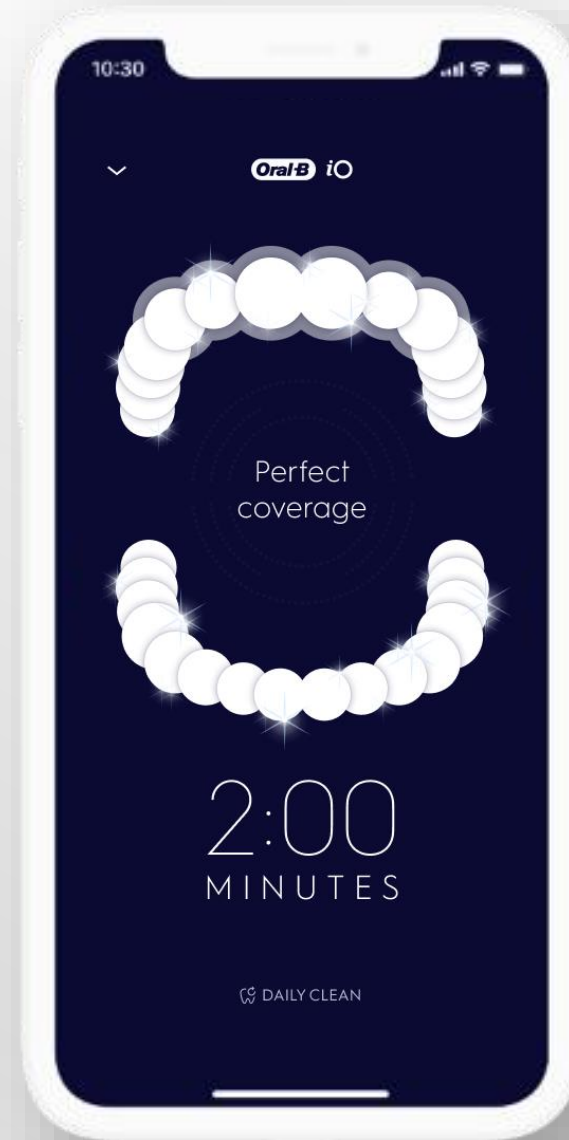
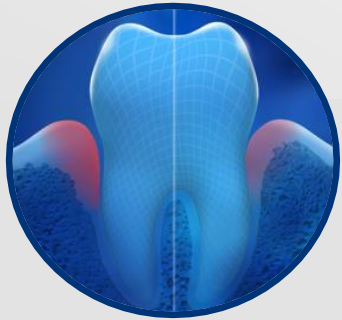


EMPOWERING PATIENTS IN SELF-CARE

Better oral care routines with interactive
brush technologies
Real-world Data Analysis



GUIDANCE is essential for establishing good oral hygiene behaviors, yet evidence to support conventional interventions is limited



Up to 50% of the global adult population suffers from periodontal disease¹



Maintenance of periodontal health is critically dependent upon the behavior of the patient²



Guidelines for Clinical Practice
Dental Professionals must provide Oral Hygiene Advice to their patients³



Conventional interventions have limited outcomes⁴

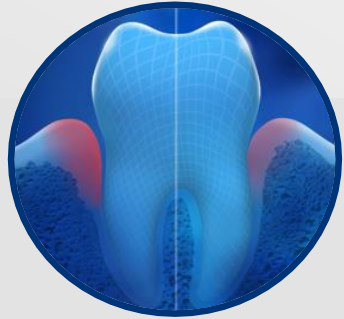
¹ <https://fdiworldental.org/gphp>

² Newton, JT, Asimakopoulou, K. Behavioral models for periodontal health and disease. *Periodontol* 2000. 2018; 78: 201– 211. <https://doi.org/10.1111/prd.12236>

³ Sanz M, *J Clin Periodontol*. 2020 Jul;47 Suppl 22(Suppl 22):4-60. doi: 10.1111/jcpe.13290. Erratum in: *J Clin Periodontol*. 2021 Jan;48(1):163. PMID: 32383274; PMCID: PMC7891343.

⁴ Soldani FA et al *Cochrane Database Syst Rev*. 2018 Oct 31;10(10):CD007447. doi: 10.1002/14651858.CD007447.pub2. PMID: 30380139; PMCID: PMC6516798.

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Dental Professionals must provide Oral Hygiene Advice to their patients³



Conventional interventions have limited outcomes⁴

“There was insufficient high-quality evidence to recommend any specific one-to-one OHA method as being effective in improving oral health or being more effective than any other method”⁴



Systematic Review & Meta Analysis



¹ <https://fdiworlddental.org/gphp>

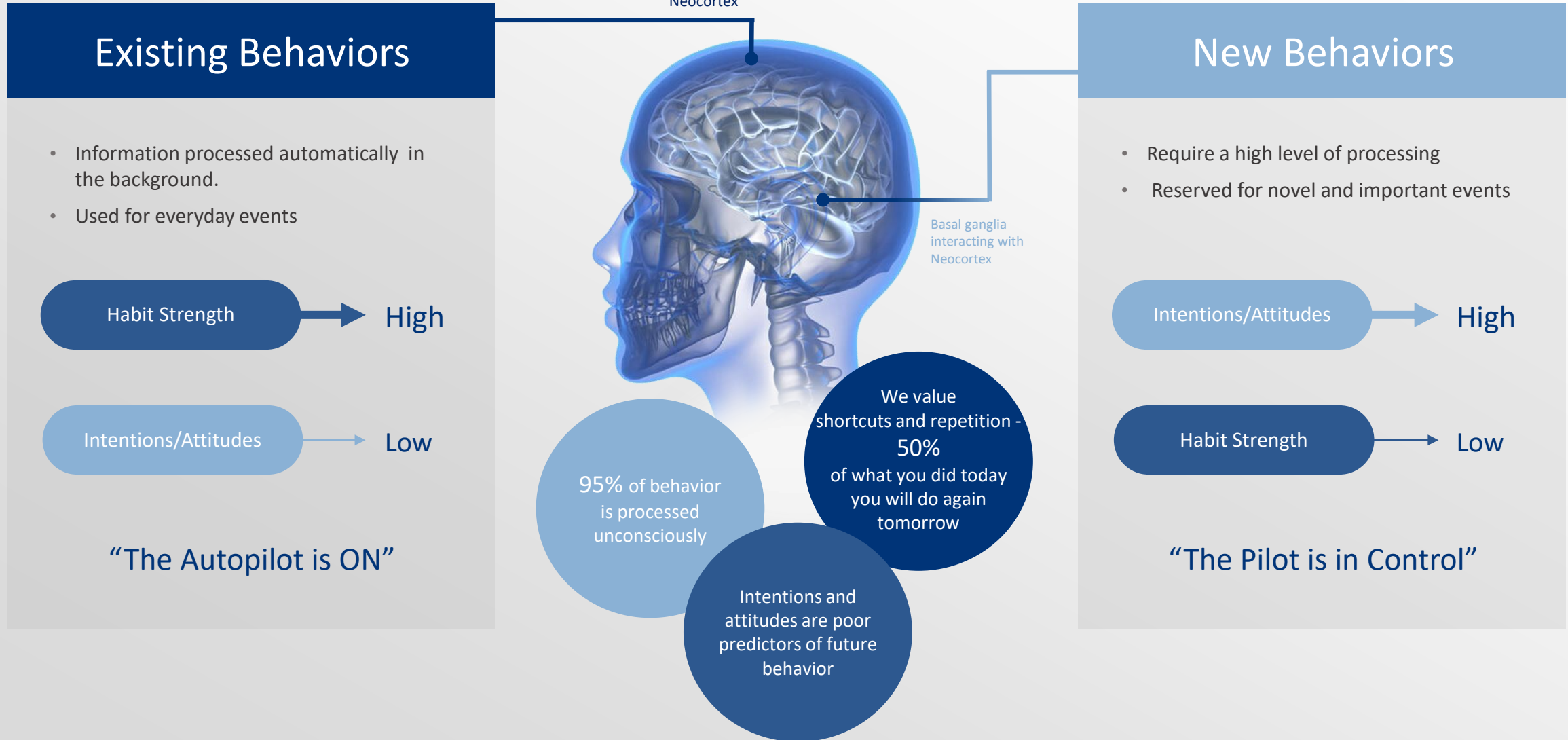
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³ Sanz M, *J Clin Periodontol*. 2020 Jul;47 Suppl 22(Suppl 22):4-60. doi: 10.1111/jcpe.13290. Erratum in: *J Clin Periodontol*. 2021 Jan;48(1):163. PMID: 32383274; PMCID: PMC7891343.

