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# The influence of a child's temperament on an attention deficit

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## Abstract

The purpose of this study is to investigate the relationship between the temperament of the child and the disability related to attention deficit via a study of descriptive correlation as a method. As a result, all the assumptions of the regression equation are satisfied, and the regression results are reliable. In conclusion, the Persistence temperament of children affecting attention disorder could be developed through basic human desire such as regular eating, securing space for activities, and exercise.

**Keywords:** Temperament, Attention Deficit, Hyperactivity, Child.

## La influencia del temperamento de un niño en un déficit de atención

### Resumen

El propósito de este estudio es investigar la relación entre el temperamento del niño y la discapacidad relacionada con el déficit de

atención a través de un estudio de correlación descriptiva como método. Como resultado, se cumplen todos los supuestos de la ecuación de regresión y los resultados de la regresión son confiables. En conclusión, el temperamento persistente de los niños que afectan el trastorno de la atención podría desarrollarse a través del deseo humano básico, como comer regularmente, asegurar un espacio para actividades y hacer ejercicio.

**Palabras clave:** temperamento, déficit de atención, hiperactividad, niño.

## 1. INTRODUCTION

Temperament is defined as the natural tendency of an individual to respond to the environment in a certain way. The children choose the activity and the environment, according to their temperament, and the difference in the degree of these stimuli is related to the difference in the behavioral patterns. The emotional nature of the child is an important aspect of the child's ability to feel competence in social behavior, which is one aspect of the child's temperament and has been noted as the essence of individual differences among the inherent characteristics of the child. Although this temperament is an inherent trait of an individual, it is different in that it is favored by the culture in which the individual belongs to. Accordingly, even if some children have the same temperament, individual adaptability would vary as they are living in different environments, and also individual temperament would vary depending on their cultures. The research interest of child development in Korea was higher than that of other areas in the social and emotional development fields, but the interest on temperament,

which is a sub-domain of social and emotional development, was relatively low compared to other sub-domains. According to the premise that it is necessary to explore what the various developmental phenomena of children in Korea are in the context of Korean society, most of the variables studied with the pre-existing temperament were limited to the children's relationship with the society and their mothers (Cho et al., 2014; Park, 2009).

Since the New York Longitudinal Study suggested that a difficult temperament could be a sign of problematic behavior, research had been continuing to find out the relationship between temperament traits and future problematic behavior, and ADHD had also been studied as a risk factor related to maladjustment. According to the American Psychiatric Association, the incidence of ADHD is a frequency of approximately 3 to 7%, and in general, ADHD is highly prevalent in infancy and childhood. However, ADHD, which has a high prevalence rate in infancy and childhood, is hardly distinguished from the behavioral characteristics also common in infancy, and parents are not aware that the child's lack of attention or hyperactivity is a disability that requires a special treatment. As a consequence, ADHD was often neglected (Lim, 2006).

Because the symptoms of ADHD were apparent at elementary school ages, most of ADHD studies were conducted on elementary school students. However, as the problematic behavioral characteristics of ADHD had already started to appear during infancy when behavioral characteristics of ADHD were discovered, and the

appropriate intervention was performed, the prognosis might not deteriorate. The results of a study Ahmad (2014) that ADHD symptoms during infancy persisted over time and subsequently influenced adaptation in elementary school emphasize the importance of early intervention in ADHD. Adler, who is a pioneer in psychology, argues that the psychological nature of humans is formed before the age of six, so it is crucial that the care of children before that age influences their entire lives. Accordingly, the purpose of this study is to investigate the relationship between the temperament of the child and the disability related to attention deficit, which is a current social issue. The specific objectives are: First, we examine the differences in temperament and the ability to concentrate according to general characteristics of subjects, Second, we examine the relationship between the subject's temperament and the ability to concentrate, Third, we identify the underlying factors of temperament that influence the subject's ability to concentrate (Khan et al., 2015; Park, 2014).

## **2. METHODOLOGY**

### **2.1 Research Design**

This research is a study of descriptive correlation to investigate the relationship between the temperament and attention deficit of children.

## **2.2 Research Sample and Data Collection Method**

Data collection was executed from March 1, 2015 to June 30, 2015 with the mothers of children who were using the daycare centers in C city. The size of the sample for multiple regression analysis in this study was analyzed using G-power 3.0 program. Based on the significance level ( $\alpha$ ), 0.05, the power ( $1-\beta$ ), 0.95, the intermediate effect size ( $f^2$ ), 0.15 and seven independent variables, the total number of samples required was 153, and the number of participants in this study was 256, which was an appropriate number for this study (Hong et al., 2003; Nam, 2013).

