Perceptual, Motor and Cognitive Factors in Braille Reading: A Scoping Review

Natalie Martiniello[1,2] ◆ Walter Wittich[1,2,3]

[1] CRIR/Centre de réadaptation MAB-Mackay du CIUSSS du Centre-Ouest-de-l'Île-de-Montréal
[2] School of Optometry, Université de Montréal, Montreal, Canada
[3] CRIR/Institut Nazareth et Louis-Braille du CISSS de la Montérégie-Centre

BACKGROUND

- Reading difficulties are the most common reasons for referral to vision rehabilitation services (Brussee, van Nispen, & van Rens, 2014), with at least sixty percent of clients referred to low vision rehabilitation experiencing difficulties related to reading that require intervention (Rubin, 2013).
- Braille assessments exist for intervening with children, but there are no standardized assessments for older adults.
- There is little evidence-based research on the influence of age on factors related to braille reading, but there is a perceived difficulty associated with learning to read braille in older adulthood (Heller & Gentaz, 2014).
- Tactile perception, motor dexterity and cognitive ability are known to decline with age, but the impact of this on braille training and reading performance is unknown (Stevens, Foulke & Patterson, 1996; Legge et al., 2008).

RESEARCH QUESTIONS

This study synthesizes research on factors related to braille reading and aging using the scoping review methodology (Arskey and O'Malley, 2005) to address the following:

(1) What perceptual, motor and cognitive factors are known to impact braille reading performance as individuals age?

(2) How have these factors been measured in functionally blind participants in prior studies?

Arksey, H., & O'Malley, L. (2005). Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology, 8*(1), 19-32

Brussee, T., van Nispen, R. M., & van Rens, G. H. (2014). Measurement properties of continuous text reading. *Ophthalmic and Physiological Optics, 34*, 636-657.

Heller, M. A., & Gentaz, E. (2014). *Psychology of Touch and Blindness*. (C. 9, iBooks Ed.) New York: Psychology Press, Taylor & Francis Group.

Legge, G. E., Madison, C., Vaughn, B. N., Cheong, A. M., & Miller, J. C. (2008). Retention of high tactile acuity throughout the lifespan in blindness. *Percept Psychophys, 70*(8), 1471-1488. doi:10.3758/PP.70.8.1471

Pham, M. T., Rajic, A., Grieg, A. D., Sargeant, J. M., Papadopoulos, A., McEwen, S. A. (2014). A scoping review of scoping reviews: advancing the approach and enhancing the consistency. *Research Synthesis Methods, 3*(4): 371-385.

Rubin, G. (2013). Measuring reading performance. *Vision Research, 90*, 43-51.

Stevens, J. C., Foulke, E., & Patterson, M. Q. (1996). Tactile acuity, aging, and braille reading in long-term blindness. *Journal of Experimental Psychology: Applied, 2*(2), 91-106.

METHODS

Identifying Relevant Studies

Given the relatively small amount of published research, a wide-ranging search for the word "braille" was conducted in four electronic databases: PubMED, PsycINFO, the Cochrane Database of Systematic Reviews, and ERIC.

Inclusion Criteria

- English language only
- Peer-reviewed studies only
- Addresses at least one perceptual, motor, or cognitive factor influencing braille reading or learning performance or outcomes
- Only studies focusing on factors related to acquisition of the braille code, and not literacy (e.g. phonetics, spelling)

Study Selection

Titles and abstracts were reviewed by two independent reviewers to eliminate articles irrelevant to the two research questions. An initial sample of 250 articles was reviewed and then compared, resulting in substantial agreement between reviewers (Cohen's kappa = .76, 95% CI = [.71, .81], p < .01) prior to discrepancies being discussed and resolved between the reviewers. Across all articles considered, nearly perfect agreement was achieved (Cohen's kappa = .91, 95% CI = [.88, .93], p < .01). Where discrepancies could not be resolved between the reviewers, the articles were retained for full-text evaluation. The full texts of these articles will be assessed by two reviewers to confirm eligibility for inclusion, and any discrepancies resolved between them to reach a final decision.