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IT'S HARD TO CHANGE BEHAVIOR¹

IT'S HARD TO CHANGE BEHAVIOR¹



SELF-MONITORING & FEEDBACK

are integral to establishing effective oral care routines¹



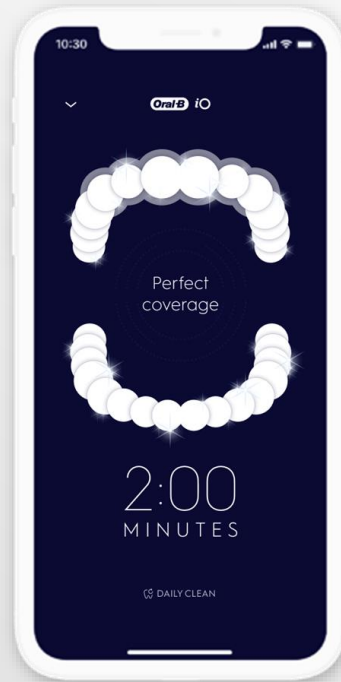
Behavioral Intervention Model for Periodontal Health¹

Can App technology bridge the HOME VS DENTAL OFFICE GAP to improve oral care compliance¹?



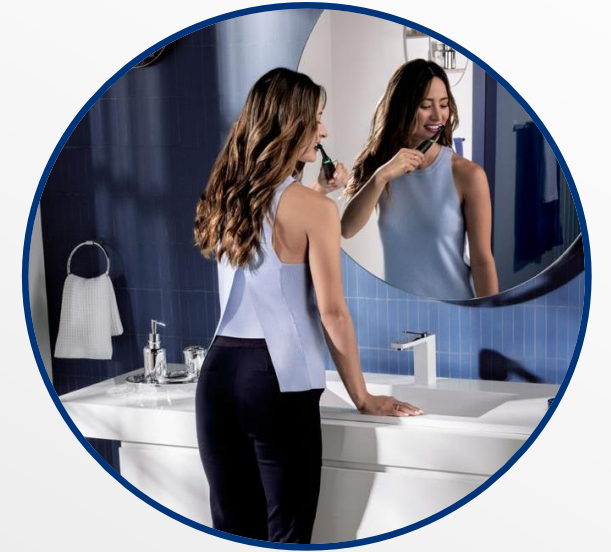
Oral Health
Intervention

+



App
Technology

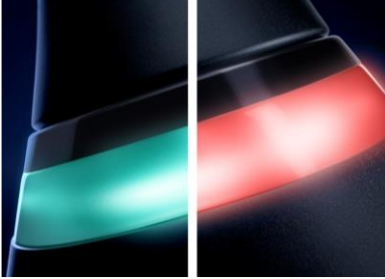
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Effective
Self-Care


Feedback with NUDGING & COACHING designed to facilitate behavior change

Pressure Sensor Technology




Interactive Display:

- Timer
- Smileys




NUDGING




Subtle or invisible cues to enable a desired, but infrequently exhibited, behavior associated with a goal

App Technology:

- Brush coaching
- Oral Care Journeys
- Self-reporting of oral hygiene habits



COACHING



Explicit guidance to encourage or mandate a behavior or behavior change

A Global, In-Market, Evaluation of Toothbrushing Behavior and Self-Assessed Gingival Bleeding with Use of App Data from an Interactive Electric Toothbrush¹

OBJECTIVE

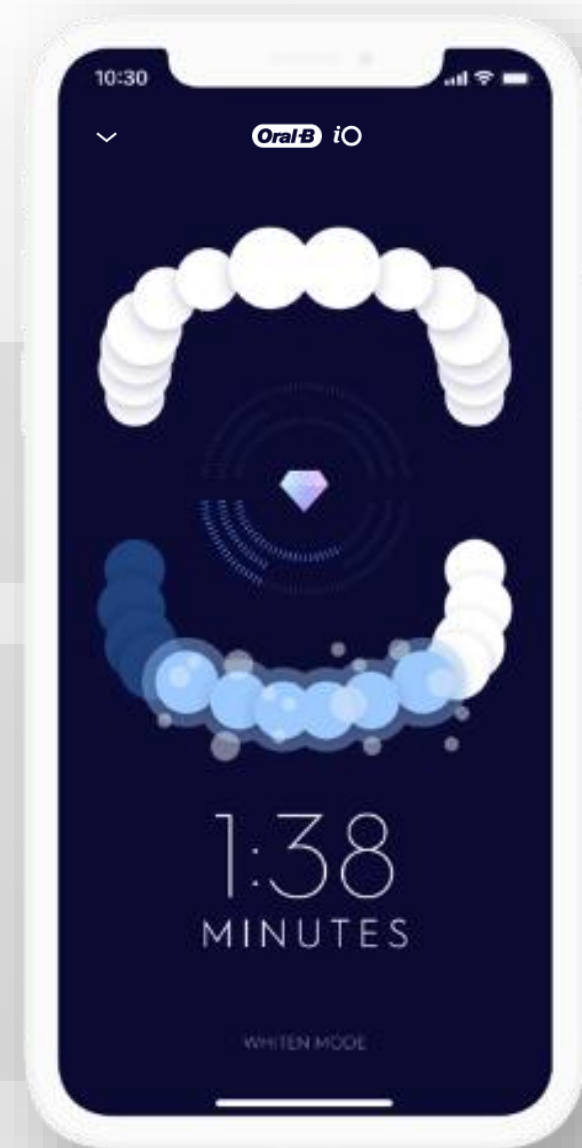
To determine if an interactive electric toothbrush and smartphone application (app) can reduce self-reported gingival bleeding and promote better brushing behavior based on global, in-market usage data.

