DOI Number: 10.37506/v20/i1/2020/mlu/194580

Medication Supportive Behavior of Mothers with Children with ADHD: A Structural Equation Model

Myeong-hui Choe[1], Hyunju Park[2]

[1]Professor, Department of Nursing, Uiduk University, [2]Professor,College of Nursing, Kangwon National University, South Korea

Abstract

Background/Objectives: This study aimed to establish and validate a supportive behavior model for the medication of mothers with children with ADHD based on Theory of Planned Behavior (TPB) and empirical evidence.

Method/Statistical Analysis: Participants were 205 mothers with children in elementary school in grades 1 to 3 who had been diagnosed with ADHD and experienced medication treatment. A constructed Structural Equation Model (SEM) was analyzed using AMOS program.

Findings: The goodness-of-fit index of the final model was found to be appropriate. The model's explanatory power for mother's medication supportive behavior was 90.4%. The intention for medication supportive behavior (β = .486, p<.001), subjective norms (β = .250, p<.001), the perceived control for the medication supportive behavior (β = .287, p<.001) and psychological health of mothers (β = -.074, p = .008) had a direct effect on medication supportive behavior. Mothers' ADHD knowledge (β = .060, p = .016) was found to have an indirect effect on medication supportive behavior.

Improvements/Applications: The results of this study are expected to guide the development of interventions to improve the medication compliance rate of ADHD children in lower academic years in elementary school.

Keywords: *ADHD, Medication, Mother, Supportive behavior, Children.*

Introduction

Attention-deficit hyperactivity disorder (ADHD) is a condition that occurs mainly in early childhood before 7 years old[1]. In most cases, ADHD in children is typically found after entrance into elementary school as children experience having problems with academic performance or classroom life, such as disruptive behavior during class or noncompliance of rules. In this case, if the symptoms are not treated, more behavior problems may occur in their later academic years; in this regard, early treatment is critically important [1] .

The primary treatment for ADHD is medication for treating brain function problems[1,2]. In Korea, however, the proportion of children with ADHD who showed consistent medication compliance was about 5% only[3], which is very low. The lack of adequate treatment of ADHD at the time it is needed negatively impacts children's academic achievements and peer relationships, leading to misconduct and crime in adolescence and adulthood. Thus, starting medication for ADHD from early elementary years is important [1].

Meanwhile, the role of mothers is crucial to ensure smoothness of ADHD medication treatment of elementary schoolchildren. Treatment decisions for children with ADHD are largely made by parents, especially children in lower grades who tend to take

Corresponding Author:
Hyunju Park
Professor,College of Nursing, Kangwon National University, South Korea
e-mail: hpark@kangwon.ac.kr

medication given by their mother rather than take care of medication themselves[4,5]. Therefore, to improve the medication compliance rate of children with ADHD, understanding mothers' medication supportive behavior is the first priority.

In previous studies, several factors related to mothers' medication supportive behavior for ADHD children have been reported in parts. In fact, there is no study on a mothers' medication supportive behavior model for the comprehensive understanding of these relationships. Therefore, in this study, we developed a hypothetical model comprising TPB-based variables (attitudes, subjective norms, perceived control, intention)[2,3,5-9], which are known to be effective in the explanation of health-related behavior, and variables that have been reported as factors affecting mothers' medication supportive behavior for children with ADHD (social stigma perception, knowledge of ADHD, degree of symptoms, and the psychological health of mothers)[2,3,5–11]. This study investigated the validity of the model.

Method

The present study employed cross-sectional design. Participants were the mothers of lower-grade children with ADHD in a Korean elementary school. They were recruited by convenience sampling according to the following inclusion criteria: a mother a) who has a child of age between 6–9 years diagnosed with ADHD and experienced ADHD medication treatment; b) who had been understood the purpose of the study, and agreed to participate in the study. A total of 205 questionnaires, which was a sufficient number of the sample size, [12] were collected and analyzed. For the contents and method of this study, approval from K University's IRB was received.

The theoretical framework (Figure 1) was based on TPB and established by adding relationships between influential factors and concepts identified in the literature review.

