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Psychological interventions to improve poor oral health in adults and adolescents

Werner H, Dahlström L, Eriksson M, Hakeberg M, Svanberg T, Svensson L, Wide Boman U, Strandell A, Sjögren P

Psychological interventions to improve poor oral health in adults and adolescents

[Psykologiska interventioner för att förbättra bristfällig munhälsa hos ungdomar och vuxna]

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Abbreviations and word list

Interventions

MI	*Motivational Interviewing*, based on Self-regulation Theory.
BMI	*Brief Motivational Interviewing*, based on Self-regulation Theory.
CSCCM	*Client Self-Care Commitment Model*, based on Client Empowerment Model, Explanatory model and Human Needs Conceptual Model.
ITOHEP	*Individually Tailored Oral Health Educational Programme*, based on the perspective of behavioural medicine, i.e. an integration of cognitive behavioural principles, and non-surgical periodontal treatment. Including MI components and Social cognitive strategies (e.g. specific goals and the use of diary).
FFP	*Freedom From Plaque*, oral hygiene classes, based on Social Learning Theory.
Faraquhar´s six step method	Based on a Behavioural cognitive method.
Behaviour educational intervention	Including MI components and the use of diary between sessions.
Social cognitive intervention	Including variables of self-efficacy and Theory of Reasoned Action, with several references to Social Cognitive Theory.
PsI	*Psychological Interventions* (including the interventions mentioned above).

Comparators (controls)

TAU	*Treatment As Usual*, including education and/or information and/or standard dental treatment.

Outcome measures

BOP	Bleeding On Probing
GI	Gingival Index
PI	Plaque Index
PD	Pocket Depths
PPD	Probing Pocket Depth
OHKQ	Oral Health Knowledge Questionnaire
MRCA	Motivation/Readiness/Confidence to Adhere
TSRQ-C/-A	Treatment Self-Regulation Questionnaire, self-regulation scores regarding Control vs. Autonomy

1. Summary of the Health Technology Assessment

Background
Adolescents and adults with poor oral health are commonly treated in routine dental care. Besides the dental treatment itself, the therapeutic challenge is to achieve and maintain patient compliance in oral hygiene and oral health related behaviour (e.g. diet and smoking habits). Traditionally, patients are educated or informed in oral hygiene measures and behaviours, chair-side, by dental professionals. Psychological interventions are commonly used to change health related behaviours, and have also been studied for changing oral health related behaviours.

Objective
To describe and assess the evidence from clinical studies on the efficacy of psychological interventions for improvement of oral health, in adults and adolescents with poor oral health, regarding dental caries, periodontal diseases, and peri-implantitis.

Search methods and study selection criteria
Systematic searches were performed in PubMed, Medline (Ovid), PsycInfo, the Cochrane Library, and a number of HTA-databases. Reference lists of relevant articles were scrutinised for additional references. Required study designs for inclusion were: systematic review, randomised or non-randomised trial. The certainty of evidence was rated according to the GRADE system.

Main results
Ten publications, reporting on nine different randomised controlled trials (RCTs) met the inclusion criteria. The RCTs had methodological limitations, mainly with blinding and patient-reported outcome data, but also with consistency, directness, and precision. The follow-up periods varied from three weeks to 12 months.
Meta-analyses on psychological intervention vs. education and/or information, regarding *gingivitis* (gingival index: -0.13 [95% CI: -0.37, 0.10]; bleeding on probing: -1.61 [95% CI: -8.98, 5.76], and *dental plaque* (plaque index: -0.24 [95% CI: -0.41, -0.06]; plaque presence: -7.49 [95% CI: -18.55, 3.56]), showed no clinically important differences. For motivational interview vs. education and/or information, a meta-analysis on *gingivitis* (bleeding on probing: -2.81 [95% CI: -11.54, 5.91]), showed neither statistically significant nor clinically important differences. Significant improvements in oral health behaviours, and in self-efficacy regarding tooth brushing, were seen, in favour of psychological interventions. The clinical relevance of these differences was difficult to estimate, and long-term effects have not been studied. Effects on dental caries, peri-implantitis, health-related quality of life, self-perceived oral health, and complications, were not studied.

Concluding remarks
The psychological interventions studied so far, have resulted in little or no difference regarding periodontal outcomes, gingivitis, dental plaque, oral health behaviour, or oral health beliefs, as compared with patient education and/or information, in adults and adolescents with poor oral health.
Low certainty of evidence (GRADE⊕⊕◯◯). The long-term effects are unknown.

2. Svensk sammanfattning

Bakgrund
Ungdomar och vuxna med bristfällig munhälsa behandlas vanligen inom allmäntandvården. Förutom tandvårdsåtgärderna i sig, är den terapeutiska utmaningen att uppnå och bibehålla patientföljsamhet avseende daglig egenvård och munhälsorelaterat beteende (t.ex. kost och rökvanor). Traditionellt utbildas och/eller informeras patienterna i munhygienåtgärder och beteenden av tandvårdspersonal på mottagningen. Psykologiska interventioner används ofta för att förändra hälsorelaterade beteenden, och har också studerats i syfte att ändra munhälsorelaterade beteenden.

Syfte
Att utvärdera den vetenskapliga dokumentationen på effekten av psykologiska interventioner för förbättrad munhälsa, jämfört med utbildning/information, hos vuxna och ungdomar med bristfällig munhälsa, avseende karies, tandlossningssjukdomar samt periimplantit.

Sökmetoder och urvalskriterier
Systematiska sökningar gjordes i PubMed, Medline (Ovid), PsycInfo, Cochrane Library, samt ett antal HTA-databaser. Referenslistor i relevanta artiklar lästes för att identifiera ytterligare publikationer. Studiedesign som krävdes för inklusion var systematisk översikt, randomiserad eller icke-randomiserad studie. Det vetenskapliga underlaget bedömdes enligt GRADE-systemet.

