FINNISH COMMUNICATIVE DEVELOPMENT INVENTORIES - ADVANCES AND APPLICATIONS

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Abstract: *Different versions of the Finnish Communicative Development Inventories (FinCDIs) have been used in multiple studies. The research topics include descriptions of typical language development, longitudinal associations between early and later language ability, and investigations of the effect of background factors on language development. The FinCDIs have been applied in typical populations as well as in specific populations (e.g., preterm children). Further research is needed on the use of the FinCDIs to assess language development in older or multilingual children, in cross-linguistic studies, as well as in clinical populations. Different versions of the FinCDIs are being utilised in ongoing studies, which will provide novel information in the future.*

Keywords: *the Finnish long form versions of the Communicative Development Inventories; the Finnish short form versions of the Communicative Development Inventories; The Finnish Communicative Development Inventories III; lexical development; language development*

INTRODUCTION

The MacArthur Communicative Development Inventories (CDIs) have been used over two decades in Finland. The adapted Finnish long form versions of the CDI (FinCDI-LFs) were published in 1999 (Lyytinen, 1999), while the adapted Finnish short form versions were published in 2018 (FinCD-SFs; Stolt & Vehkavuori, 2018) and the validation study of the adaptation of the FinCDI III was published in 2023 (Stolt, 2023). All FinCDI measures have been used in research. Based on these instruments, a substantial amount of information has been derived on the language development of Finnish children. This article provides an overview of the different topics investigated using the FinCDIs. This article is not intended to serve as a comprehensive list of all studies conducted so far, but to provide examples of the studies carried out for different purposes and within different populations.

Use of the FinCDIs in assessment of typically developing children

The FinCDI-LFs have been used in multiple studies to chart features in typical language development in children acquiring Finnish. The norming study of the FinCDI-LFs (Lyytinen, 1999) provided basic information on the receptive and expressive lexicon size at various age points during the period between 9 and 30 months of age. The later study verified this finding and provided further specific data on the lexical growth rate (lexical spurt), gender differences, and compositional development of early receptive and expressive lexicons of Finnish children during the second year of life (Stolt et al., 2008). Another study (Stolt et al., 2007) described in detail the lexical composition of 2-year-old Finnish children based on lexicon size. In addition, specific associations between lexicon size and composition and grammatical development at the age of two were described in a later study (Stolt et al., 2009). The findings of these studies showed that the growth and composition of the receptive and expressive lexicons, and well as the associations between lexicon and grammar, typically develop in a comparable manner in Finnish-acquiring children as observed in children acquiring, for example, English as their native language.

Further studies have focused on the longitudinal predictive value of early lexicon in terms of later language ability. For example, Vehkavuori et al. (2021) reported, using the FinCDI-SF, that early lexical abilities are associated with a variety of linguistics domains at age five. Thus, the longitudinal associations are not restricted to lexicon alone. Aalto et al. (2020) examined the connections between phonological ability in children at three and half years of age, and lexical ability at two years of age using the FinCDI-LF and lexical skills at the age of three years and six months. Longitudinal associations between lexicon and phonological skills were stronger than the cross-sectional associations. Visapää et al. (2023) reported specific connections between lexical composition measured using the FinCDI-LF at the age two and pre-reading skills at the age five. Further, the usability of the FinCDI-LF and FinCDI-SF was evaluated in a recent longitudinal study conducted by Surakka et al. (2023).

The FinCDIs have been utilised to investigate the associations between background and environmental factors and lexical development in different studies. Paavola et al. (2006) have used the FinCDI-LF in multiple studies, e.g., by investigating the links between mother-child interaction at 10 months and communicative and linguistic development at 12 months. Two large, ongoing, multidisciplinary studies - the *FinnBrain Birth Cohort Study* and the *Steps to the Healthy Development and Well-being of Children Study (the STEPS Study)* - also use the FinCDI-LF to investigate the possible effects of background and environmental factors (e.g., child's temperament, paternal factors, and child's sex) on the development of early gestures and/or language skills during the childhood years. In addition, in the norming and validation study of the FinCDI III (*Leinikki Study*), the FinCDI III has been utilised to investigate the associations between screen time and parental linguistic support in the home environment and children's language skills between the ages of two years and six months and four years and one month (Mustonen et al., 2022).

