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Corresponding author:

Mahaveer Sangha

mahaveer.sangha.16@ucl.ac.uk

Author Affiliation:

Norfolk and Norwich University Hospitals.

A scoping systematic review protocol for assessing the correlation between socioeconomic risk factors and speech outcomes in pre-secondary school children born with cleft lip and/or palate

Sangha, MS; Jaiswal, SK; Davies, J; Van Eeden, S; Butterworth, S; Fell, MJ.

ADMINISTRATIVE INFORMATION

Support - n/a.

Review Stage at time of this submission - Data analysis.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202580079

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 25 August 2025 and was last updated on 25 August 2025.

INTRODUCTION

Review question / Objective To assess whether sub factors of socioeconomic status* affects speech outcomes^ in pre-secondary school children with cleft lip and/or palate, and without additional deficits in speech or cognition

*sub factors were characterised from the index of multiple deprivation, American Psychological Association and the World Health Organisation's classifications of social determinants of health

^following consultation with two specialist cleft speech and language therapists, it was decided that the main constituent components of each commonly used cleft speech assessment tool were to be used as variables due to the frequency in reporting at least one of these. This included: nasal resonance, nasal emission, turbulence, grimace, articulation patterns, and phonation. Additionally, the CLEFT-Q scale, an internationally validated patient reported outcome measure (PROM)¹⁴, was also included as a method to assess speech.

Background Cleft lip and/or palate (CLP) represents the most frequently occurring craniofacial congenital anomaly globally. The highest burden of disease is thought to occur in Sub-Saharan Africa, South Asia and the Middle East/North Africa. People born with CLP can encounter differences in both physical (appearance and function) and psychological wellbeing. Speech is intricately involved with the cleft pathology and there are recognised patterns of cleft speech characteristics. Many individuals born with isolated CLP are able to achieve speech outcomes equivocal to their non-cleft peers (following medical intervention) with no difference to quality or length of life. Overall, up to 58-76% of children (at 5-years old) with CLP achieve normal speech. In 2010, the landmark Marmot Report highlighted the impact of health inequalities and social determinants of health on long-term health outcomes, in particular it highlighted the need to provide children with optimal healthcare to provide the best start in life. In the non-cleft population, socioeconomic factors (such as low household income and parental level of education), have been

shown to correlate with poorer speech and language outcomes. Hoff et al. (2003) compared high to mid-socioeconomic families with otherwise healthy children, and found speech and language outcomes in these children strongly correlated with parental education. In identifying the influence of SES on speech outcomes in CLP, SLT intervention can be optimised for at risk children to maximise speech quality.

The impact of socioeconomic status (SES) on speech outcomes in CLP has not been explored in detail, though studies report socioeconomic deprivation adversely impacts language outcomes in CLP. The aims of this study are to identify if SES factors correlate with speech outcomes in children with CLP at pre-secondary school age and without other cause for speech deficit and whether these correlations are isolated by country/region or exist globally. Given the broad topic and inconsistency in reporting speech outcomes and socioeconomic variables, a scoping review was conducted in order to identify key concepts and gaps in knowledge for future reviews/studies.

Rationale There are few current studies investigating SES and speech outcomes in CLP, and those that do are highly heterogeneous in their measurement of both socioeconomic factors and speech outcomes. This heterogeneity prevents meta-analysis and makes it difficult to draw firm conclusions about whether socioeconomic disparities influence speech outcomes, or whether these effects are specific to certain regions/healthcare systems. Moreover, confounding factors such as timing of surgery, access to healthcare, hearing problems, and parental language background are often not adequately controlled. Given these uncertainties, a scoping review is the most appropriate methodology to systematically map the available literature, identify the range of SES factors studied, assess how speech outcomes are measured, and highlight knowledge gaps. This approach will clarify whether socioeconomic influences on speech outcomes in CLP have been adequately studied, and provide a foundation for future studies. Ultimately, the findings may inform healthcare professionals and policymakers in tailoring SLT interventions, ensuring equitable outcomes for children with CLP.

METHODS

Strategy of data synthesis Independent variables As per the World Health Organisation (WHO): ‘social determinants of health are circumstances in which people are born, grow up, live, work and age in, and the systems put in place to deal with illness.’ There is variation in the recording of

socioeconomic status (SES) between countries and studies. Initially the index of multiple deprivation (IMD), a measure of relative deprivation and surrogate for healthcare inequality, and its seven constituent factors (income, employment, education, health, crime, barriers to housing and services, and living environment) were selected as methods for assessing SES. However, the IMD is a tool specifically validated for use in England and is not uniformly reported. Additionally, the score is not specific to the individual and is based off the average scores for each constituent factor in an area/postcode. Therefore, in order to identify all applicable literature from all countries, a composite of factors extracted from the IMD, American Psychological Association and the WHO’s classifications of social determinants of health will be used as the baseline markers for assessing socioeconomic status.

Dependent variables

Several variations in speech assessment exist. In the UK, the most common speech assessment protocols include the CAPS-A and GOS.SPASS-98, and although these are validated and standardised, these tools are not used internationally and not always reported in UK studies. Following consultation with two specialist cleft Speech and Language Therapists (SLTs), it was decided that the main constituent components of each assessment were to be used as the dependent variables due to the frequency in reporting at least one of these variables. These included: nasal resonance, nasal emission, turbulence, grimace, articulation patterns, and phonation. Additionally, the CLEFT-Q scale, an internationally validated patient reported outcome measure (PROM)¹⁴, was also included as a method to assess speech. The scale includes scoring for reading out loud, trouble with specific words or sentences, and the need to use strategies, such as speaking slowly or needing to concentrate to speak well. If alternative variables are presented, these will be discussed with SLT colleagues (J.D. and S.V.E.) and included if deemed to be valid measurements and comparable to aforementioned variables. In keeping measures of speech broad, study screening will be able to identify all applicable literature for review.