Resultat
Studier
Tio publicerade artiklar från nio randomiserade kontrollerade studier uppfyllde kriterierna (PICO) för att inkluderas i utvärderingen. Studierna hade vissa metodologiska begränsningar, främst avseende blindning och patientrapporterade utfallsmått, men även avseende överensstämmelse, överförbarhet och precision. Uppföljningstiderna varierade från tre veckor till 12 månader.
Effekter
Metaanalyser av psykologisk intervention i jämförelse med utbildning/information, för utfallen *gingivit* (gingival index: -0.13 [95% CI: -0,37, 0,10], blödning vid sondering: -1,61 [95% CI: -8,98, 5,76], och *plack* (plack index: -0.24 [95% CI: -0.41, -0.06]; plack förekomst: -7.49 [95% CI: -18.55, 3.56]), visade antingen inga statistiskt signifikanta eller inga kliniskt betydelsefulla skillnader. En metaanalys avseende motiverande intervju i jämförelse med utbildning/information för utfallet *gingivit* (blödning vid sondering: -2,81 [95% CI: -11,54, 5,91]), visade varken statistiskt signifikanta eller kliniskt betydelsefulla skillnader. Signifikanta förbättringar i munhälsorelaterat beteende och tilltro till den egna förmågan (self-efficacy) att utföra tandborstning sågs, till förmån för psykologiska interventioner. Den kliniska relevansen av dessa skillnader var svår att uppskatta, och långsiktiga effekter har inte studerats. Effekter på karies, periimplantit, hälsorelaterad livskvalitet, självupplevd munhälsa och komplikationer, hade inte studerats.
Etiska aspekter
Inga betydande etiska konsekvenser kunde identifieras. För majoriteten av patienterna utgör munsjukdomarna inga allvarliga hälsoproblem, men avancerade sjukdomstillstånd kan försämra livskvaliteten, det fysiska välbefinnandet och det sociala livet, på grund av smärta och oral dysfunktion. Det kan utgöra ett etiskt dilemma att, med stöd av begränsat vetenskapligt underlag med relativt korta uppföljningstider, införa en behandlingsmetod med liten eller ingen bevisad effekt.
Ekonomiska aspekter
Det är svårt att uppskatta kostnaderna för införandet. Vid ett tänkbart scenario med halvtidsanställda psykologer vid fem specialistkliniker, samt 1-2 heltidsanställda psykologer inom allmäntandvården i Västra Götalandsregionen skulle totalkostnaden vara ca 6 MSEK per år.

Slutsatser
De hittills studerade psykologiska interventionerna för förbättrad munhälsa har resulterat i liten eller ingen skillnad avseende parodontala utfall, gingivit, plack, tandhälsorelaterat beteende, eller uppfattning om den egna munhälsan, jämfört med patientutbildning eller information hos vuxna och ungdomar med bristfällig munhälsa.
Begränsat vetenskapligt underlag (GRADE ⊕⊕◯◯). De långsiktiga effekterna är okända.

Summary of the Health Technology Assessment (1 & 2) from The Regional Health Technology Assessment Centre (HTA-centrum)

The Regional Health Technology Assessment Centre (HTA-centrum) of Region Västra Götaland, Sweden (VGR) has the task to make statements on HTA reports carried out in VGR. The English summary is a concise summary of similar outline as the summaries in the Cochrane systematic reviews. The Swedish summary summarises the question at issue, results and certainty of evidence regarding efficacy and risks, and economical and ethical aspects of the particular health technology that has been assessed in the report, and is ended with a final statement/concluding remark from HTA-centrum.

Christina Bergh, Professor, MD
Head of HTA-centrum of Region Västra Götaland, Sweden, 2014-05-21

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Lennart Jivegård	Ninni Sernert	Therese Svanberg
MD, Senior university lecturer	Associate professor	HTA-librarian
Jenny Kindblom	Henrik Sjövall	Kjell-Arne Ung
Specialist	MD, Professor	MD, Associate professor

3. Participants

The question was posed by
Gunnar Eriksson, CEO, Public Dental Service, Region Västra Götaland, Sweden.

Participants in the work group
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External reviewers
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Project time
HTA was accomplished during the period of 2013-10-17 – 2014-05-21.
Literature search were conducted in October 2013.

Conflicts of interest
None declared.

4. Disease/disorder of Interest and Present Treatment

Poor oral health and its degree of severity
Poor oral health caused by dental caries, periodontitis, gingivitis or peri-implantitis.

☐ Risk of premature death
☒ Risk of permanent illness or damage, or reduced quality of life
☒ Risk of disability and reduced health-related quality of life

Prevalence of poor oral health
In Sweden 5-10% of adults and adolescents are estimated to have severe oral health problems, related to dental caries, gingivitis, or periodontitis. The prevalence of dental caries in the adult population is estimated to be 1-2 carious tooth surfaces per individual (Edman *et al*., 2012). Periodontal disease, with gingival pockets deeper than 6 mm, is considered to be present in 5-10% of the adult population (Fuller *et al*., 2011). The prevalence of advanced periodontitis was reported to be 9%, and moderate periodontitis to be 16%, in the adult population, in the County of Dalarna in Sweden (Edman *et al.*, 2012). Based on these data the prevalence of severe caries and advanced periodontitis in the adult population of Region Västra Götaland is estimated to be about 120,000 individuals.

Present treatment of poor oral health
Treatment of adolescents and adult patients with poor oral health is common in both general and specialist dental care. Besides dental treatment (e.g. restorative treatment or debridement), patient education and/or information is routinely given, with verbal and/or written instructions, in order to improve the patients' oral hygiene behaviour and oral health related behaviour (diet, smoking). This education and/or information is usually provided by dental professionals. In the National Guidelines for Adult Dental Care by The National Board of Health and Welfare in Sweden (Socialstyrelsen, 2011) it was stated that traditional, brief patient education has minor effects in improving oral health. The recommendations are to use brief, and individualised patient education, and to use more advanced theory-based interventions when indicated. It is unknown to what extent these recommendations have been implemented.

Number of patients per year who undergo current treatment regimen
Not possible to estimate.

The normal pathway of a patient through the dental care system
Approximately 70% of the adult Swedish population attend dental examinations on a regular basis (Socialstyrelsen, 2013). Dental treatment normally includes some education and/or information concerning oral diseases and related behaviours. In more serious conditions (e.g. progressive or advanced periodontal disease) patients can be referred to specialist dental clinics.

Actual wait time in days for dental assessment or treatment
There is no or only up to three months waiting period before treatment may be started at dental clinics in Region Västra Götaland. This is irrespective of enrolment in general dental care or specialist dental care.

5. Present health techology

Psychological interventions to improve oral health
Psychological interventions based on psychological theories and models are often used to change health related behaviours. In a Cochrane review with a focus on periodontal disease (Renz *et al.*, 2007) it was concluded that 'there is tentative evidence from low quality studies that psychological approaches to behaviour management can improve oral hygiene related behaviours'. However, new research has been published since the Cochrane review was completed.

In the Cochrane report, a large number of different theoretical frameworks were evaluated for psychological interventions to improve oral health (Renz *et al.*, 2007). Additional theories such as Cognitive Therapy, Behavioural Therapy and Cognitive Behavioural Therapy (CBT) are often cited in the literature. In this report the term Psychological Interventions (PsI) is used for the different psychological interventions used in the included studies.

Psychological Interventions (PsI)
Psychological interventions can include different psychological methods. They are often based on well-known theories (e.g. Health Belief Model, Theory of Reasoned Action, Theory of Planned Behaviour, Transtheoretical Model, Self Regulatory model, and Social Learning Theory; sometimes referred to as CBT) and often with empirical support from experimental psychological research. Psychological interventions take into consideration the individuals own thoughts (e.g. affirmations, expectations, and memories), feelings and behaviours, and invite the patient to reflect upon these different components, and to see if they can be altered in order to improve health. Different well-established techniques can be used for this purpose, for example behavioural activation, exposure, generalization of knowledge, cognitive reconstruction, reinforcement, modelling and acceptance (Ramnerö and Törneke, 2013). The interventions can be delivered individually and/or in groups, range from including one to several sessions, and are delivered by someone with great understanding of psychological theory and practice.

