Kaohsiung Journal of Medical Sciences (2012) 28, 390–396

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ORIGINAL ARTICLE

Inattention and development of toddlers born in preterm and with low birth weight

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Received 21 February 2011; accepted 3 October 2011
Available online 7 April 2012

KEYWORDS
BSID-III;
Comprehensive psychological development;
Inattention;
Low birth weight;
Preterm

Abstract The objective of this study was to examine the impact of low birth weight and preterm birth on a toddler's inattention and development, including cognitive, language, motor, social–emotional and adaptive behaviors. A total of 105 toddlers enrolled for the study; they were divided into four groups: 40 full-term and normal birth weight (NBW, birth weight greater than 2500 g) toddlers, 24 moderate birth weight (MLBW, birth weight between 2499 and 1500 g) toddlers, 20 very to extremely low birth weight (V-ELBW, 12 between 1000 and 1499 g and 8 lower than 1000 g) toddlers, and 21 term toddlers who were recruited from a clinic of developmental delay as the developmental delay at risk (DDR) group. The Bayley Scales of Infant and Toddler Development—Third Edition (BSID-III) and Disruptive Behavior Rating Scale—Toddler were used. The findings were as follows: (1) DDR group performed worst in BSID-III; (2) although there were no statistical differences among the NBW, MLBW, and V-ELBW groups in BSID-III, the lower the birth weight, the lower the average performance, especially in language, adaptive social behavior, and adaptive practical behavior; and (3) comparing the inattention score, the DDR group was the poorest, normal and V-ELBW groups were the best, and MLBW group was in the middle. In conclusion, low birth weight and preterm delivery affected children's inattention and development of language, adaptive social behavior, and adaptive practical behavior.

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1607-551X/$36
doi:10.1016/j.kjms.2012.02.006

Introduction

Several studies have shown that preterm or low birth weight infants may have cognitive and behavioral problems later. In general, better developmental outcome was associated with a longer period of gestation [1,2]. Very low birth weight (VLBW) infants had higher risk for developmental dysfunction [3]. Extremely low birth weight (ELBW) or very preterm children performed worse in spatial rotation, visual attention, and tracking at 7—9 years of age [4]. Also, tests of attention effectively predicted parents' and teachers' rating in behavioral rating scales. Four hundred and thirty-one very preterm or VLBW children aged 5 scored higher in Child Behavior Checklist (CBCL) than matched controls [5], especially in social and attention problems. If children were diagnosed by pediatricians as having developmental problem or perinatal problem, the differences were even more distinct. School-aged children of low birth weight or born preterm tended to have behavioral and emotional problems resulting in the decisive effect on academics. Immediate target-directed intervention might help children and their parents overcome problems and gain social success. Another study found that 24% of 87 ELBW (birth weight less than 1000 g) children were diagnosed with attention-deficit and hyperactivity disorder (ADHD) and generally had cognitive, social, and academic problems [6]. Early focused attention of preterm infants at 7 months was an effective predictor of later attention and cognitive function at 2—5 years of age, and it is continuously related to cognitive abilities and attention skills through the preschool years [7]. Another study also pointed out that the preterm group performed worse in the motor, cognitive, and behavioral aspects than the control group at 7, and were more likely to be diagnosed with ADHD [8]. These studies indicated that low birth weight was associated with ADHD, and regardless of moderate low birth weight (MLBW), VLBW, or ELBW, preterm infants were at high risk of ADHD in future development.

Prematurity is often determined by low birth weight ($<$2500 g) or the number of gestational weeks ($\leq$38) [9]. Owing to the factors of maternal nutrition, disease, uncertainty of gestation weeks, environment, etc., infants born full term with low birth weight can still be diagnosed as being premature, and vice versa. Therefore, this study used birth weight to define preterm toddlers. The objective of this study was to examine the following: (1) the development of low birth weight and preterm toddlers; and (2) the impact of low birth weight and preterm on inattention in toddlerhood.

