A higher proportion of children aged 4 years were referred to speech and language therapists after the introduction of a new language screening tool

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Abstract

Aim: Language difficulties in children can have enduring impacts on their academic and emotional well-being. Consequently, early identification and intervention are critical. This study aimed to investigate the impact of introducing Språkfyran, a language screening tool, on the identification and referral rates for speech and language assessment compared to the previous method.

Methods: An observational study was conducted in Gotland, Sweden, using the medical records of 3537 children (53% boys) who were 3–4 years of age. The study period lasted between 5 January 2016 and 29 April 2022, encompassing data collection both before and after the introduction of Språkfyran.

Results: Following the introduction of Språkfyran, 15% failed the screening, compared to 20% with the previous speech test. However, referrals for assessment increased significantly with Språkfyran, rising to 7% compared to 3% with the speech test.

Conclusion: The proportion of children who failed the Språkfyran screening was consistent with findings from previous studies. Children who failed the screening were more likely to be referred for speech and language assessment after the introduction of Språkfyran. This indicates that Språkfyran is a clinically relevant tool that promotes children's language development through increased referral rates.

Keywords
child health service, language assessment, language screening, screening

INTRODUCTION

Communication and language form the basis of human interaction and are essential for development, learning and health. Language difficulties can profoundly impact a child's life and lead to a lower quality of life, including mental health problems, difficulties in school and social exclusion.1–3

Language disorder is a common neurodevelopmental condition, affecting approximately 10% of children in the Western world.4 Moreover, there is a large overlap between language disorders and...
other neurodevelopmental conditions, such as autism spectrum disorders, attention deficit hyperactivity disorder and intellectual disability. Early identification and intervention play a crucial role in influencing a child’s language development and reducing the risk of secondary negative consequences. Early universal language screening has been criticized due to the challenges of identifying and diagnosing developmental language disorders in children under 4 years of age and is not recommended. Instead, researchers have recommended universal language and communication surveillance at various developmental stages.

Swedish child health services reach nearly all children with health-promotion services from birth to age five. The services are structured within a national programme aimed at promoting health, monitoring development and providing parental support. This programme provides guidance on what to offer while also allowing for regional differences. Children’s language development undergoes assessment at several time points, enabling continuous universal language surveillance. Despite researchers advising against screening before the age of four, formal language screening is nationally performed at approximately 2.5–3.0 years of age.

One method for assessing children’s language abilities involves the speech test, which includes 10 pictures aiming to elicit specific speech sounds and combinations. According to this method, a child exhibiting phonological difficulties other than pronunciation should be referred for speech and language assessment. Sensitivity and specificity assessments have revealed acceptable specificity (0.88), but low sensitivity (0.48), for identifying children with moderate to severe language abilities at school start. According to the same study, 14% of screened children fail the speech test.

Another method, Språkfyran, developed for identifying language difficulties in children from 4 years of age, has been introduced as a universal screening tool in various child health services across Sweden. The screening takes about 10 min and can be performed by a nurse. Specifically, it comprises 37 items covering sentence and word-level language comprehension, categorisation tasks, word retrieval, repetition of words and non-words, and the ability to point out central parts of a picture. For the last five items, the child health nurses also make overall assessments of the child’s language in terms of intelligibility, common thread, responsiveness, turn taking and prosody. A defined cut-off indicates the need for referral to speech and language assessment. Språkfyran has shown a sensitivity of 0.84 and a specificity of 0.96, with 15% of the children failing the screening.

Swedish child health care utilizes medical record systems to facilitate and monitor referrals between healthcare providers, such as child health services and speech and language therapy services.

In summary, there is a lack of studies assessing real-life settings and the implementation of language and communication screening methods. Although Språkfyran has been studied in terms of sensitivity, specificity and fidelity, further evaluation of its clinical utility is warranted.

The aim of the present observational study was to examine whether the introduction of Språkfyran led to differences in identification rates and referrals to speech and language therapy compared to the previously used speech test.

Specifically, the study investigated the speech test and Språkfyran based on five research questions. These inquiries included potential differences in the proportion of identified children and referrals to speech and language assessment between the two methods. The study also analysed the number of children who failed the screening and were subsequently referred to speech and language therapists using each method. Additionally, the research aimed to determine if the methods exhibited equal identification rates between girls and boys. Finally, the study investigated potential differences in referral rates between the methods, taking into account both gender and screening outcomes.