Charting the Data

The following information will be extracted from each article, where available, for analysis purposes:

- Country of origin (population studied)
- Year of publication
- Sample characteristics
  - Sample size
  - Age range of study sample
  - Vision characteristics of study sample
- Study characteristics
  - Setting (school, rehabilitation center, academic setting, etc.)
  - Language used for assessment
  - Research methods (case study, descriptive, qualitative, experimental)
- Factors identified
  - Category (perceptual, motor, cognitive) and factor(s) considered
  - Instrument of measurement employed to assess each factor
- Key findings (as they relate to identified factors)
- Study limitations (as they relate to identified factors)

RESULTS

Titles and abstracts have been reviewed and we are commencing the process of acquiring and reviewing the full texts of each article to confirm inclusion.

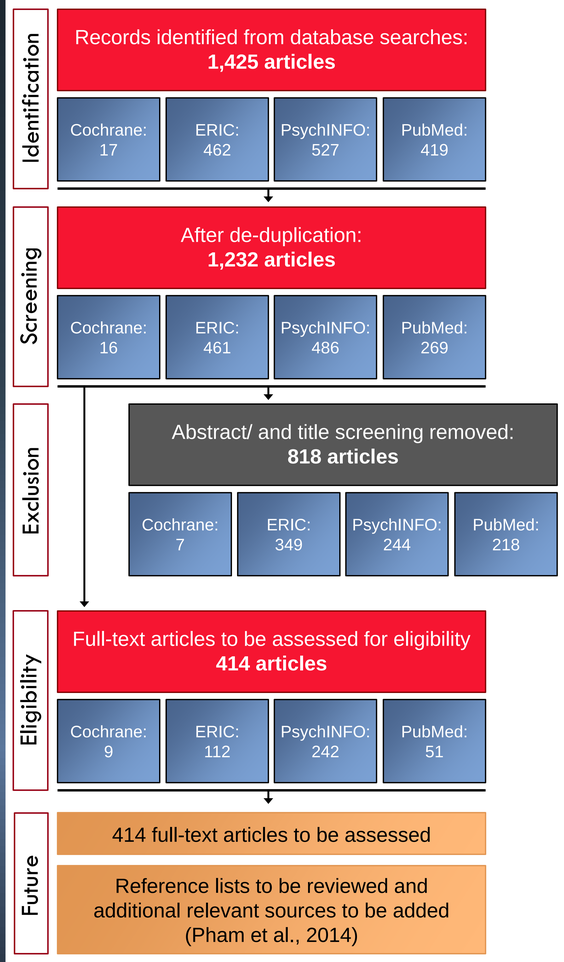

Figure 1. PRISMA flow diagram (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) for the scoping review.

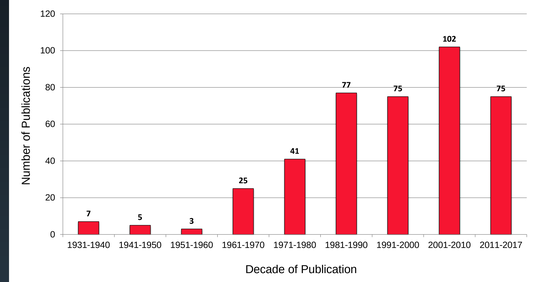

Figure 2. Distribution of included publications by decade of publication.

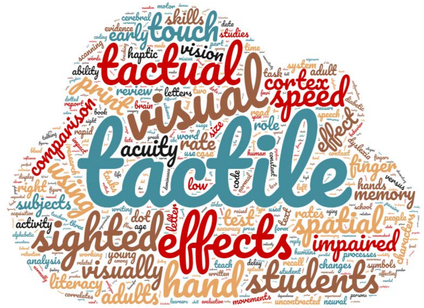

Figure 3. Word cloud generated from the titles of the included articles.

CONCLUSION

- 414 articles will be reviewed for inclusion.
- Results will provide direction for future studies and the development of evidence-based assessment and training protocols for adult and senior clients

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