PS-6

Development of a Child Articulation Screening Test within Digital Therapeutics Using Delphi Method

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Background and Objective

◆ Speech sound disorders (SSDs): **common in children**
- Associated with **reading and academic difficulties**

◆ After the COVID-19 pandemic
- Increased need for **remote and digital assessment**

◆ Existing Korean tools
- Face-to-face dependent
- No automated scoring
- Limited for remote use

◆ Objective
- To develop and validate a digital-friendly articulation assessment tool for DTx integration

Method

◆ Design: 3-round modified Delphi

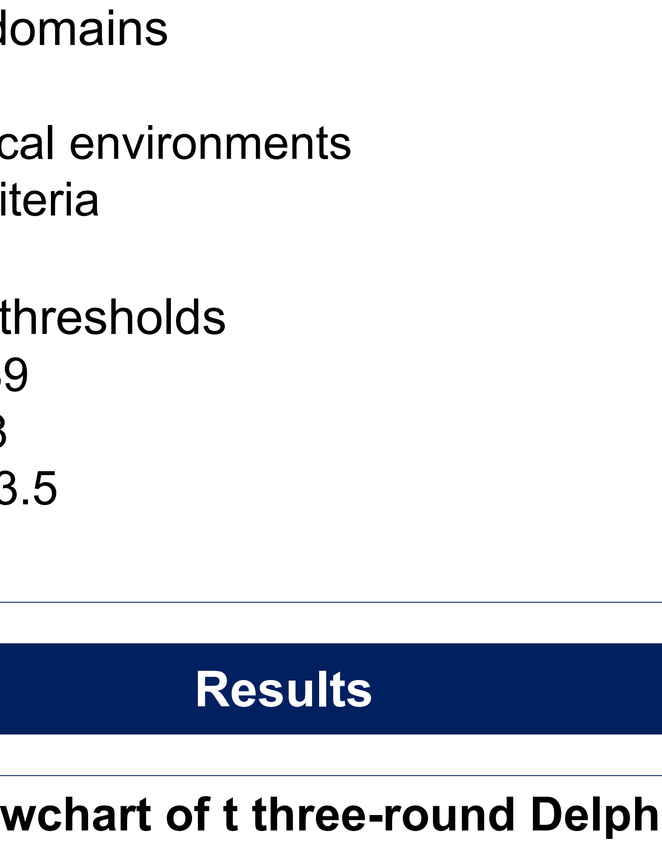
◆ Participants: 23 experts
- Physiatrists (n=12)
- Speech-language pathologists (n=11)

◆ Evaluation domains
- Word list
- Phonological environments
- Scoring criteria

◆ Consensus thresholds
- CVR ≥ 0.39
- CVI ≥ 0.78
- Median ≥ 3.5
- IQR ≤ 1.0

Results

Figure 1. Flowchart of t three-round Delphi process



◆ **Round 1**
- Removed outdated/dialectal words
- Expanded diphthongs & fricative/affricate items
- Suggested visualization of results

◆ **Round 2**
- Established **35-word list**
- 5 items required revision

◆ **Round 3**
- **Full consensus achieved**

◆ **Final Output**
- Validated **35-word articulation tool**
- Improved scoring system
- **Visual reporting features**

Table 3. Outcomes of the second-round Delphi survey evaluating the appropriateness of the word list, phonological environments, and scoring criteria for articulation assessment.

Category	Survey Questions	CVR	CVI	Median	IQR	Agreement
Word List and Stimulus Appropriateness	Word list matches assessment purpose	0.83	0.91	4	0	1
	Word list appropriate for ages 2–18 ; familiar vocabulary	0.65	0.83	4	0	1
	Words difficult to visualize or confusing	0.83	0.91	4	0	1
	Presentation order appropriate for flow and difficulty	0.83	0.91	4	0	1
	Word list appropriate for frequency and exposure by age	0.91	0.96	4	1	0.75
	Word length appropriate	0.83	0.91	4	1	0.75
	Factors to prioritize for engaging stimulus words	0.83	0.91	4	0.5	0.88
Phonological Environments	Adequate coverage of consonant positions, places, manners, features	0.83	0.91	4	0	1
	Selection of target vowels valid	0.74	0.87	4	1	0.75
	Environments reflect common child speech errors	0.48	0.74*	4	0.5	0.88
	Exclude dialectal/regional words	0.74	0.87	4	0	1
	Option for diphthongs due to increased task difficulty/vocabulary load	0.74	0.87	4	1	0.8
Scoring Criteria	Understanding of indices (PCC, PMLU, PWP, PVC)	0.65	0.83	4	0	1
	Usefulness of indices in clinical practice	0.65	0.83	4	1	0.75
	Validity of consonant error classification	0.91	0.96	4	0	1
	Clarity of scoring criteria (place, manner, phonation, features)	0.91	0.96	4	1	0.75
	Appropriateness of scoring method	0.57	0.78	4	0	1
	Sufficiency of indices for clinical interpretation	0.57	0.78	4	0.5	0.88
	Scoring rubric excessively detailed or redundant	0.13*	0.57*	4	1	0.75
	Appropriateness for caregiver explanation	0.65	0.83	4	1	0.75
	Usefulness of PWC/PWP for goal setting	0.39	0.7*	4	1	0.75
	Contribution of mean phonological length to complexity	0.22*	0.61*	4	1	0.75
	Usefulness of accuracy by place/manner	0.91	0.96	4	1	0.75
	Contribution of feature-based indices to error analysis	0.3*	0.65*	4	2*	0.5*
	Need for comprehensive report format	0.57	0.78	4	1	0.75

*: did not meet the criterion

CVR: Content Validity Ratio, CVI: Content Validity Index, IQR: interquartile range

Conclusion

◆ Addresses limitations of existing tools

◆ Enables digital and AI-based DTx integration

◆ Automated scoring + visualization
→ enhanced clinical utility

◆ Supports personalized intervention for children with SSDs

◆ **Future Directions**
- **Non-inferiority testing** vs. existing tools
- Clinical validation in **real-world DTx platforms**