Psychosocial correlates of oral hygiene behaviour in people aged 9 to 19

*a systematic review with meta-analysis*


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<table>
<thead>
<tr>
<th>Study, country, design, (quality assessment score)</th>
<th>Sample (number, gender, age)</th>
<th>Psychosocial correlates (Theoretical framework)</th>
<th>The independent correlations with 95% CI per oral hygiene behaviour outcome</th>
</tr>
</thead>
</table>
| Aleksejuniene et al. 2012 Lithuania; Cross-sectional study (4 points) | n=235 a, mix b aged 12-13 years | 1. Locus of control (internal)  
2. Locus of control (external) | - Plaque score (IQP-index)  
1. 0.02 (-0.11;0.15)  
2. -0.06 (-0.18;0.07)  
- Self-reported tooth brushing frequency  
1. na.  
2. -0.11 (-0.24;0.01) |
| Ayo-Yusuf et al. 2009 South Africa; Prospective study (18 months) (6 points) | n=526; mix mean age(SD) in years=14.4 (1.5) | 1. Sense of coherence  
2. Depression vulnerability**  
3. Attitude  
4. Intention (I-Change Model) | - Self-reported tooth brushing frequency  
1. 0.02 (-0.07;0.11)  
2. 0.13 (0.05;0.21)  
3. 0.05 (-0.04;0.14)  
4. 0.08 (-0.01;0.16) |
| Cinar et al. 2009 Finland; Cross-sectional study (4 points) | n=338; mix aged 10-12 years | 1. Self-efficacy | - Self-reported tooth brushing frequency  
1. 0.09 (0.03;0.15) |
| Cinar et al. 2009 Turkey; Cross-sectional study (3 points) | n=611; mix aged 10-12 years | 1. Self-efficacy | - Self-reported tooth brushing frequency  
1. 0.28 (0.20;0.35) |
| Dorri et al. 2010 Iran; Cross-sectional study (4 points) | n=911; mix Mean age(SD) in years=12.4 (0.8) Range=11-16 years | 1. Sense of coherence (Salutogenic model) | - Self-reported tooth brushing frequency  
1. 0.09 (0.03;0.15) |
| Freire et al. 2001 Brazil; Cross-sectional study (3 points) | n=664; mix 15 year olds | 1. Sense of coherence (Salutogenic model) | - Self-reported tooth brushing frequency  
1. 0.01 (-0.07;0.08) - Plaque score (index of Silnes & Löe)  
1. 0.03(-0.05;0.10) |
| Cholami et al. 2014 Iran; Cross-sectional study (4 points) nested within a prospective study (1 month) (6 points) | n=156; F aged 11-15 years mean age(SD) in years= 12.5 (1.1) | 1. Intention  
2. Self-efficacy  
3. Action planning  
4. Coping planning (HAPA constructs) | - Self-reported flossing frequency  
<code>cross (n=156) pros (n=89)</code>  
1. 0.65 (0.55; 0.73)  
2. 0.72 (0.64; 0.80)  
3. -0.09 (-0.24; 0.07)  
4. 0.04 (-0.12; 0.20) -0.03 (-0.28; 0.12) |
| Honkala et al. 2007 Kuwait; Cross-sectional study (3 points) | n=1826; mix; Mean age: 11.9 years (SD ± 1.3); range=11-13 years | 1. Self-esteem  
2. Life-satisfaction** | - Self-reported tooth brushing frequency  
1. 0.12 (0.08;0.17)  
2. 0.10 (0.05;0.14) - Self-reported flossing frequency  
1. 0.16 (0.12;0.20)  
2. 0.04 (0.00;0.08) |
| Kallestal et al. 2006 Sweden; 2 cross-sectional studies within the same study group (4 points) | n=2836; mix mean age in '97 = 14 years mean age in '99 = 16 years | 1. Self-esteem  
2. Attitude | - Self-reported tooth brushing frequency  
<code>cross</code>  
1. 0.02 (-0.12;0.15)  