## **2.3 Measurements**

The research tools were the questions about the general characteristics of a research subject, a child temperament personality test (Korea – Preschool version Temperament and Character Inventory: K-ps TCI), and the severity of ADHD (Korea ADHD Rating Scale: K-ARS). K-ps TCI was a variation of the Cloninger's Temperament and Character Inventory (TCI) and applied to preschool children by Park. K-ps TCI is a tool to measure the personality temperament of a child through a parental questionnaire. The questionnaire consisted of 40 items about temperament in a 5-point scale and 34 items about personality, 74 items in total. Each item could be scored from 1 as absolutely not to 5 as absolutely yes, and 32 items out of 74 items were arranged in a reverse order. The reliability of K-ps TCI was indicated

as Cronbach's alpha (0.62 – 0.78 as test – retest) according to the reliability as described Buss & Plomin (1984) four months after the test. Cronbach's  $\alpha$  in this study was 0.71.

In order to measure the ADHD tendency, the Korea-ADHD Rating Scale (K-ARS), which standardized the ADHD scale composed of 18 items extracted from the diagnostic criteria of the American Psychiatric Handbook, was used. K-ARS consisted of 9 items measuring distractibility and 9 items measuring ADHD behavior / impulsiveness in total 18 items, and they were scored from 1 point of not at all to 4 points of always at all. The higher the score, the higher the level of the variable to be measured, and according to the study of Campbell (1969), the reliability of Korea-ADHD Rating Scale (K-ARS) was equivalent to the Cronbach's alpha of 0.91. Cronbach's  $\alpha$  in this study was 0.89.

## **2.4 Data Analysis Method**

The collected data were analyzed using SPSS 20.0 program. First, the general characteristics of children were analyzed by frequency, percentage, mean, and standard deviation. Second, the differences in childhood temperament and ADHD, according to the general characteristics of children were analyzed using the t-test, one-way ANOVA and the Duncan's test. Third, the correlation between the child's temperament and ADHD was calculated by using Pearson's Correlation Coefficient. Fourth, the multiple regression analysis was

conducted to examine the effects of childhood temperament on ADHD (Maziad & Cote, 1984).

### **3. RESULTS**

#### **3.1 General Characteristics**

Table 1 shows the general characteristics of the subjects. Girls were 135 (52.78%), and 196 (76.6%) were normal in respect to obesity. At birth, 233 (91.0%) children were weighing less than 2.5kg ~ 3.9kg, and 122 (47.7%) were breastfed together with powdered milk. 186 children (72.7%) had play time within one hour per day, which was the most among the subjects, 134 (52.3%) were watching TV from one to three hours a day, 222 (86.7%) were using a computer less than one hour per day, and 214 (83.6%) were not doing exercise, 248 (96.9%) were eating snacks and 229 (89.5%) were eating regularly. In addition, 129 (50.4%) children were eating meals at a normal speed, 209(81.6%) were overeating less than once a week, 211 (82.4%) were eating a midnight snack less than once a week, 164 cases (64.1%) were children eating junk food less than once a week, 180 cases (70.3%) were children who had their own play space, and 221 cases (86.3%) were parents who were primary caregivers, which were the most (Kim, 2005; Pawar et al., 2014).