Methods

Subjects

One hundred and five toddlers, aged 1½— to 3 years, from southern Taiwan participated in this study. In the beginning, 117 toddlers were divided into four groups. There were 44 toddlers in the first group, the term and normal birth weight (NBW) group, which were recruited from the community. Four full-term toddlers weighed less than 2500 g and thus were excluded, resulting in a total of 40 toddlers (22 boys and 18 girls) born full term in the NBW group. The second group was the MLBW group. Twenty-six toddlers weighing between 1500 and 2500 g were in this group. A mother in this group refused to complete the Bayley Scales of Infant and Toddler Development—Third Edition (BSID-III), resulting in 25 pairs of toddlers and respondents. The third group was the very to extremely low birth weight (V-ELBW) group, which included 17 toddlers weighing between 1000 and 1499 g, which was the range of VLBW. Two of 17 parents were fathers as respondents. Eight toddlers weighed less than 1000 g, which was classified as ELBW. However, because of the small sample size and all variables of maternal state during pregnancy, perinatal course of babies, and other developmental-related diagnosis being non-significant ($p > 0.01$) (Table 1), VLBW and ELBW were combined into the third group—V-ELBW group. Gestation and the Apgar score were significantly different between MLBW group and V-ELBW group (Table 1); therefore, low birth weight toddlers were divided into MLBW and V-ELBW groups who were referred by neonatologists at a medical center in southern Taiwan. Moreover, intraventricular hemorrhage (IVH) and periventricular leukomalacia (PVL) will probably affect some aspects of psychological development, so one toddler with IVH in MLBW group and three toddlers with IVH and two toddlers with PVL in VLBW group were excluded. Therefore, there were 24 toddlers in MLBW group and 12 toddlers in VLBW group. The fourth group was recruited from a clinic of developmental delay as developmental delay at risk (DDR) group. One toddler refused to complete the motor scale of the BSID-III, resulting in 21 pairs of toddlers (17 boys and 4 girls) and respondents in this group. All toddlers of DDR group were term, and almost all had normal birth weight (except one being 1750 g). Consequently, DDR group could not be mixed up with V-ELBW group. Informed consent was obtained from all the parents.

Instruments

Bayley scales of infant and toddler development—third edition (Bayley, 2006)

The five subscales of the BSID-III are as follows: (1) Cognitive scale: it had 91 items according to the three dimensions of cognitive development, play (play with objects and symbolic or pretend play), number concepts and counting (one-to-one correspondence, counting, and cardinality), and information processing (attention to novelty, habituation, memory, and problem solving). (2) Language scale: it includes receptive communication subscale (49 items) and expressive communication subscale (48 items). Each subscale had a scale score, of which the mean was 10 and a standard deviation was 3. The composite score of the language scale was combined into two scale scores. Due to the Chinese translation, the items 34, 37, 38, 39, 44 in the receptive communication subscale and items 30, 34, 38, 45, 47, 48 in the expressive communication subscale were deleted. (3) Motor scale: it includes fine motor subscale (66 items) and gross motor subscale (72 items). Each subscale had a scale score with a mean of 10 and a standard deviation of 3. The two subscales were combined into the composite score of motor scale. (4) Social—emotional scale: the basis of social—emotional scale is *the Greenspan Social—Emotional Growth Chart: A Screening Questionnaire for Infants and*

Table 1 Background history and demographic information of preterm toddlers and parents.