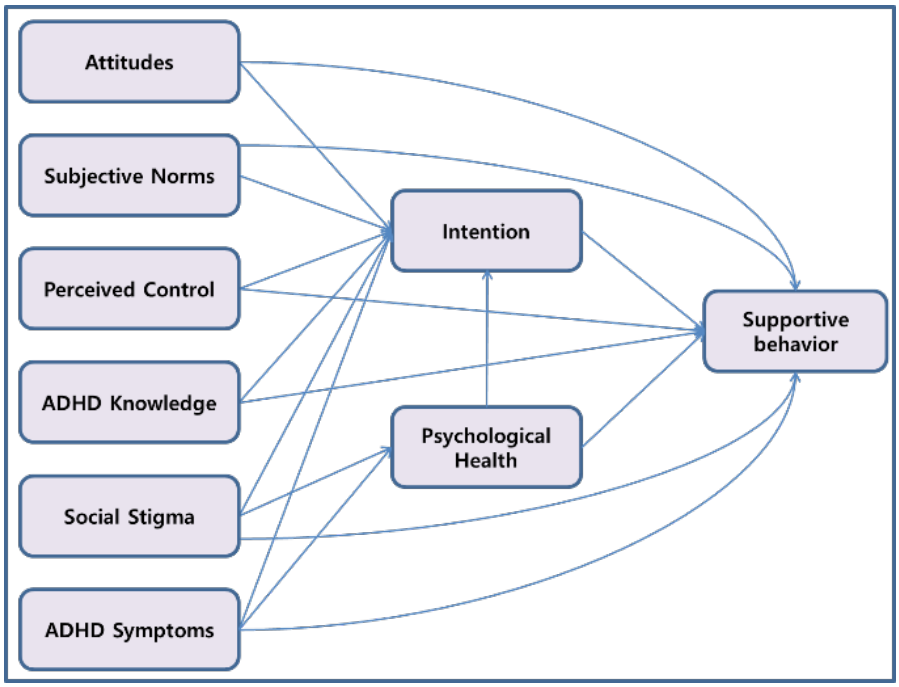

Figure 1. Theoretical framework

Ten observed variables for the hypothetical model were measured as follows. Attitudes referred to a mother's overall like or dislike of ADHD medication supportive behavior for their children[13]. Measurement was carried out using Attitude Direct Questions from the ADHD Medication Belief Report (AMBR)[2],which consisted of five question measured on 7-point Likert scale. Higher scores mean positive attitudes. Cronbach's α was 0.93 in this study.

Subjective norms were measured by Subjective Norm Questions in the AMBR[2]. Subjective norms referred to the extent to which significant others recognize a mother's supportive behavior and to which a mother is willing to conform to expectations of significant others[13]. This tool consisted of 11 questions measured on a 7-point Likert scale. The higher the score, the more positive the perception of subjective norms. Cronbach's α was 0.95 in this study.

Perceived control referred to the perception that mothers perceive supportive behavior as easy or difficult[13] and was measured by self-efficacy for the supportive behavior[14]. The tool consisted of eight questions measured on a 5-point Likert scale. The higher the score, the higher a mother's perceived control of a child's ADHD medication supportive behavior. Cronbach's α was 0.95 in this study.

Mothers' knowledge of ADHD was measured by the questions associated with ADHD[15], which consisted of 19 questions. Knowledge score was the sum of the number of questions answered correctly. Cronbach's $\alpha$was 0.62 in this study.

Social stigma is the degree to which mothers perceive social stigma for ADHD. It was measured on the social stigma scale[16], which consisted of five items measured on a 4-point Likert scale. The higher the score, the more social stigma is perceived. Cronbach's α 0.98 in this study.

ADHD symptoms referred to the degree of mothers' perception of their child'symptoms, measured using the ADHD Rating Scale(ARS)[17], which consisted of 18 questions measured on a 4-point Likert scale; it had two subscales: attention deficit and hyperactivity symptoms[17]. Higher scores indicate that symptoms are more severe. In this study, Cronbach's $\alpha$was 0.87 and 0.88 for each subscale.

Intention referred to the subjective possibility of mothers to perform supportive behavior[13], which was measured by Intention Questions in the AMBR[2]. The tool consisted of five questions measured on a 7-point Likert scale. Higher scores indicate strong intentions. Cronbach's α was 0.99 in this study.