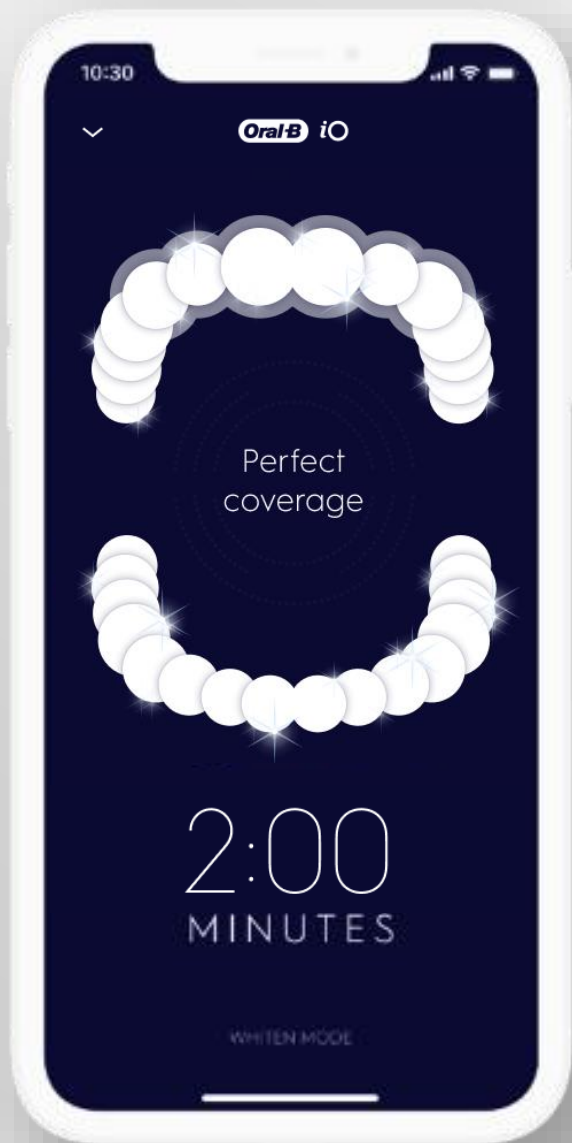
ANALYSIS

Anonymized data from the Oral-B app collected between July 2020- January 2021

Genius, Genius X and iO users

Self-reported gingival bleeding and brushing behavior data analyzed via Google Firebase & Google Big Query



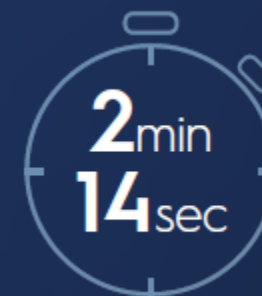
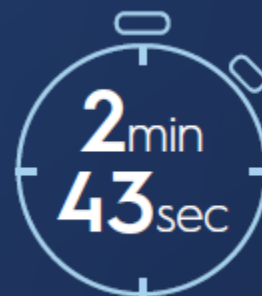


REAL-TIME FEEDBACK

resulted in the biggest improvements in brushing behavior¹

21.6 % longer brushing time with Position Detection v No App

Mean Brushing Durations



Position Detection

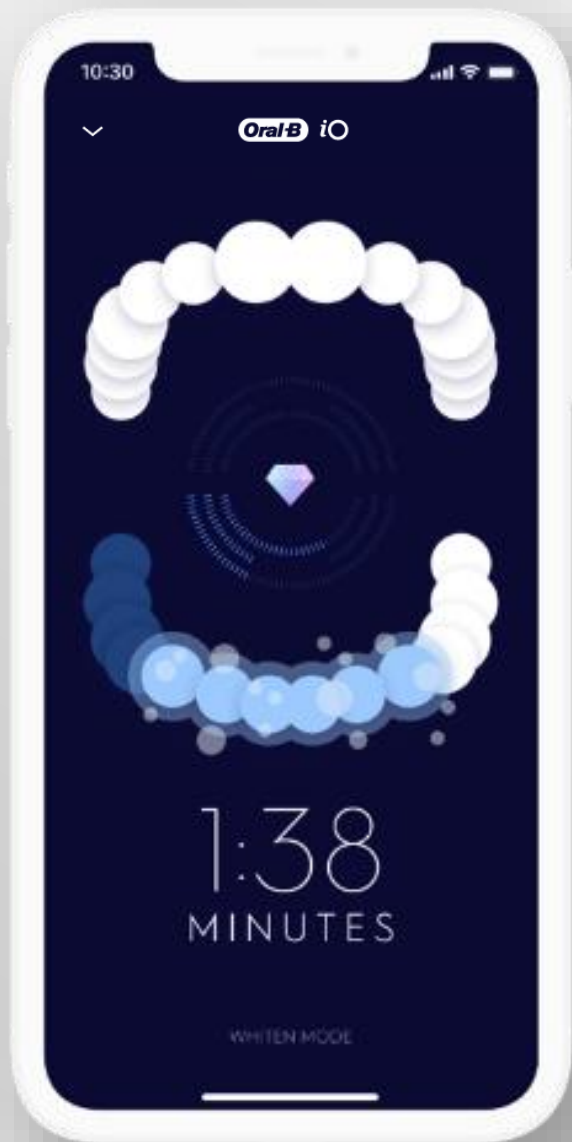
No App

Average brushing time reported for Manual Brush²

16,681,216

Total Brushing Sessions





REAL-TIME FEEDBACK

resulted in the biggest improvements in brushing behavior¹

BRUSHING MEASURE	NUMBER OF BRUSHING SESSIONS	ADJUSTED MEANS [§]		
		Position Detection	Timer only	Offline Session (app not used)
Coverage [%]	7,568,598 [†]	94.4		
Sessions with complete coverage [%]	7,568,598 [†]	79.6		
Duration [s] [§]	16,681,216 [‡]	162.6	122.7	133.8
Overpressure [s] [§]	16,681,213 [‡]	1.55	1.64	2.35
Overpressure [% of total duration] [§]	16,681,213 [‡]	1.06	1.35	2.04

Brushing sessions with Position Detection lasted longer and with less overpressure¹

