

Type of Award: Orthodontic Faculty Development Fellowship Award (OFDFA)

Name of Principal Investigator: Van Wallace McCarlie, Jr.

Title of Project: Oral Health and Orthodontic Literacy Correlated with Oral Health and Orthodontic Status in Eastern North Carolina

Period of AAOF Support: 07-01-15 to 06-30-17

Amount of Funding: \$20,000.00

Abstract: The main purpose and scope of this study was to understand whether oral health literacy (OHL) and orthodontic literacy (OrthoL) was correlated with oral health and orthodontic status. The hypothesis was that lower OHL and OrthoL would be correlated to lower oral health outcomes or orthodontic status. We recruited adults (N=137) and utilized 6 separate metrics as part of 3 validated instruments in order to determine levels of OHL and OrthoL. We identified oral health and orthodontic status by accessing electronic health record data including decayed teeth, missing teeth due to caries, and filled tooth surfaces (DMFS), periodontal status, and malocclusion using the index of orthodontic treatment need (IOTN). Correlation coefficients were calculated between each pair of continuous variables, such as missing tooth count and OHLI total score. Means, standard deviations, and other summary statistics were calculated for continuous variables at each level of every categorical variable, with comparisons among levels of the categorical variable using Kruskal-Wallis tests. Frequencies and percentages were calculated for each pair of categorical variables, with chi-square tests used to test for associations between the categorical variables. An overall metric of OHL, OHLI Total, was inversely correlated (-0.26; p-value 0.0056) with those who had experienced severe manifestations of dental caries, missing teeth. This inverse correlation means, for example, as OHL decreases the number of missing teeth increase. OrthoL was also inversely correlated (-0.31; p-value 0.0017) with missing teeth. OrthoL and another metric of OHL, REALMD-20, were also inversely correlated with DMFS (-0.31 and -0.21; p-values 0.0016 and 0.0246). Thus, there is a correlation between OHL, OrthoL and oral health and orthodontic status. Though these correlations are not high, they are statistically significant (p-value < 0.05) and, taken with the fact that these correlations are not isolated to one instrument, one metric or one variable, there is a real, consistently pervasive effect of OHL and OrthoL on oral health status and orthodontic status.

Response to final report questions:

1. Were the original, specific aims of the proposal realized?

Yes, the original, specific aims of the research were realized. For example, page 18 of the original proposal stated: “The purpose of this project is to assess oral health and orthodontic literacy in connection with the oral health status of individuals . . . We will do this by recruiting approximately 150 adults (18 or older).” We recruited 159 adults and obtained an N of 137. We found that there is a correlation between oral health literacy (OHL) and oral health status and orthodontic literacy (OrthoL) and orthodontic status. Specifically, we determined (1) OHL and OrthoL by administering validated instruments (see original proposal pages 19-20 for these instruments we took from the published literature, including their citations) to subjects; (2) we also determined oral

health and orthodontic status by accessing this information from the subject's electronic health record; and (3) we determined that oral health and orthodontic outcomes are affected by OHL and OrthoL across multiple measures and instruments. Though the magnitude of this effect is not overwhelming, it nonetheless indicates a pervasive and significant (p-values < 0.05) effect (all fulfilling the specific aims on page 19 of the original proposal).

2. Were the results published?

Not yet. The plan is to submit our results for publication no later than the end of the fall period. This will be a very interesting and insightful article. When we submit, AAOF support will be acknowledged.

3. Have the results of this proposal been presented?

Not yet. Specific plans include submitting to the 2018 AAO Annual Session in order to present the research there (May 4 - 8, 2018, Washington, DC). AAOF support will be acknowledged.

4. To what extent have you used, or how do you intend to use, AAOF funding to further your career?

Because of this OFDFA Award, the research I was able to complete, and the other areas of my career development, I have applied for promotion this next academic year. Additionally, I have designed my next research project and am planning to submit it for a new AAOF Award. It will focus on a pediatric and a parent population with regard to OHL and OrthoL. I have already enlisted community practitioners that desire to be a part of my next study.

Also, I have fulfilled all my other aims specifically enumerated in the original proposal (see the section below and page 16, original proposal).

My career development plan includes the following specific aims:

Educational

Specific Aim: Receive a Graduate Credential in Education in the Healthcare Professions, focused on teaching in dental education by participating in a yearlong educational program.

Result: Received Graduate Credential in Education in the Healthcare Professions from the ECU College of Education, May 9, 2016

Teaching and Research

Specific Aim: Develop orthodontic teaching modules utilizing the best practices of effective and validated teaching techniques.

Results: Example 1: I was able to specifically redesign Cephalometry from a traditional design to a mixture of varying techniques and assessment: I flipped the classroom on basic knowledge such as anatomical planes and imaging principles where I was able to edit videos that were short and focused.