Psychological health referred to the depression of mothers, measured using the Beck Depression Inventory (BDI)[18], which had 21 items measured on a 4-point Likert scale. Higher scores indicate severe depression. Cronbach's α was 0.83 in this study.

Supportive behavior referred to a mother's supportive behavior of the medication of a child. We measured the degree of supportive behavior of mothers for outpatient visits, drug doses, and time-to-dose compliance for their children[3]. This tool was a three-item 10-point scale. The higher the score, the more likely a mother is well supporting her child. Cronbach's α was 0.99 in this study.

From the collected data, participants' general characteristics were analyzed by descriptive statistics using SPSS 22.0. For verification of the model, AMOS 22.0 were used. The normality of the observed variables was evaluated. Then, a confirmatory factor analysis (CFA) was conducted. Finally, the fitness of the hypothesis model was evaluated by goodness-of-fit indices, and the statistical significance of the direct, indirect, and total effects of the model was tested using Bootstrapping.

Result

1. **Demographic Characteristics:** Demographic characteristics of the subjects are shown in Table 1.

Table 1. General characteristics

Characteristics	Categories	N(%) or M±SD
Mothers		
Age		40.51±4.48
Marital status	Married	167(81.5)
	Divorced	38(18.5)
Economic status	Upper-middle	26(12.7)
	Middle	96(46.8)
	Lower-middle	61(29.8)
	Low	22(10.7)
Children		
Age		7.79±0.87
Gender	Boys	175(85.4)
	Girls	30(14.6)
Academic achievement	High	3(1.5)
	Upper-middle	14(6.8)
	Middle	51(24.9)
	Lower-middle	44(21.5)
	Low	93(45.4)
Age at ADHD diagnosis		6.17±0.75
Duration of ADHD treatment (month)		18.9±11.26
Current medication	Yes	180(87.8)
	No	25(12.2)
Experience of drug side effects	Yes	106(51.7)
	No	99(48.3)

M: Mean, SD: Standard deviation

2. **Descriptive statistics and normality test of observed variables:** All observed variables satisfied the condition of normal distribution[12] (Table 2). VIF of each variable was distributed in the range of 1.77-5.91 and condition index was 49.785. The correlation coefficients between exogenous variables were in the range of 0.04–0.77, indicating no problems with multicollinearity [12].

The results of the CFA showed that all goodness-of-fit indices were within the recommended range: $x^2(p)$ = .279, x^2/df = 1.235, RMSEA = .034, RMR = .013, GFI = .992, AGFI = .935, NFI = .995, RFI = .970, CFI = .999, and TLI = .994. Convergence validity was found with factor loading of observed variables between 0.50 and 0.99; average variance extracted (AVE) value was in the range of 0.71–0.98; and construct reliability was in the range of 0.91–0.99. The largest value of the correlation coefficients was 0.77 and the square of 0.77 was 0.59 ($Ø^2$); as AVE value was larger than 0.59, the discriminant validity was also verified [12].

Table 2. Descriptive statistics of observed variables

Variables		M±SD	Range	Skewness	Kurtosis	VIF	AVE
Attitude		5.18±1.01	1~7	0.10	-0.84	3.34	0.71
Subjective norms		4.83±1.33	1~7	-0.34	-0.43	5.53	0.87
Perceived control		3.90±0.87	1~5	-0.54	-0.52	4.55	0.96
Knowledge toward ADHD		0.66±0.15	0~1	-0.07	-1.06	2.17	-
Social stigma		2.48±0.65	1~4	-0.08	0.30	2.81	0.97
ADHD symp-toms	Attention deficit	1.44±0.52	0~3	0.32	0.02	2.34	0.94
	Hyperactivity	1.22±0.52	0~3	0.34	0.28	2.73	-
Intention		5.40±1.72	1~7	-1.05	0.35	5.91	0.98
Psychological health		0.38±0.33	0~3	0.51	-0.51	1.77	0.94
Behavior		7.10±2.87	1~10	-0.96	-0.12	1.77~5.91	0.98

M: Mean, SD: Standard deviation, VIF: Variance inflation factor, AVE: Average variance extracted

