

American Association of Orthodontists Foundation Craniofacial Growth Legacy Collection in the orthodontic literature—use and trends: A systematic review

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Introduction: The American Association of Orthodontists Foundation (AAOF) Craniofacial Growth Legacy Collection is a digital repository of records from 9 craniofacial growth study collections in the United States and Canada. The purposes of this article were to describe the use of materials from the AAOF Craniofacial Growth Legacy Collection in the orthodontic literature in comparative and follow-up studies, and to analyze trends before and after the project's launch in 2009. **Methods:** An electronic search without date or language restriction was conducted in the following databases: PubMed, Embase, Evidence-Based Medicine Reviews, and CINAHL. Grey literature resources and the bibliographies of the selected studies were also consulted. Three independent reviewers assessed the studies for inclusion. The criteria were human subjects of any age, sex, and ethnicity; at least 1 of the 9 AAOF legacy collections used as either the main sample population or the comparison or control; and orthodontic outcomes assessed. Data were analyzed using STATA software (version 14.2; StataCorp, College Station, Tex). **Results:** A total of 199 studies (127 follow-up, 72 comparative) were included. The most commonly used collection in comparative studies was the Michigan Growth sample. The number of published studies more than doubled after the AAOF Legacy Collection project testing and launch in 2009. The increase continued through 2010 to 2014, during which there was a trend to use multiple collections. The Burlington Growth collection was the most commonly used collection for follow-up studies. The overall use of the legacy collection showed a small increase in published studies after 2009. **Conclusions:** The overall numbers of published studies in the comparative and follow-up categories increased after 2009, reflecting the efforts of the AAOF team and collection curators to make the records available worldwide. Further research should consider studying each collection to identify utilization predictors. (Am J Orthod Dentofacial Orthop 2018;153:15-25)

Between 1930 and 1985, researchers in the United States and Canada collected longitudinal growth data on children with malocclusions. The data included radiographic and nonradiographic records that were amassed in individual, independent collections.¹ Preservation of these collections is absolutely

critical because these records were accumulated at considerable human and economic costs. Because of the radiation exposure risk, these studies are unlikely to be repeated in view of ethical considerations.² Therefore, these records are likely to remain invaluable for decades to come.²

Due to concerns about loss of the physical records, the American Association of Orthodontists Foundation (AAOF) supported the development of a centralized database to preserve the records in a digital format, allowing them to be accessible from a single Web site.^{3,4} The AAOF Craniofacial Growth Legacy Collection is the result. It currently holds 9 of the 11 known collections of longitudinal craniofacial growth study records.⁵ The 9 collections, comprising a total sample size of 762 subjects^{4,5} with different malocclusions, are the Bolton-Brush Growth, Burlington

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Growth, Denver Growth, Fels Longitudinal, Forsyth Twins, Iowa Facial Growth, Mathews Growth, Michigan Growth, and Oregon Growth studies.^{1,6-15}

Each collection had its own sampling technique, study follow-up duration, data collection method, and types of records. Collectively, however, a wealth of information can be gathered from the data, including physical growth, craniofacial growth and development, skeletal maturation, and aging of the craniofacial complex. This rich array of knowledge is invaluable. Records collected annually,^{1,5,9-12} semiannually,^{1,5-8,15} or quarterly^{6,7,15} as part of the original growth studies include dental casts, cephalometrics, twin studies, family studies, implant records, hand-wrist films, facial photographs, demographic records, and other records of importance.¹ Some studies followed children from infancy to adulthood, others only during adolescence. See [Table 1](#) for a full description of each collection. The data provided by these records is the segue to treatment of growing and nongrowing patients in contemporary orthodontics.¹⁴⁻¹⁷

Use of the AAOF Legacy Collection and trends in the use of the individual collections are not clear. It has been claimed that the AAOF Legacy Collection project significantly improved the prospects of orthodontic research over the 8 years since initiation of the project.

The aims of this systematic review were to describe the use of the AAOF Legacy Collection in the orthodontic literature focusing on both comparative and follow-up studies and to analyze trends of use before and after the Legacy project launch. As a secondary objective, we hoped to highlight the importance of the AAOF Legacy Collection for future research opportunities.

MATERIAL AND METHODS

Protocol and registration

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) as closely as possible. The protocol for this systematic review was registered on PROSPERO: international prospective register of systematic reviews (PROSPERO 2016: CRD42016038395). Details of the protocol can be accessed at http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42016038395.

Eligibility criteria

Studies were eligible for inclusion based on the following criteria.

1. Primary studies that used an experimental or observational study design (randomized controlled trial, cohort/longitudinal study, case-control study, cross-sectional study).

2. At least 1 of the 9 collections in the AAOF Legacy Collection was used as either the main sample population or as a comparison/control group within the study.
3. The study included human subjects of any age, sex, and ethnicity.
4. The study measured orthodontic appliance outcomes, longitudinal craniofacial growth and development, malocclusions, or any other orthodontically related outcome.

Narrative reviews, case reports, and case series studies were excluded from review. Animal studies were also excluded, because the goal of this systematic review was to analyze trends in the use of the AAOF Legacy Collection in the orthodontic literature as it pertains to human subjects. Studies were also excluded if they did not measure at least 1 orthodontic outcome (eg, anthropological studies).

Information sources, search strategy, and study selection

An electronic search was conducted in March 2016 in the following databases: PubMed (1946-March 2016), Embase (1966-March 2016), CINAHL (1937-March 2016), and Evidence-Based Medicine Reviews (1991-March 2016). Evidence-Based Medicine Reviews is a database available through the Ovid platform and comprises 7 databases, which include the Cochrane Register of Controlled Trials, Cochrane Database of Systematic Reviews, Cochrane Methodology Register, ACP Journal Club, Database of Abstracts of Reviews of Effects, Health Technology Assessment, and NHS Economic Evaluation Database. The search was developed and performed by a health sciences librarian (E.S.). The search included 2 main components: the 9 components of the AAOF Legacy Collection, and orthodontic keyword and MeSH terms to locate relevant orthodontic studies. No language restrictions were used. The complete search strategy used in PubMed can be found in [Appendix 1](#). Additionally, a search for grey literature was conducted on [ClinicalTrials.gov](https://clinicaltrials.gov/) (<https://clinicaltrials.gov/>), [OpenGrey.eu](http://opengrey.eu/) (<http://opengrey.eu/>), and [Grey Literature Report](http://greyliit.org/) (<http://greyliit.org/>) by searching each AAOF Legacy Collection name, AAOF Legacy, or American Association of Orthodontists Foundation. The ProQuest Dissertations and Theses Global database were also searched according to each collection name, AAOF Legacy, or American Association of Orthodontists combined with “orthodontics,” “craniofacial growth,” or “dental.” The bibliographies of the included studies were also used to identify additional studies for possible inclusion.

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