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AAO Foundation Final Report Form
(a/o 6/30/2018)

Please prepare a report that addresses the following:

Type of Award: Orthodontic Faculty Development Fellowship Award

Name(s) of Principal Investigator(s): Sohyon “Michelle” Kim, DMD, MS

Institution: Oregon Health & Science University

Title of Project: Mandibular incisor inclination changes produced by Class II elastics in fixed labial orthodontic appliances and clear aligner therapy: A retrospective analysis

Period of AAOF Support (e.g. 07-01-18 to 06-30-19): Originally 07-01-19 to 06-30-20, but No Cost Extension was approved until 06-30-21 due to the research restrictions caused by the COVID-19 pandemic

Amount of Funding: \$20,000.00

Summary/Abstract:

ABSTRACT

Objective: This retrospective pilot study determined if there were significant differences in mandibular incisor inclination change and treatment duration in adolescents using Class II elastics and clear aligner (CAT) versus fixed appliance therapies (FAT).

Materials and Methods: Approval for the study protocol was obtained from the Oregon Health & Science University Institutional Review Board. Case inclusion criteria were adolescents consecutively treated by one orthodontist with CAT or FAT and bilateral Class II elastics to achieve ≥ 1 mm molar correction with initial cervical vertebral maturation stage ≥ 4 and Little’s Irregularity Index < 4 . Angle’s classification and Little’s Irregularity Index were measured via digital model software. Pre- and post-treatment lateral cephalograms were digitally traced to measure mandibular central incisor long axis-to-mandibular plane angle (IMPA, $^{\circ}$). Data were analyzed using t-tests where $p < 0.05$ defined significance.

Results: Thirty-two CAT and thirty-four FAT cases met study criteria and had similar baseline

characteristics: mean ages 15.1 ± 1.6 and 15.1 ± 1.6 years, respectively; Irregularity Index 2.0 ± 1.3 and 1.9 ± 1.3 mm, respectively; pre-treatment Class II molar relationships 2.6 ± 1.0 and 2.7 ± 1.0 mm, respectively; mean pre-treatment IMPA 97.0 ± 6.1 and $94.4 \pm 7.1^\circ$, respectively. CAT retroclined mandibular incisors by -0.1 ± 5.1 , whereas FAT proclined mandibular incisors by $5.3 \pm 5.7^\circ$ and these IMPA changes were significantly different ($P= 0.00$). Treatment duration was significantly shorter with CAT at 20.4 ± 6.9 months compared to FAT at 24.3 ± 5.7 months ($P= 0.02$). Elastic compliance was significantly better in the CAT group (81.3% good, 12.5% fair, 6.3% poor) than the FAT group (52.9% good, 32.4% fair, 14.7% poor) with $p=0.05$.

Figure 1. Mean change in mandibular incisor inclination relative to mandibular plane ($\Delta\text{IMPA}_{T2-T1}$) for each group, Clear Aligner Therapy (CAT) and Fixed Appliance Therapy (FAT), where vertical bars indicate standard deviations and ** indicates significant difference ($P<0.001$).

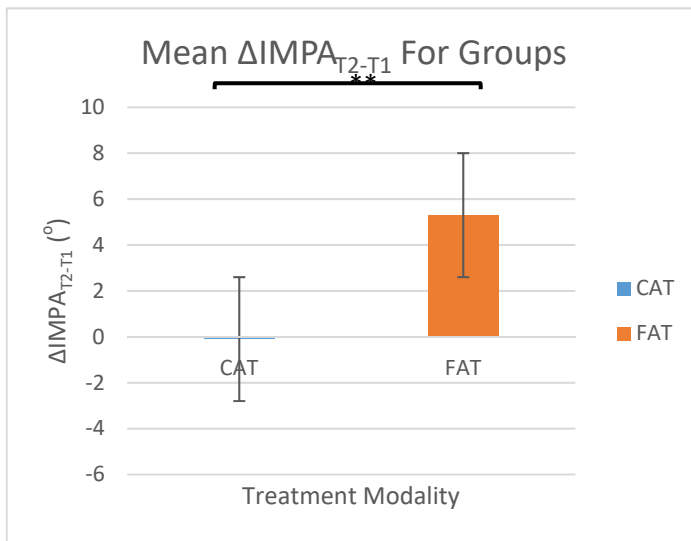


Figure 2. Mean treatment duration and prescribed elastic wear duration for each group, Clear Aligner Therapy (CAT) and Fixed Appliance Therapy (FAT), where vertical bars indicate standard deviations, * indicates significant difference ($P<.05$) and ** indicates significant difference ($P<0.001$).

