

Reflections on Research Day 2025

Lois Rabinowitz Lamond

The University of Pennsylvania Dental School's Research Day was held earlier this year than in prior years. It was moved from Alumni Week in May to mid-April. The change might have to do with the current political climate and how the administration plans to address lost funding issues with their alumni.

The mood and tone of the event were subdued. The weather was damp and chilly so the outdoor tables during the buffet lunch were empty. The lunch was a variety of sandwiches and potato chips. It was disappointing that there were no accommodations for those who observe Passover. Most attendees grabbed a sandwich and came inside, eating while standing up or crowding around display counters. When I inquired about the food, I was told that in a time that is plagued by budget cuts to research, it seemed wrong to have a lavish meal. One researcher shared that the withholding of federal funds was not impacting all the university departments equally; the sciences and medical research were bearing the brunt of the fiscal losses.

The Joseph L Rabinowitz Memorial Lecture was presented via Zoom because the speaker, Michail Lionakis, from NIH was unable to travel due to a federal government travel restriction. He presented interesting research related to fungal infections, specifically Candida, the most common type. If I understood the information correctly, the research initially focused on two different shapes that manifested in this fungus, one elongated, the other more globular. One type primarily was found in people with suppressed immune systems. The research has led to implications in more than 20 diseases that had not previously been associated with fungal infections.

The highlight of the day for me was chatting with two of the winners of the Joseph and Josephine Rabinowitz Award for Excellence in Research from 2024. Dr. Myra Laird reported that her project had received a senior NSF award which will provide funding for the next five years. Through our award, she was able to take several students with her to Chicago where her collaborator is located. The students collected data for their own related projects that were being shared at the Penn Dental School Research Day. She texted me photos of two of her students with their research posters. Both photos acknowledged the Rabinowitz Award.

Kyle Vining, another 2024 winner, spoke with me and then followed up with an email. He said:

Hi Lois,

It was great seeing you again yesterday at PDM Research Day! It's been a fun and exciting year, thanks to your family's support. I attached some photos of my students presenting their projects supported by the Joseph and Josephine Rabinowitz Award.

Some highlights include master's student Chenyang Zhang's oral presentation at the BMES Conference in Baltimore, MD in October 2024. His work is now being prepared as a revised manuscript for publication. Master's student Keyu Chen presented her poster at the Materials Research Society Conference in Boston, MA, in December 2024. She was also named a finalist for the CiPD RESTORE Prize. Keyu is currently finishing her project before starting PhD at the University of Michigan this upcoming fall. She plans to submit her work for publication before she leaves the lab this summer.

I'll share any updates we have on these manuscripts once they are accepted for publication.

