly, participation in the program increased participants' life satisfaction, supporting Hypothesis 4. Social support has been shown to be more vital in the life satisfaction of mothers with sick children than of those with typically developing children (Doupnik et al., 2017). Life satisfaction is also positively related to stronger social support for mothers (Lu et al., 2015). This study differs from previous research in that we

Table 4
Comparison of the homogeneity of the outcome variables between groups (N = 34).

Variables	Experimental group (n = 17)		Control group (n = 17)		t	p ^a
	M ± SD		M ± SD			
Guilt	10.65	±3.72	10.06	±3.98	0.45	0.659
Stress	37.06	±13.11	33.41	±13.52	0.80	0.431
Anxiety	8.94	±9.87	4.24	±4.42	1.79	0.082
Life satisfaction	20.76	±4.82	19.53	±3.74	0.84	0.410

M = mean; SD = standard deviation.

^a Independent groups t-test.

Table 5
Correlations between outcome variables among participants (N = 34).

Variables	Guilt	Stress	Anxiety	Life satisfaction
	r (p ^a)			
Guilt	1	0.61 (<0.001)	0.60 (<0.001)	−0.19 (0.295)
Stress	0.61 (<0.001)	1	0.43 (0.012)	−0.48 (0.004)
Anxiety	0.60 (<0.001)	0.43 (0.012)	1	−0.21 (0.232)
Life satisfaction	−0.19 (0.295)	−0.48 (0.004)	−0.21 (0.232)	1

^a Pearson's correlation test.

Table 6
Comparison of the outcome variables between groups (N = 34).

Variables	Group	Pre-test		Post-test		Difference		t	p ^a
		M	±SD	M	±SD	M	±SD		
Stress	Exp.	37.06	±13.11	23.35	±14.55	13.71	±11.69	4.84	<0.001
	Cont.	33.41	±13.52	34.00	±12.62	-0.59	±4.43		
Anxiety	Exp.	8.94	±9.87	5.88	±6.79	3.06	±7.69	1.64	0.121
	Cont.	4.24	±4.42	4.06	±4.37	0.18	±4.49		
Guilt	Exp.	10.65	±3.72	7.06	±2.38	3.59	±3.62	4.08	0.001
	Cont.	10.06	±3.98	9.88	±3.89	0.18	±2.74		
Life satisfaction	Exp.	20.76	±4.82	23.47	±5.59	-2.71	±2.82	3.95	0.001
	Cont.	19.53	±3.74	19.35	±2.98	0.18	±2.94		

Exp. = experimental group (n = 17); Cont. = control group (n = 17); M = mean; SD = standard deviation.

^a Independent groups t-test.

measured life satisfaction rather than quality of life. Quality of life is a measurement of the physical, psychological, social, and environmental aspects of an individual's life (Saqib Lodhi et al., 2017). However, life satisfaction reflects an individual's cognitive and emotional response to his/her living environment (Jayawickreme, Tsukayama, & Kashdan, 2017).

To the best of our knowledge, our study is the first to implement a social support intervention for mothers of children with precocious puberty in the field of nursing worldwide. The social support program developed in this study reduced stress and increased life satisfaction among such mothers through expert education and self-help group meetings. Nurses who provide care for children and families may improve the emotional health and quality of life of the mothers of children with precocious puberty by effectively using this program.

The limitations of this study are as follows. First, we assessed the effects of the program immediately after its implementation and did not observe its long-term effects. Additional research monitoring the long-term effect of the program is needed. Second, although spousal support is the greatest source of social support for married women of children with precocious puberty (Lee & Lee, 2018), spouses were not included in this study because we posited that mothers of children with precocious puberty would require additional social support from experts and peers than would mothers of children without this condition. Future studies should investigate the need for spousal support among mothers of children with precocious puberty and discover ways to enhance spousal support. Third, in this study, we modified the before stress tool of mothers of children with chronic disease. Future research should aim to develop a stress tool for mothers of children with precocious puberty. Fourth, although we compared the mothers of children with precocious puberty and children with chronic diseases, precocious puberty is associated with lower physical risk (Lazar, Meyerovitch, de Vries, Phillip, & Lebenthal, 2014) and complications (Guaraldi, Beccuti, Gori, & Ghizzoni, 2016) than other chronic diseases. Fifth, because this study was performed at a single tertiary general hospital in Korea, the results may not be generalizable to other populations. Sixth, the possible influence of the nonequivalent group design on the results should also be taken into account, as the participant group assignment in this study was self-selected. Seventh, this study was conducted with a small number of participants; therefore, it is necessary to conduct research with a larger sample.

Conclusion

Although the number of children with precocious puberty is increasing rapidly, it has been difficult to develop an appropriate nursing intervention for their mothers. This preliminary study was the first to develop a social support program optimized for mothers of children with precocious puberty. Notably, we confirmed the effectiveness of the program, which significantly reduced mothers' stress and guilt and increased their life satisfaction. Applying this program to clinics and communities with mothers of children with precocious puberty may

help the mothers lead a healthy life and may positively impact their parenting.

Declarations of interest

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