**Table 1. General characteristics of the subjects**

N=256							
Content	Classification	N	%	Content	Classification	N	%
Gender	male	121	47.3	Using Computer	Less than 1 hour	222	86.7
	female	135	52.7		1~3 hours	11	4.3
Obesity	underweight	17	6.6	Eating regularly	No	27	10.5
	normal	196	76.6		Yes	229	89.5
	overweight	29	11.3	Eating speed	Slow	115	44.9
	Obesity	14	5.5		Normal	129	50.4
Weight at birth	Less than 2.5kg	9	3.5	Frequency of overeating	Fast	12	4.7
	2.5~3.9kg	233	91.0		Less than once a week	209	81.6
	More than 4.0kg	14	5.5		2~3 times a week	45	17.6
Feeding style	Breastfeeding only	81	31.6	Frequency of midnight snack	Less than once a week	211	82.4
	Bottle feeding only	53	20.7		2~3 times a week	40	15.9
	Breastfeeding and bottle feeding together	122	47.7	Frequency of eating junk food	Less than once a week	164	64.1
Playtime	Less than one hour	186	72.7		2~3 times a week	87	34.0
	1~3 hours	62	24.2		More than 4 times a week	4	1.6
	More than 3 hours	6	2.3	Children's own play space	No	75	29.3
TV time	Less than 1 hour	108	42.2		Yes	180	70.3
	1~3 hours	134	52.3		Primary caregiver	Parents	221
	More than 3 hours	14	5.5	Grandparents		27	10.5
Exercise	No	214	83.6	Others		8	3.1
	Yes	41	16.0	Average Height of Children: 103.8 ± 11.1 cm Average Weight of Children: 17.2 ± 3.9 kg Average Age of Children: 4.3 ± 1.3 year	No	119	46.5
Selective eating	Yes	134	52.3		Yes	134	52.3
	Snack	No	8		3.1	Yes	248
Yes		248	96.9				

### **3.2 Temperaments of Children**

The average ratings of the subjects were, within the score range from 1 to 5 points, Harm Avoidance,  $2.7 \pm 0.55$  points, Novelty Seeking,  $2.6 \pm 0.47$  points, Reward Dependency,  $4.1 \pm 0.46$  points, Persistence,  $3.3 \pm 0.49$  points, Self-Directedness,  $3.5 \pm 0.51$  points, Cooperativeness,  $3.8 \pm 0.52$  points, and Self-Transcendence,  $3.4 \pm 0.54$  points. Among the items, the score of Reward Dependency was the highest. As for the differences between the children's temperament and the lower 7 regions according to general characteristics, children with selective eating ( $t = -2.759$ ,  $p = 0.006$ ), feeding type ( $F = 4.387$ ,  $p = 0.013$ ), children's play time ( $F = 3.118$ ,  $p = 0.046$ ) and the frequency of overeating per week ( $t = -2.285$ ,  $p = 0.023$ ) showed significant differences in the Harm Avoidance. The score of Harm Avoidance was higher for children who ate selectively ( $2.88 \pm 0.58$ ) than who did not eat selectively ( $2.69 \pm 0.50$ ), for who were breastfed together with powdered milk ( $2.89 \pm 0.53$ ) than who breastfed only ( $2.70 \pm 0.56$ ) and fed on powdered milk only ( $2.68 \pm 0.55$ ), for who played less than one hour per day ( $2.83 \pm 0.55$ ) than who played from 1~3 hours ( $2.65 \pm 0.56$ ) and more than 3 hours ( $2.57 \pm 0.20$ ) in order, and for who overate 2~3 times per week ( $2.95 \pm 0.59$ ) than who overate less than once a week ( $2.75 \pm 0.54$ ).

As for the Novelty Seeking, children eating regularly ( $t = 3.513$ ,  $p = 0.001$ ) and the frequency of eating junk food ( $F = 3.152$ ,  $p = 0.044$ ) showed significant differences. Children not eating regularly ( $2.91 \pm 0.37$ ) relative to eating regularly ( $2.59 \pm 0.47$ ), eating junk food

more than 4 times a week ( $3.06 \pm 0.47$ ) relative to 2~3 times ( $2.68 \pm 0.43$ ) and less than once a week ( $2.58 \pm 0.48$ ) showed higher scores in the Novelty Seeking. As for the Reward Dependency, children who used the computer less than one hour per day ( $4.12 \pm 0.39$ ) showed significantly higher scores than those who used the computer for 1~3 hours ( $3.89 \pm 0.19$ ) ( $t=14.758$ ,  $p=0.002$ ). As for the Persistence, gender ( $t=-2.212$ ,  $p=0.028$ ), exercise ( $t=-2.26$ ,  $p=0.025$ ), play time ( $F=3.880$ ,  $p=0.022$ ) showed significant differences. Female ( $3.50 \pm 0.50$ ) relative to male ( $3.35 \pm 0.51$ ), doing exercise ( $3.45 \pm 0.40$ ) relative to no exercise ( $3.27 \pm 0.49$ ), playing 1~3 hours per day ( $3.44 \pm 0.49$ ) relative to less than one hour ( $3.25 \pm 0.49$ ) and more than 3 hours ( $3.20 \pm 0.35$ ) showed higher scores in the Persistence.