*Sincerely,
Kyle*

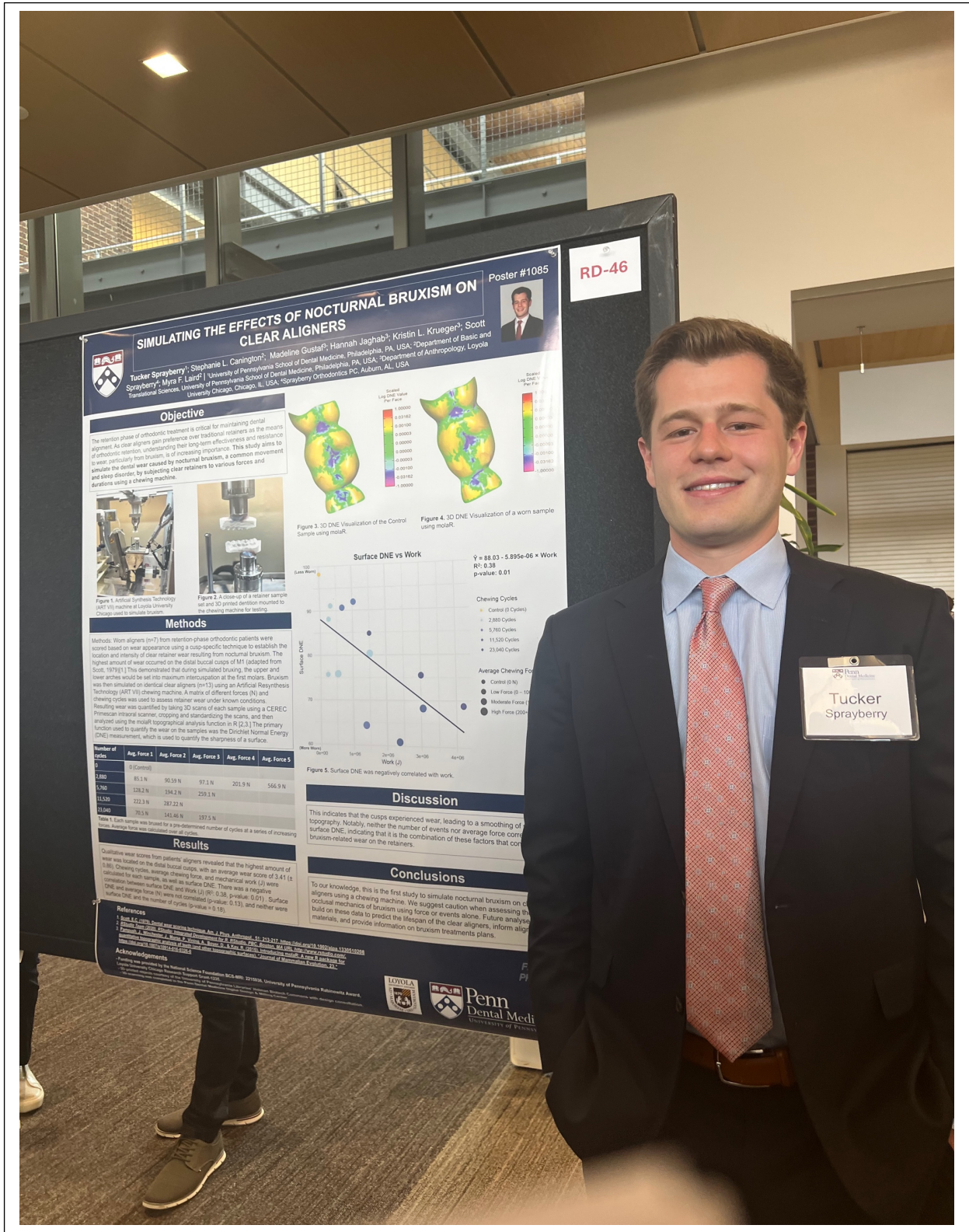
The third winner from 2024 had just left for maternity leave.

Dr. Wolf, the Dean of the Dental School, made an appearance at the awards ceremony. I did not see him at any of the lectures I attended. Dr. Esra Sahingur introduced both the Rabinowitz Award and the Rabinowitz Memorial Lecture. She speaks with a heavy accent which made it difficult to understand much of the information related to those honors. (Example: She pronounced our last name as Rah-been- oh-veetch).

The 2025 Rabinowitz Award Winner included Kathleen Boesze-Battaglia, a colleague of Dad's. She had won previously in 2011. Her research focuses on the eyes. This year's project is entitled Effects of Western Diet on Retinal Lipoprotein Metabolism and Visual Function. I asked why she was at a Dental School when her research focused on eyes. She explained that she was originally hired to teach a specific class and that the Dental School was not concerned about her research interests.

The other two 2025 winners (Katherine Theken and Marco Tizzano) were cordial and pleasant. I told them that I would be interested in their research findings, and would speak with them in 2026 to hear how the Joseph and Josephine Rabinowitz Award had impacted their research.





Dr. Myra Laird's student researcher Tucker Sprayberry

Poster #1085
RD-46

SIMULATING THE EFFECTS OF NOCTURNAL BRUXISM ON CLEAR ALIGNERS

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Objective

The retention phase of orthodontic treatment is critical for maintaining dental alignment. As clear aligners gain preference over traditional retainers as the means of orthodontic retention, understanding their long-term effectiveness and resistance to wear, particularly from bruxism, is of increasing importance. This study aims to simulate the dental wear caused by nocturnal bruxism, a common movement and sleep disorder by subjecting clear retainers to various forces and durations using a chewing machine.

