

Social competence of 3 to 5-year-old children born with low birth weight

Nurul Komariah

Abstract

Background Low birth weight (LBW) has long been used as an indicator of public health. Low birth weight is not a proxy for any dimension of other maternal or perinatal health outcomes. Low birth weight infants require special care, and have more chronic conditions, learning delays, and attention deficit hyperactivity disorders compared to infants of normal birth weight (NBW). Social competence is viewed as a primary component of healthy function and development and is an important predictor of academic and financial success.

Objective To examine social competence of children aged 3-5 years born with low birth weight.

Methods This cross-sectional study was undertaken in Palembang in 2012. Subjects consisted of children aged 3-5 years attended a preschool in the Seberang Ulu I District, Palembang, and were divided into two groups: low birth weight (LBW) and normal birth weight (NBW). Social competence was assessed by observation and *Interaction Rating Scale (IRS)* and *Parenting Style questionnaire (PSQ)*. Chi-square analysis was used to compare social competence between the two groups. Multivariate regression logistic analysis was used to assess for the dominant factors that may affect a child's social competence.

Results Low birth weight children aged 3 to 5 years had a 1.435 times higher risk of low social competence compared to normal birth weight children of similar age. (RP 1.435; 95%CI 1.372 to 13.507; P=0.019). Multivariate regression logistic analysis revealed that parenting style was a dominant factor affecting social competence.

Conclusion Social competence in 3 to 5-year-old children born with low birth weight is lower compared to those with normal birth weight. [Paediatr Indones. 2015;55:158-63].

Keywords: low birth weight, normal birth weight, social competence, parenting style, preschool.

Low birth weight (LBW) has long been used as an important indicator of public health. Low birth weight is not a proxy for any dimension of other maternal or perinatal health outcomes. Globally, the indicator is a good summary measure of multifaceted public health problems that include long term maternal malnutrition, diseases, hard work and poor pregnancy health care.¹ Low birth weight is defined as a birth weight < 2,500 grams.² Low birth weight newborns require special care, and have more chronic conditions, learning delays, and attention deficit hyperactivity disorders compared to normal birth weight children.³ Social competence is viewed as a primary component of healthy function and development.^{4,5} In preschool, central development is considered to be social, i.e., learning to interact with the other people.⁶

Social competence is an important predictor of academic and financial success.⁷⁻⁹ Children who are not socially and emotionally ready for school are less likely to make a successful transition to kindergarten. Furthermore, children who are not successful in early

From the Health Polytechnic of Ministry of Health, Palembang, South Sumatera, Indonesia.

Reprint requests to: Nurul Komariah, Health Polytechnic of Ministry of Health Palembang, Jl. Jend. Sudirman No. 1356 Km 3,5 Palembang 30126. Phone (0711)360952 Fax (0711)360952 Email: nknurulkomariah@gmail.com.

schooling may have problems in later behavioral, emotional, academic, and social development. Children who repeat a grade may also exhibit several specific behavioral and emotional disorders. Grade retention is also predictive of dropping out of school and adolescent pregnancies. Children who have poor academic achievement early in life also are at risk for delinquent and antisocial behavior.¹⁰

In our study, subjects' social competence was assessed by observation and the *Interaction Rating Scale* (IRS) instrument from Japan (2010). This test is used to easily evaluate the interaction of parents/caregivers and children in daily activities. A former study using IRS was done on children aged 18, 30, and 42 months, as well as 7 years.¹¹

The objective of this study was to examine the social competence of LBW children compared to those with normal birth weight at 3 to 5-year-old.

Methods

This was a cross-sectional study performed in September to November 2012 on children aged 3-5 years attended a preschool in the Seberang Ulu I District, Palembang, and fulfilled the inclusion criteria. Inclusion criteria were children born with body weight between 1500-3499 grams. We excluded children who were ill during the neonatal period (hospitalized), had physical disabilities or mental disorders. Subjects' parents provided informed consent. Questionnaires were used to collect subjects' early life data including characteristics, birth weight, birth height, and perinatal histories.

The independent and dependent variables were categorical and sample size was calculated with analytical comparative categories. The minimum required sample size was 37 subjects in LBW group as well as in NBW group. Subjects were collected by consecutive sampling.¹² We restricted our sample population to those who attended an early education program in order to assess their peer interaction. Subjects in the two groups were matched for age and gender. Multivariate logistic regression analysis was used to control for maternal age, parental education, parental occupation, economic status, presence of sibling(s), and parenting style. Birth weight (grams) data were collected from questionnaires. This study

was approved by the Research Ethics Committee at the Padjadjaran University Medical School, Bandung.