Potential value of psychological interventions to improve oral health, according to the participants in the work group
Oral health among adolescents and adults in Sweden is generally good. However, there are groups in the population with poor oral health (Hugoson *et al.*, 2005), and therefore this is a public health problem. Moreover, it is especially important to target young adults with poor oral health as they are forming their health related habits for adult life.
Psychological and social factors have a considerable impact on oral health. These include health behaviours (attending dental care, health promoting behaviour, oral hygiene behaviour and diet), psychological variables (oral health beliefs, locus of control, sense of coherence and dental anxiety) and socioeconomic variables (Christensen *et al.*, 2010). Methods to improve oral health should address behavioural aspects and specifically aim to stimulate health promoting behaviours. It has been emphasized that health behaviour interventions based on psychological theories are more successful and that behaviour change interventions should be guided by theory (Noar and Zimmerman, 2005; Bartholomew *et al.*, 2011).
It has been argued that interventions to improve oral health, based on psychological theories and/or models, have a potential to improve oral health.

Psychological interventions are delivered by different categories of health care professionals, and could potentially indicate new ways of organizing the dental care system, including different professional categories than used today.
Psychological interventions can be used in both general and special dental care.

The central question for the current HTA project
In adults and adolescents with poor oral health, are interventions based on psychological and/or behavioural models and theories better than education and/or information, in improving oral health, and health-related quality of life?

PICO P=Patients, I=Intervention, C=Comparison, O=Outcome

P = Adults and adolescents (≥13 years of age who are independent and autonomous of care from others) with poor oral health
defined as caries and/or periodontitis, gingivitis and peri-implantitis

I = Interventions based on psychological and/or behavioural models and theories, including cognitive behaviour therapy (CBT)

C = Education and/or information in oral health

O = *Critical for decision making*: dental caries, periodontitis, gingivitis, peri-implantitis
Important for decision making: dental plaque, oral health related behaviours, health-related quality of life
Not important for decision making: health beliefs and attitudes, self-perceived oral health, complications/risks

6. Review of the certainty of evidence

Search strategy, study selection and references – Appendix 1
During December 2013 two librarians (ME, TS) performed systematic literature searches in PubMed, Medline (Ovid), PsycInfo, the Cochrane Library, and a number of HTA-databases. Reference lists of relevant articles were scrutinised for additional references. Search strategies, eligibility criteria and a graphic presentation of the selection process are presented in Appendix 1. The librarians conducted the literature searches, selected studies and independently of one another assessed the obtained abstracts and made a first selection of full-text articles for inclusion or exclusion. Any disagreements were resolved in consensus. The remaining articles were sent to the participants of the HTA project group, who read the articles independently and then decided in a consensus meeting which articles that should be included in the final assessment.

The literature search identified a total of 846 articles (after removal of duplicates). The librarians excluded 794 articles after reading the abstracts. Nine additional articles were excluded by the librarians after reading the articles in full text. The remaining 43 articles were sent to the participants of the HTA project group, and ten were finally included in the report (Appendix 2). All the included articles were reports of randomised controlled trials (RCTs). They were critically appraised using checklists from SBU (Swedish Council on Health Technology Assessment). Excluded articles are listed in Appendix 3.
The certainty of evidence was rated according to the GRADE system.

Present knowledge of psychological interventions to improve oral health
The systematic literature search identified nine RCTs that fulfilled the PICO (one RCT was reported in two publications) (Appendix 2).

A majority of the interventions was individually oriented, except for one RCT that evaluated a group-based intervention (Little *et al.*, 1997). All except one intervention (Stenman *et al.*, 2012) was delivered at a dental clinic. The number of sessions varied from one to several, and the length of each session varied from 10-90 minutes. The interventions were delivered by different professionals: dentists (Godard *et al.*, 2001, Kakudate *et al.*, 2009), dental hygienists (Little *et al.*, 1997, Tedesco *et al.*, 1992, Jönsson *et al.*, 2006, 2009, 2010), clinical psychologist (Stenman *et al.*, 2012), and trained counsellor (Brand *et al.*, 2013). In one RCT (Philippot *et al.*, 2005), the provider of the intervention was not reported.

Different psychological theories were used in the included articles: Social Learning Theory, Self Efficacy Theory, Theory of Reasoned Action, and Self-Regulatory Theory. Especially the latter worked as an outset for several studies, including motivational interviewing as the intervention (or components thereof).

All the RCTs had methodological limitations, mainly with blinding and patient-reported outcome data. There were also problems with consistency, directness, and precision. The follow-up periods varied from three weeks to 12 months.

<u>Dental caries</u>
None of the studies reported this outcome.

Periodontitis (Appendix 4.1 and 5)

Four RCTs reported treatment effect on periodontitis. This was measured as pocket depth or probing pocket depth. The inclusion criteria varied across the studies, and patients with different degrees of periodontal disease were included. This makes it difficult to compare the results. Two of the RCTs reported a statistically significant difference in the prevalence of pockets 4-6 mm, and in reduction of pocket depths for pockets measuring 3-6 mm at baseline, respectively (Brand *et al*., 2013; Little *et al*., 1997). The two additional RCTs showed no significant differences between study groups (Jönsson *et al*., 2006, 2010).

Conclusion: Psychological interventions may result in little or no difference in periodontal outcomes as compared with oral health education and/or information in adults and adolescents with poor oral health. Low certainty of evidence (GRADE ⊕⊕◯◯).

Gingivitis (Appendix 4.2, 4.3 and 5)

Gingivitis was measured with two different methods. Five RCTs reported bleeding on probing and four RCTs reported gingival index (e.g. Löe and Silness, 1963).

Meta-analyses on Psychological Intervention compared with standard education and/or information revealed no statistically significant, or clinically important differences regarding gingivitis (Figures 1 and 2). In the meta-analysis of motivational interview compared with standard education and/or information, there was no statistically significant nor clinically important difference (Figure 3). The two additional RCTs that were not included in the meta-analyses (absence of data) showed largely similar results. One of them without statistically significant differences (Tedesco *et al*., 1992), and one with a statistically significant but not clinically important difference in favour of psychological intervention (Little *et al*., 1997).

Conclusion: Psychological interventions may result in little or no difference in gingivitis as compared with oral health education or information in adults and adolescents with poor oral health. Low certainty of evidence (GRADE ⊕⊕◯◯).