		Groups of low birth weight						t or χ^{2a} (VLBW vs. ELBW)	t or χ^{2a} (MLBW vs. V-ELBW)
		1500—2499 g (MLBW)		1000—1499 g (VLBW)		Below 1000 g (ELBW)			
Sample size		25[b]		17		8			
Sex	Boy(girl)	15(10)		10(7)		6(2)		0.02	−0.04
Gestation (wk)		34.04(2.21)[c]	(31—38)[d]	29.41(2.32)	(26—33)	28.00(1.93)	(25—31)	1.49	8.03**
Maternal state during pregnancy	Hypertension	0.14%(3)[e]		23.52%(4)		37.50%(3)		0.00	0.84
	Diabetes mellitus	0.09%(2)		11.76%(2)		0.00%(0)		0.00	0.01
Prenatal steroid use		0.14%(3)	23.53%(4)	37.50%(3)	−0.21	0.70		—	—
Apgar score	First minute	7.39(0.94)	(6—9)	5.65(1.50)	(2—8)	4.13(1.89)	(1—6)	2.18*	5.44**
	Fifth minute	8.74(0.79)	(7—10)	7.59(1.00)	(6—9)	6.63(1.51)	(4—8)	1.91	5.57**
Development-related diagnosis	IVH	0.05%(1)		17.65%(3)		0.00%(0)		1.13	0.19
	PVL	0.00%(0)		11.76%(2)		0.00%(0)		—[f]	0.44
	RDS	0.50%(11)		70.59%(12)		75.00%(6)		0.35	0.26
Maternal age at pregnancy (y)		30.70(4.11)	(23.0—44.0)	31.95(5.02)	(23.2—43.3)	29.92(7.50)	(19.3—42.2)	0.80	−0.42
Maternal education		18(7)[g]		10(7)		4(4)		0.00	0.78
Paternal education		13(12)		9(8)		3(5)		0.09	0.00

* $p < 0.05$.
** $p < 0.01$.
ELBW = extreme low birth weight; IVH = intraventricular hemorrhage; MLBW = middle low birth weight; PVL = periventricular leukomalasia; RDS = respiratory distress syndrome; V-ELBW = very to extremely low birth weight; VLBW = very low birth weight.
[a] χ^2 was corrected for small (under 5) number.
[b] Three subjects were not born at the medical center, so that their data were missed.
[c] Mean(SD).
[d] (Minimum—maximum).
[e] Percentage(frequency).
[f] All of PVL were constant so that statistic testing could not be obtained.
[g] Number of college above (number of college below).

Young Children to identify healthy emotional function and provide mental process goals, including the ability to embrace in different emotions (e.g., intimate joy, self-approve); experience, express, and understand different emotional signals; and use words or symbols to elaborate on different feelings (e.g., pretend play). (5) Adaptive behavior scale: it includes 10 skill areas, including communication, community use, functional pre-academics, home living, health and safety, leisure, self-care, self-direction, social, and motor. The composite score of 10 skill areas is called general adaptive score (GAC). Also, by combining different skill areas, the three composite scores of conceptual area (communication, functional pre-academics, and self-direction), social area (leisure and social), and practical area (community use, home living, health and safety, and self-care) are formed. Due to the Chinese translation, the items 15 and 21 in the communication skill area and items 6 and 15 in the functional pre-academics area were deleted, and the score were prorated by the number of deleted items.

Each scale had a composite score, of which the mean was 100 and standard deviation was 15. The α-value of internal consistency in Taiwan were 0.97 in the cognitive scale, 0.98 in the language scale, 0.97 in the motor scale, 0.93 in the social—emotional scale, and 0.99 in the adaptive behavior scale. Except for the sensory processing subscale in the social—emotional scale with an α-value of 0.87, the α-value of other subscales were between 0.92 and 0.98. The internal consistency of the normal norm in Taiwan was better than the norm provided by the BSID-III. Similar consequences were shown in the special norm with higher α-values in Taiwan. Only the α-value of the gross motor subscale in Taiwan (special norm of 0.96) was lower than that of the BSID-III.

In addition to the new scales (social—emotional scale and adaptive behavior scale) in the third edition, there have been different indexes between the second and third editions of the Bayley Scale of Infant and Toddler Development. For example, index of mental development (MDI) in the second edition is split into cognitive scale and language scale in the third edition; index of motor development (PDI) is also split into fine motor subscale and gross motor subscale, which were combined into the composite score of motor scale.