The IRS was used to assess social competence in our subjects. *Interaction Rating Scale* (IRS) was deemed to be a valid and reliable instrument. Internal consistency from each other category was assessed by Cronbach alpha interval from 0.43 until 0.88 and total internal consistency of (0.85- 0.91). The IRS has 10 subscales: 5 subscales for the child and 5 subscales for the caregiver. The 5 subscales were comprised of autonomy, responsiveness, empathy, motor regulation and emotion regulation. Each subscale, in turn, comprised of 5 items.¹¹ In addition to the IRS, the interaction between mother/father and their child was examined by a psychologist. During the 5-minute assessment, the parents and child played a puzzle game. For child behavior similar to the IRS result, a score of 1 was given. For child behavior different from the IRS result, a score of 0 was given. The total score was an accumulation from the sum of all subscales. A score of 18-25 points was considered to be a high level of development, while a score of 0-17 points was considered to be low level of development.¹³

Confounding variables in this study were maternal age, gender, parental education level, parental occupation, economic status, the presence of siblings and parenting style. These factors were assessed using questionnaires and using *Parenting Style Questionnaire* (PSQ) to determine their parenting style. This instrument was created by Robinson C,¹⁴ and consists of three components: authoritative, authoritarian, or permissive. Each component was scored on a scale of 1 to 6, ranging from 'never' to 'always.' The authoritative and authoritarian components have 13 items each, with total score then divided by 13. The permissive component had 4 items, with total score then divided by 4. Thus, the parenting style was indicated in order, beginning with the high score. The internal consistency coefficient of authoritarian, authoritative, and permissive was 0.81, 0.83, and 0.65, respectively. Whereas the reliability authoritarian of parenting scale, authoritative parenting scale, and permissive was $r=0.84$, $P<0.01$; $r=0.92$, $P<0.01$; and $r=0.78$, $P<0.01$, respectively.¹⁴

Chi-square analysis was used to calculate the equality characteristics of the respondent in both groups and compare social competence between the LBW and NBW groups. Multivariate logistic

regression analysis was done to control for the confounding factors.

Results

Of 392 children, 38 had a history of LBW and fulfilled the eligible criteria. As the control group, 38 NBW children who fulfilled the inclusion criteria were matched for age and gender. **Table 1** shows the characteristics data of both groups. There were no significant differences ($P > 0.005$) in age, gender, maternal age, parental education and occupation, presence of siblings, and economic status between the groups.

The comparison of social competence between the LBW and NBW groups is shown in **Table 2**. Children born with LBW had 1.435 times risk lower social competence than those born with NBW (RP=1.435; 95%CI 1.097 to 1.908; $P=0.019$).

Any variable with P value < 0.25 on bivariate analysis was calculated in regression logistic. Result of regression logistic is shown in **Table 3**. Children born with LBW had 9.950 times risk of low social competence than normal birth weight after controlling gender, maternal education, maternal occupation and parenting style. We used the backwards method in this test, so one-by-one variables were removed for $P < 0.05$, beginning with maternal occupation, maternal education, gender and parenting style. The

final model is shown in **Table 4**.

A confounding factor in our research was parenting style. Children aged 3-5 years with a history of LBW had 9.986 times the risk of low social

Table 1. Characteristics of subjects

| Characteristics | Group | |
|---------------------------|-------|-----|
| | LBW | NBW |
| Gender, n | | |
| Male | 22 | 22 |
| Female | 16 | 16 |
| Age, n | | |
| 3-4 years | 6 | 6 |
| 4-5 years | 32 | 32 |
| Maternal age, n | | |
| < 20 years | 5 | 2 |
| ≥ 20 years | 33 | 36 |
| Maternal education, n | | |
| Basic | 18 | 15 |
| Medium | 19 | 17 |
| High | 1 | 6 |
| Maternal occupation, n | | |
| Housewife | 35 | 33 |
| Worker | 3 | 5 |
| Paternal education, n | | |
| Basic | 16 | 11 |
| Medium | 20 | 21 |
| High | 2 | 6 |
| Paternal occupation, n | | |
| No occupation | 0 | 1 |
| Worker | 38 | 37 |
| Economic status, n | | |
| Less | 28 | 25 |
| Good | 10 | 13 |
| Presence of sibling(s), n | | |
| No | 12 | 12 |
| Yes | 26 | 26 |