3. **Structural equation modeling:** The goodness-of-fit indices of the hypothesis model are as follows: x^2 = 34.716, df = 11, $x^2(p)$<.001, x^2/df = 3.156, RMSEA = .103, RMR = .017, GFI = .968, AGFI = .839, NFI = .981, RFI = .924, CFI = .987, and TLI = .947. Of these, $x^2(p)$, x^2/df, RMSEA and AGFI did not meet the criteria, so the model was modified[12]. We added two paths to the hypothesis model. The goodness-of-fit indices of the modified model were all within the recommended range except for $x^2(p)$, so this model was confirmed as the final model[12]: x^2 = 18.358, df = 9, $x^2(p)$ = .031, x^2/df = 2.040, RMSEA = .071, RMR = .023, GFI = .982, AGFI = .892, NFI = .990, RFI = .951, CFI = .995, and TLI = .974.

4. **Analysis of the effects of the final model:** There are 10 significant paths of the final model (Figure 2). Variables with direct effects on supportive behavior were subjective norms (β = .250, p<.001), perceived control (β = .287, p<.001), intention (β = .486, p<.001), and psychological health (β = -.074, p = .008). Direct (β = .250, p = .002), indirect (β = .201, p = .018), and total (β = .451, p = .006) effects were all significant in the path from subjective norms to supportive behavior. Direct (β = .287, p = .006), indirect (β = .233, p = .023), and total (β = .520, p = .021) effects were all significant in the path from perceived control to supportive behavior. Only indirect effects (β = .060, p = .016) were significant in the path from knowledge of ADHD to supportive behavior. Direct (β = -.074, p = .008) and total (β = -.071, p = .011) effects were significant in the path from psychological health to supportive behavior. Subjective norms, perceived control, knowledge of ADHD, intention, and psychological health explained 90.4% of supportive behavior.

The variables with significant direct effects on intention were subjective norms (β = .413, p<.001), perceived control (β = .479, p<.001), and knowledge of ADHD (β = .100, p = .016). These variables explained

83.0% of intention. The variables that directly affect psychological health were attitudes (β = -.161, p = .049), knowledge of ADHD (β = -.163, p = .031), and social stigma (β = .396, p<.001), which explained 40.3% of psychological health.