2. 0.11 (0.06;0.17) - Self-reported flossing frequency  
<code>cross</code>  
1. 0.48 (0.42;0.54)  
2. 0.24 (0.16;0.31) |
| Kamalkhah et al. 2015 Iran; Cross-sectional study (4 points) | n=652; mix; Mean age: 16.3 years (SD ±1.02); | 1. Self-efficacy  
2. Attitude | - Self-reported flossing frequency  
1. 0.48 (0.42;0.54)  
2. 0.24 (0.16;0.31) |
### Psychosocial Correlates of Oral Hygiene Behaviour

<table>
<thead>
<tr>
<th>Study</th>
<th>Country &amp; Region</th>
<th>Setting</th>
<th>Sample Size</th>
<th>Mean Age</th>
<th>Outcomes</th>
<th>Effect Sizes &amp; Confidence Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Koerber et al. 2006&lt;sup&gt;4&lt;/sup&gt;</td>
<td>United States of America; Cross-sectional study (4 points)</td>
<td>n=575; mix mean age=10.8 years</td>
<td>1. Social influences 2. Self-esteem 3. Self-efficacy (Mixed models - social learning constructs)</td>
<td>Self-reported tooth brushing frequency</td>
<td>1. 0.34 (0.27;0.41) 2. 0.16 (0.08;0.24) 3. 0.12 (0.12;0.28)</td>
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<tr>
<td>Macgregor et al. 1997&lt;sup&gt;2&lt;/sup&gt; Study 1</td>
<td>England; Cross-sectional study (3 points)</td>
<td>n=18158; f/m range=12-13 years</td>
<td>1. Self-esteem 2. Locus of control</td>
<td>Self-reported tooth brushing frequency</td>
<td>1. 0.03 (0.02;0.05) 2. 0.02 (0.00;0.03)</td>
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<tr>
<td>Macgregor et al. 1997&lt;sup&gt;2&lt;/sup&gt; Study 2</td>
<td>England; Cross-sectional study (3 points)</td>
<td>n=4736; f/m age range=13-14 years</td>
<td>1. Self-esteem 2. Locus of control</td>
<td>Self-reported tooth brushing frequency</td>
<td>1. 0.06 (0.03;0.08) 2. 0.02 (0.01;0.04)</td>
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<tr>
<td>Macgregor et al. 1997&lt;sup&gt;2&lt;/sup&gt; Study 3</td>
<td>England; Cross-sectional study (3 points)</td>
<td>n=15492; f/m range=14-15 years</td>
<td>1. Self-esteem 2. Locus of control</td>
<td>Self-reported tooth brushing frequency</td>
<td>1. 0.07 (0.06;0.09) 2. 0.04 (0.03;0.06)</td>
<td></td>
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<tr>
<td>Macgregor et al. 1997&lt;sup&gt;2&lt;/sup&gt; Study 4</td>
<td>England; Cross-sectional study (3 points)</td>
<td>n=2756; f/m range=15-16 years</td>
<td>1. Self-esteem 2. Locus of control</td>
<td>Self-reported tooth brushing frequency</td>
<td>1. 0.08 (0.07;0.10) 2. 0.07 (0.03;0.10)</td>
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<tr>
<td>Morowatisharifabad et al. 2007&lt;sup&gt;43&lt;/sup&gt;</td>
<td>Iran; Cross-sectional study (4 points)</td>
<td>n=300; mix mean age (SD) in years=17.45±0.54 range=17-19 years old.</td>
<td>1. Perceived self-efficacy 2. Attitude 3. Social influences (Health Promotion Model)</td>
<td>Self-reported oral health behaviour (Brushing and its quality; brushing after consumption of sweets, flossing; use of fluoride mouthwash, and dental visits.)</td>
<td>1. 0.40 (0.31;0.50) 2. 0.38 (0.27;0.47) 3. 0.28 (0.17;0.34)</td>
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<tr>
<td>Pakpour et al. 2012&lt;sup&gt;45&lt;/sup&gt;</td>
