

Selective citation in the literature on swimming and childhood asthma

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Introduction

- *Selective citation* can lead to biased knowledge development.
- Especially when citations are driven by the outcome of the cited study (*citation bias*)
- Previously a meta-analysis has shown that articles with positive outcomes are cited about twice as often.
- In this citation analysis, we will assess the impact of multiple determinants on citation.
- Topic of investigation: swimming water & asthma (blue box).

Method

- A search strategy, with terms for *swimming pools, asthma* and *children*, was applied to Web of Science Core Collection.
- 36 articles on the relation between swimming and asthma-related measures in children until 18 years old were identified, with 507 potential citation paths (Fig 1 & 3)
- Citation paths were considered *potential* if the publication date of the cited article was before the citing article's submission date.
- Information on positive/negative *outcome*, study *design*, *sample size*, *impact factor*, *authority*, and *self-citation* was extracted (among other factors).

Swimming and childhood asthma

Human sweat and urine interact with free chlorine in chlorinated water.

This chemical reaction leads to trichloramine (NCl₃).

NCl₃ is airborne and will be inhaled by swimmers.

The actual exposure to NCl₃ is higher for indoor pools with limited ventilation, and if swimmers do not take a shower before, stay long and exercise intensively.

Children's lungs are still in development and possibly more sensitive to health effects of NCl₃.

In Europe there are more swimming pools and a higher incidence of childhood asthma.

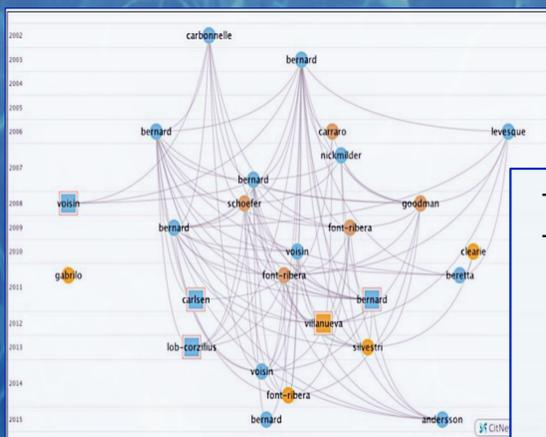
Based on these considerations, Bernard formulated the following hypothesis:

Swimming in chlorinated water increases the risk of developing asthma in children.

Research objective

To assess the occurrence and determinants of selective citation in scientific publications on the relationship between swimming in chlorinated water and childhood asthma

Figure 1: Citation network.



Blue circles represent articles with a positive authors' conclusion. Orange circles represent articles with a negative authors' conclusion. (Neutral articles are excluded from this graph).
The circles represent empirical articles, the squares represent narrative articles.

Statistical analyses (Table 1)

- Univariate random-effects logistic regressions were performed, clustered on the citing article
- Dependent variable: potential citation being realized (1) or not (0)
- Predictors: characteristics of the cited article
- Analyses were repeated with adjustment for design.
- Fixed-effects logistic regressions were used to assess self-citation.

Table 1: Odds ratios for the impact on citation.

Characteristics	Crude OR (CI)	Adjusted OR (CI)
Authors' Conclusion (pos vs neg)	1.4 (0.9 – 2.3)	1.8 (1.1 – 2.9)
Study Design (empirical vs narrative)	4.2 (2.6 – 6.7)	-
Sample Size (ref: low)		
medium	4.2 (2.1 – 8.4)	-
high	5.8 (2.9 – 11.6)	-
Journal Impact Factor (ref: 0-2)		
2 – 4	0.5 (0.3 – 0.9)	0.7 (0.4 – 1.1)
>= 4	1.9 (1.2 – 3.1)	2.0 (1.2 – 3.3)
Authority (ref: low)		
medium	2.4 (1.5 – 4.0)	2.8 (1.7 – 4.6)
high	4.1 (2.2 – 7.8)	4.1 (2.1 – 8.0)
Self-citation (yes vs no)	4.6 (2.8 – 7.5)	5.2 (3.1 – 8.8)

Figure 3: Number of articles, per study design.

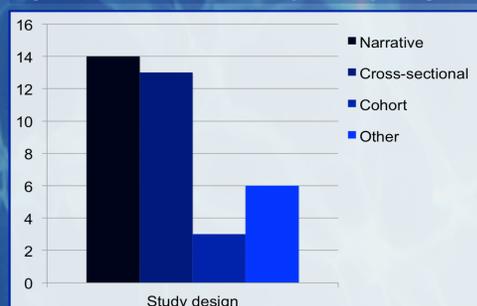
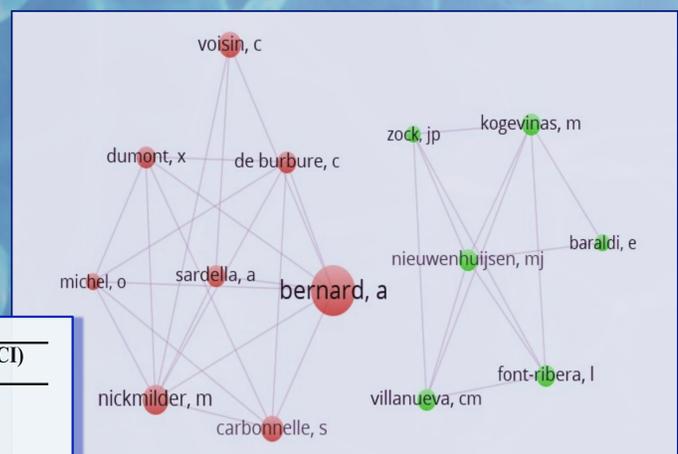


Figure 2: Research groups.



Each circle represents an author. The bigger the circle, the higher the number of publications. Each line represents a shared authorship.

Findings

- 36 articles in this network. 16 confirming and 10 rejecting the hypothesis (Fig 1)
- 22 empirical articles: only 3 of these were cohort studies and no rct. (Fig 3) Research waste?
- Clear evidence for selective citation (Table 1)
- Evidence for citation bias exists but is not strong.
- There are 2 active research groups, with contradictory views. (Fig 2)
- Self-citation is eminent, in both research groups.