Methods

Worn aligners (n=7) from retention-phase orthodontic patients were scored based on wear appearance using a cup-specific technique to establish the location and intensity of clear retainer wear resulting from nocturnal bruxism. The highest amount of wear occurred on the distal buccal cusps of M1 (adapted from Scott, 1979) [1]. This demonstrated that during simulated bruxing, the upper and lower arches would be set into maximum interocclusion at the first molars. Bruxism was then simulated on identical clear aligners (n=13) using an Artificial Resynthesis Technology (ART) (V) chewing machine. A matrix of different forces (N) and chewing cycles was used to assess retainer wear under known conditions. Resulting wear was quantified by taking 3D scans of each sample using a CEREC Precision retainer scanner, cropping and standardizing the scans, and then analyzed using the molR topographical analysis function in R (2,3). The primary function used to quantify the wear on the samples was the Dirichlet Normal Energy (DNE) measurement, which is used to quantify the smoothness of a surface.

Number of Cycles	Avg. Force 1 (N)	Avg. Force 2 (N)	Avg. Force 3 (N)	Avg. Force 4 (N)	Avg. Force 5 (N)
1,000	81.1 N	80.29 N	97.1 N	201.9 N	566.9 N
5,100	128.2 N	78.27 N	259.1 N		
11,520	222.3 N	287.22 N			
23,040	203.9 N	343.46 N	377.9 N		

Table 1. Each sample was bruxed for a pre-determined number of cycles at a series of increasing forces. Average force was calculated over 6 cycles.

Results

Qualitative wear scores from patients' aligners revealed that the highest amount of wear was located on the distal buccal cusps, with an average wear score of 3.41 (± 0.88). Chewing cycles, average chewing force, and mechanical work (J) were correlated between surface DNE and Work (J) (R²: 0.38, p-value: 0.01). Surface DNE and average force (N) were not correlated (p-value: 0.13), and neither were surface DNE and the number of cycles (p-value: 0.18).

Discussion

This indicates that the couple experienced wear, leading to a smoothing of topography. Notably, neither the number of events nor average force correlated with surface DNE, indicating that it is the combination of these factors that contribute to bruxism-related wear on the retainers.

Conclusions

To our knowledge, this is the first study to simulate nocturnal bruxism on clear aligners using a chewing machine. We suggest caution when assessing the occlusal mechanics of bruxism using force or events alone. Future analyses build on these data to predict the lifespan of the clear aligners, inform aligner materials, and provide information on bruxism treatments plans.