## METHODS

Data for the study were retrieved from children’s medical records in Gotland, the smallest region in Sweden, where approximately 500 to 600 children are born annually. The dataset included visits conducted between 5 January 2016 and 29 April 2022. Healthcare services across three centres in Hemse, Slate and Visby manage all aspects of healthcare delivery, with each site employing one to nine nurses. The nurses receive support from a central child health unit, consisting of a part-time child health nurse, a paediatrician and a psychologist.

In the past few years, healthcare services in the Gotland Region of Sweden have worked actively to introduce evidence-based methods to identify children and parents in need of extended support, while also providing support to child health nurses in their health promotion efforts. Besides the language screening included in the national programme at 2.5–3.0 years of age, a communication

### Key notes

- This study assessed the introduction of a language screening tool, Språkfyran, regarding screening outcomes and referral rates, compared with a previous method.
- Fewer children failed the Språkfyran screening compared to the previous speech screening method; however, referrals for speech and language assessment significantly increased among those who did not pass the screening.
- Språkfyran appears to offer clinical utility by identifying children requiring speech and language assessment through its comprehensive assessment of linguistic abilities.
screening was implemented at 18 months. Another implemented method is Språkfyran, which was introduced at the beginning of 2020 for children born in 2016, replacing the previously used speech test. The implementation of Språkfyran started with a training session for child health service nurses conducted by a speech and language therapist familiar with the method. The 4-h session included theoretical insights into children's language development and information on using Språkfyran. Participants also had the opportunity to practice Språkfyran on each other.

### 2.1 Participants

The study included children aged 3:11–4:11 years attending child health services in the region. The dataset comprised 3537 children, of whom 1670 (53%) were boys. These children were born between 11 March 2011 and 28 April 2018, and they had their 4-year visit between 5 January 2016 and 29 April 2022. The speech test group had their visits between 2016 and 2019, while the Språkfyran group had their visits between 2020 and 2022. Figure 1 displays the number of children who failed and passed assessments using each method. Due to the recent introduction of Språkfyran, a higher number of children underwent assessments with the speech test: 2241 (63%) compared to 1296 (37%) for Språkfyran.

### 2.2 Data collection and analysis

Data were retrieved from the medical records of all children who visited the child health services during the study period. The variables collected included age at the visit, gender, fail or pass screening and referral to speech and language therapy. In addition, nurses' comments regarding language and communication were retrieved from the medical journal when a child failed a screening but was not referred to speech and language assessment.

Descriptive statistics were used to analyse the proportion of identified children and referrals for each screening method separately. Differences between screening methods in terms of identification and referral, as well as gender differences, were calculated using Fisher’s exact test, with the alpha value set at 0.05. Logistic regression analysis was performed to examine potential variations in screening outcomes between girls and boys and between the methods. Statistical analyses were conducted using SPSS version 28 (IBM Corp, New York, USA) and RStudio version 4.0.3 (R Foundation for Statistical Computing, Vienna, Austria).

### 2.3 Ethics

This study was conducted according to the ethical guidelines described in the Declaration of Helsinki and was approved by the Swedish Ethical Review Board (Dnr 2021-04737). As the study was based on anonymised, previously collected medical record data, no consent was collected.

### 3 RESULTS

With the speech test, 380 children (20%) failed the screening. After the introduction of Språkfyran, 195 children (15%) failed the screening, marking a significant decrease ($p = 0.03$). Using the speech test, 76 children (3%) were referred to speech and language assessment during the 4-year visit, whereas using Språkfyran, 91 children (7%) were referred ($p < 0.001$).

Among children who received a failed result on the speech test, 71 (19%) were referred to speech and language assessment. Upon the introduction of Språkfyran, this number increased to 77 (40%). Reasons for not referring children with failed screening are reported in Table 1. The most frequent reason for non-referral was ongoing speech and language support. For just under 30% of cases, no reason was given. An apparent difference between the speech test and Språkfyran was that, following the introduction of Språkfyran, parents were not encouraged to initiate contact with the speech and language services themselves.