Disruptive behavior rating scale—Toddler (Chao et al., 2006)

Disruptive Behavior Rating Scale—Toddler (DBRS-Toddler) is an empirical-based assessment for ADHD. The toddler version excluded the index of conduct disorder and required primary caretakers to complete the scale. The scores of the other three indices— inattention, hyperactivity impulsivity, and oppositional defiant—indicated the severities of target symptom behaviors. The internal consistencies of the DBRS-Toddler in Taiwan were between 0.85 and 1.00. The extracted 26 items associated with the behavior characteristics of ADHD showed that the symptom behavior characteristics of ADHD in toddlerhood are similar to that in childhood. Furthermore, DBRS-Toddler—Parent Form can effectively differentiate the behavior characteristics between those at high risk for ADHD and normal children, thus showing good reliability and validity for the DBRS-Toddler.

Procedures

Toddlers came into the laboratory with their respondents and were tested by trained intern clinical psychologists using the BSID-III cognitive, language, and motor scales. After the assessment, intern clinical psychologists explained the other three scales—social-emotional, adaptive behavior, and DBRS-Toddler—to the respondents and asked them to return these scales back to the laboratory after completion. After the research assistants received the completed questionnaires, they would first check for missing items; if there was any, the research assistant would interview the parents for the missing items over telephone. Intern clinical psychologists then computed the composite scores. The results were sent to the respondents after being examined by a clinical psychologist.

The social—emotional scale and adaptive behavior scale in BSID-III and DBRS-Toddler were completed by respondents of these toddlers, except for two fathers in the third group and two fathers in the fourth group.

Statistically analysis

Chi-square test was applied to examine the demographic information of the toddlers and their parents. Pearson correlation was used to analyze the correlation among the five scales in the BSID-III and the DBRS-Toddler. Also, ANOVA and Scheffe *post hoc* methods were carried out.

Result

Demographic information of the toddlers and parents

Within the 111 toddlers, 71 were boys and 40 were girls. There was no significant difference ($p > 0.05$) in the gender of the toddlers among the four groups. After adjusting for the toddlers' age by subtracting preterm days from biological age of the preterm toddlers aged 2 years and younger, the mean age of the MLBW group was 26.47, V-ELBW group was 26.64, and DDR group was 27.78 months. No significant differences ($p > 0.05$) were found among the adjusted ages across the four groups (Table 1).

There were no statistically significant differences ($p > 0.05$) among the low birth weight groups in parental educations (Table 1). However, there were significant differences among the four groups with respect to the parents' level of education; the DDR group had lower level of education than the non-DDR groups (paternal level of education: $\chi^2_2 = 16.04$, $p < 0.05$; maternal level of education: $\chi^2_2 = 13.92$, $p < 0.05$).

Correlations and comparisons of groups

The correlation among the BSID-III cognitive, language, motor, and adaptive behavior scales were between 0.42 and 0.95 (Table 2). Social—emotional scale had lower correlation with the other four scales ($r = 0.37$—0.58), but still showed significant differences ($p < 0.01$). The eight composite scores of the BSID-III had no significant

Table 2 Correlations of five subscale scores of BSID-III ($n = 105$).

Correlations of scale scores of BSID-III	Language	Motor	Social—emotional	Adaptive behavior	Conceptual	Social	Practical
Cognitive	0.81*	0.71*	0.42*	0.65*	0.69*	0.58*	0.59*
Language		0.75*	0.47*	0.63*	0.71*	0.56*	0.55*
Motor			0.37*	0.54*	0.56*	0.42*	0.48*
Social—emotional				0.57*	0.58*	0.56*	0.52*
Adaptive behavior					0.95*	0.83*	0.95*
Conceptual						0.80*	0.86*
Social							0.74*

*$p < 0.01$.
BSID-III = Bayley Scales of Infant and Toddler Development—Third Edition.

correlations with hyperactivity impulsivity and oppositional/defiant indices of the DBRS-Toddler, yet was significantly negatively ($p < 0.05$) associated with the inattention index of the DBRS-Toddler ($r = 0.21—0.34$) (Table 3).