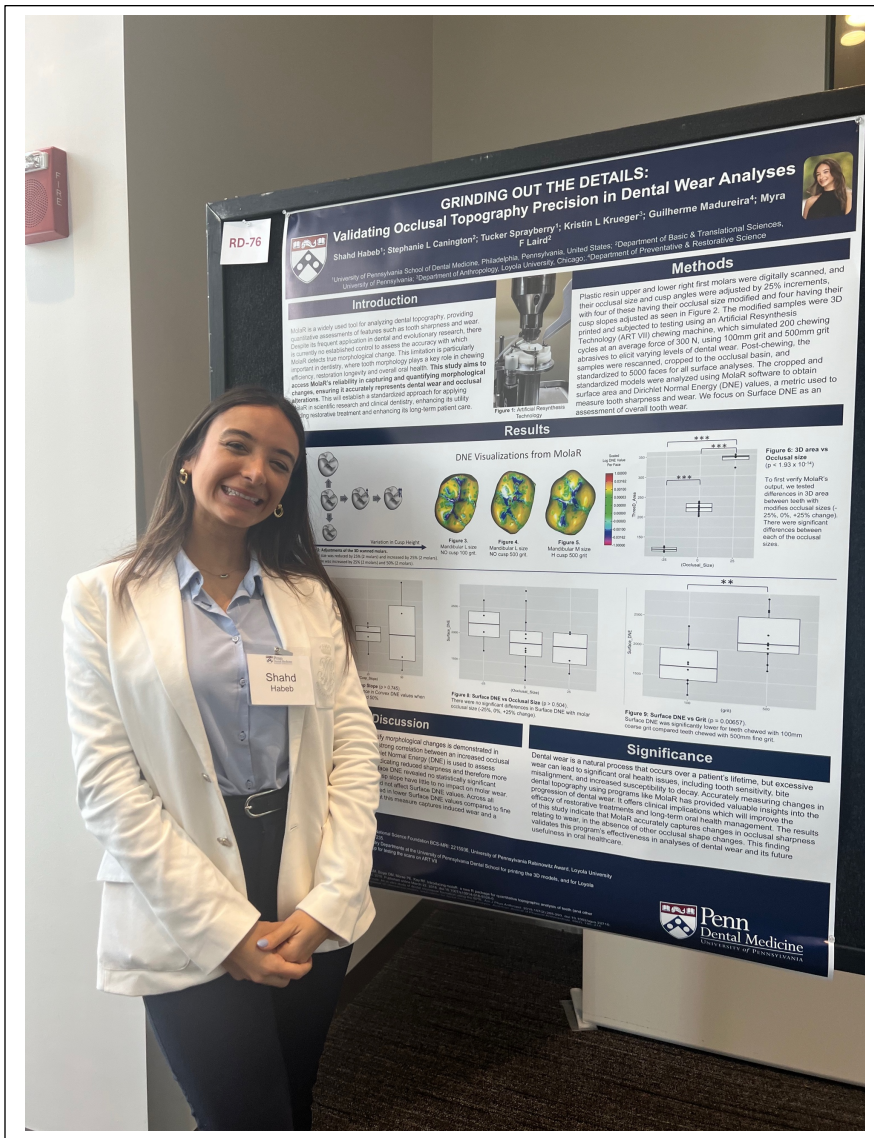
References

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- Wang, J., & Wang, J. (2019). *Journal of Statistical Software*, 91, 1-14.
- Wang, J., & Wang, J. (2019). *Journal of Statistical Software*, 91, 1-14.

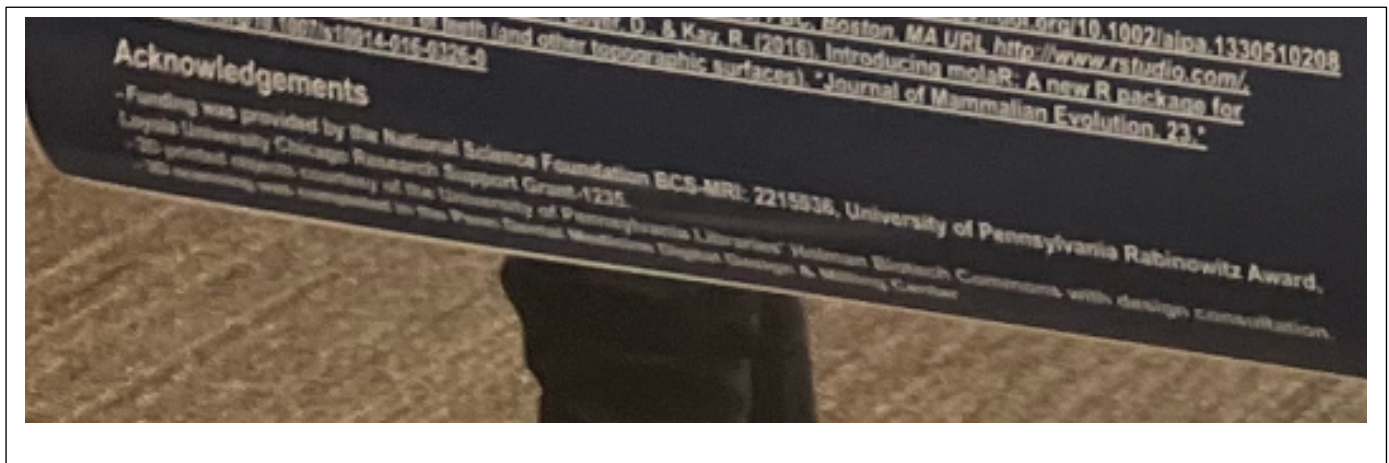
Acknowledgments

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Logos: Loyola University Chicago, Penn Dental Med, University of Pennsylvania