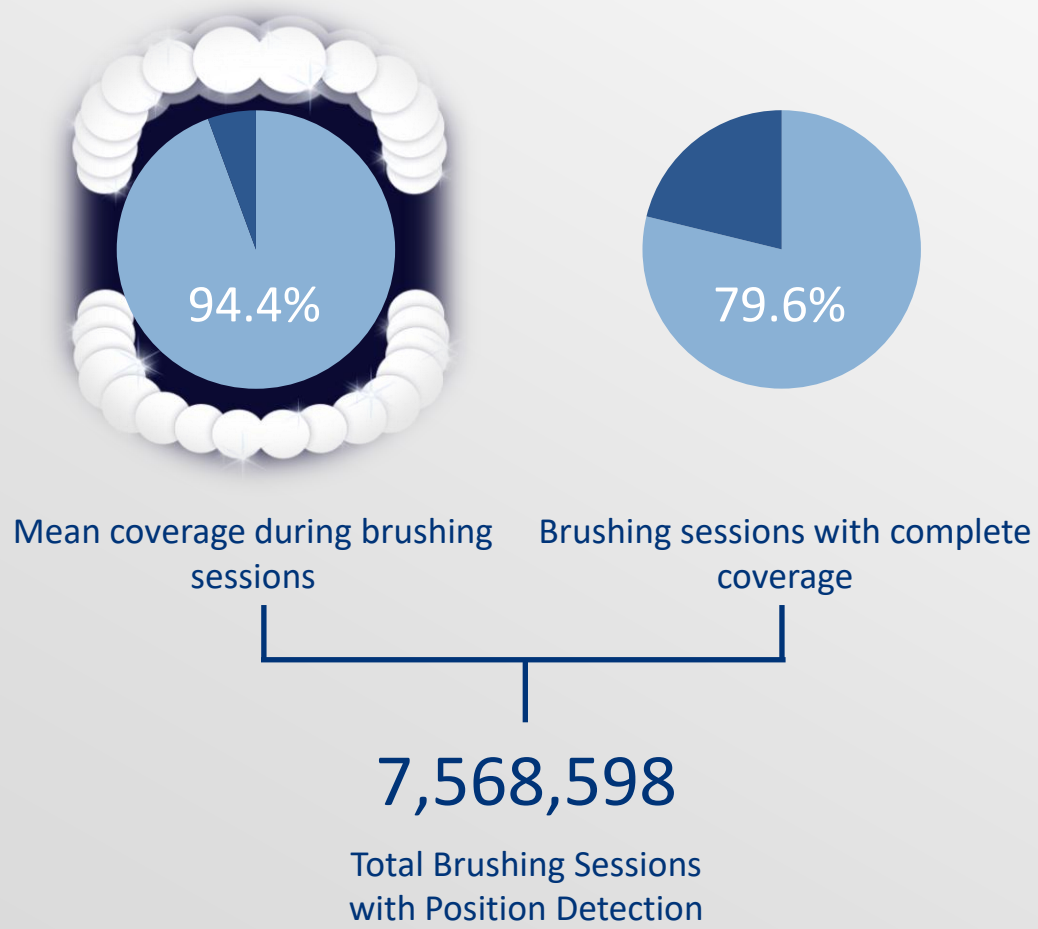
¹ Thurnay S, Adam R, Meyners M. Oral Health Prev Dent. 2022 Jan 20;20(1):1-10. doi: 10.3290/j.ohpd.b2572911. PMID: 35049247.

² Beals et al. Am J Dent 2000; Mar;13(Spec No):5A-14A.

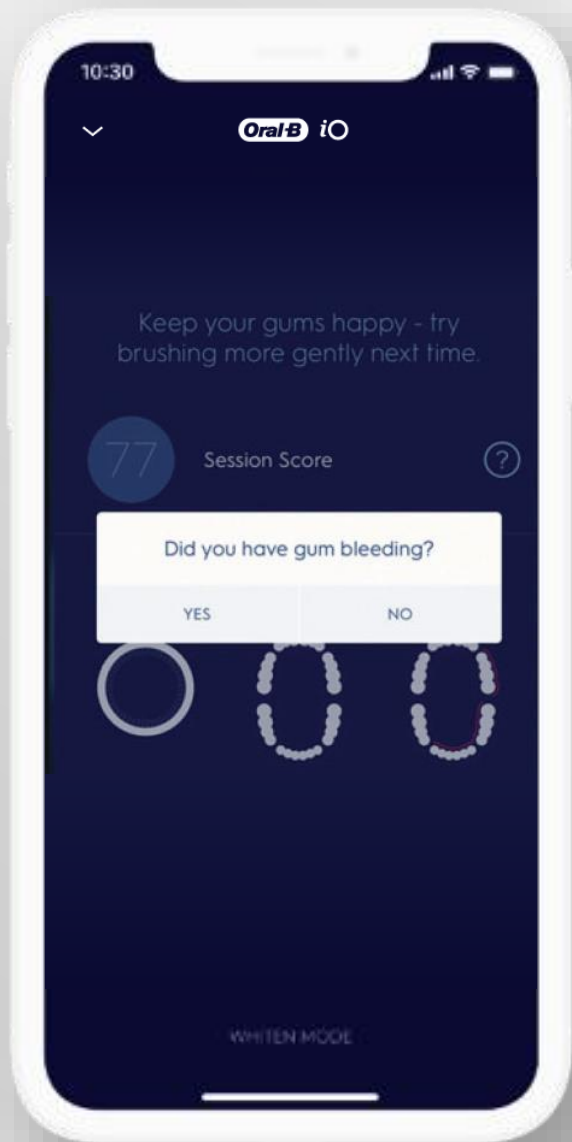


POSITION DETECTION

facilitates thorough brushing coverage¹



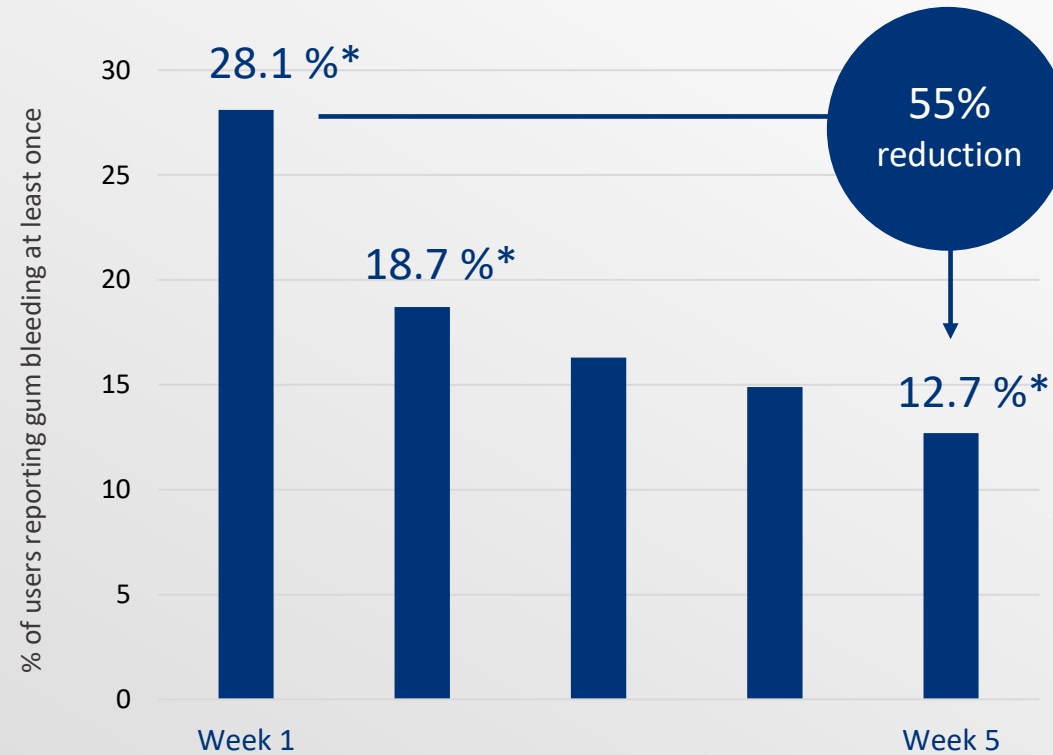
¹Thurnay S, Adam R, Meyners M. Oral Health Prev Dent. 2022 Jan 20;20(1):1-10. doi: 10.3290/j.ohpd.b2572911. PMID: 35049247.