Figure 1 Behavioural intervention - Gingival Index (Löe and Silness, 1963) as mean proportion of measured tooth surfaces

	Experimental			Control				Mean Difference	Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI	IV, Random, 95% CI
Jönsson 2006	0.38	0.2	19	0.39	0.14	16	48.0%	-0.01 [-0.12, 0.10]	
Jönsson 2009	0.27	0.14	57	0.52	0.2	56	52.0%	-0.25 [-0.31, -0.19]	
Total (95% CI)			**76**			**72**	**100.0%**	**-0.13 [-0.37, 0.10]**	

Heterogeneity: Tau² = 0.03; Chi² = 13.13, df = 1 (P = 0.0003); I² = 92%

Test for overall effect: Z = 1.12 (P = 0.26)

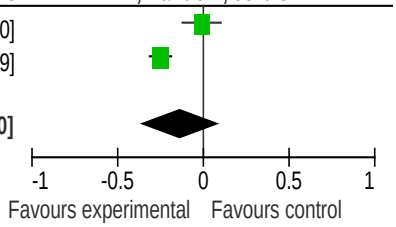


Figure 2 Behavioural intervention - Bleeding On Probing as mean (%) of measured tooth surfaces

	Experimental			Control				Mean Difference	Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI	IV, Random, 95% CI
Brand 2013	33	15	29	36	20	24	20.6%	-3.00 [-12.69, 6.69]	
Jönsson 2006	18.7	8.3	19	16.3	5.7	16	28.4%	2.40 [-2.26, 7.06]	
Jönsson 2010	19	13	53	29	14	55	27.8%	-10.00 [-15.09, -4.91]	
Stenman 2012	21	12.5	19	16.2	13.4	20	23.1%	4.80 [-3.33, 12.93]	
Total (95% CI)			**120**			**115**	**100.0%**	**-1.61 [-8.98, 5.76]**	

Heterogeneity: Tau² = 44.05; Chi² = 15.62, df = 3 (P = 0.001); I² = 81%

Test for overall effect: Z = 0.43 (P = 0.67)

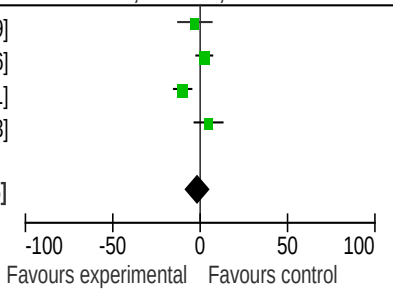
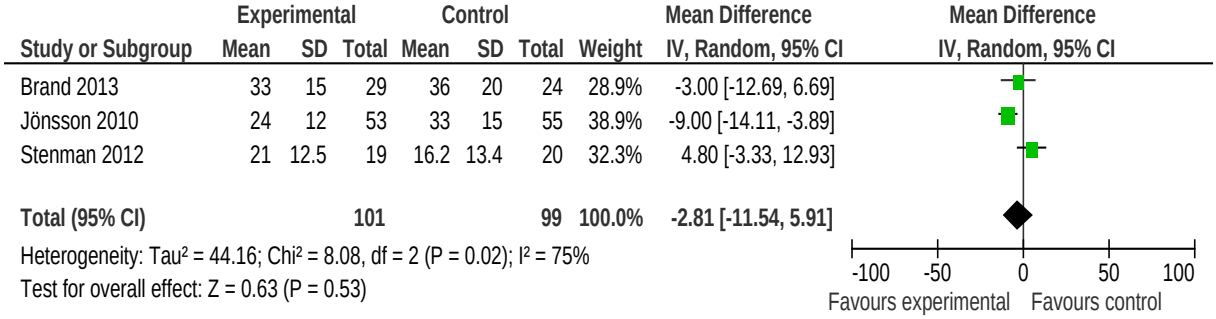


Figure 3 Motivational Interview - Bleeding On Probing as mean (%) of measured tooth surfaces



Peri-implantitis

None of the studies reported this outcome.

Dental plaque (Appendix 4.4 and 5)

Dental plaque measured by different indices (e.g. plaque index by Silness and Löe, 1964), or dichotomised as 'presence' or 'absence' of plaque on tooth surfaces (percentage) was reported in nine RCTs (one RCT was reported in two publications).

Two meta-analyses were performed. The first meta-analysis showed no statistically significant difference in plaque presence (Figure 4). The second meta-analysis showed a small but statistically significant difference in plaque index values, in favour of psychological intervention (Figure 5). However, the difference was not clinically important (Figure 5). The four additional RCTs that were not included in the meta-analyses (absence of data, or different outcome) reported largely similar results, two without statistically significant differences (Brand *et al*., 2013; Tedesco *et al*., 1992), and two with statistically significant but not clinically important difference in favour of psychological intervention (Jönsson *et al*., 2010; Little *et al*., 1997).

Conclusion: Psychological interventions may result in little or no difference in dental plaque as compared with oral health education and/or information in adults and adolescents with poor oral health. Low certainty of evidence (GRADE ⊕⊕◯◯).

Figure 4 Plaque presence as mean (%) of measured tooth surfaces

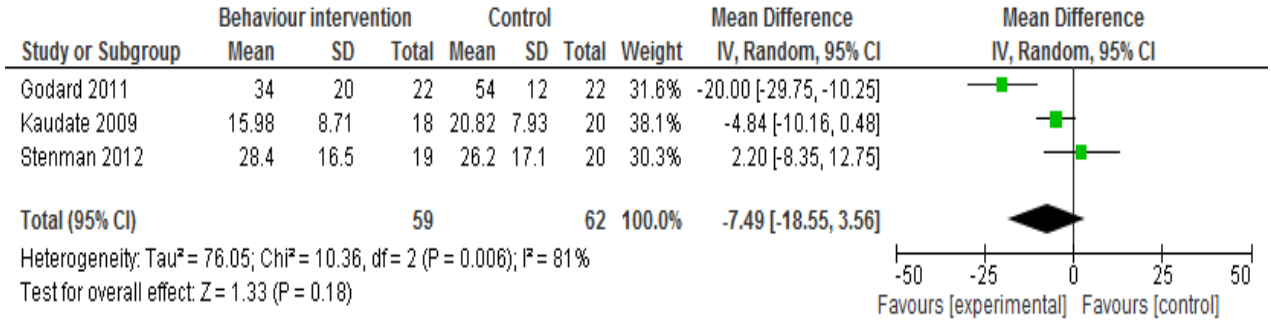
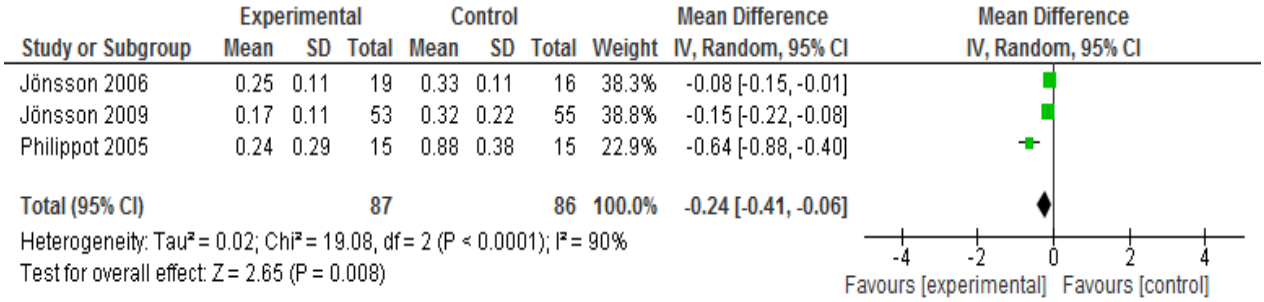