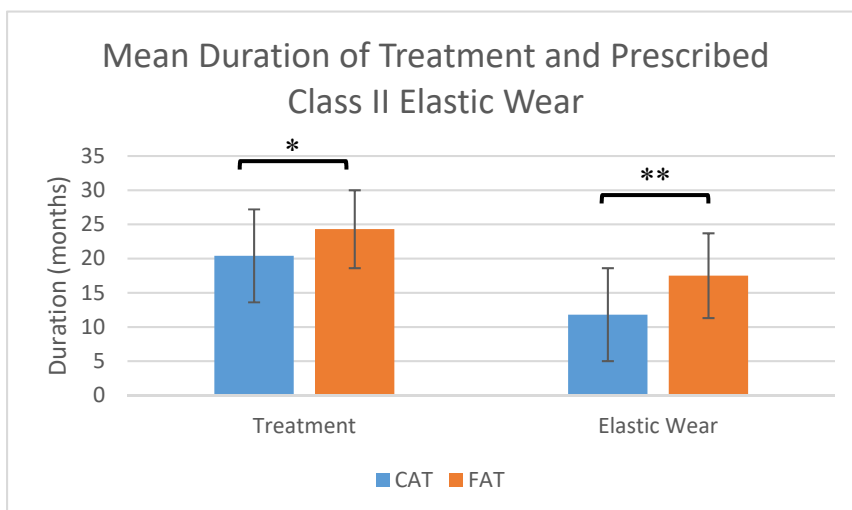


Figure 3. Class II elastic compliance by group, where CAT = Clear Aligner Therapy, FAT = Fixed Appliance Therapy, Good = elastics were worn >85% of the time, Fair = between 70% – 85% of the time, Poor = <70% of the time, and * indicates significant difference ($P<0.05$).

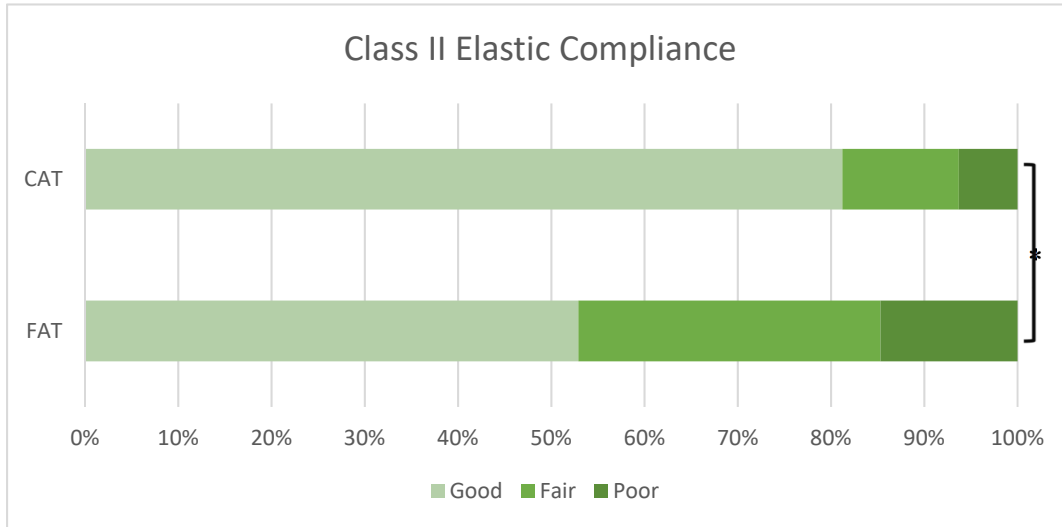


Table 1. Comparison of independent variables and dependent variables between treatment modalities using t-test, where CAT = Clear Aligner Therapy, FAT = Fixed Appliance Therapy, T1 = pre-treatment, T2 = post-treatment, and IMPA = Lower Incisor to Mandibular Plane Angle.