After the ANOVA analysis and the *post hoc* test, the DDR group showed significantly lower performance in the five scales of the BSID-III: the cognitive, language, motor, social—emotional, and adaptive behavior scales (Table 4). The V-ELBW group performed significantly ($p < 0.05$) lower than the NBW and MLBW group adaptive social behavior and adaptive practical behavior; and lower than the NBW group in language. The mean of the NBW group was the highest in all BSID-III scales. The MLBW group had the second highest mean and the V-ELBW group had the third highest mean among the four groups in all BSID-III Scales. The *post hoc* test also found that there were significant differences in the inattention index, and the mean of the NBW group was the lowest and DDR group's mean was the highest. Moreover, the inattention index of the MLBW group was between the V-ELBW and DDR groups. Nevertheless, there were no significant differences among the four groups in hyperactivity-impusivity and oppositional-defiant indices of the DBRS-Toddler.

Table 3 Correlation of the BSID-III with DBRS ($n = 105$).

BSID-III	DBRS		
	Inattention	Hyperactivity impulsivity	Oppositional/ defiant
Cognitive	−0.31**	−0.01	−0.10
Language	−0.31**	0.03	−0.09
Motor	−0.34**	−0.03	−0.03
Social—emotional	−0.30**	−0.01	−0.07
Adaptive behavior			
Composite	−0.31**	−0.09	−0.09
Conceptual area	−0.31**	−0.07	−0.13
Social area	−0.21*	−0.01	−0.11
Practical area	−0.31**	−0.13	−0.08

*$p < 0.05$.
**$p < 0.01$.
BSID-III = Bayley Scales of Infant and Toddler Development—Third Edition; DBRS = Disruptive Behavior Rating Scale.

Discussion

Correlation results showed that the BSID-III and the DBRS-Toddler had good reliability in Taiwan. Since the DDR group had been referred from the clinic of developmental delay, these toddlers performed worst in the BSID-III. Although no statistical differences were found among the NBW, MLBW, and V-ELBW groups, the trend was still obvious: the lower the birth weight, the lower the average performance. In the *post hoc* test, the V-ELBW group was not significantly different from the DDR group in the BSID-III except adaptive social behavior and adaptive practical behavior. Accordingly, low birth weight toddlers still needed special assistance to promote their development, even if they were not diagnosed as developmental delay.

BSID-III could improve overall clinical application and be modified according to special subjects for researchers and practitioners [10]. Moreover, preterm birth or low birth weight might result in infantile and toddlerhood developmental delay [11,12]. The interaction between biological/medical conditions and the environment affected the developmental outcome of the infants [13]. The environment and organisms continue to interact and modify, bringing the outcome of infant and toddler development [14]. BSID-III could be used to help parents understand their children's developmental status by enhancing the sensitivity of the parents and facilitating their development [15]. Hence, BSID-III could improve overall clinical application and be modified according to special subjects for researchers and practitioners [10].

The motor scores of premature children was significantly lower than those of matched controls (premature group = 96.4; control group = 102.9) [11]. The remaining composite and subscale scores for the premature group were comparable with those of the matched controls. Thus, the BSID-III suggests that, except in language, children born premature were likely to be indistinguishable from those born full term. However, this study showed a trend of V-ELBW affecting developmental outcome in the language, adaptive social behavior, and adaptive practical behavior. The subdivision of birth weight into MLBW, VLBW, and ELBW brought different results, showing that children born premature did not commensurate with children born at or near term.

The *Diagnostic Statistical Manual*, fourth edition [16], pointed out that the prevalence of ADHD is 3—5%, making it the most common diagnosis in child psychiatric

Table 4 Comparisons of groups in the BSID-III and DBRS-Toddler.