Figure 5 Plaque index (Silness and Löe, 1964) as mean proportion of measured tooth surfaces



Oral health behaviours (Appendix 4.5 and 5)

Three RCTs reported on the treatment effect on oral health behaviours, including interdental cleaning and tooth brushing. All three RCTs reported small but statistically significant improvements in oral health behaviours in favour of psychological interventions. The clinical importance of these differences was difficult to estimate since the trials were unblinded and outcomes were self-reported. Furthermore, there was a great variation in follow-up times.

Conclusion: Psychological interventions may result in little of no difference in oral health behaviours as compared with oral health education and/or information in adults and adolescents with poor oral health. Low certainty of evidence (GRADE ⊕⊕◯◯).

Health-related quality of life

None of the studies reported this outcome.

Health beliefs and attitudes (Appendix 4.6 and 5)

Three RCTs reported treatment effect on oral health beliefs and attitudes. One of the RCTs showed significantly improved self-efficacy regarding tooth brushing, and two RCTs showed no significant differences between the study groups. The clinical relevance was difficult to estimate since the trials were unblinded and outcomes were self-reported.

Conclusion: Psychological interventions may result in little or no difference, in oral health beliefs and attitudes, as compared with oral health education and/or information, in adults and adolescents with poor oral health. Low certainty of evidence (GRADE ⊕⊕◯◯).

Self-perceived oral health

None of the studies reported this outcome.

Complications/risks

None of the studies reported this outcome.

Ongoing research
A search in Clinical Trials database (www.clinicaltrials.gov) (2014-02-25) using the search terms ((caries OR peridontitis OR gingivitis OR periimplantitis OR "dental plaque") AND (cognitive OR cognition OR motivation OR motivational OR "dental education" OR "health belief model" OR "Theory of Reasoned Action" OR "Theory of planned behavior" OR behavioral OR behaviour OR behavior OR behavioural OR self-efficacy OR "locus of control" OR "sence of coherence" OR "transtheoretical model" OR "readiness to change" OR "self-regulatory model" OR acceptance OR commitment)) identified 71 trials. None of the trials were relevant for the present question at issue.

Medical societies or health authorities the recommend the new health technology
The National Board of Health and Welfare recommends brief and individualised patient education in general, and more advanced theory-based interventions in special cases.

☒ The National Board of Health and Welfare
☐ Medical societies
☐ Other health authority

7. Ethical consequences

Ethical aspects

No major ethical consequences were identified. It may constitute an ethical dilemma to introduce a treatment regimen with yet little or no proven effect. Changing health related behaviours is important for patients with poor oral health, but an effective method is yet undefined. There is also an ethical dilemma to continue to deliver standard education and/or information, since it has not been proven to be effective, especially when it comes to advanced oral disease. Reallocation of dental care resources will probably lead to displacement effects.

8. Organisation

When psychological interventions can be put into practice

The time estimate is uncertain.

Use of psychological interventions in other hospitals in Region Västra Götaland

At present it is not known to what extent psychological interventions are used in general and/or specialist dental clinics, in Region Västra Götaland.

Consequences of psychological interventions for personnel

The consequences for personnel depends on which professional category will provide the psychological interventions. If other professions than the dental staff are needed, then resources need to be reallocated from dental care to other organisations. This could be associated with increased costs and organisational issues. Nonetheless, there are additional costs associated for dental care as well. An important question is therefore which profession is the most effective in delivering psychological interventions.

Consequences for other clinics or supporting functions in Region Västra Götaland

If psychological interventions will be shown to be effective, the number of referrals to clinics where psychological interventions are given may increase.

9. Economy aspects

Present costs of currently used psychological interventions
Unknown.

Expected costs of the new health technology
There will be costs associated with educational activities and possible supervision, although the need of this might vary between professionals.
Depending on the need of recruitment of psychologist/psychotherapists in dentistry there may be additional costs.
Despite the lack of shown effectiveness o*ne scenario* is that a psychologist (50%) at a specialist clinic can treat patients with advanced forms of oral diseases (caries/periodontitis). With five specialist clinics in the region, 2.5 to three fulltime employed psychologists would be needed. The estimated costs (salary + social security contributions) would be three million SEK per year.
In addition, for the general dental care in each of the three main subregions another two to three psychologists (fulltime) may be needed to cover the actual treatment of patients with advanced oral diseases. Thus, an added minimum cost of three million SEK can be estimated. The total cost will then be six million SEK.
Another cost scenario is that a dental hygienist provides the intervention, described in further detail below.

Total change of cost
Using the scenario above the estimated direct costs for employing psychologists in the region may be around six million SEK to cover the treatment needs for patients with advanced oral diseases. However, if the psychological treatment may be cost effective, then the total treatment cost, patient fees and direct/indirect costs for the employer can be reduced and eventually the cost for employing the psychologists may be diminished. Thus, the overall change of cost if difficult to estimate.

Possibility to adopted and use psychological interventions within the present budget
Unknown. It is difficult to estimate the possible costs in the budget. However, as mentioned above, employment and/or educational activities may result in increased costs. But, since resources in adult dental care, to a large extent rely on patient fees, the budget impact may consequently be small or even positive.

Available analyses of health economy - Cost advantages or disadvantages
Jönsson *et al*., 2012a evaluated the cost-effectiveness of a psychological intervention (ITOHEP), delivered by a dental hygienist. The intervention was the same as in Jönsson *et al*. (2009). The results indicate that there is an incremental cost of 1,724 SEK per ‘successful-none-surgical periodontal treatment case’. However, 1,189 SEK adheres to dental treatment costs. The effectiveness, when it comes to implementation in general dental care may be questionable, since a standard treatment was given monthly, during the study period of 12 months.

There are no cost-effectiveness analyses of psychological treatment on individuals with advanced dental caries.

10. Unanswered questions

Important gaps in scientific knowledge
The effects of psychological interventions on dental caries, peri-implantitis, health-related quality of life, self-perceived oral health, and complications, have not been studied.

There is a need for studies with longer follow-up. The follow-up periods in the included studies ranged from three weeks to one year (although the latter included regular standard treatment during time for follow-up).