	CAT	FAT	P value
Age (years)	15.1 ± 1.6	14.0 ± 1.1	0.00*
T1 Class II molar relationship (mm)	2.6 ± 1.0	2.7 ± 1.2	0.72
T1-T1 Class II molar relationship (mm)	2.7 ± 1.1	2.5 ± 0.9	0.32
Little's Irregularity Index (mm)	2.0 ± 1.3	1.9 ± 1.3	0.85
T1 IMPA (°)	97.0 ± 6.1	94.4 ± 7.1	0.12
T2 IMPA (°)	96.9 ± 6.0	99.7 ± 7.0	0.09
T2-T1 IMPA (°)	-0.1 ± 5.1	5.3 ± 5.7	0.00*
Treatment Duration (months)	20.4 ± 6.9	24.3 ± 5.7	0.02*
Elastic Wear Duration (months)	11.8 ± 6.9	17.5 ± 6.2	0.00*

* Indicates significant differences between therapy groups ($P<0.05$).

Conclusions: Class II adolescents treated using Class II elastics and FAT compared to CAT showed significantly greater mandibular incisor proclination and treatment duration.

Response to the following questions:

1. Were the original, specific aims of the proposal realized?
Yes, the followings are the original specific aims of the proposal and the conclusions of the

project.

- 1) To determine if there is any significant difference in mandibular incisor inclination change from pre- to post-treatment in Class II adult cases treated with Class II elastics and CAT versus FAT: Class II adolescents treated using Class II elastics and FAT compared to CAT showed significantly greater mandibular incisor proclination
 - 2) To determine if there is any significant difference in treatment time in Class II adult cases treated with Class II elastics depending on CAT versus FAT and elastic wear compliance: Class II adolescents treated using Class II elastics and FAT compared to CAT showed significantly greater treatment duration and poorer elastic compliance.
2. Were the results published?
- a. If so, cite reference/s for publication/s including titles, dates, author or co-authors, journal, issue and page numbers
 - b. Was AAOF support acknowledged?
 - c. If not, are there plans to publish? If not, why not?

The results have not been published, but I have been working on a manuscript to have the results published in the Angle Orthodontist. AAOF support will be acknowledged and co-authors will be Drs. Puja Patel, DDS, MS and Laura Iwasaki, DDS, MSc, PhD.

3. Have the results of this proposal been presented?
- a. If so, list titles, author or co-authors of these presentation/s, year and locations
 - b. Was AAOF support acknowledged?
 - c. If not, are there plans to do so? If not, why not?

The results have not been presented, but I am aiming to have the results presented at the 2021 Pacific Coast Society of Orthodontists Annual Session Scientific Posterboard Exhibit. The deadline to submit the application and abstract is August 6, 2021. AAOF support will be acknowledged and co-authors will be Drs. Puja Patel, DDS, MS and Laura Iwasaki, DDS, MSc, PhD.

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

This is my first time to use AAOF funding. I would like to apply for the BRA in coming years to further my career. I would like to take advantage of my business background and apply for the Business/Practice of Orthodontics category of the BRA funding.

Accounting for Project; i.e., any leftover funds, etc.

There are no leftover funds. Please see Appendix for the budget table.

Appendix. Budget Table (This shows the re-budgeting request that was approved in August 2020)