	NBW(A)	MLBW(B)	V-ELBW(C)	DDR(D)	*F* value	Group comparisons[a]
Sample size	40	24	20	21		
BSID-III						
Cognitive	103.88 (12.17)[b]	99.58 (11.03)	96.19 (10.60)	80.95 (12.91)	17.95**	A, B, C/D[c]
Language	114.80 (17.05)	106.17 (15.10)	100.81 (16.40)	74.67 (16.74)	27.98**	A, B/B, C/D[d]
Motor	102.93 (13.33)	97.17 (12.28)	95.00 (13.24)	81.45 (15.36)	11.40**	A, B, C/D
Social—emotional	92.88 (13.10)	92.29 (13.23)	90.48 (13.87)	78.57 (13.71)	5.84**	A, B, C/D
Adaptive behavior						
Composite	105.00 (14.09)	98.21 (18.53)	93.19 (20.47)	74.43 (20.32)	13.91**	A, B, C/D
Conceptual	110.70 (11.98)	103.58 (18.06)	99.62 (17.73)	77.90 (19.49)	21.53**	A, B, C/D
Social	96.85 (19.62)	96.04 (18.33)	90.52 (19.66)	74.62 (17.28)	7.11**	A, B, C/C, D[e]
Practical	103.23 (14.97)	98.21 (17.34)	92.24 (19.28)	78.8 (22.34)	8.83**	A, B, C/C, D
DBRS—Toddler						
Inattention	8.80 (3.49)	10.67 (4.83)	8.90 (4.36)	13.38 (6.02)	5.33**	
Hyperactivity impulsivity	6.75 (2.75)	7.83 (3.64)	5.90 (3.21)	8.10 (3.74)	2.15	
Oppositional defiant	15.50 (7.40)	15.96 (7.94)	14.29 (7.01)	16.24 (8.13)	0.27	

*$p < 0.05$.
**$p < 0.01$.
BSID-III = Bayley Scales of Infant and Toddler Development—Third Edition; DBRS = Disruptive Behavior Rating Scale—Toddler; DDR = developmental delay at risk; MLBW = moderate low birth weight; NBW = normal birth weight; V-ELBW = very and extreme low birth weight
[a] *Post hoc* test by Scheffe method ($p < 0.05$).
[b] Mean(SD).
[c] A, B, C were the same and D was the lowest.
[d] A, B were the same, and B,C were also the same; A, B were the highest, and D were the lowest.
[e] A, B, C were the same and C, D were also the same; C, D were the lowest.

department. Research in the recent years found that during the perinatal period, if the fetus is affected by medication or insufficient blood flow to the brain, it will affect the arborization and development of synapses, influencing the dopamine system and causing ADHD-type behaviors (such as inattention, hyperactivity, and impulse behaviors); through epigenetic mechanisms, ADHD-type behaviors are passed on from generation to generation [17,18]. Therefore, providing knowledge and teaching special parenting skills to parents of children found to have ADHD tendencies at toddlerhood are important in preventing toddlers from developing ADHD behavior problems.