It is difficult to evaluate the effectiveness of psychological interventions regarding oral health, since the available interventions vary in theoretical foundations as well as methodological aspects. There are also variations in standard treatment with regard to the frequency of visits, time per session and content (education and/or information only and/or oral health treatment). These observations imply a significant lack of knowledge on how interventions for behaviour change to improve oral health should be delivered.

Most interventions in the studies included were delivered by dental hygienists. It is unclear if the use of other professionals, such as psychologists with broad theoretical understanding and practise of this area, would have resulted in different outcomes.

Interest in the own clinic/research group/organisation to start studies/trials within the research field at issue
Yes, we want to perform an RCT for oral health promotion in young adults with poor oral health in the general dental care setting. We plan to use a multi professional approach, with both dental professionals and psychologists. Moreover, the psychological intervention will be based on a modern form of Cognitive Behaviour Therapy.

Appendix 1, Search strategy, study selection and references

Question(s) at issue:
In adults and adolescents with poor oral health, are interventions based on psychological and/or behavioural models and theories better than education and/or information, in improving oral health, and health-related quality of life?

PICO: (*P=Patient I=Intervention C=Comparison O=Outcome*)

P	Adults and adolescents (≥13 years of age who are independent and autonomous of care from others) with poor oral health defined as dental caries and/or periodontitis, gingivitis and peri-implantitis
I	Interventions based on psychological and/or behavioral models and theories, including cognitive behavior therapy (CBT)
C	Education and/or information in oral health
O	*Critical for decision making*: dental caries, periodontitis, gingivitis, peri-implantitis *Important for decision making*: dental plaque, oral health related behaviours, health-related quality of life *Not important for decision making*: health beliefs and attitudes, self-perceived oral health, complications/risks

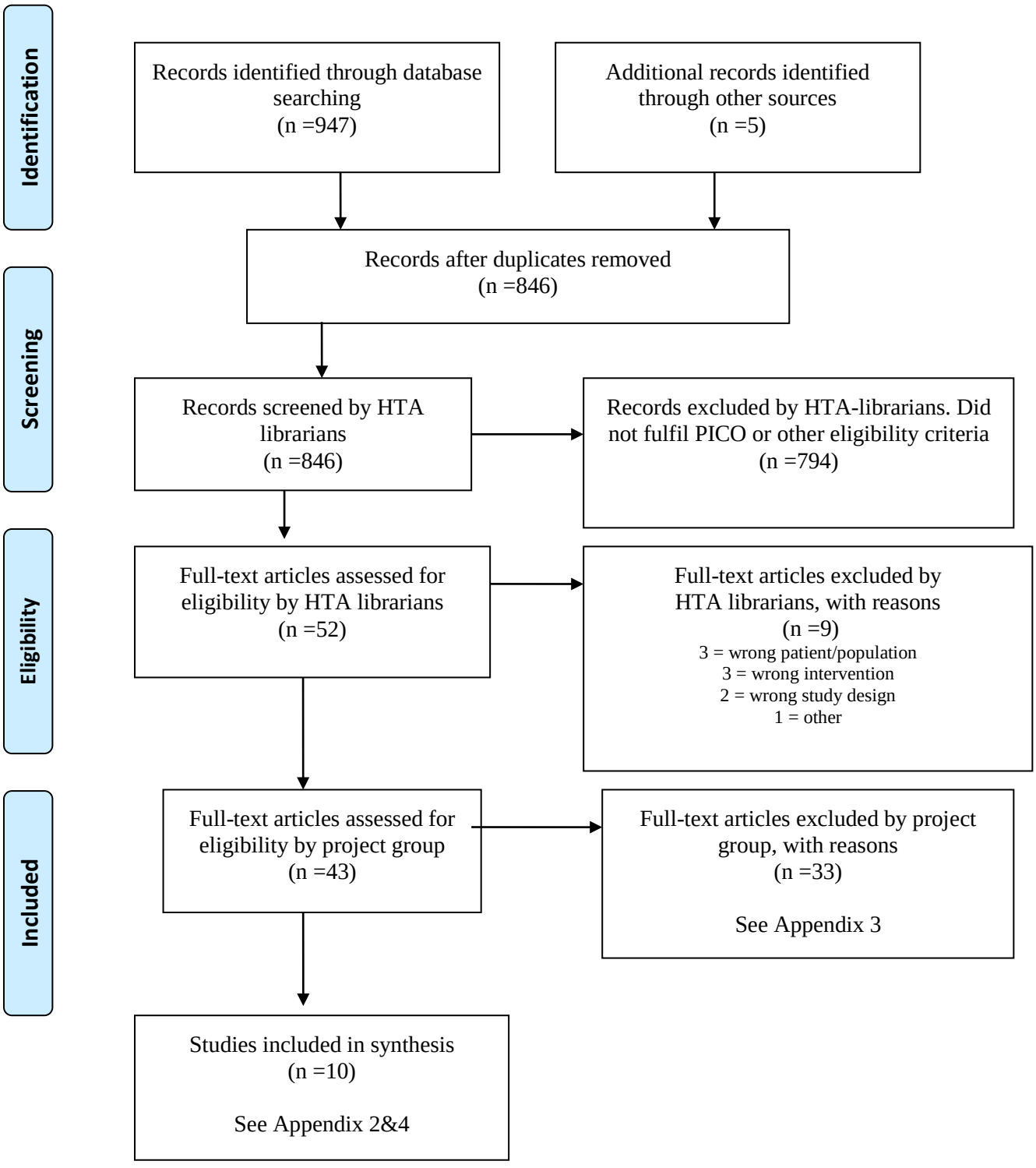
Eligibility criteria

Study design:
Systematic reviews
Randomised controlled trials
Non-randomised controlled studies if ≥ 100 patients
No case series, case reports or review articles