Use of the FinCDIs in assessment of bilingual children and cross-linguistic studies

The FinCDIs have been used to investigate the lexical development of bilingual children, for example, in a longitudinal study investigating the language development and linguistic environment of hearing children of deaf parents (Kanto et al., 2013). In this study, children's expressive lexicon and syntactic complexity of both spoken Finnish language and Finnish Sign language (FinSL) were examined between the ages of one year and two years and six months using the FinCDI-LFs. The collected data was combined with information collected using other measures. The findings showed large variation in language input and acquisition in these bilingual children. Additionally, language exposure, especially in FinSL, was associated with the children's lexical and syntactic skills in both languages.

The FinCDI-LF was used in a cross-linguistic study to investigate the lexical composition of Finnish and Italian children who were born very prematurely (born <32 gestational weeks), and their controls to examine the possible influence of native language on lexical composition (Stolt et al., 2017). Moreover, in another cross-linguistic study, the FinCDI-SF was used to explore the effects of internal and external factors on the lexical and word combination skills of children acquiring Finnish, Estonian, and Croatian at the age of two (Kuvač-Kraljević et al., 2021). The findings from these cross-linguistic studies highlight comparable features in lexical or word combination development in the children from the different language groups.

Use of the FinCDIs in assessment of clinical populations

The *Jyväskylä Longitudinal Study of Dyslexia* has actively utilised the FinCDI-LF to investigate early lexical and morphological skills in children with and without a familiar risk of dyslexia (Lyytinen & Lyytinen, 2004). Several research articles have been published from this research project, which have provided information on the effect of the hereditary dyslexia risk status on later lan-

guage development. Further, a Finnish nationwide multicentre research project used the FinCDI-LF (Välimaa et al., 2018) to explore lexical development and the effect of background factors in children with bilateral cochlear implants. The authors emphasised the importance of following up the lexical growth of children with bilateral cochlear implants to identify children with delayed lexical development.

The FinCDI-LF has been used in multiple longitudinal studies on very preterm children (born <32 gestational weeks and/or birth weight ≤1500 g). In the *Development and Functioning of Very Low Birth Weight Infants from Infancy to School Age* (PIPARI) study, a regional cohort study of very preterm born children, the FinCDI-LF was used to investigate early lexical (size and composition) and gestural development of very preterm children (Stolt et al., 2007). Recently, Joensuu et al. (2025) explored the predictive value of language skills at age two for reading fluency and reading comprehension at 11 years in the same cohort.

In the *Auditory environment by Parents of Preterm infants; Language development and Eye movements* (APPLE) *study*, conducted in Finland and Estonia, the FinCDI-SF was used to investigate associations between lexical processing at 18 months and lexical development at 12, 15 and 18 months in children born very prematurely (Ståhlberg-Forsén et al., 2022). In the same study, the FinCDI-LF was utilised to study the connections between parental talk in the intensive care units and the lexical development of very preterm children at age one (Aija et al., 2025). In addition, in the ongoing study *Clear Path for the language Development of very preterm children*, different versions of the FinCDIs are being used to investigate which are the best possible early age points and the best measurements for the early identification of weak language abilities in very preterm children in clinical settings. The findings from the above-mentioned studies highlight the significance of the use of different versions of the FinCDIs in assessments of the early language abilities of very preterm children, e.g., to establish the predictive value of early language development, as well as to identify children at risk for weak language skills in this high-risk group.

DISCUSSION AND FUTURE DIRECTIONS

In conclusion, as presented above, quite comprehensive evidence already exists on the use of different versions of the FinCDIs to measure features of early language development (e.g. Stolt et al., 2008; Stolt et al., 2009; Stolt et al., 2007), connections between child- and family-related factors, and children's language skills (Mustonen et al., 2022; Paavola et al., 2006), as well as longitudinal associations between early and later language abilities in typically developing children (e.g. Vehkavuori et al., 2021; Visapää et al., 2023). In clinical populations, experience has been gained, especially regarding the use of the FinCDIs, in assessments of preterm born children (e.g. Aija et al., 2025; Joensuu et al., 2025; Ståhlberg-Forsén et al., 2022), and in those with cochlear implants (Välimaa et al., 2018). The strengths of the studies conducted so far are rather large participant groups, and longitudinal and multidisciplinary research settings.

More information is needed on the use of the FinCDI III in older children and in a variety of clinical populations. There is also a need for further studies in multilingual children. Additionally, cross-linguistic studies employing different versions of the FinCDIs are limited, although they are highly recommended. Future findings from ongoing studies will provide novel information, especially in older children, bilingual children, and in clinical populations.

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