Data synthesis

Data will be extracted independently from each study by M.S.S. and S.K.J, inconsistency in charting will be resolved by discussion. Where available, the following variables will be collated and tabulated within a Microsoft Excel Spreadsheet: country of origin, study design,

number of centres involved/structure of healthcare service, number of patients within dependent and control group, characteristics of the population assessed, average age and range at which speech assessments were conducted, the domains of SES assessed and how patients were stratified, speech outcome scoring system used, pertinent results. To make data comparable between studies, all results will be reviewed with SLT colleagues to assess whether data can be modified into a standard format.

Critical appraisal

Bias will be assessed in line with the Cochrane Handbook. Assessments will be carried out independently by the two authors. Where discrepancies are identified a further review and discussion will be conducted until consensus is achieved, an additional author will be involved if required. The revised Cochrane risk of bias tool for randomized trials (RoB 2) and Risk Of Bias In Non-randomized Studies - of Interventions/Exposures (ROBINS-I/E) tools will be used respectively depending on study design. Given the variation in reporting of socioeconomic factors and speech, methodology and results will also be critically appraised by the corresponding author, against guidelines outlined by Enhancing the QUALity and Transparency Of health Research (EQUATOR) so that a recommendation for the reporting of SES and speech in studies regarding CLP can be presented.

Eligibility criteria The study places no restrictions on country of origin or date at which conducted for reviewed literature, in order to assess if SES corresponds to speech outcomes globally or nationally. Despite some countries having standardised ages for which CLP speech quality is assessed, these do not necessarily match with international counterparts and are influenced by structure of the available healthcare services and education systems. Therefore, following discussion with SLT colleagues the age range selected for this study is 3-12 years, i.e. coinciding with the early years of schooling. In selecting this range, the impact of schooling on speech production should be minimised and therefore not confound the inherent SES factors present in a child's early life. Additionally, persistent speech disorders negatively affect educational outcomes, therefore earlier identification of adverse correlation with SES may yield greater impact. Studies that did not exclude/segregate patients with CLP and other conditions that significantly contributed to morbidity, cognitive impairment and non-CLP-linked speech abnormality will be excluded. Studies reporting only language outcomes will be excluded. No

restriction will be placed on measure of SES or speech outcome as outlined above. Case reports and review studies will be excluded though references will be reviewed for applicable constituent studies, all other study designs will be included.

Source of evidence screening and selection A systematic search for studies will be conducted through PubMed/MEDLINE and Cochrane databases. The following MESH and key-terms will be used in the synthesis of a search-string: (cleft*) AND ((Socioeconomic*) OR (social*) OR (economic*) OR (income*) OR (high-income*) OR (low-income*) OR (middle-income*) OR (standard*) OR (living*) OR (inequ*) OR (class*) OR (pover*) OR (status*) OR (school*))). The full search string will be made available in the official publication of results. The search, title and abstract screening will be conducted by at least two authors, full article screening will also be conducted by at least two authors., with disagreements in study selection resolved through discussion. Citations of articles undergoing full article screen will be reviewed and included in the selection process if relevant. At full article review, for articles which are not written in the English language, the original authors will be approached for manuscript versions in the English language or will be translated using Google Translate and reassessed. If suitably translated, the article will be included, if incoherent or clear inaccuracies are identified, the full article will be removed. If data is missing/incomplete, attempts to identify relevant data in supporting information will be made, if insufficient, attempts to extrapolate required information from the manuscript will be made, if this is still unsuccessful, original authors will be contacted for the required data. If data remains incomplete, analysis will be conducted with the presently available information.

Data management Reference Management

All references retrieved from database search will be stored in Mendeley Desktop Ver 1.19.8, organisation and removal of references at each stage of the screening process will be conducted within the software. As mentioned previously, screening will be conducted by at least two authors and any discrepancies will be resolved by discussion, should a resolution not be met, an additional author will be provide input.

Data Charting

Following identification of applicable studies, data will be extracted and stored onto an encrypted and password protected Microsoft Excel file that will only be shared between authors. Specific information to be recorded within this file will include: article title, article authors, year and

country of publication, average age and range of ages of speech assessment in control and independent groups, study design, whether the study is multicentre or not, number of patients in total and in each group, characteristics of the groups within the study (inclusion and exclusion criteria, first language), scoring system and factors used for assessing socioeconomic status, tool used for speech assessment, average findings of aforementioned scores/tools, critical analysis and bias assessment of each included study.

Following publication of findings, anonymised, raw data will be made available upon reasonable request to aid transparency, discussion and further research.

Reporting results / Analysis of the evidence

Results (and the entirety of the manuscript) will be reported in line with the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist. A flow diagram will be used to illustrate the stages of screening, the number of studies included/excluded at each stage and reason for exclusion. Data will be presented in tabular form and include aforementioned data points, descriptive and numerical entries will be included. Additionally, findings from bias assessment will be presented in figures made using online tools made by riskofbias.info.

Language restriction No.

Country(ies) involved United Kingdom.

Keywords socioeconomic status, speech, cleft lip, cleft palate, orofacial cleft.

Contributions of each author

Author 1 - Mahaveer Sangha - Drafted manuscript, involved in all aspects of protocol development.

Author 2 - Sharlene Jaiswal - Will be involved in search strategy development and data collection.

Author 3 - Julie Davies - Contributed to selection of variables and inclusion/exclusion criteria.

Author 4 - Stephanie Van Eeden - Contributed to selection of variables and inclusion/exclusion criteria.

Author 5 - Sophie Butterworth - Contributed to selection of variables and inclusion/exclusion criteria.

Author 6 - Matthew Fell - Involved in all aspects of protocol development.