



## Predictors for everyday functioning in preschool children born preterm and at term



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### 1. Introduction

Everyday life situations like mealtimes, attending preschool and participating in leisure activities are important in a child's life. They consist of sequences of actions that take place within everyday contexts during activities such as dressing, eating, moving indoors and outdoors, and playing [1]. Functioning in the everyday life situations requires both motor skills (for moving around and handling objects) and process skills (the ability to initiate and organize sequences of actions). Everyday functioning also requires skills in communication, interaction with peers and others in the child's context, and being able to fulfil expected social roles [2]. Thus everyday functioning is a multidimensional construct influenced by a multitude of factors and different circumstances during childhood which may influence the development of needed skills. Preterm birth (gestational age GA < 37 weeks) is an example of such a circumstance.

Despite advances in neonatal care the risk of neonatal morbidity is evident for the preterm child, increasing the risk of developing poor developmental outcomes [3,4]. Preterm children may experience more difficulties in cognition [3,4], in executive functions [5] and in motor function than term born children [6–8]. For the preterm born children externalizing and internalizing behaviour problems mediated by cognitive levels, language and motor development are more prevalent [9,10]. This may increase the importance of early detection of also minor behaviour problems, possibly reducing the risk of manifest behaviour disorders in school ages.

Preterm born children may be particularly vulnerable concerning everyday functioning due to difficulties in cognitive, motor and behavioural skills. Palta [11] and Sullivan and Msall [12] found that preterm children, especially those with neonatal morbidities, low birth weight and motor deficiencies, performed worse in everyday life situations at age four than children born at term. Poor everyday functioning may create a barrier for children to participate in everyday life situations typical for their age and context, yet the number of studies in this field is limited. The relationship between perinatal risk factors and later functioning is not clear. Further, most published research up to date emphasize risks and difficulties of preterm born children as isolated phenomena. As a consequence, groups of children born preterm or term are often compared regarding later functional and developmental problems. Differences found between the groups are interpreted accordingly, i.e. as mainly related to the preterm birth. However, the way children function in everyday life is only weakly related to the categories preterm or term born [13,14]. Everyday functioning is due to a multitude of individual and contextual factors. Perinatal factors are relevant, but other factors may be as important and may compensate for the risk related to being born preterm. The aim of the current study was to explore everyday functioning and its relationship to perinatal factors, neonatal morbidity, child behavioural factors and parental socio-economic status for a population-based group of preterm-born and term-born children at six years of age.

### 2. Method

This population-based study from two county councils in Sweden relies on the national registry data from Statistics Sweden [15], which includes official statistics for Sweden, the Swedish Medical Birth Registry (SMBR) [16], which includes perinatal data regarding all children in

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Sweden, administered by the National Board of Health and Welfare; and the Swedish Neonatal Quality Registry (SNQ) [17], which includes data regarding children who have received care in neonatal wards. Three questionnaires were sent to the parents of all children. Informed consent was collected from the parents. The study was approved by the Regional Research Ethics Board in Uppsala, Sweden, Dnr 2012/552 and performed according to the Declaration of Helsinki [18].

### 2.1. Subjects

The two county councils studied have a total of 520,000 inhabitants. In 2008, 5408 children were born, 334 of which were born preterm. These children, identified in the SMBR, were recruited for the current study together with a group of children born at full-term ( $n = 714$ ) matched for day of birth  $\pm 1$  day, gender and residence. Due to the relatively small number of children [19] and an anticipated lower willingness to answer in the full-term (FT) group, two FT children were recruited for each preterm. The preterm children were divided into two groups according to their GA at birth: Very preterm GA  $\leq 32$  weeks (VPT) and late preterm GA 33–36 weeks (LPT).

### 2.2. Procedure

The study was conducted in collaboration with Statistics Sweden and the National Board of Health and Welfare, for a description of the process see Fig. 1. In an invitation letter the parents of the preterm and full-term children were informed that by responding to the questionnaires he/she agreed to participate in the study and consented to

registry data from Statistics Sweden, SMBR and SNQ being made available to the research group. Parents who agreed to participate answered three questionnaires and sent them to the research group. The link between the registers and questionnaires was handled by Statistics Sweden and SMBR. Registry data from all registers regarding eligible children ( $n = 350$ ) were sent to the research group (Fig. 1).

#### 2.2.1. Registers and questionnaires

Data concerning GA, birth weight (BW), birth length (BL), head circumference (HC), Apgar score and neonatal morbidity were collected from SMBR. The latter included the most common neonatal morbidities in prematurity; bronchopulmonary dysplasia, hypoglycaemia, hypoxic ischemic encephalopathy, intraventricular haemorrhage, necrotizing enterocolitis, neonatal infections, periventricular leukomalacia, persistent ductus arteriosus, retinopathy of prematurity [3,20].

