

# The effectiveness of smart toothbrushing for children

Existing evidence shows that regular tooth brushing with fluoride toothpaste reduces the development of caries. Furthermore, brushing teeth twice a day leads to more effective caries prophylaxis than brushing teeth only once a day.<sup>1</sup> These findings were supported by the S2K guideline for caries prophylaxis.<sup>2</sup>

Despite current best practice recommendations, not every child follows this procedure, which can become a challenge for parents. The evaluation of the KiGGS study wave 2 showed that around one-fifth (22%) of 0- to 17-year-olds brush their teeth too infrequently.<sup>3</sup>

Playbrush for children is a smart toothbrush available in two versions: As Playbrush Smart, it is plugged into the end of the manual toothbrush and is suitable for children from 3 years of age. The Playbrush Smart Sonic is an electric toothbrush suitable for children from the age of 6. Both smart systems can be connected to a smartphone or tablet via Bluetooth. Adding interactivity through games can guide users to achieve a longer and more thorough brushing experience. The cleaning statistics also provide information about cleaning behavior.

## Key findings of the studies



Children brushed twice as long through interactive toothbrushing with games than without games.<sup>5</sup>



Playbrush games can help to create a more thorough brushing experience, as the brushing direction to the right is less overlooked.<sup>4</sup>



Interactive toothbrushing with games can encourage more regular toothbrushing (2x daily).<sup>5</sup>

## Study 1: The significance of interactive manual and electric toothbrushes for dental hygiene.<sup>4</sup>



**Primary Target**





Evaluation of the influence of playful and interactive toothbrushing with electric Playbrush on children's brushing time and frequency. A comparison group consisted of both the electric and the manual interactive Playbrush without games. Also examined was the influence of a brushing statistic for parents on their children's brushing behavior.



**Secondary Target**

Parents' opinions about the usefulness of the Playbrush and its influence on their children's brushing behavior.

## Design of Study

-  **Monadic Home use study**
-  **Great Britain: Wirral and Liverpool**
-  **150 children Between 6-10 years**
-  **Study period: 6 weeks**

5 Groups (N=150)					
	Group	Brushing statistics	Manual	Electric	5 Games
Intervention	1	⊗	⊗	✓	✓
	2	✓	⊗	✓	✓
Control	3	✓	⊗	✓	⊗
	4	⊗	⊗	✓	⊗
	5	⊗	✓	⊗	⊗

150 children recruited with 4,300 recordings

110 children with 3,877 recordings evaluated

- Drop-out reasons**
- Children with <5 or >300 recordings in 42 days
  - Recordings <4 seconds
  - All recordings in groups 3-5 while accessing games

## Study findings

### Brushing duration



Group	Users	⊗ Brushing Time in Sec. (95% KI)
1	17	117 (115-118)
2	21	117 (116-118)
3	21	107 (103-111)
4	15	90 (87-93)
5	17	44 (41-47)

Children who brushed their teeth in a playful manner showed the longest brushing time. This can support plaque removal.

### Brushing behavior



Group 3 had the largest average increase in brushing time from 82 to 120 seconds during a period of 6 weeks.

Access to brushing statistics can positively influence brushing time.

### Brushing direction



Children who brushed their teeth with games (1,2) spent more time brushing in different directions (left, right, up, and down) than children who brushed manually (5).

Playbrush games can promote more thorough toothbrushing because the right brushing direction is less overlooked (1,2).

## Variability



The variability of cleaning times of children with games (1) was significantly lower than in group 3 ( $p < 0.0001$ ), 4 ( $p < 0.0001$ ) and 5 ( $p < 0.0001$ ).

Interactive brushing with Playbrush games can lead to a more consistent brushing time.

## Parental survey



Questionnaires



Audio recordings  
Focus Groups n=16

For one-fifth of the survey participants, the benefits of playful tooth brushing were clear:

- ✓ Improvement of the child's independence.
- ✓ Improvement of the brushing technique.
- ✓ Improving the willingness to brush teeth.

This study was funded by Playbrush.

# Study 2: The significance of interactive toothbrushes in children's dental hygiene.<sup>5</sup>



## Study objective

Evaluation of the influence of interactive manual toothbrushes on the duration and frequency at which children brush their teeth.

## Design of Study



Monadic  
Home use study



Great Britain:  
Wirral



115 children  
Between 6-10 years



Study period:  
6 weeks



Interactive manual  
toothbrush

### 4 randomised groups

Group	Interactive Game	Brushing statistics
A	✓	⊗
B	✓	✓
C	⊗	⊗
D	⊗	✓

115 children  
recruited

103 children  
evaluated

12 drop-outs

## Study findings

### Brushing duration



Children with interactive games (A,B) brushed on average twice as long as children without games (C,D) (101 sec vs. 50 sec;  $p < 0.001$ ).

## Brushing frequency

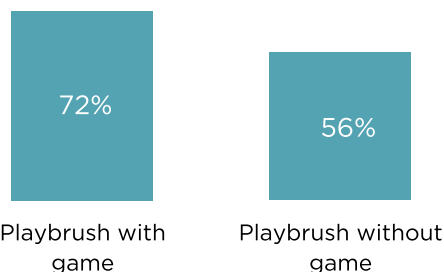


Children with interactive games (A,B) cleaned an average of 1.75 times per day, while children without games (C,D) cleaned an average of 1.36 times per day ( $p < 0.001$ ).

The number of brushing units per day increased by 15% due to the interactive game.

The likelihood of brushing 2x a day increased by 23% as a result of an interactive game.

■ Likelihood of brushing 2x daily within 6 weeks (in %)



## Parents' questionnaire

### Fun while brushing teeth



Playful tooth brushing was fun for children.

<30%

Baseline

50%

Week 1

without game

100%

Week 1

with game

### Brushing Reminder



Children who brushed their teeth with games required fewer reminders.

Brushing statistics can prompt parents to provide brushing reminders.

>79%

Baseline

A + B



30-35%

Week 1

C + D

64-68%



B + C + D

68-78%



Week 6

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