<td>Iran; Cross-sectional study (4 points) nested within a prospective study (1 month) (6 points)</td>
<td>n=721, mix mean age (SD) in years=15.45 (1.18)</td>
<td>1. Intention 2. Attitude 3. Perceived behavioural control 4. Subjective norm 5. Action planning 6. Coping planning (TPB + HAPA constructs)</td>
<td>Self-reported tooth brushing frequency</td>
<td>1. 0.70 (0.66;0.73) 2. 0.46 (0.40;0.51) 3. 0.72 (0.68;0.75) 4. 0.34 (0.28;0.41) 5. 0.51 (0.45;0.56) 6. 0.71 (0.67;0.74)</td>
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<tr>
<td>Pakpour et al. 2012&lt;sup&gt;45&lt;/sup&gt;</td>
<td>Iran; Cross-sectional study (4 points) nested within a prospective study (1 month) (6 points)</td>
<td>n=961, mix mean age (SD) in years=15.61 (1.19), range=14-18 years old</td>
<td>1. Intention 2. Perceived behavioural control 3. Action planning 4. Coping planning (TPB + HAPA constructs)</td>
<td>Self-reported tooth brushing frequency</td>
<td>1. 0.40 (0.31;0.50) 2. 0.38 (0.27;0.47) 3. 0.28 (0.17;0.34)</td>
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<tr>
<td>Pölk et al. 2014&lt;sup&gt;46&lt;/sup&gt;</td>
<td>United states of America, prospective study (6 months) (5 points)</td>
<td>n=576; mix aged 9-12 years mean age =10 years</td>
<td>1. intention</td>
<td>Self-reported tooth brushing frequency</td>
<td>1. 0.50 (0.16;0.73)</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Country</td>
<td>Design</td>
<td>Sample Size</td>
<td>Age(s)</td>
<td>Variables</td>
<td>Effect Size(s)</td>
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<td>-------</td>
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<tr>
<td>Poutanen et al. 2005**</td>
<td>Finland; Cross-sectional study (4 points)</td>
<td>n=1464; mix aged 11-12 year old</td>
<td>1. Attitude</td>
<td>Self-reported oral health behaviour (brushing, snacking and xylitol chewing gum)</td>
<td>1. 0.17(0.12;0.22)</td>
<td></td>
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<tr>
<td>Poutanen et al. 2005*</td>
<td>Finland; Cross-sectional study (4 points)</td>
<td>n=673; mix; aged 11-12 year old</td>
<td>1. Attitude</td>
<td>Self-reported oral health behaviour (brushing, snacking and xylitol chewing gum)</td>
<td>1. 0.16(0.08;0.23)</td>
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<tr>
<td>Rise et al. 1998*</td>
<td>Norway; Prospective study (4 weeks)</td>
<td>n=163; mix mean age(SD) in years=15.3(0.3)</td>
<td>1. Attitude 2. Subjective norm 3. Perceived behavioural control 4. Past behaviour 5. Intention (TPB)</td>
<td>Self-reported flossing frequency</td>
<td>1. 0.17(0.02;0.32) 2. 0.30(0.15;0.43) 3. 0.42(0.29;0.54) 4. 0.45(0.32;0.57) 5. 0.50(0.38;0.61)</td>
<td></td>
</tr>
<tr>
<td>Schou et al. 1990**</td>
<td>Scotland; Cross-sectional study (3 points)</td>
<td>n=4935; f/m 11, 13 &amp;15 year olds.</td>
<td>1. Health perception**</td>
<td>Self-reported tooth brushing frequency</td>
<td>1. 0.13 (0.11:0.14)</td>
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<tr>
<td>Smyth et al. 2007*</td>
<td>Spain; Cross-sectional study (3 points)</td>
<td>n=1105; mix 12 year olds</td>
<td>1. Attitude (KAB model)</td>