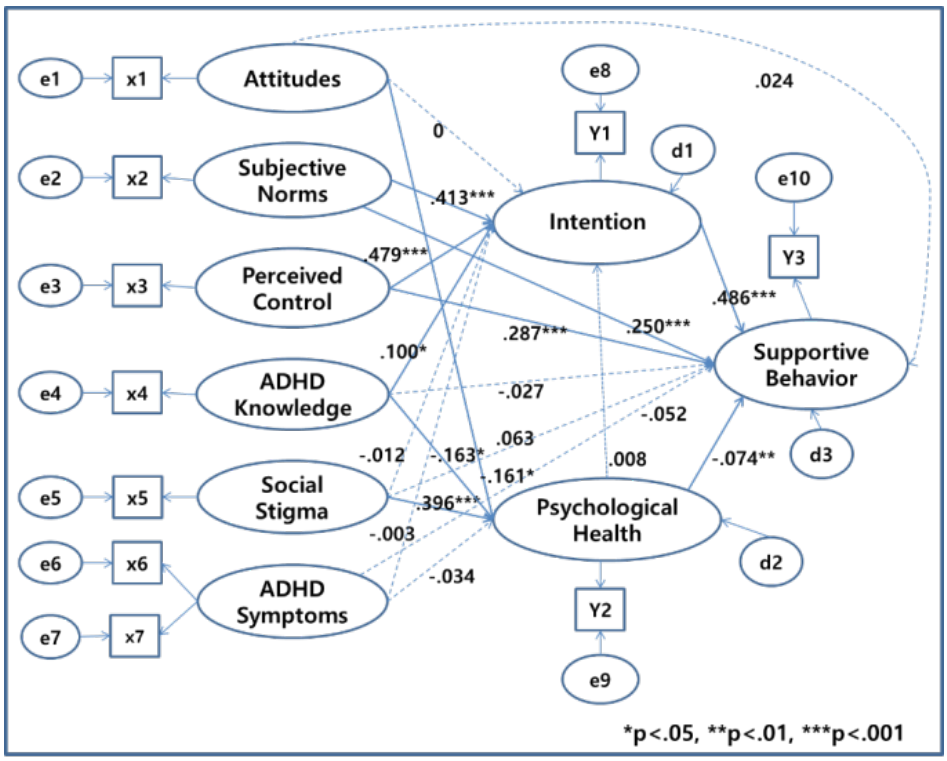

Figure 2. Path diagram for the final model

Discussion

In this study, the most influential variable on a mother's supportive behavior was the intention for supportive behavior, and such intention was directly affected by subjective norms, perceived control, and knowledge of ADHD. These results are consistent with previous studies, which reported that the higher a mother's supportive behavior intention for the medication of their child with ADHD, the better her child's medication compliance and that the subjective norms perception affected the intention[7]. It is also consistent with a previous study[20] stating that subjective norms and perceived control had a significant effect on the intention of seeking help in women with incontinence. The results of knowledge of ADHD as a predictor of intention can also be found in a previous study[10].

These findings indicate that interventions that increase the intention are effective in improving mothers' supportive behavior in the medication of their children with ADHD. To enhance the intention, it is necessary to provide mothers with nursing interventions that increase their subjective norms perception and perceived control of ADHD medication supportive behavior for children. In addition, supportive behavior increases along with mothers' knowledge of their children's condition and medication. Therefore, a program that helps mothers' accurate understanding of their child's condition and medication, such as active counseling by medical staff, are necessary.

Meanwhile, a mother's psychological health negatively affected the direct path for supportive behavior and was influenced by attitudes and social stigma. These results imply that a child's medication supportive behavior is less active when a mother's depression is more severe. This finding is consistent with previous studies that reported negative correlations between a mother's psychological health and supportive behavior [3,5,6,9]. It also supports a study that reported a positive correlation between a mother's social stigma perception and her depression being related to her child with

ADHD[9]. Therefore, these findings suggest that social biases and stigma of children with ADHD negatively affect a mother's psychological health and interfere with her supportive behavior to help her child's medication. Increasing medication compliance in children with ADHD requires a change in social perception of them. Therefore, more attention should be paid to the extent of depression of a mother taking care of children with ADHD.

The limitation of this study is that the generalization of study results is limited because participants were recruited by convenience sampling in limited areas. It is necessary to conduct a study with more representative samples later. Nevertheless, this study is the first to build and validate a model of medication supportive behavior of Korean mothers with children with ADHD. Its significance lies in its establishment of a theoretical framework for future intervention development.

Conclusion

In this study, intention for the medication supportive behavior, perceived control, subjective norms perception, psychological health, and knowledge of ADHD affected mothers' supportive behavior. Attitudes and social stigma perception directly affected psychological health of mothers. These results indicate that enhancing intention of a mother's supportive behavior, perceived control, and subjective norms perception; improving psychological health; and increasing knowledge of ADHD may improve mothers' medication supportive behavior.

Ethical Clearance: Not required

Source of Funding: Nil

Conflict of Interest: Nil

Acknowledgment: This is a revised work from the first author's dissertation.