Self-reported gingival bleeding was less frequent the longer GUM GUARD was used ¹



Self-Reporting of gingival bleeding over time via Gum Guard

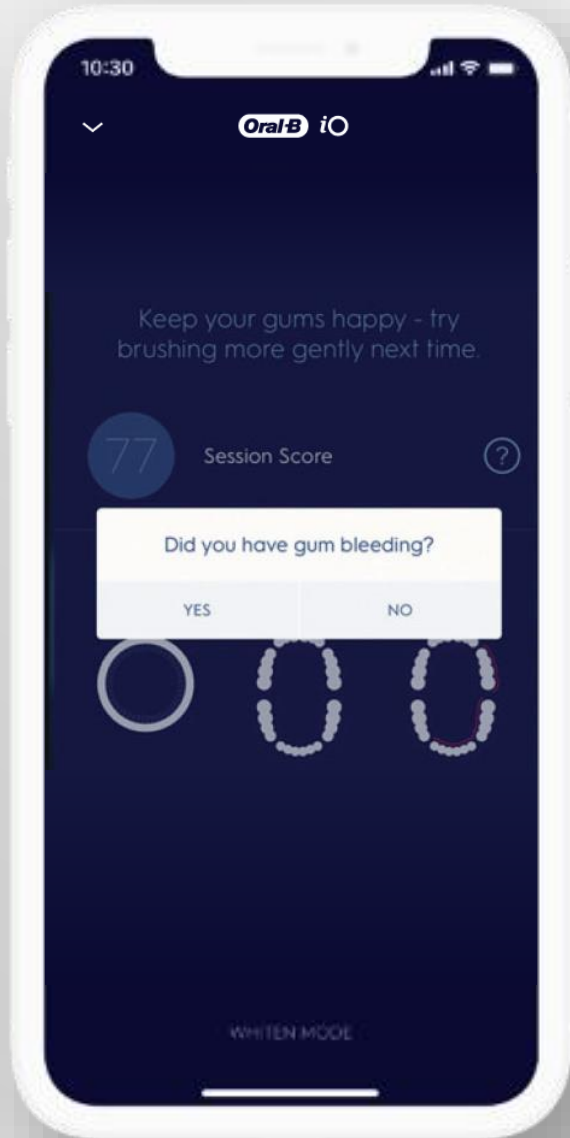


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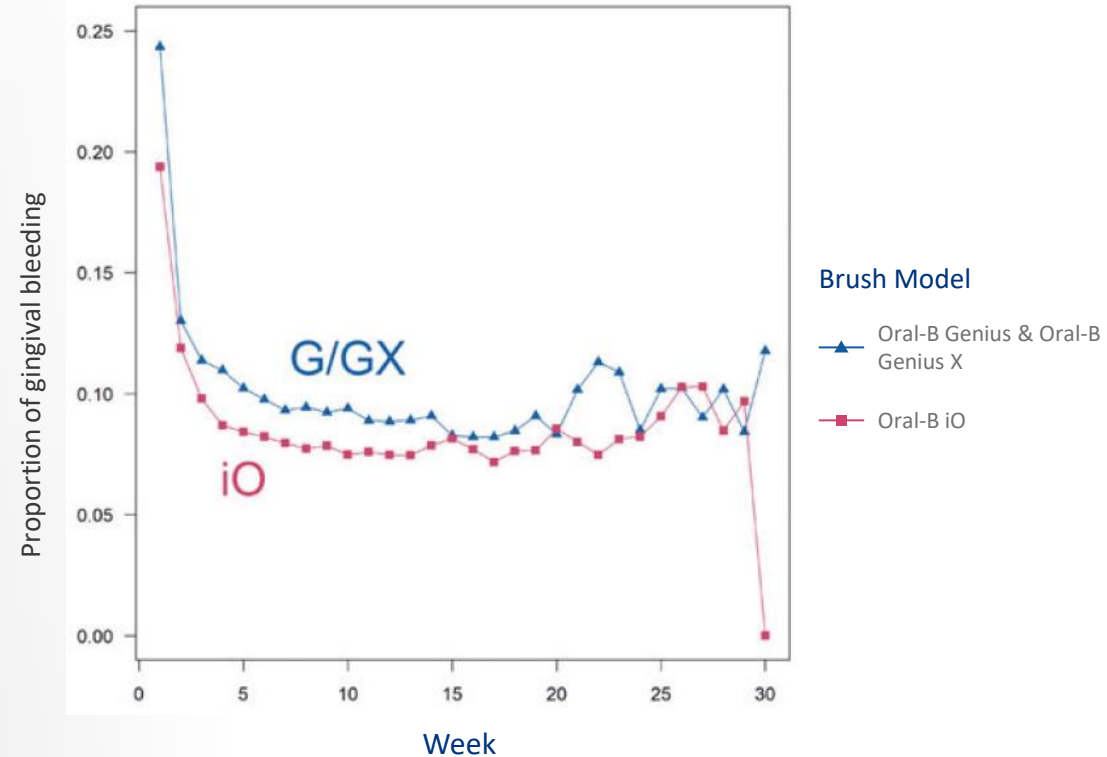


Self-reported gingival bleeding was less frequent the longer GUM GUARD was used, with statistically significant reductions as early as week 2¹



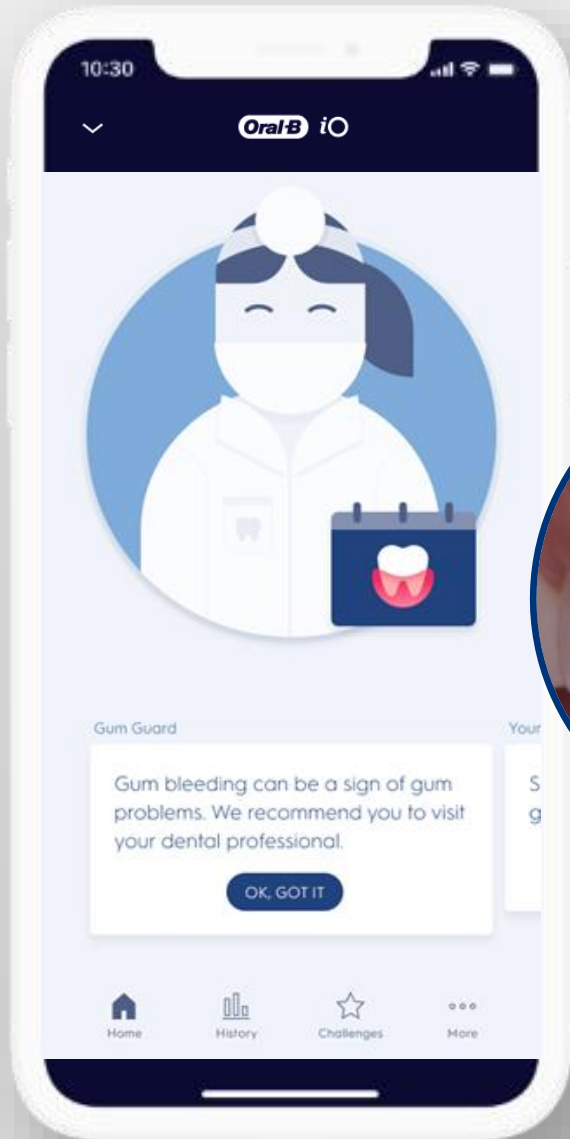
Oral-B iO users had consistently lower rates of self-reported gingival bleeding versus Genius/Genius X users

