

Relevance of practice-based research to orthodontics

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The Rapid Assessment of Evidence (RAE) panel of the American Association of Orthodontists Foundation (AAOF) conducted a review in response to a request from an American Association of Orthodontists (AAO) member to explain and justify the effectiveness of Practice-Based Research and its relevance to the Orthodontic community. Two members of the current AAOF-RAE panel have leadership roles in Practice-Based Research (V.A. serves as the Director of the Specialty Node of the National Dental Practice-Based Research Network, and S.F.-B. serves as the Chair of the AAO Practice-Based Research Network (AAO-PBRN) task force). Accordingly, we believe that this panel is well-positioned to address the request by the AAO member. In the following sections, we provide a brief overview of the National Dental Practice-Based Research Network (PBRN; “network”), the relevance of Practice-Based Research in the current landscape for orthodontists and, finally, some opportunities for the orthodontic community to conduct research via the network.

Development of the National Dental PBRN

Initial seeds for developing Dental Practice-Based Research Networks in the United States were sown in 2005 when NIH/NIDCR supported three independent regional networks which ultimately demonstrated very successfully that the PBRN concept can be an effective means to improve the scientific basis for everyday clinical care.¹ In 2012, a single nationwide network called the National Dental PBRN was established by a seven-year grant from NIH/NIDCR. All U.S.

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states and territories were included in the second funding cycle (2012-2019). Building on this success, in 2019, the third cycle of funding was given by NIH/NIDCR to continue with the National Dental PBRN for another seven years. Currently, the network is supported by NIH/NIDCR through two grants: U19-DE-028717 (National Administrative & Resource Center) and U01-DE-028727 (National Coordinating Center). Since 2005, 41 studies have been completed (with another 14 in development or pre-launch) involving more than 44,000 patients.^{1,2} The network comprises over 7000 members (including dental practitioners, office staff, and researchers). There are three levels of membership: Informational, Limited, and Full. Informational level members receive periodic updates from the network, participate in Quick Polls, and suggest study topics of interest. Limited members enjoy all the benefits of Informational Level members and, in addition, can attend network meetings and participate in questionnaire-based studies. The full members enjoy all the above benefits, participate in clinical studies, and serve on network committees.²

Relevance of Practice-Based Research in the Current Landscape

Orthodontic care provided in non-academic, private clinics is substantial. Quite paradoxically, most of the published literature in orthodontics stems from clinical work accomplished in academic settings. While academic settings offer rigorous frameworks for conducting clinical research, they may not reflect real-world operations. In this context, Practice-Based Research is critically important as we work on providing a solid empirical base to help the day-to-day decision-making of all clinicians. In Practice-Based Research, the research is typically conducted in non-academic offices within the context of ongoing everyday clinical care and, consequently, reflects real-world operations and clinical pathways. One of the most extensive prospective clinical studies in orthodontics (the National Anterior Open Bite Study) was conducted through the network during the 2012 to 2019 funding cycle.³⁻⁶ A total of 347 adult subjects (with a diagnosis of anterior open bite) drawn from 91 practitioners throughout the United States were enrolled in the study. The study was completed successfully and provided valuable

information on different treatment strategies, biomechanical approaches, end-of-treatment outcomes, patient/practitioner satisfaction, treatment success, and long-term stability of orthodontic correction of anterior open bites.³⁻⁶ The study identified practice patterns that are in vogue nationally. The study was seamlessly conducted in private offices and academic centers with minimal impact on daily practice activities.

In the current funding cycle (2019-2026), the network is developing a Specialty Node to conduct clinical studies most-relevant to specialists. One challenge of doing Practice-Based research involving multiple practitioners is the clustering of outcomes within practitioners. These clustering effects need to be accounted for well, e.g., by using specific statistical approaches while analyzing the data, such as Generalized Estimating Equation methods or Hierarchical modeling. As of May 2021, a total of 422 orthodontists and 36 dual-trained orthodontists/periodontists were enrolled in the network. Experienced network Node Directors and Node Coordinators facilitate clinical study design and conduct in network offices. The network has demonstrated that extensive nationwide clinical studies can be very effectively done. Such comprehensive studies are critically important for our profession as their findings are generalizable, externally valid, and represent what is happening in the real world of everyday clinical care, where almost all of the population receives its care.