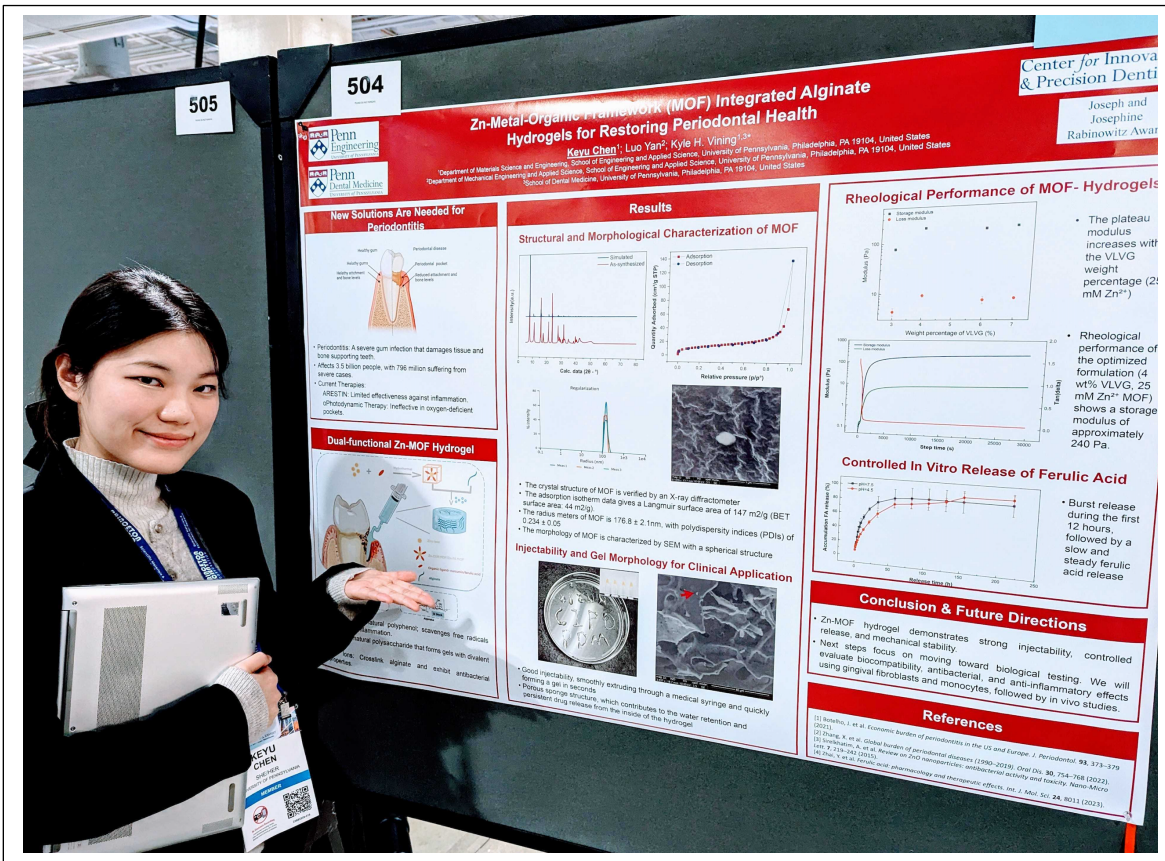


Dr. Myra Laird's student researcher Shahd Habeb.





Dr. Kyle Vining with two of his student researchers



Keyu Chen with research poster (note the top righthand corner: Joseph and Josephine Rabinowitz Award)



Chenyang Zhang's oral presentation at the BMES Conference in Baltimore, MD