Proportion of self-reported gingival bleeding over time by brush*



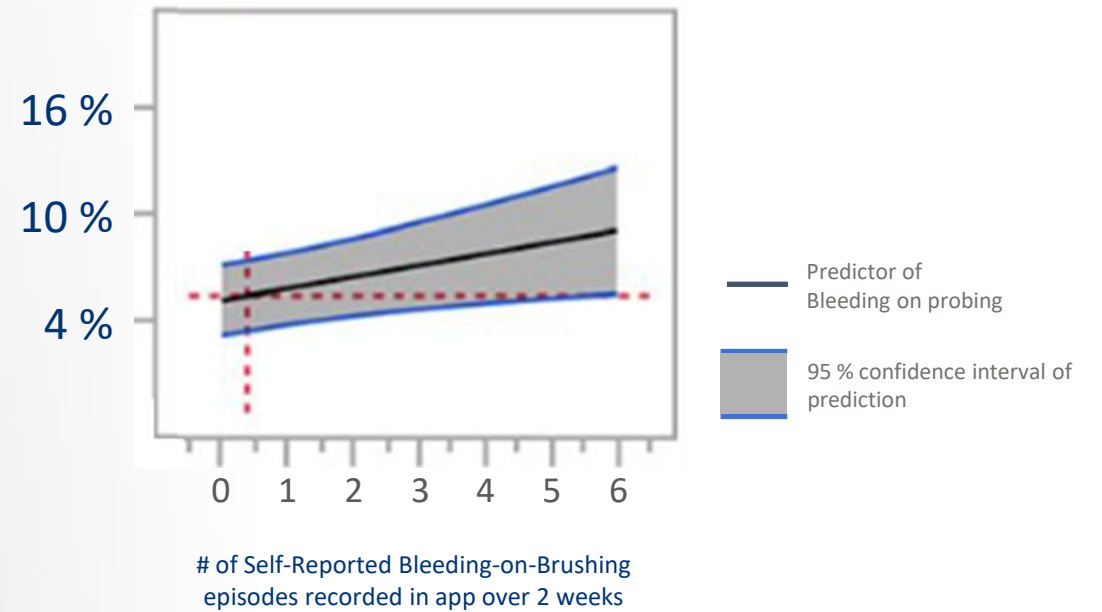
* p<0.001 for first 10 weeks, p<0.05 through week 13

Earlier analysis shows self-assessment of gingival BLEEDING-ON-BRUSHING is a clear predictor of BLEEDING-ON-PROBING¹



Prediction Profiler of Self-Reported Bleeding-on-Brushing v Clinical Bleeding-on-Probing*

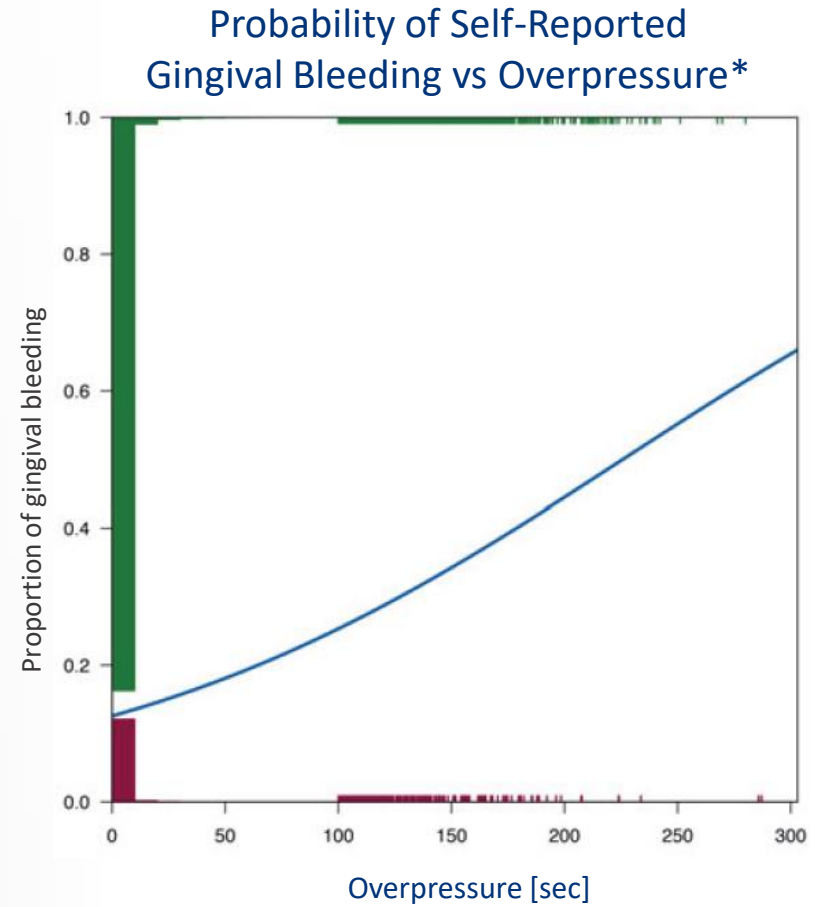
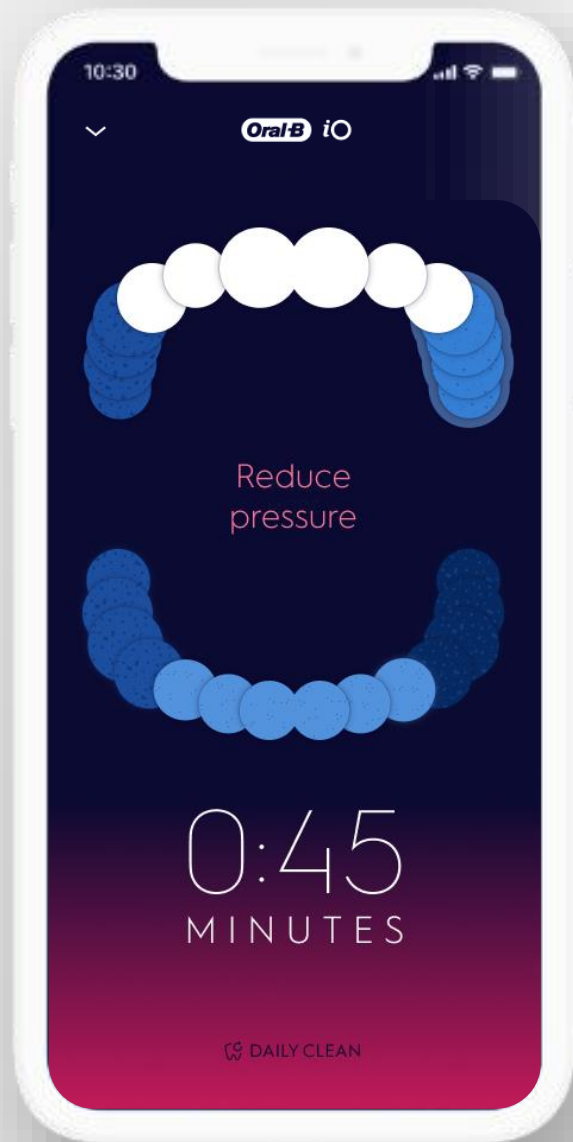
Full Mouth Bleeding Scores



of Self-Reported Bleeding-on-Brushing episodes recorded in app over 2 weeks

¹ Tonetti, MS, Deng, K, Christiansen, A, et al. Self-reported bleeding on brushing as a predictor of bleeding on probing: Early observations from the deployment of an internet of things network of intelligent power-driven toothbrushes in a supportive periodontal care population. J Clin Periodontol. 2020; 47: 1219– 1226. <https://doi.org/10.1111/jcpe.13351>

