Journal of Fluency Disorders 39 (2014) 25–33

Contents lists available at ScienceDirect

Journal of Fluency Disorders

Birth weight and stuttering: Evidence from three birth cohorts

Jan McAllister[a,*], Jacqueline Collier[b]

[a] School of Rehabilitation Sciences, University of East Anglia, Norwich NR4 7TJ, United Kingdom
[b] Faculty of Social Sciences, University of East Anglia, Norwich, United Kingdom

ARTICLE INFO

Article history:
Received 28 August 2013
Received in revised form
25 September 2013
Accepted 1 October 2013
Available online 2 November 2013

Keywords:
Birth weight
Stuttering
Birth cohort

ABSTRACT

Purpose: Previous studies have produced conflicting results with regard to the association between birth weight and developmental stuttering. This study sought to determine whether birth weight was associated with childhood and/or adolescent stuttering in three British birth cohort samples.
Methods: Logistic regression analyses were carried out on data from the Millenium Cohort Study (MCS), British Cohort Study (BCS70) and National Child Development Study (NCDS), whose initial cohorts comprised over 56,000 individuals. The outcome variables were parent-reported stuttering in childhood or in adolescence; the predictors, based on prior research, were birth weight, sex, multiple birth status, vocabulary score and mother's level of education. Birth weight was analysed both as a categorical variable (low birth weight, <2500 g; normal range; high birth weight, ≥4000 g) and as a continuous variable. Separate analyses were carried out to determine the impact of birth weight and the other predictors on stuttering during childhood (age 3, 5 and 7 and MCS, BCS70 and NCDS, respectively) or at age 16, when developmental stuttering is likely to be persistent.
Results: None of the multivariate analyses revealed an association between birth weight and parent-reported stuttering. Sex was a significant predictor of stuttering in all the analyses, with males 1.6–3.6 times more likely than females to stutter.
Conclusion: Our results suggest that birth weight is not a clinically useful predictor of childhood or persistent stuttering.

1. Introduction

Many studies have attempted to identify risk factors associated with stuttering; see, for example, Andrews and Harris (1964), Ardila, Bateman, and Niño (1994), Berry (1938a,b), Cook, Howell, and Donlan, (2013), Craig, Hancock, Tran, Craig, and Peters (2002), Howell (2013), Howell and Davis (2011), Johnson (1955), Månsson (2000), Reilly et al. (2009) and Yairi and Ambrose (2013). Packman (2012) has proposed a model of developmental stuttering whose central hypothesis is that the fundamental cause of the disorder is a neural deficit. This hypothesis is consistent with the findings of many recent studies, which have reported structural and functional abnormalities in the brains of people who stutter (Chang, Erickson, Ambrose, Hasegawa-Johnson, & Ludlow, 2008; Chang, Horwitz, Ostuni, Reynolds, & Ludlow, 2011; Cykowski, Fox, Ingham, Ingham, & Robin, 2010; Watkins, Smith, Davis, & Howell, 2008). One risk factor for abnormal neural development is birth weight (Walhovd, Fjell, & Brown, 2012). Low birth weight is well documented as a major determinant of mortality, morbidity and disability in infancy and childhood and also has a long-term impact on health outcomes in adult life (World Health

* Corresponding author. Tel.: +44 1603 593361.
E-mail address: j.mcallister@uea.ac.uk (J. McAllister).

0094-730X/$ – see front matter © 2013 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.jfludis.2013.10.002

Organization, 1992). High birth weight can be associated with complications during childbirth (Zhang et al., 2008). Either of these variations might have an impact on neurological development that could lead to stuttering.

Two recent studies have reported conflicting results regarding the association between birth weight and developmental stuttering. Reilly et al. (2009) used a birth cohort sample of 1612 children to identify the predictors of therapist-diagnosed stuttering in one hundred and fifty eight 3-year-olds. As well as birth weight, they examined the influence of child's temperament, language development, maternal mental health, maternal education, sex, premature birth status, birth order, twinning, socio-economic status, and family history of stuttering. They found that cohort members (CMs) who stuttered at age 3 were significantly more likely than other CMs to be male, be a twin, have a high vocabulary score at 2 years of age, and be the child of a highly-educated mother. Birth weight was not a significant predictor of stuttering in their study.