More boys than girls failed the screening regardless of the method used ($p < 0.001$). Specifically, among girls, 15% failed the Speech test and 12% failed Språkfyran. For boys, the proportions were 24% and 21%, respectively. However, there was no significant difference in the proportion of girls or boys with a failed screening between the two methods.

Regression analysis indicated that the introduction of Språkfyran resulted in more children with failed screening being referred to speech and language assessment at the 4-year visit. Additionally, there were no gender differences in referral rates when controlled for screening outcome and method used (Table 2).

### 4 DISCUSSION

The proportion of children who failed the speech test was slightly higher than expected. However, for Språkfyran, this proportion harmonised with previous research findings. Girls failed the assessment to a lesser extent than boys, regardless of the method used. This is in line with previous studies indicating that boys exhibited higher rates of language difficulties and earlier identification compared with girls. While this difference might be due to actual gender differences, Lindsay and Strand and Norbury, et al. suggest that girls’ language difficulties were underestimated and underdiagnosed.

The results from this study indicate that children identified using Språkfyran are more likely to be referred for evaluation of eligibility for speech and language therapy than those identified using the speech test, regardless of gender. Children identified using Språkfyran, almost twice as many were referred to speech and language therapy compared to those identified using the speech test.
Major limitation of the study was that no data regarding speech and language assessments were included. Therefore, it was not possible to discern whether the identified or referred children actually needed speech and language therapy. However, there seemed to be a higher degree of agreement between nurses' clinical assessments and screening outcomes after the introduction of Språkfyran. The training received by nurses prior to the implementation of Språkfyran may have increased their understanding of speech and language development. Consequently, they might have been more likely to refer individuals for speech and language assessments. However, it may also suggest that Språkfyran itself was regarded as more reliable than the speech test, indicating its clinical utility. The speech
test at age four only focuses on speech sounds, while Språkfyran screens linguistic abilities such as word retrieval and categorisation skills. Therefore, Språkfyran may enable children to demonstrate a broader set of essential linguistic abilities. The speech test, on the other hand, may not fully capture the complexities of language difficulties. Thus, Språkfyran may identify children in need of speech and language therapy more accurately. The speech test may not meet the criteria for screening methods and should most likely be seen as a health surveillance tool. Several studies suggest that screening identifies children with difficulties to a greater extent than health surveillance alone and more equitably across demographic groups. Nevertheless, universal screening for language difficulties has been criticised, as the assessed screening methods do not sufficiently distinguish transient from persistent difficulties. As a result, common practice in Swedish child health services involves a combination of repeated screenings and overall assessments of child development and family situation to refine referral processes and ensure timely interventions, which is supported in previous research.

The present study used an observational study design based on registry data from medical records. This design presents both strengths and limitations. One major strength is that the study population consisted of all children who visited the child health services over the study period of 6 years. However, a notable limitation is that the study only included information from medical records; therefore, information on assessment fidelity is lacking. Notably, assessment fidelity has been reported to be low for Språkfyran. Another limitation is that the studied context, the Gotland Region of Sweden, is a small region with specific conditions, which may influence the referral rates. Thus, the generalisability of the findings to broader contexts could be somewhat limited.

Future research should assess children’s development over a more extended period and incorporate data from speech and language services. This will help to determine whether the difficulties identified through Språkfyran are persistent or transient.

**5 | CONCLUSION**

The proportion of children who failed the Språkfyran screening was in line with previous studies. Children who failed the screening were more likely to be referred to a speech and language therapist after the introduction of Språkfyran. This suggests that Språkfyran is a clinically relevant tool for promoting children’s language development by leading to higher referral rates.

**AUTHOR CONTRIBUTIONS**

Anton Dahlberg: Conceptualization; investigation; writing – original draft; methodology; validation; visualization; writing – review and editing; formal analysis. Anna Levin: Conceptualization; investigation; writing – review and editing; formal analysis. Anna Fälå: Conceptualization; investigation; writing – original draft; funding acquisition; methodology; validation; writing – review and editing; formal analysis; project administration; data curation.

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**CONFLICT OF INTEREST STATEMENT**

Anna Levin was involved in the planning and implementation of Språkfyran in the Gotland Region of Sweden. The other authors have no conflicts of interest to declare.

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