Oral-B app Users were MORE LIKELY to self-report gingival bleeding with increased overpressure ¹



█ Responses without gingival bleeding

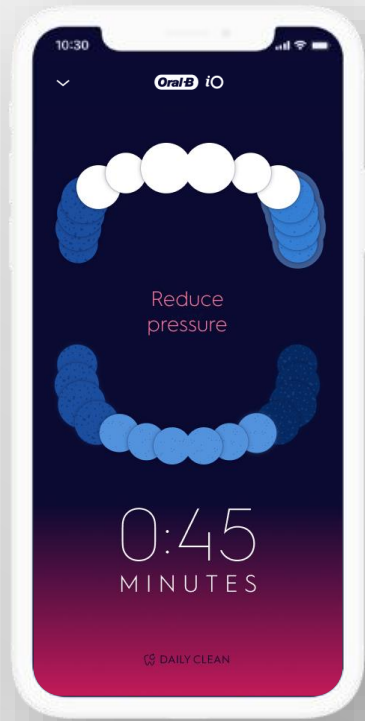
█ Responses with gingival bleeding

— Probability of self-reported gingival bleeding



¹ Thurnay S, Adam R, Meyners M. Oral Health Prev Dent. 2022 Jan 20;20(1):1-10. doi: 10.3290/j.ohpd.b2572911. PMID: 35049247

⁵ Adjusted means

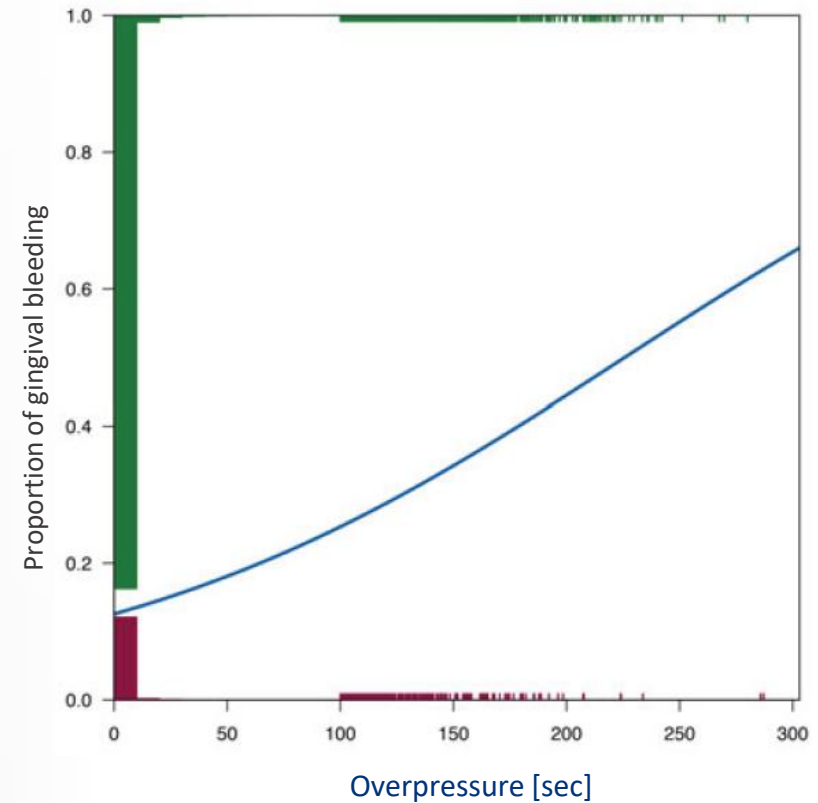


Oral-B app Users were MORE LIKELY to self-report gingival bleeding with increased overpressure ¹

Brushing sessions using the Oral-B app had less overpressure*

* vs sessions without app

Probability of Self-Reported Gingival Bleeding vs Overpressure*



BRUSHING MEASURE	NUMBER OF BRUSHING SESSIONS	Position Detection	Timer only	Offline Session (app not used)
Overpressure [s] [§]	16,681,213	1.55	1.64	2.35
Overpressure [% of total duration] [§]	16,681,213	1.06	1.35	2.04

█ Responses without gingival bleeding
 █ Responses with gingival bleeding
 — Probability of self-reported gingival bleeding



¹ Thurnay S, Adam R, Meyners M. Oral Health Prev Dent. 2022 Jan 20;20(1):1-10. doi: 10.3290/j.ohpd.b2572911. PMID: 35049247

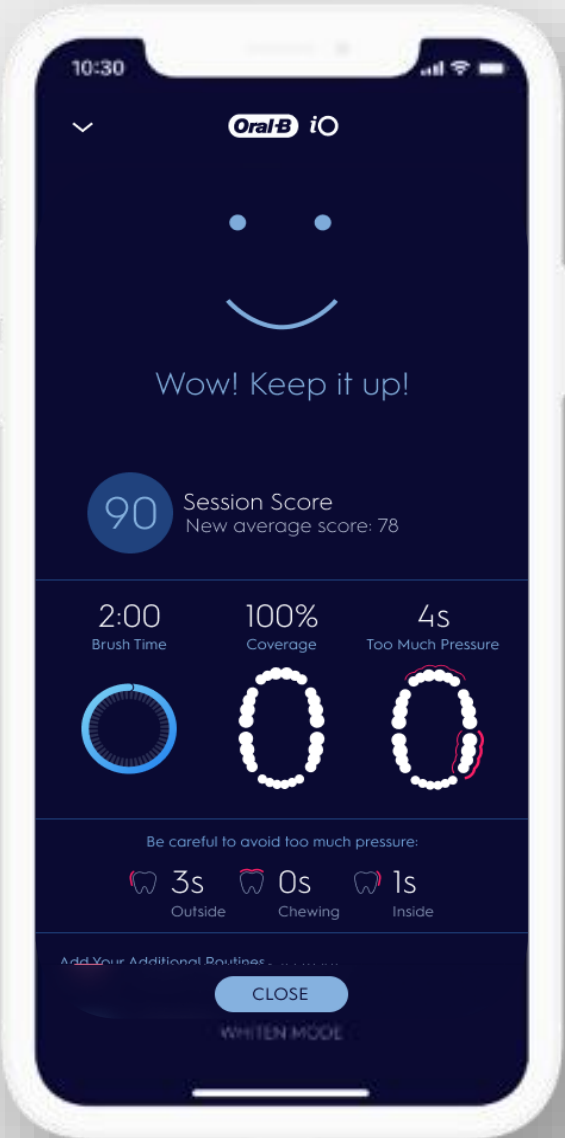
[§] Adjusted means

SUPPLEMENTARY ANALYSIS

beyond the publication



iO + Oral-B app usage shown to improve & sustain key brushing behaviors WITHIN 5 SESSIONS¹