Language:
English, Swedish, Norwegian, Danish

Publication date: 1990-

Selection process – flow diagram



Search strategies

Database: PubMed
Date: 2013-10-31
No of results: 99

Search	Query	Items found
#94	**Search #88 AND #89 Filters: Publication date from 1990/01/01; Danish; English; Norwegian**	**99**
#90	Search #88 AND #89	106
#89	Search (pubmednotmedline[sb] OR inprocess[sb] OR publisher[sb])	2093567
#88	Search #87 NOT #86	4434
#87	Search #84 NOT #85	4614
#86	Search (Editorial[ptyp] OR Letter[ptyp] OR Comment[ptyp] OR case reports[ptyp])	2745623
#85	Search ((animals[mh]) NOT (animals[mh] AND humans[mh]))	3829074
#84	Search #83 AND #76	4649
#83	Search #79 OR #81 OR #82	128438
#76	Search #66 OR #72 OR #73 OR #74 OR #75	383212
#82	Search plaque[tiab] AND (dental[tiab] OR tooth[tiab] OR teeth[tiab] OR oral[tiab])	12946
#81	Search oral hygiene[tiab] or gingiv*[tiab] or dental hygiene[tiab] or (periodontal[tiab] AND (disease[tiab] OR diseases[tiab])) or dental prophylaxis[tiab] or caries[tiab]	81464
#79	Search ((((((("Periodontitis"[Mesh]) OR "Gingivitis"[Mesh]) OR "Dental Plaque"[Mesh]) OR "Oral Hygiene"[Mesh:NoExp]) OR "Periodontal Diseases"[Mesh:NoExp]) OR "Dental Prophylaxis"[Mesh:NoExp]) OR "Dental Caries"[Mesh]	92747
#75	Search (behaviour*[tiab] OR behavior*[tiab]) AND (modification[tiab] OR change[tiab])	66462
#74	Search ((health[tiab] AND belief*[tiab]) OR (theory[tiab] AND reasoned[tiab] AND action[tiab]) OR (theory[tiab] AND planned[tiab] AND (behaviour[tiab] OR behaviour[tiab])) OR (self-efficacy) or (locus[tiab] AND control[tiab]) or (sense[tiab] AND coherence[tiab]) or (transtheoretical[tiab] AND model[tiab]) or (stages[tiab] AND model[tiab]) or (readiness[tiab] AND change[tiab]) or (stages[tiab] AND change[tiab]) or (self[tiab] AND regulatory[tiab] AND model[tiab]) or (acceptance[tiab] AND commitment[tiab] AND therapy[tiab]))	107673
#73	Search (motivational[tiab] and (interview* or intervention* or counsel*))	3761
#72	Search #71 AND #70	144395
#66	Search (((((((("Health Education, Dental"[Mesh]) OR "Patient Education as Topic"[Mesh]) OR "Cognitive Therapy"[Mesh]) OR "Behavior Therapy"[Mesh:NoExp]) OR "Self Efficacy"[Mesh]) OR "Internal-External Control"[Mesh]) OR "Sense of Coherence"[Mesh]) OR "Motivational Interviewing"[Mesh]	131416
#70	Search behaviour*[tiab] OR behavior*[tiab] OR cognitive*[tiab]	882668
#71	Search theory[tiab] or theories[tiab] or therapy[tiab] or therapies[tiab] or intervention[tiab] or interventions[tiab]	1924667

Database: Medline (OVID SP)
Date: 2013-10-31
No of results: 343
No of additional results: **113***
The main search resulted in 1802 references. After limiting to children or randomized controlled trials (see #16-20) the result was 343 references. We also scanned the titles of the differing references, which resulted in another 113 references, where we needed to read the abstracts.
The flow chart shows these 343 plus 113, and the result from all the other databases.

#	Searches	Results
1	(health education dental or patient education as topic or cognitive therapy or behavior therapy or self efficacy or internal external control or sense of coherence or motivational interviewing).sh.	139508
2	(behavio?r$ or cognitive$).ab,ti.	929417
3	(theory or theories or therapy or therapies or intervention or interventions).ab,ti.	2020288
4	((behavio?r$ or cognitive$) adj3 (theory or theories or therapy or therapies or intervention or interventions)).ab,ti.	34208
5	(motivational and (interview$ or intervention$ or counsel$)).ab,ti.	4218
6	((health adj2 belief$) or (theory adj3 reasoned adj3 action) or (theory adj3 planned adj3 behavio?r) or (self adj efficacy) or (locus adj3 control) or (sense adj3 coherence) or (transtheoretical adj 2 model) or (stages adj2 model) or (readiness adj2 change) or (stages adj2 change) or (self adj2 regulatory adj2 model) or (acceptance adj3 commitment adj3 therapy)).ab,ti.	26675
7	(behavio?r$ adj3 (modification$ or change)).ab,ti.	20062
8	1 or 4 or 5 or 6 or 7	188131
9	exp Periodontitis/ or exp Gingivitis/ or dental plaque.sh. or oral hygiene.sh. or periodontal diseases.sh. or dental prophylaxis.sh. or dental caries.sh.	95132
10	(oral hygiene or gingiv$ or dental hygiene or (periodontal adj2 disease$) or dental prophylaxis or caries).ab,ti.	81381
11	(plaque and (dental or tooth or teeth or oral)).ab,ti.	13531
12	9 or 10 or 11	130118
13	8 and 12	4025
14	(addresses or autobiography or biography or case reports or classical article or comment or dictionary or directory or editorial or festschrift or government publications or historical article or in vitro or interview or legal cases or legislation or letter or news or newspaper article or patient education handout or periodical index or personal narratives or portraits).pt.	3713430
15	13 not 14	3815
16*	limit 15 to (yr="1990 -Current" and (danish or english or norwegian or swedish))	1802*
17	(child or child preschool).sh.	1554915
18	16 not 17	1089
19	16 not 18	713
20	(random$ or control$ non-random$ or compar$).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]	4969815
21	**18 and 20**	**343**

Database: PSYCINFO (EBSCO)
Date: 2013-10-31
No of results: 168

Set	Search	Results
S12	**S11Limits applied Limited by: Date: After January 01 1990 Language:Danish, English, Norwegian, Swedish**	**168**
S11	S10 AND S6	203
S10	S7 OR S8 OR S9	1279
S9	ab(plaque and (dental or tooth or teeth or oral)) OR ti(plaque and (dental or tooth or teeth or oral))	120
S8	ab(oral hygiene or gingiv* or (dental hygiene) or (periodontal disease*) or (dental prophylaxis) or caries or periodontitis) OR ti(oral hygiene or gingiv* or (dental hygiene) or (periodontal disease*) or (dental prophylaxis) or caries or periodontitis)	804
S7	SU.EXACT.EXPLODE("Dental Health") OR SU.EXACT.EXPLODE("Oral Health")	653
S6	S1 OR S2 OR S3 OR S4 OR S5	292377
S5	ab((behaviour* or behaviour*) and (modification* or change)) OR ti((behaviour* or behaviour*) and (modification* or change))	12244
S4	ab((health belief*) or (theory of reasoned action) or (theory of planned behavior) or (theory of planned behaviour) or (self efficacy) or (self-efficacy) or (locus of control) or (sense of coherence) or (transtheoretical model) or (stages of change model) or (stages-of-change model) or (readiness to change) or (readiness for change) or (stages of change) or (self regulatory model) or (self-regulatory model) or (acceptance commitment therapy)) OR ti((health belief*) or (theory of reasoned action) or (theory of planned behavior) or (theory of planned behaviour) or (self efficacy) or (self-efficacy) or (locus of control) or (sense of coherence) or (transtheoretical model) or (stages of change model) or (stages-of-change model) or (readiness to change) or (readiness for change) or (stages of change) or (self regulatory model) or (self-regulatory model) or (acceptance commitment therapy))	79650
S3	ab((motivational and (interview* or intervention* or counsel*))) OR ti((motivational and (interview* or intervention* or counsel*)))	5072
S2	ab((behavior* or behaviour* or cognitive*) and (theory or theories or therapy or therapies or intervention or interventions)) OR ti((behavior* or behaviour* or cognitive*) and (theory or theories or therapy or therapies or intervention or interventions))	199568
S1	SU.EXACT.EXPLODE("Dental Education") OR SU.EXACT.EXPLODE("Client Education") OR SU.EXACT.EXPLODE("Behavior Therapy") OR (SU.EXACT.EXPLODE("Cognitive Behavior Therapy") OR SU.EXACT.EXPLODE("Cognitive Therapy")) OR SU.EXACT.EXPLODE("Internal External Locus of Control") OR SU.EXACT.EXPLODE("Self Efficacy") OR SU.EXACT.EXPLODE("Motivational Interviewing") OR SU.EXACT.EXPLODE("Sense of Coherence")	67638