Table 2. Social competence comparison of the LBW and NBW groups

| Birth Weight | Social competence | | Total | RP | (95%CI) | P value |
|--------------|-------------------|------|-------|-------|----------------|---------|
| | Low | High | | | | |
| LBW | 33 | 5 | 38 | 1.435 | 1.079 to 1.908 | 0.019 |
| NBW | 23 | 15 | 38 | | | |
| Total | 56 | 20 | 76 | | | |

Notes: *Chi-square test; RP=ratio prevalence; CI=confidence interval

Table 3. The association of several risk factors and social competence (early model)

| Variables | B | SE | POR | 95%CI | P* value |
|---------------------|---------|-------|---------|--------------------|----------|
| Birth weight | 2.298 | 1.142 | 9.950 | 1.062 to 93.233 | 0.044 |
| Gender | -0.868 | 0.919 | 0.420 | 0.069 to 2.540 | 0.345 |
| Maternal education | 0.748 | 0.770 | 2.113 | 0.467 to 9.557 | 0.331 |
| Maternal occupation | -0.901 | 1.594 | 0.406 | 0.018 to 9.228 | 0.572 |
| Parenting style | 4.916 | 1.190 | 136.426 | 13.242 to 1405.506 | <0.001 |
| Constanta | -10.242 | 3.555 | <0.001 | | 0.004 |

Note: *logistic regression; B=beta; SE=standard error; POR=prevalence odds ratio; CI=confidence interval

Table 4. The association of several risk factors and social competence (final model)

| Variables | B | SE | P value | POR | 95%CI |
|-----------------|---------|-------|---------|---------|--------------------|
| Birth weight | 2.301 | 1.118 | 0.040 | 9.986 | 1.116 to 89.374 |
| Parenting style | 4.943 | 1.164 | <0.001 | 140.222 | 72.992 to 1314.321 |
| Constanta | -11.185 | 3.043 | <0.001 | <0.001 | |

Notes: *regression logistic test; B=beta; SE=standard error; POR=prevalence odds ratio; CI= confidence interval

competence compared to the NBW group, after adjusting for the parenting style variable.

Discussion

To date, there has been limited study on the social competence of 3 to 5-year-olds using the IRS test and psychologist's observations. We found that social competence in 3 to 5-year-old children with LBW history was lower than that of NBW children of similar age. The LBW children had 1.435 times the risk of lower social competence than NBW children. This result was similar to a study found that LBW children had social competence problem.¹⁶

Social competence in children with LBW history is associated with difficult temperament, behavioral problems, language and speech disorders.¹⁷ Temperament is associated with personality and character that is permanent to the individual.¹⁸ A child with a difficult temperament often has negative reactions, irregular activities, is slow to accept change, and cries often. Temperament can be divided into the categories of inhibitory control and personal regulation. Inhibitory control is control against fear and shyness.¹⁸ Temperament is associated with several aspects of social development.¹⁹

Children born with LBW often have behavioral problems. A study found that children aged 7 years with LBW history had mean behavioral problems of 7.03 (SD 5.72) in girls and 7.51 (SD 5.40) in boys.²⁰ Similarly, another study found in children with body weight 2,001-2,500 grams, 20.9% had behavioral problems at the age of 3 years and 18.5% had behavioral problems at the age of 5 years.²¹ These behavioral problems were associated with social competence.²²

A previous study found that preschool children with LBW history had a 0.99 times the risk of speech disorders, 1.4 times the risk of linguistic disorders, and a 1.17 times the risk of a combination of language and speech disorders than NBW children.²³ Another

study found that LBW children (<2,500 grams) had 2.33 times the risk of linguistic delay.²⁴ Linguistic disorders might delay communication, affecting the child's social competence.^{25,26}

During the test we found that mothers and fathers did not encourage their children to use creative processes to solve the puzzle. They were focused on the final result, not the puzzle-solving process itself. Some parents even pushed their child's hands away when the child tried to play the puzzle, causing the child to give up. This meant how the parents forced their will on the child without care of the child's development. The quality of parent-child interactions from the neonatal period until early infancy has been associated with the quality of peer interactions. The optimal parent-child interaction has a strong/close association with the child's social competence and interaction with peers.¹⁸ Parenting style is also associated with adolescent social competence. In particular, the mother-child bond influences the domain of interpersonal relations. On the whole, maternal control exerted through a loving attitude seems to be key for the formation of children's competence and behavior.²⁷