Category	Original Budget Amount (Re-budgeted Amount Approved on 05/19/20)		Revised Budget Amount		Difference = Original Budget Amount - Revised Budget Amount
Research Plan					
Data collection, data analysis, and manuscript publication	None		No revision requested		
Research Plan Total		\$0.00	Research Plan Total	\$0.00	\$0.00
Educational Plan					
PSU Curriculum and Instruction Master's Degree Program	Summer 2019 (Tuition)	\$1,794.00	Summer 2019 (Tuition)	\$1,794.00	
	Fall 2019 (Tuition)	\$2,123.50	Fall 2019 (Tuition)	\$2,123.50	
	Fall 2019 (Textbook 1)	\$18.68	Fall 2019 (Textbook 1)	\$18.68	
	Fall 2019 (Textbook 2)	\$29.43	Fall 2019 (Textbook 2)	\$29.43	
	Fall 2019 Total	\$2,171.61	Fall 2019 Total	\$2,171.61	
	Winter 2020 (Tuition)	\$1,620.00	Winter 2020 (Tuition)	\$1,620.00	
	Winter 2020 (Textbook)	\$59.99	Winter 2020 (Textbook)	\$59.99	
	Winter 2020 Total	\$1,679.99	Winter 2020 Total	\$1,679.99	
	Spring 2020 (Tuition)	\$2,123.50	Spring 2020 (Tuition)	\$2,037.00	
	Spring 2020 (Textbook)	\$41.89	Spring 2020 (Textbook)	\$41.89	
	Spring 2020 Total	\$2,165.39	Spring 2020 Total	\$2,078.89	
	Educational Plan Total	\$7,810.99	Educational Plan Total	\$7,724.49	+\$86.50
Teaching Skills Plan					
Student interaction	None		N/A		
OHSU & SOD Workshops, Seminars, CE Lectures	None		N/A		

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ADEA eLearn bimonthly webinars	None		N/A		
2020 ADEA Annual Session & Exhibition, National Harbor, MD	2021 ADEA Annual Session & Exhibition, Boston, MA (2020 ADEA Annual Session was canceled due to the COVID-19 pandemic) Registration	\$689.00	2021 ADEA Annual Session & Exhibition, Boston, MA is going to be held virtually due to the COVID-19 pandemic Registration	\$0.00	
	Airfare (Flight ticket was purchased in 2020)	\$528.01	Airfare (Flight ticket was purchased in 2020. Alaska Airlines only offered the option of a credit certificate for future travel: will be used for attending future AAO or ADEA meetings)	\$528.01	
	Hotel	\$600.00	Hotel	\$0.00	
	Meals	\$182.99	Meals	\$0.00	
	Total	\$2,000.00	Total	\$528.01	+\$1,471.99
UCI Virtual Teacher Specialization course	Monthly fee for April 2020	\$39.00	Monthly fee for April 2020	\$39.00	
	Monthly fee for May 2020	\$39.00	Monthly fee for May 2020	\$39.00	
	Total	\$78.00	Total	\$78.00	\$0.00
AAL CAAMP 2020 (Added)	This was not listed	This was not listed	Tuition (Total tuition is \$1,975, but only \$1,601.25 is requested to stay within the total budget)	\$1,601.25	-\$1,601.25
Teaching Skills Plan Total		\$2,078.00	Teaching Skills Plan Total	\$2,207.26	-\$129.26

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Clinical Skills Plan				
Student interaction/supervision	None		N/A	
Patient care in the OHSU Faculty Dental Practice	None		N/A	
Clinical Skills Plan Total		\$0.00	Clinical Skills Plan Total	\$0.00
Other				
AAO annual dues for junior faculty	\$550.00		\$508.25	+\$41.75
ADEA annual dues for full-time faculty	\$0.00		\$0.00	\$0.00
ADA annual dues	\$657.00		\$657.00	\$0.00
WA dental license renewal fee	\$402.50		\$402.50	\$0.00
ABO annual dues	\$260.00		\$260.00	\$0.00
Salary Supplementation	\$8,240.50		\$8,240.50	\$0.00
Others Total		\$10,110.00	Others Total	\$10,068.25
	Grand Total	\$19,998.99	Grand Total	-\$1.01

List of abbreviations: **PSU** = Portland State University; **N/A**= not applicable; **OHSU** = Oregon Health & Science University; **SOD** = School of Dentistry; **CE** = Continuing Education; **ADEA** = American Dental Education Association; **UCI** = University of California, Irvine; **AAL CAAMP** = The Academy for Advancing Leadership Chairs and Academic Administrators Management Program; **AAO** = American Association of Orthodontists; **ADA** = American Dental Association; **WA** = Washington State; **ABO** = American Board of Orthodontics