References

1. Park WJ, Park SJ, Hwang SD. Effects of cognitive behavioral therapy on attention deficit hyperactivity disorder among school-aged children in Korea: A meta-analysis. Journal of Korean Academy of Nursing. 2015;45(2):169-182. DOI:https://doi.org/10.4040/jkan.2015.45.2.169.
2. Scoular D. An evaluation of medication adherence in children with attention-deficit/hyperactivity disorder using the theory of reasoned action and planned behavior [dissertation]. Ottawa: The University of British Columbia; 2005.
3. Kwag YK. Factors related to medication adherence according to severity of attention deficit hyperactivity disorder in children. Journal of Korean Academy of Psychiatric and Mental Health Nursing. 2012;21(4):321-332. DOI:https://doi.org/10.12934/jkpmhn.2012.21.4.321.
4. Charach A, Fernandez R. Enhancing ADHD medication adherence: Challenges and opportunities. Current Psychiatry Reports. 2013;15:371-378. DOI:https://doi.org/10.1007/s11920-013-0371-6.
5. Gau SS, Shen HY, Chou MC, Tang CS, Chiu YN, Gau CS. Determinants of adherence to Methylphenidate and the impact of poor adherence on maternal and family measures. Journal of Child and Adolescent Psychopharmacology. 2006;16(3):286-297. DOI:https://doi.org/10.1089/cap.2006.16.286.
6. Brinkman WB, Sherman SN, Zmitrovich AR, Visscher MO, Crosby LE, Phelan KJ, Donovan EF. Parental angst making and revisiting decisions about treatment of attention-deficit/hyperactivity disorder. Pediatrics. 2009;124(2):580-589. DOI:https://doi.org/10.1542/peds.2008-2569.
7. Oh WO, Park ES. Parenting experiences of parents of children with ADHD: Approaching the normal. Journal of Korean Academy of Nursing. 2007;37(1):91-104. DOI:https://doi.org/10.4040/jkan.2007.37.1.91.
8. Jackson D, Peters K. Use of drug therapy in children with attention deficit hyperactivity disorder (ADHD): maternal views and experiences. Journal of Clinical Nursing. 2008;17(20):2725-2732. DOI:https://doi.org/10.1111/j.1365-2702.2008.02444.x.
9. Arica E, Fernánez MC, Jáquez M. Latina mothers' stances on stimulant medication: complexity, conflict, and compromise. Journal of Developmental and Behavioral Pediatrics. 2004;25(5):311-317. DOI:https://doi.org/10.1097/00004703-200410000-00002.
10. Leslie LK, Plemmons D, Monn AR, Palinkas LA. Investigating ADHD treatment trajectories: Listening to families' stories about medication use. Journal of Developmental and Behavioral

Pediatrics. 2007;28(3):179-188. DOI:https://doi.org/10.1097/dbp.0b013e3180324d9a.

11. Fiks AG, Gafen A, Hughes CC, Hunter KF, Barg FK. Using freelisting to understand shared decision making in ADHD: Parents' and pediatricians' perspectives. Patient Education and Counseling. 2011;84(2):236-244. DOI:https://doi.org/10.1016/j.pec.2010.07.035.
12. Byrne BM. Structural equation modeling with Amos: basic concepts, applications, and programming 3rd ed. New York: Routledge; 2016.
13. Ajzen I. The theory of planned behavior. Organizational Behavior and Human Decision Processes. 1991;50:179-211. DOI:https://doi.org/10.1016/0749-5978(91)90020-T
14. Lee HJ. Factors affecting medication compliance of hypertensive patients. [Unpublished master's thesis]. Cheonan: Dankook University; 2002. Available from: http://uci.or.kr/G901:A-0005047554.
15. Jerome L, Gordon M, Hustler P. A comparison of American and Canadian teachers' knowledge and attitudes towards attention deficit hyperactivity (ADHD). Canadian Journal of Psychiatry. 1994;39(9):563-567. DOI:https://doi.org/10.1177/070674379403900909.
16. Komiya N, Good GE, Sherrod NB. Emotional openness as a predictor of college students' attitudes toward seeking psychological help. Journal of Counseling Psychology. 2000;47(1):138-143. DOI:https://doi.org/10.1037//0022-0167.47.1.138.
17. Dupaul GJ. Parent and teacher ratings of ADHD symptoms: Psychometric properties in a community-based sample. Journal of Clinical Child Psychology. 1991;20(3):245-253. DOI:https://doi.org/10.1207/s15374424jccp2003_3.
18. Beck LT, Mendelson M, Mook J, Erbaugh J. An inventory for measuring depression. Archives of General Psychiatry. 1961;4(6):561-571. DOI:https://doi.org/10.1001/archpsyc.1961.01710120031004.
19. Ambrosini PJ, Metz C, Bianchi MD, Rabinovich H, Undie A. Concurrent Validity and Psychometric Properties of the Beck Depression Inventory in Outpatient Adolescents. 1991;30(1):51-57. DOI:https://doi.org/10.1097/00004583-199101000-00008.
20. Wu C, Wang K, Sun T, Xu D, Palmer MH. Predicting help-seeking intention of women with urinary incontinence in Jinan, China: a theory of planned behaviour model. Journal of Clinical Nursing. 2015;24(3-4):457–464. DOI:https://doi.org/10.1111/jocn.12623.