Instructional goals:

1. Adequately describe AP skeletal and dental relationships, vertical skeletal and dental relationships and pertinent soft tissue relationships.
2. Adequately describe AP skeletal and dental diagnoses, vertical skeletal and dental diagnoses and pertinent soft tissue diagnoses.
3. Adequately create basic treatment objectives for skeletal, dental, and soft tissue findings.
4. Adequately recognize various cephalometric anatomical regions.

Instrument to assess:

OSCE-type questions as a skills assessment

Summary of instructional strategy:

Flipping the classroom and team-based learning

The students were to study these videos and other material before our first meeting and are required to recognize anatomical structures and answer questions during the first period. As the module continued, they would later engage in team-based learning by electronically receiving pieces of basic clinical information and talk through and identify relationships and diagnoses. A review of this material is then conducted and detailed feedback is provided. I created an objective structured clinical examination (OSCE)-type of clinical exam, which is given to assess higher level thinking, thus revealing how well the student has assimilated and can apply this knowledge of basic AP, skeletal, and dental relationships. This OSCE is a skills assessment and requires an essay response and has a time limit after which the student cannot make any changes. They must pass by accumulating enough points to be above a predetermined threshold. Detailed feedback is provided.

Example 2: Another example, is the addition of a Clinical Photography module to our curriculum.

Instructional goals:

1. Understand fundamentals of photography in order to document clinical problems, treatment and outcomes.
2. Describe intra-oral DSLR camera systems and their use.
3. Understand the principles of taking intra-oral and extra-oral photographs.
4. Basics on editing, presentation and HIPPA compliant storage of clinical photographs

Analysis of learners and contexts:

The learners have not had any in-depth education or even much at all in the way of clinical photography up to this point in the curriculum. This will truly be an introduction for them presented in a comprehensive but digestible way.

Instrument to assess:

Team-based learning skills exercises.

Summary of instructional strategy:

team-based learning

Summary

The group clinical photography segment goes like this: (1) break student up into groups of 5 for a total of 10 groups. (2) give the students a panel of 8 typical clinical photographs without giving them any instruction and give them 10 minutes to decide whether or not the photos are overall good or bad and why. During this period they write down a group answer and send it to me on an internal social network. (3) After the groups examine the photos without any prior knowledge (or whatever a priori knowledge they might have), I then (4) provide guidelines on what is clinically necessary and what things we want to look at in terms of diagnostics and treatment planning. (5) Then the students again look at the same photos and an additional panel of photos. Now we have them determine whether each photo is clinically acceptable. Each team member would be responsible for, at least 3 separate clinical photos and would be instructed to take the lead in deciding and then consulting with the team as to whether his or her reasoning appears correct. The second part involves the principles involved in quality clinical photography such as exposure (amount of light), depth of field, sharpness (resolution), and noise, and then important camera settings that correspond to these: aperture, shutter speed, and the image sensor sensitivity (e.g., ISO sensitivity).

Example 3: I co-authored a peer-reviewed article in an educational venue as an iBook. Watkins, RT, Broome, AN, Conn, LJ, **McCarlie, VW**. *How to Implement Computer-Based Applied Didactic Exams (OSCE) as Part of the Assessment of Clinical Competence*. iBook, 2016: 1-59. <https://itunes.apple.com/us/book/how-to-implement-computer/id1150606270?mt=11>.

Specific Aim: Design, develop and conduct research that assesses orthodontic and oral health literacy.

Result: See pages 1 and 2 of this AAO Foundation Award Final Report.

Clinical Skills

Specific Aim: Demonstrate progress in treating patients and amassing documentation of their care for the American Board of Orthodontics in order to achieve board certification (I am board eligible).

Result: Before the Award, I did not have a faculty practice to begin board cases. However, I pioneered the practice here at ECU and started my first potential board case in January 2016. In my faculty practice, I am currently treating all the criterion-based cases required for board certification, including at a minimum three (3) cases with a DI of twenty (20) or greater, and three (3) cases with a DI of ten (10) or greater; some of these have been identified as an extraction case and a Class II case. These cases, barring patient compliance issues or other unforeseen circumstances, should be completed by the end of spring 2019. I would, therefore, anticipate sitting for my board certification in 2019.

Leadership

Specific Aim: Participate in and lead groups and activities that will benefit from my training and expertise to improve dental and orthodontic care and education.

Result: I served as Chair of the ADEA Section on Orthodontics (2015-2016), as Editor of the AAO Society of Educators (2016-2017), and was elected Secretary-Treasurer of the AAO Society of Educators for 2017-2019.

Specific Aim: Promotion as my professional career progresses.

Result: My Division Director has written a letter of support for my promotion next academic cycle.

I truly feel honored to have been selected for this significant award and look forward to continuing what I have started so that my work will continue to have an influence for good in the specialty, both in predoctoral and postdoctoral orthodontic education.

Thank you again, and if you have any other additional questions or need additional information, please do not hesitate to contact me directly.

Respectfully submitted by Van Wallace McCarlie, Jr., MA, DMD, PhD, Cert.Ortho