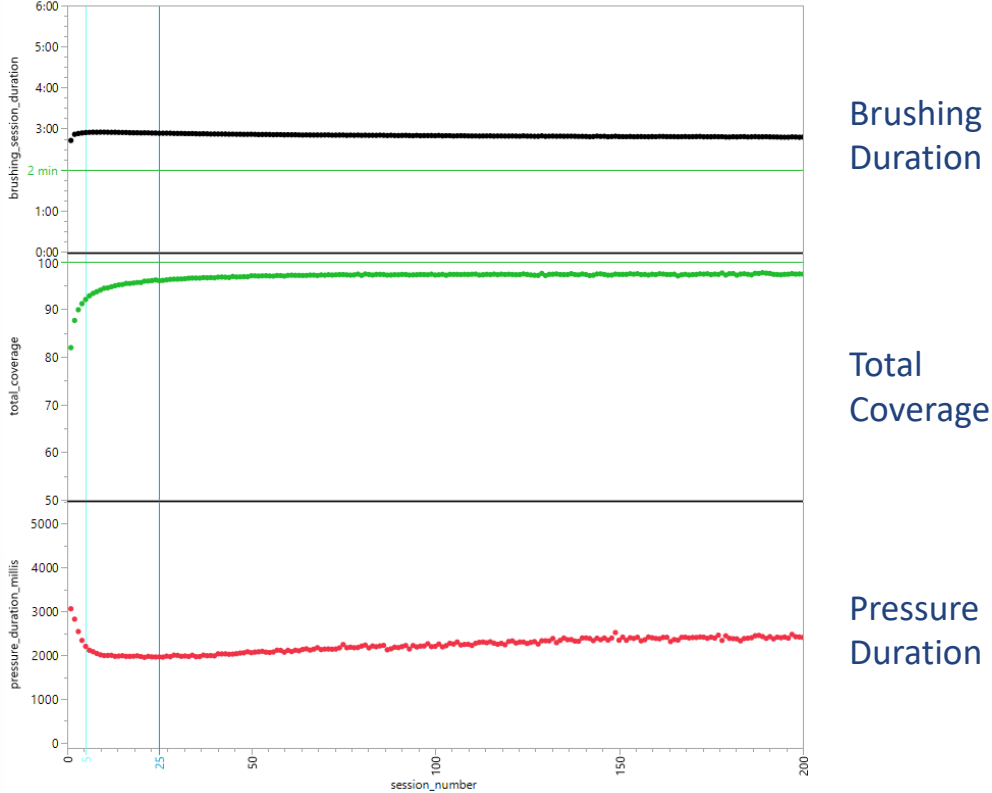


Within the first 5 sessions, brushing habits are seen to **improve** and are then **maintained**

Coverage and in-app brushing duration **increase**

Overpressure duration **decreases**

Brushing Habits over Time



- Mean (brushing_session_duration)
- Mean (total_coverage)
- Mean (pressure_duration_millis)

¹ Oral-B app data on File







DAILY CLEAN

is the mode most often used among iO brushers*



% of sessions per mode

71 %

13 %

6 %

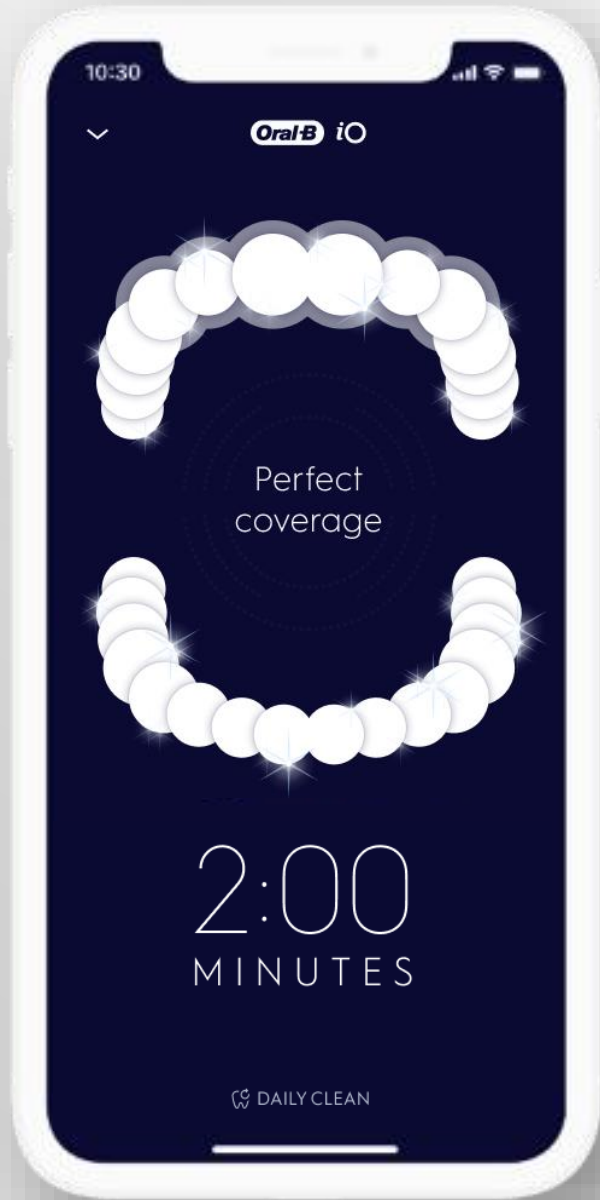
11 %

4 %

3 %

* 8,626,019 total sessions with reliable data July 2020-June 2021





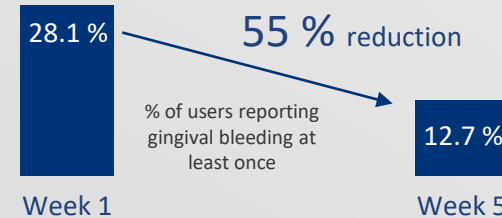
Real-world data suggests that using Oral-B interactive oscillating-rotating electric toothbrushes with the Oral-B app can support Dental Professional oral hygiene guidance and empower patients in Self-Care¹

Real-time feedback resulted in the strongest brushing behavior improvements¹

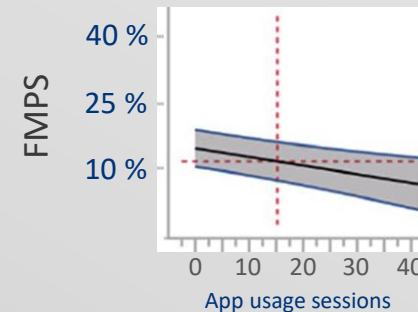


Mean Brushing Durations

Self-reported gingival bleeding was less frequent the longer Gum Guard was used¹



Findings support previous analysis showing usage of Oral-B app correlates positively with improved oral hygiene²



Correlation between Oral-B App Usage & Full Mouth Plaque Scores

* p>0.15

¹ Thurnay S, Adam R, Meyners M. Oral Health Prev Dent. 2022 Jan 20;20(1):1-10. doi: 10.3290/j.ohpd.b2572911. PMID: 35049247

² Tonetti, MS, Deng, K, Christiansen, A, et al.. J Clin Periodontol. 2020; 47: 1219– 1226. https://doi.org/10.1111/jcpe.13351