For children with registry data in SNQ ( $n = 104$ ) data were verified, and missing data in the SMBR were supplemented. Data concerning the mother's age during pregnancy were collected from SMBR. Data regarding socioeconomic status (SES), i.e. household income and parents' level of education were collected from Statistics Sweden. Since the household incomes ranged from zero to more than five million SEK per year this variable could not be used in the regression analysis. Hence parents' level of education was used as the marker for SES in these analyses.

Three different questionnaires were used:

*The Strengths and Difficulties Questionnaire (SDQ)* is a behavioural screening questionnaire for children 4–16 years of age, designed to be answered by parents and/or teachers. The questionnaire comprises 25 items divided into five scales for hyperactivity, emotional symptoms,

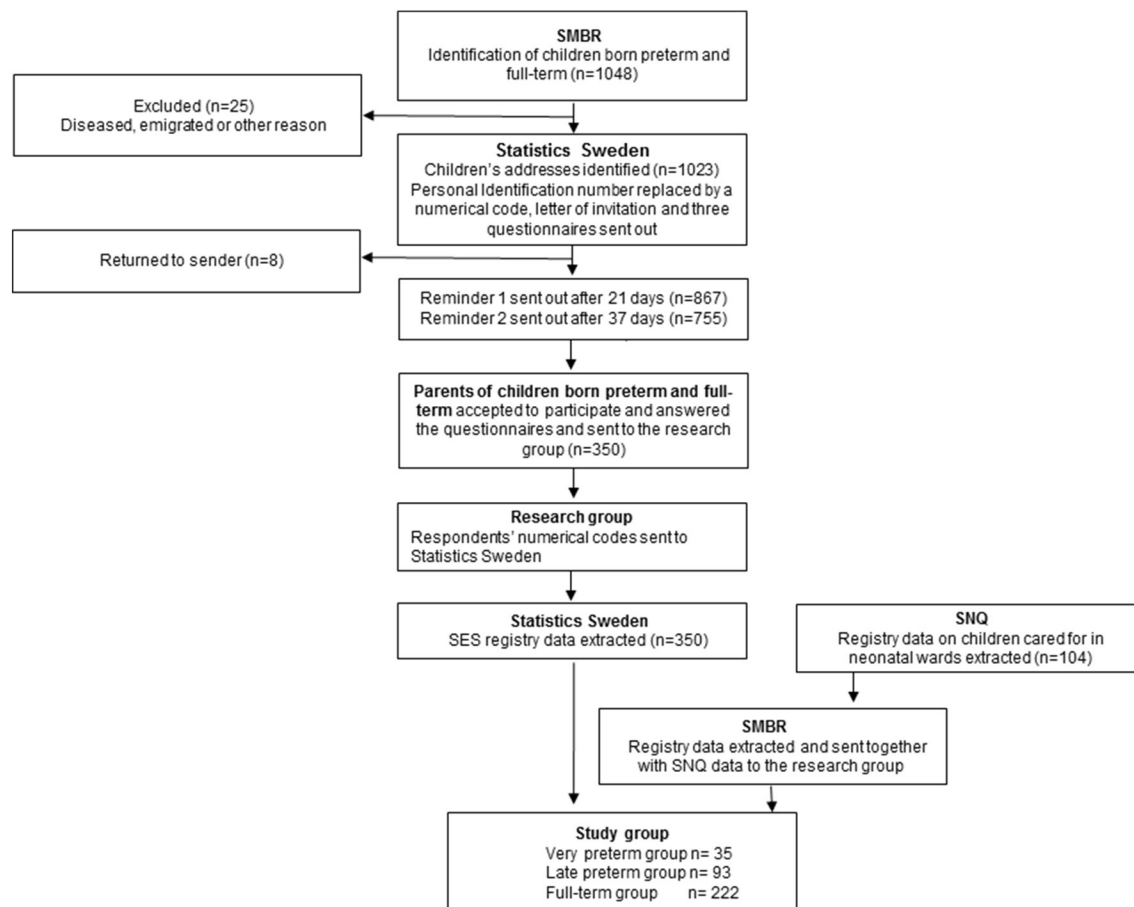


Fig. 1. Flow chart showing recruitment of participants and the data collection procedure. SMBR = Swedish medical birth registry, SNQ = Swedish neonatal quality registry.

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