Opportunities for Academicians to Conduct Research via the National Dental PBRN

The current funding cycle started in June 2019 and is expected to conclude in May 2026. Broadly, there are two different funding pathways for academicians to apply for grants to conduct studies through the network. Researchers can apply for network infrastructure access to develop an application.⁷ NIDCR currently funds network studies using two grant mechanisms (X01 and UG3/UG3 grants).^{8,9} The X01 pathway funds developmental/exploratory, feasibility, pilot, and survey studies.⁸ Up to two years of support can be provided. Recently, several COVID-19 based studies were done by the network through a Notice of Special Interest Funding Opportunity, recently expired.¹⁰ A milestone-driven UG3/UH3 cooperative agreement mechanism is available for researchers interested in conducting large clinical trials and observational studies through the network.⁹ Several members of the AAO-PBRN task force are currently working on submitting grant applications through the UG3/UH3 and X01 pathways. We highly encourage interested grant applicants to review the strategic goals of NIH/NIDCR and make sure that their project plans align with those of NIH/NIDCR.

REFERENCES

1. National Dental Practice-Based Research Network. Website link: <https://www.nationaldentalpbrn.org/>. Date of access is 09/05/2021.
2. National Dental Practice-Based Research Network. Handbook for practitioners and researchers. WWW link is https://www.nationaldentalpbrn.org/wp-content/uploads/2020/07/Handbook-for-Practitioners-and-Researchers_04-17-2020.pdf. Date of access is 09/05/2021.
3. Todoki LS, Finkleman SA, Funkhouser E, Greenlee GM, Choi KW, Ko HC, Wang HF, Shapiro PA, Khosravi R, Baltuck C, Allareddy V, Dolce C, Kau CH, Shin K, de Jesus-Vinas J, Vermette M, Jolley C; National Dental Practice-Based Research Network Collaborative Group, Huang GJ. The National Dental Practice-Based Research Network Adult Anterior Open Bite Study: Treatment success. *Am J Orthod Dentofacial Orthop* 2020;158:e137–e150.
4. Finkleman SA, Todoki LS, Funkhouser E, Greenlee GM, Choi KW, Ko HC, Wang HF, Shapiro PA, Khosravi R, Baltuck C, Allareddy V, Dolce C, Kau CH, Shin K, de Jesus-Vinas J, Vermette M, Jolley C; National Dental Practice-Based Research Network Collaborative Group, Huang GJ. The National Dental Practice-Based Research Network Adult Anterior Open Bite Study: Patient satisfaction with treatment. *Am J Orthod Dentofacial Orthop* 2020;158:e121–e136.
5. Choi KW, Ko HC, Todoki LS, Finkleman SA, Khosravi R, Wang HF, Funkhouser E, Baltuck C, Raj V, Allareddy V, Matunas JC, Vermette ME, Harrell WE Jr, Coro JC, Greenlee GM, Huang GJ; National Dental PBRN Collaborative Group. The National Dental Practice-Based Research Network adult anterior open bite study: A description of the practitioners and patients. *Angle Orthod* 2018;88:675–683.
6. Huang G, Baltuck C, Funkhouser E, Wang HC, Todoki L, Finkleman S, Shapiro P, Khosravi R, Ko HJ, Greenlee G, De Jesus-Vinas J, Vermette M, Larson M, Dolce C, Kau CH, Harnick D; National Dental Practice-Based Research Network Collaborative Group. The National Dental Practice-Based Research Network Adult Anterior Open Bite Study: Treatment recommendations and their association with patient and practitioner characteristics. *Am J Orthod Dentofacial Orthop* 2019;156:312–325.
7. NIH/NIDCR. Researchers proposing a study idea. WWW link is <https://www.nidcr.nih.gov/research/researchers-proposing-study-idea>. Date of access is 09/08/2021.
8. NIH. National Dental Practice-Based Research Network Infrastructure Access (X01 Clinical Trial Not Allowed). WWW link is <https://grants.nih.gov/grants/guide/pa-files/PAR-20-073.html>. Date of access is 09/08/2021.
9. NIH. National Dental Practice-Based Research Network Clinical Trial or Observational Study Planning and Implementation Cooperative Agreement (UG3/UH3 Clinical Trial Optional). WWW link is <https://grants.nih.gov/grants/guide/rfa-files/RFA-DE-20-005.html>. Date of access is 09/08/2021.
10. NIH. Notice of Special Interest (NOSI): Infrastructure Access for Research on Coronavirus Disease 2019 (COVID-19) Conducted in the National Dental Practice-Based Research Network. WWW link is <https://grants.nih.gov/grants/guide/notice-files/not-de-20-023.html>. Date of access is 09/08/2021.