As for the Self-Directedness, children's own play space ( $t=-2.493$ ,  $p=0.013$ ), play time ( $F=6.238$ ,  $p=0.002$ ), and the frequency of eating midnight snack ( $t=2.727$ ,  $p=0.007$ ) showed significant differences. Children who had own play space ( $3.48 \pm 0.43$ ) relative to not having one ( $3.33 \pm 0.51$ ), playing 1~3 hours ( $3.60 \pm 0.38$ ) relative to more than 3 hours ( $3.57 \pm 0.38$ ) and less than one hour ( $3.38 \pm 0.47$ ) in order, and eating midnight snack less than once per week ( $3.49 \pm 0.41$ ) relative to 2~3 times ( $3.29 \pm 0.44$ ) showed higher scores in the Self-Directedness. For the Cooperativeness, eating regularly ( $t=-2.693$ ,  $p=0.008$ ) and weight at birth ( $F=3.363$ ,  $p=0.036$ ) showed significant differences. Eating regularly ( $3.84 \pm 0.45$ ) relative to not eating ( $3.60 \pm 0.41$ ), more than 4.0kg at birth ( $4.08 \pm 0.42$ ) relative to less than 2.5kg ( $3.98 \pm 0.44$ ) and 2.5~3.9kg ( $3.80 \pm 0.45$ ) in order showed higher scores in the Cooperativeness.

As to the Self-Transcendence, female ( $3.50 \pm 0.50$ ) relative to male ( $3.35 \pm 0.51$ ) showed significantly higher scores ( $t = -2.212$ ,  $p = 0.028$ ).

### **3.3 ADHD of Children**

The average rating of the child's attention deficit ranges from 0 ~ 3 points, and more than 2 points are the criteria for diagnosis. In our study, the distraction score was  $0.54 \pm 0.38$  and the hyperactivity-impulsivity score was  $0.56 \pm 0.42$ . In terms of children's distraction and hyperactivity impulsiveness according to general characteristics, the frequency of eating midnight snack ( $-2.445$ ,  $p = 0.015$ ) and the frequency of eating junk food ( $F = 3.116$ ,  $p = 0.046$ ) showed significant differences in the distraction of children. Eating midnight snack 2~3 times a week ( $0.68 \pm 0.35$ ) relative to less than once a week ( $0.52 \pm 0.38$ ), and eating junk food more than 4 times a week ( $0.83 \pm 0.21$ ) relative to 2~3 times ( $0.60 \pm 0.40$ ) and less than once ( $0.50 \pm 0.37$ ) showed higher scores in attention distraction (Lim & Min, 2007).

### **3.4 Correlation between temperament and ADHD**

The variables of temperament related to the distraction of the child are, Novelty Seeking ( $r = 0.418$ ,  $p = 0.000$ ), Persistence ( $r = -0.444$ ,  $p = 0.000$ ), Self-directedness ( $r = -0.356$ ,  $p = 0.000$ ), and Cooperativeness

( $r=-0.443$ ,  $p=0.000$ ). The higher the score of Novelty Seeking as well as the lower the scores of Persistence, Self-directedness, and Cooperativeness, the higher the distraction score of the child. Also, the higher the score of Novelty Seeking ( $r=0.599$ ,  $p=0.000$ ) and the lower the score of Persistence ( $r=-0.250$ ,  $p=0.000$ ), the higher the score of hyperactivity impulsivity (Corey, 2009).

### **3. 5 Factors affecting the child's ability to concentrate**

Table 2 summarizes the results of multiple regression analysis with independent sub-factors of child temperament affecting children's attention. Multiple regression analysis was used to test the assumption of regression analysis for independent variables. First, the correlation coefficients between independent variables are 0.02-0.39, meaning that predictive variables are independent because there are no explanatory variables greater than 0.80. Next, assumptions of linearity, normality of the error term, and equivariance are also satisfied to meet the assumptions of residuals. Therefore, all the assumptions of the regression equation are satisfied, and the regression results are reliable. The three factors of Novelty Seeking, Persistence, and Cooperativeness have statistically significant influences on children's distraction and hyperactivity impulsiveness. Especially, Persistence upon distraction and Novelty Seeking upon hyperactivity impulsivity have the greatest influence, respectively (Semenov et al,2018).