<td>Plaque score (index of Silnes &amp; Løe)</td>
<td>1. 0.11 (0.05:0.17)</td>
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<tr>
<td>Tolvonen et al. 2012*</td>
<td>Finland; Cross-sectional study (4 points)</td>
<td>n=827; mix 15 &amp;16 year olds</td>
<td>1. Attitude 2. Risk-perception** (KAB model)</td>
<td>Self-reported oral health behaviour (tooth brushing, fluoride toothpaste, use of dental floss)</td>
<td>1. 0.35(0.29;0.41) 2. na. (not sign.)</td>
<td></td>
</tr>
<tr>
<td>Tran et al. 2006*</td>
<td>Vanuata Cross-sectional study (3 points)</td>
<td>n=4474; mix range 11-17 year.</td>
<td>1. life-satisfaction</td>
<td>Self-reported tooth brushing</td>
<td>1. AOR=0.99(0.85:1.16)</td>
<td></td>
</tr>
<tr>
<td>Tran et al. 2006*</td>
<td>Tonga Cross-sectional study (3 points)</td>
<td>n=1485; mix range 11-17 year.</td>
<td>1. life-satisfaction</td>
<td>Self-reported tooth brushing</td>
<td>1. AOR=1.05(0.85:1.28)</td>
<td></td>
</tr>
<tr>
<td>Tran et al. 2006*</td>
<td>Pohnpei, FSM Cross-sectional study (3 points)</td>
<td>n=104; mix range 11-17 year.</td>
<td>1. life-satisfaction</td>
<td>Self-reported tooth brushing</td>
<td>1. AOR=1.09(0.69:1.72)</td>
<td></td>
</tr>
<tr>
<td>Vakili et al. 2011*</td>
<td>Iran; Cross-sectional study (4 points)</td>
<td>n=300; mix mean age(SD) in years=16.24 (0.8) range=15-18 years</td>
<td>1. Self-efficacy 2. Attitude 3. Social influences 4. Intention (Health Promotion Model)</td>
<td>Self-reported oral health behaviour (brushing and its quality, brushing after consumption of sweets, dental visits, flossing, and use of a fluoride mouthwash)</td>
<td>1. 0.53(0.44;0.61) 2. 0.36(0.26;0.45) 3. 0.39(0.29;0.48) 4. 0.32(0.22;0.42)</td>
<td></td>
</tr>
<tr>
<td>Verrips et al. 1993*</td>
<td>Netherlands Cross-sectional study (4 points)</td>
<td>n=518; mix; 11 year olds.</td>
<td>1. Attitude 2. Descriptive norm (parental)</td>
<td>Self-reported tooth brushing frequency</td>
<td>1. AOR=2.2(1.5:4.0) 2. na.</td>
<td></td>
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<tr>
<td>Williams 1972*</td>
<td>United States of America; Cross-sectional study (5 points)</td>
<td>n=386; f/m Age: na.; (9th grade students, 14-15 year olds)</td>
<td>1. Locus of control (external)</td>
<td>Self-reported tooth brushing frequency</td>
<td>1. 0.07(-0.03:0.18)</td>
<td></td>
</tr>
</tbody>
</table>

**Note.** cross: cross-sectional data; pros: prospective data; na.: data not available; AOR: Adjusted Odds Ratio; TPB: theory of planned behaviour; KAB: Knowledge-Attitude-behaviour; HAPA: Health Action Process Approach. a Smallest number of participants in relevant analyses; b Mix indicates a mixed sample of female (F) and males (M); For the studies denoted by the sign * applies that (additional) data were supplied by author. For variables denoted by the sign ** applies that these variables were excluded from the analysis, since meta-analyses were only performed if data of two or more independent correlations were available (k > 1). The software Comprehensive Meta-Analysis calculated the presented correlations with confidence interval (CI).