The parent-child relationship is strongly linked with social competence and positive peer relationships, including the components of warmth, conflict, control and monitoring. The quality of the parent-child relationship has been associated with aggressive behavior and delinquency, with more extreme parenting environments, leading to worse child outcomes and/or more likelihood of clinical disturbance.²⁸ Parents of LBW, small for gestational age (SGA) and premature children tend to be overprotective and have an authoritarian parenting style.²⁹ The overprotective parenting style is characteristically high on warmth and demand, and low on autonomy.³⁰ Overprotection may interfere with child's acquisition of necessary social skills, leaving the child feeling out of control when presented with social demands. It is the expectation that one's behavior is controlled by external forces that afterwards serves to increase social anxiety.³¹

In this study, the sample population was collected using the best alternative, non-random sampling for LBW group and random sampling for the NBW group. Observations were performed by an expert psychologist who was blinded to subjects' groupings. In addition, we used valid and reliable instruments, the IRS for social competence and PSQ for parenting style. We controlled for confounding variables through restriction, matching and multivariate regression logistic test. Participation rate was high because the number of subjects included was more than the minimum required sample size, and because researchers cooperated with the preschool teachers. A limitation of this research was its cross-sectional design, the results of which cannot be used to predict or accurately describe social development. Also, the LBW classification was not defined by gestational age, because most mothers in the community had forgotten the first day of their last menstrual period after 3-5 years. Furthermore, only one psychologist made observations in this study, so we had no comparison for the observation results.

In conclusion, social competence of 3 to 5-year-old children born with LBW is lower than in those born with NBW. A future cohort retrospective study is needed to further assess the social competence of children with premature or SGA history. Further study is also needed on best-practice parenting styles for LBW children.

Acknowledgments

The authors are grateful to the University of Padjadjaran, Health Polytechnic of Ministry of Health, Palembang, as well as Prof. Dr. Sjarif Hidayat Effendi, dr, SpA; Dr. Farid Hadyana Sukandar, and A. Justu Lubis for their contributions to this study.

Conflict of interest

None declared.

References

1. Wardlaw T, Blanck A, Jelka Z, Elizabeth A. LBW: Country regional and global estimate. New York: United Nations Children's Fund and World Health Organization; 2004. p.3.

2. William W, Hay J. The small for gestational age infant. In: Rudolph CD, Rudolph AM, Hostetter MK, Lister G, Siegel NJ, editors. Rudolph's pediatrics. Volume 21. New York: McGraw Hill; 2003. p.56-7.
3. Stein RE, Siegel MJ, Bauman LJ. Are children of moderately low birth weight at increased risk for poor health? a new look at an old question. *Pediatrics*. 2006;118:217-23.
4. Rubin KH, Bukowski W, Parker J. Peer interaction, relationship and groups. In: Eisenberg N, editor. *Handbook of child psychology (6 th edition) social, emotional and personality development*. Wiley; 2006. p.571-645.
5. Parker JG, Rubin KH, Erath SA, Wojslawowicz JC, Burkirk AA. In: Cicchetti D, Cohen D, editors. *Peer relationship, child development, and adjustment: a developmental psychopathology perspective*. *Developmental psychology vol 1, theory and method*. 2nd edition. John Wiley & Sons Inc. 2006. p.419-493.
6. Yusuf S. *Developmental psychology of children and adolescents*. Bandung: Rosdakarya; 2011. p.122-5.
7. Team RM. Is social emotional development a predictor of school success in Head Start children? [Dissertation]. [Texas]: Texas A& M University; 2006. [cited 2013 March 31]. Available from: <http://hdl.handle.net/1969.1/ETD-TAMU-1866>.
8. Welsh M, Parke RD, Widaman K, O'Neil R. Linkages between children's social and academic competence: a longitudinal analysis. *J Sch Psychol*. 2001;39:463-81.
9. Baron RA, Markman GD. Beyond social capital: the role of entrepreneurs social competence in their financial success. *J of Business Venturing*. 2003;18:41-60.
10. Huffman LC, Mehlinger SL. Risk factors for academic and behavioral problems at the beginning of school. 2000; [cited 2013 March 31]. Available from: <https://secure.cccredit.com/articles/9580/riskfactorsacademic.pdf>.
11. Anme T, Shinohara R, Sugisawa Y, Tong YS, Tanaka E, Watanabe T, *et al*. Interaction rating scale (IRS) as an evidence-based practical index of children's social skill and parenting. *J Epidemiol*. 2010;20:419-26.
12. Dahlan MS. *Sample method in medical and health research*. Jakarta: Salemba Medika; 2010. p.71-5.
13. Sugisawa Y, Shinohara R, Tong L, Tanaka E, Watanabe T, Onda Y, *et al*. The trajectory patterns of parenting and the social competence of toddlers: a longitudinal perspective. *J Epidemiol*. 2010;20:S459-65.
14. Onder A, Gulay H. Reliability and validity of parenting style & dimension questionnaire. *Procedia Social Behavioral Science*. 2009;1:508-14. [cited 2013 March 31]. Available from: www.science direct.com/science/article/pii/S1877042809000949.