Table 2. Factors Affecting Attention

N=256							
	Predictors	B	SE	$\beta$	t(p)	R <sup>2</sup>	F(P)
Distraction	Novelty Seeking	0.304	0.044	0.361	6.894(.000)	0.382	30.776(<.001)
	Persistence	-0.322	0.043	-0.391	-7.468(.000)		
	Cooperativeness	-0.128	0.058	-0.147	-2.206(.028)		
Hyperactivity Impulsivity	Novelty Seeking	0.477	0.049	.532	9.701(.000)	0.411	58.574(<.001)
	Persistence	-0.154	0.044	-.177	-3.469(.001)		
	Cooperativeness	-0.106	0.053	-.115	-1.991(.048)		

#### 4. DISCUSSION

The temperament and personality were classified based on the seven-factor model developed on the adult personality study, into seven sub-categories: Harm Avoidance (HA), Novelty Seeking (NS), Reward Dependence (RD), Persistence (P), Self- Directedness (SD), Cooperativeness (CO) and Self-Transcendence. The results of this study suggest that the most fundamental temperament influences on the child's attention deficit are Persistence, which is the ability to make sustained effort despite frustration or difficulty, Novelty Seeking that activates or initiates impulsive activities as a response to new things, and Cooperativeness that shows how individual may cooperatively relate oneself to others. In addition, the gender, exercise, and play time of the children showed significant differences in the Persistence in the temperament according to general characteristics. The children who exercised and the children played 1-3 hours a day revealed higher persistence scores. In a study ADHD children subjected to a 12-week

balancing exercise program, stretching, joint movement, posture correction, breathing exercise, walking along the line, walking in pairs, standing on one foot on the disk, walking on balance beam, walking on the stairs, getting on the balance board and so on for 1 hour each time improved their attention. Therefore, encouraging children to play for more than one to three hours with the exercise will have an impact on the Persistence of the child and further reduce the degree of distraction (Cloninger & Svrakic, 1997; Abdulai, 2017).

The underlying temperament variables that correlate with the Persistence of the child are Self-Directedness and Cooperativeness. Self-Directedness refers to how self-directed an individual is, and Cooperativeness refers to how an individual can cooperatively build a relationship with others. As a result of this study, the Self – Directedness was higher when children had own space to play when they played within 1 ~ 3 hours a day, and when they ate midnight snack less than once a week. The number of play behaviors, according to children's play space, it was seen that the more space was given, the more dynamic the children's play behavior was (Campos et al., 1989). Midnight snack is also called night-time meal for meals and snacks consumed after dinner in Korea, where a delivery culture has been developed so people can easily eat a midnight snack. Using the article search engine, riss4u.com, we could find that approximately 80 studies had been done with the keywords of night and obesity. In them, the results of this study show that the study of nighttime and main attention deficit is only one episode during the past 10 years, thus this study is meaningful in that and it suggests that the more the number of

nightly eating the lower the Self –Directedness in the child 's temperament.

Cooperativeness in the child's temperament was also correlated with Persistence analyzed as an influencing factor of attention disorder. In this study, children's Cooperativeness was a significant variable in regular diet and birth weight. Especially, eating regularly showed higher score relative to eating irregularly in the Cooperativeness. The temperament seen in the personality psychological approach is the personality traits that appear in early infancy, and it appears to be a genuinely stable genetic tendency to be affected by inborn and biological influences. However, no matter how genetically the temperament is, the child's overall social development depends on how these characteristics interact with social and physical environmental characteristic. Thus, even if a child has a natural temperament, it can change through the creation of the environment.

## **5. CONCLUSION**

In this study, it was found that the Persistence temperament of children, affecting attention disorder could be developed through basic human desire such as regular eating, securing space for activities, and exercise. Therefore, it is necessary to provide continuous education and management for the caregivers who are in charge of parenting so that they can improve the attention and excessive impulsivity of their children through healthy eating habits and exercise. Framework Act on

Education of Korea, Art. 3 provides that every citizen shall have a right to learn through life and to receive an education according to his/her abilities and aptitudes. Further, the Early Childhood Education Act of Korea, Art.3 states that the State and local governments shall share the responsibility of educating the young children in a sound or a healthy manner with protectors of young children. The State, local governments, and educational institutions as well as parents, specialists, and medical personnel must consider in mid- and long-term plans for the education of children related to the research on the development of the child as shown in this study.

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