By contrast, Boulet, Schieve, and Boyle (2011) did find an association between birth weight and stuttering. They examined the relationship between birth weight and several developmental disorders, including stuttering, in a US parent survey that studied 87,578 children of ages 3–17 years; approximately 25% were 3–5 years old. The parent-reported data included the child's birth weight and whether the child had stuttered during the previous year. In their analyses of all of the developmental disorders, the authors adjusted for the same factors: age, sex, race, household income, maternal education and year of survey. Using birth weights of 3500–3999 g as the reference category, they found that birth weights up to 2999 g were between 1.3 and 3.0 times more likely to be associated with stuttering.

One difference between the two studies that might explain this discrepancy relates to the different age ranges of the participants in the two studies and potential differences between children who recover from stuttering and those whose stuttering is persistent. Perhaps birth weight is only a predictor of persistent developmental stuttering. Since there is a high rate of spontaneous recovery among pre-schoolers who stutter (Ambrose, Cox, & Yairi, 1997; Yairi, Ambrose, Paden, & Throneburg, 1996), the majority of the children in Reilly et al.'s (2009) sample would be likely to recover. Boulet et al.'s (2011) much larger sample included participants in their teens; since most, if not all, of these older participants who stuttered would belong in the persistent category, Boulet et al's sample could contain a higher proportion of participants with persistent stuttering than Reilly et al's. Unfortunately, the way in which Boulet et al. report the data does not allow this possibility to be examined.

The aim of the present study was to determine the relationship between birth weight and developmental stuttering in three British birth cohort data sets, which contain data from over 56,000 participants in total. Using binary logistic regression analyses, we attempted to control for the factors that Reilly et al. (2009) found to be significant predictors of stuttering. We first considered the relationship between birth weight plus these other factors and parent-reported stuttering during childhood. We then considered these factors in CMs at age 16, comparing those who were still reported to stutter at this age with those who had never been reported to stutter. Based on the reasoning in the previous paragraph, we hypothesised that birth weight would be significantly associated with developmental stuttering at age 16 but not during childhood.

2. Method

2.1. Data sources

Data from three British birth cohorts were analysed. A birth cohort study is a type of longitudinal research that follows the same group of individuals throughout their lives. The three British birth cohorts that were analysed in this study were designed as a resource for researchers and policy-makers who were interested in issues such as how early life circumstances and experiences influence later life outcomes, how a person's health, wealth, family, parenting, education, employment and social attitudes are linked, and how these aspects of life vary for different individuals. The datasets form a very rich resource, with information gathered from parents, siblings, teachers and doctors as well as the cohort members themselves. They cover a wide range of aspects of the cohort members' lives, including health, education, relationships, and cognitive development. They use a variety of methods of data collection including questionnaires, cognitive tests and biometric measurements. Each dataset comprises several tens of thousands of variables.

In each analysis the outcome variable was parent-reported stuttering and the predictor variables were those that were found by Reilly et al. (2009) to be significant predictors of stuttering. It is worth noting that in secondary data analysis such as that reported here, selection of variables is constrained by those that are available, and occasionally, when the optimal variable has not been collected, it is necessary to substitute a proxy.

The three datasets that were used in the present study are briefly outlined below. For further information see http://www.cls.ioe.ac.uk/. This website also provides resources for identifying other variables that are available for analysis.

2.1.1. National Child Development Study (NCDS)

The original cohort of NCDS comprised 18,558 children who were either born in Britain in a particular week in 1958, or were born overseas in the same week but moved to Britain before age 16. Surveys were conducted at birth and when CMs were 7, 11, 16, 23, 33, 42, 46 and 50 years of age. Birth weight, sex, multiple birth status and the mother's age of leaving