Previous researches have shown inconsistent results regarding the behavior or attention of preterm children; these inconsistencies may be affected by factors including lack of research design, no representative sample, lack of background information, high rate of loss, etc. [19]. For instance, Bhutta et al. [19] used a meta-analysis to investigate 1556 preterm children and 1720 controls. They found that being preterm is a risk factor lowering the cognitive testing scores: The level of prematurity at birth is positively associated with cognitive performance at school age and elevating the incidence of ADHD behaviors. If the fetus is affected by medication or has brain blood flow deficiency during the perinatal period, it will affect the arborization and development of synapse, influencing the dopamine system and causing ADHD = type behaviors (such as inattention, hyperactivity, and impulsive behaviors) [17,18]. Preterm is a risk factor for ADHD [20]; preterm children with a birth weight between 1500 and 2500 g are not as affected in biological development. However, for children with birth weight lower than 1500 g, their biological development is in process; therefore, they will have severe developmental disability. Yet perinatal adverse factors severely impact the arborization and synaptic development process, affecting the normal development of the dopamine system, and thus inducing ADHD-type behavior. The results of this study found that the inattention severity of low birth weight is higher compared to that of the normal group, which is similar to the results of Hadders-Algra and Groothuis' study [20] on mild general movements (GMs) comorditing mild abnormal neurological function development and aggressive behavior. It is also similar to the results of Bhutta et al.'s meta-analysis [19], showing prematurity elevating behavior problems. Nevertheless, the studies of Hadders-Algra and Groothuis [20] and Bhutta et al. [19] did not differentiate low birth weight groups into MLBW or V-ELBW groups. This study regrouped the low birth weight groups. Results showed that the ADHD-type behavior of the MLBW group is more severe than that of the V-ELBW group; this result is similar to that of Miller et al.'s study [21], being that the lowest birth weight preterm children is not as severe as predicted. Therefore, ELBW have much severe medical comorbidity, but it is not necessarily associated with severe childhood behavior problems.

From the correlation results of this study, the subscales of the BSID-III have good correlation, and the BSID-III was significantly associated with the inattention dimension of DBRS. Since the DDR group includes toddlers that have been referred from the clinic of developmental delay, their performance was worse than the other three groups, even though the NBW, MLBW, and V-ELBW groups did not show statistically significant differences. However, it can be seen that the lower the birth weight, the lower the average

performance for development. The V-ELBW group did not show significant differences between the DDR group in the average scores of adaptive social behavior and adaptive practical behavior. Also, the V-ELBW group was significantly lower than the NBW group in language. Therefore, even if low birth weight toddlers are not diagnosed with DDR, they still need special assistance to promote development.

After comparing the DBRS performance of the four groups, this study found that there were no significant differences in the Oppositional/Defiant Disorder scale. It is hypothesized that the main reason may be that participants were between the ages of 1 and 3 years; thus, they have not developed obvious abnormal socializing behaviors. However, in the subscales of inattention in the ADHD disorder scale, low birth weight toddlers performed statistically worse than the normal group. This result is consistent with previous studies, such as that of Johnson et al.'s study [22]. Johnson et al. [22] compared 219 very preterm 11-year-old children (less than 26 gestational weeks) with normal birth children; the results showed that very preterm children had three times higher incidence rate of ADHD than the controls (11.5%:2.9%); additionally, there was significantly higher rate of the inattention subtype of ADHD and no differences in the combined subtype. Parent report of behavior problems at 2.5 and 6 could predict psychiatric disorder at 11 years of age, showing preterm children display ADHD symptoms at an early age.

Therefore, preterm birth and low birth weight affects some aspects of development, i.e., language, adaptive social behavior, adaptive practical behavior, and inattention, but other aspects will not be affected, such as cognitive, motor, social-emotional, adaptive conceptual behavior, hyperactivity-impulsivity behavior, and oppositional-defiant behavior. The underlying processes of these effects need further study.

Acknowledgment

This study was funded by the National Science Council of Taiwan (NSC 96-2413-H-037-005-MY2, NSC97-2815-C-037-020-H, and NSC 98-2410-H-037-002). This study used the behavior observation and assessment room of the Psychology Department of the Kaohsiung Medical University to complete the data collection process. Children were recruited from the pediatric and newborn outpatient department of Kaohsiung Medical University Hospital and Kaohsiung Municipal Hsiao-Kang Hospital. We would like to thank Ting-Li Wang, Wan Ru Liau, Ming-Yi Tseng, and Huei-Jen Li for the BSID assessment and data collection, and Yu-Shu Wang for contacting and time arrangement with the participants. Finally, we would like to thank all the toddlers and their parents who participated in this study.

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