15. Dahlan MS. Medical and health statistiscs. Jakarta: Salemba Medika; 2011. p.197-208.
16. Fan RG, Potuguez MW, Nunes ML. Cognition , behavior and social competence of preterm low birth weeiht children at school age. Clinics. 2013;68:915-21.
17. Williams NA. Short and long term effects of low birth weight and neonatal medical complications on children's emotional and behavioral outcomes [Dissertation]. [Columbia (MO)]: University of Missouri; 2008. [cited 2013 March 31]. Available from: <https://hdl.handle.net/10355/5501>.
18. Santrock JW. Child Development. 11th ed. New York: McGraw Hill; 2005. p.30-5.
19. Sanson A. Connection between temperament and social development. Soc Dev. 2004;13:142-70. [cited 2013 March 31]. Available from: onlinelibrary.wiley.com/doi/10.1046/j.1467-9507.2004.00261.x/full.
20. Gupta ND, Deding M, Lauster M. Medium-term consequences of low birth weight on health and behavioral deficit. Is there a catch-up effect? WP. 2010;10:1-42. [cited 2013 March 31]. Available from: www.hha.dk/nat/wper/10-03_ndg.pdf.
21. Gray RF, Indurkha A, McCormick MC. Prevalence, stability and predictors of clinically significant behavior problems in low birth weight children at 3, 5 and 8 years of age. Pediatrics. 2004;114:736-43.
22. Bulotsky-Shearer RJ, Fantuzzo JW, McDermott PA. An investigation of classroom situational dimensions of emotional and behavioral adjustment and cognitive and social outcomes for Head Start children. Dev Psychol. 2008;44:139-54.
23. Delgado CEF, Vagi SJ. Early risk factors for preschool speech and language impairments. The international conference of infant studies; 2004 May Chicago. Illinois; [cited 2013 March 31]. Available from: www.chris.miami.edu/publications/research/Early_risk_factors_forspeech_andlanguage_impairments.pdf.
24. Prathanee B, Purdy SC, Thinkhamrop B, Chaimay B, Reangdaraganon N, Mo-Suwan L, *et al*. Early language delay and predictive factors in children age 2 years. J Med Assoc Thai. 2009;92:930-8.
25. McCabe PC, Meller PJ. The relationship between language and social competence: how language impairment effects social growth. Psychology in the Schools. 2004;41:313-21.
26. Longoria AQ, Page MC, Tait LH, Kennison SM. Relationship between Kindergarten children's language ability and social competence. Early child development and care. 2009;179:919-29.
27. Drozd E, Pokorski M. Parental attitudes and social competence in adolescents. J Physiol Pharmacol. 2007;58:175-84.
28. O'Connor TG, Scott SBC. An overview of research linking parent-child relationship quality and child outcomes. In: O'Connor TG, Scott SBC, editor. Parenting outcome for children. London: Joseph Rowntree Foundation; 2007. p.9-14.
29. Pyhala R. Psychological and psychophysiological functioning of young adults born preterm. The Helsinki study of very low birth weight adults. [Dissertation]. Helsinki: University of Helsinki; 2012.
30. Rodriguez MMD, Donovick MR, Crowley SL. Parenting styles in cultural context: observations of "protective parenting" in first-generation Latinos. Fam Process. 2009;48:195-210.
31. Spokas M, Heimberg RG. Overprotective parenting, social anxiety, and external locus of control: cross-sectional and longitudinal relationships. Cogn Ther Rest. 2009;33:543-51.