Database: The Cochrane Library
Date: 2013-10-31
No of results: 201
Cochrane reviews 11
Trials 189
Economic evaluations 1

ID	Search	Hits
#1	(health belief*) or (theory of reasoned action) or (theory of planned behavior) or (theory of planned behaviour) or (self efficacy) or (self-efficacy) or (locus of control) or (sense of coherence) or (transtheoretical model) or (stages of change model) or (stages-of-change model) or (readiness to change) or (readiness for change) or (stages of change) or (self regulatory model) or (self-regulatory model) or (acceptance commitment therapy):ti,ab,kw (Word variations have been searched)	13334
#2	(behaviour* or behavior* or cognitive*) and (theory or theories or therapy or therapies or intervention or interventions):ti,ab,kw (Word variations have been searched)	26717
#3	(motivational and (interview* or intervention* or counsel*)):ti,ab,kw (Word variations have been searched)	1242

#4	(behaviour* or behaviour*) and (modification* or change):ti,ab,kw (Word variations have been searched)	2495
#5	#1 or #2 or #3 or #4	37898
#6	oral hygiene or gingiv* or dental hygiene or periodontal disease* or dental prophylaxis or caries or periodontitis:ti,ab,kw (Word variations have been searched)	9486
#7	plaque and (dental or tooth or teeth or oral):ti,ab,kw (Word variations have been searched)	3948
#8	#6 or #7	10511
#9	**#5 and #8 from 1990**	**201**

Database: CRD
Date: 2013-10-31
No of results: 23
DARE
NHS EED
HTA

Line	Search	Hits
1	((health belief*) or (theory of reasoned action) or (theory of planned behavior) or (theory of planned behaviour) or (self efficacy) or (self-efficacy) or (locus of control) or (sense of coherence) or (transtheoretical model) or (stages of change model) or (stages-of-change model) or (readiness to change) or (readiness for change) or (stages of change) or (self regulatory model) or (self-regulatory model) or (acceptance commitment therapy))	261
2	((behaviour* or behavior* or cognitive*) and (theory or theories or therapy or therapies or intervention or interventions))	4285
3	((motivational and (interview* or intervention* or counsel*)))	186
4	((behaviour* or behaviour*) and (modification* or change))	1120
5	#1 OR #2 OR #3 OR #4	4455
6	(oral hygiene or gingiv* or dental hygiene or periodontal disease* or dental prophylaxis or caries or periodontitis)	429
7	(plaque and (dental or tooth or teeth or oral))	84
8	#6 OR #7	445
9	**#5 AND #8**	**23**

The web-sites of **SBU, Kunnskapssenteret** and **Sundhedsstyrelsen** were visited
2013-12-04
Nothing relevant to the question at issue was found

Reference lists
A comprehensive review of reference lists brought 5 new records

Reference lists

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Appendix 2 – Included articles – study design and patient characteristics

Author, Year, Country	Study Design	Follow up	Study Groups Intervention vs control	Patients (n)	Mean Age, years (sd)	Men (%)	Outcome variables 1. Primary 2. Secondary	Patient group	Intervention
Brand, 2013, USA	RCT	12 weeks	BMI (n=29) vs. TAU (n=27)	56	61.9 (11.0)	48	1. BOP 2. PI, PD, MRCA, TSRQ (OHKQ)	Previously treated periodontal patients, at a dental school, yet with signs of clinical inflammation	BMI, 1 session (15-20min) within one week from Baseline, delivered by a trained and experienced counselor in MI TAU, Traditional oral health education, delivered by a dental hygienist
Godard, 2011, France	RCT	1 month	MI (n=27) vs. TAU (n=24)	51	MI 51.6 (16.6) TAU 48.3 (16.5)	55	1. PI	Patients with moderate-to-severe chronic periodontitis, visiting at the Department of Periodontology for the first time	MI, 2 sessions in total, 1 session (15-20min) at Baseline and 1 session at follow-up TAU, Standard consultation Both MI and TAU were provided by two experienced periodontists
Jönsson, 2006, Sweden	RCT	3 months	CSCCM (n=19) vs. TAU (n=16)	35	CSCCM 54.8 (11.7) TAU 58.1 (9.9)	51	1. PI, GI, BOP, PD, interdental cleaning	Re-examined patients at the Department of Periodontology with insufficient compliance and progress of their periodontal disease	CSCCM, 4 visits in total, 1) Baseline, 2) +1-2weeks, 3) +4weeks 4) +12-14weeks TAU, 3 visits in total 1) Baseline, 2) +1-2weeks, 3) +12-14weeks Both CSCCM and TAU were delivered by an experienced dental hygienist
Jönsson, 2009, Sweden	RCT	12 months	ITOHEP (n=57) vs. TAU (n=56)	113	ITOHEP 52.4 (8.4) TAU 50.1 (10.3)	47	1. GI 2. PI, interdental cleaning	Patients with moderate to advanced periodontitis referred to the Department of Periodontology	ITOHEP (methods of MI were included), several sessions (45-70min, once a week) until scaling treatment was finished. Median number of treatment sessions: 5 (at 3 months follow-up) and 9 (at 12months follow-up) TAU, Standard treatment program, several sessions, (45-60min, once a week) until scaling treatment was finished. Median number of sessions 4 (at 3months follow-up) and 8 (at 12months follow-up) Both ITOHEP and TAU were provided by two experienced dental hygienists
Jönsson, 2010, Sweden	RCT	12 months	ITOHEP (n=57) vs. TAU (n=56)	113	ITOHEP 52.4 (8.4) TAU 50.1 (10.3)	47	1. BOP, PPD, PI	Patients with moderate to advanced periodontitis referred to the Department of Periodontology	Same study as Jönsson 2009, different outcome

Appendix 2 – Included articles – study design and patient characteristics

Author, Year, Country	Study Design	Follow up	Study Groups Intervention vs control	Patients (n)	Mean Age, years (sd)	Men (%)	Outcome variables 1. Primary 2. Secondary	Patient group	Intervention
Kakudate, 2009, Japan	RCT	3 weeks	Faraquhar´s six-step method (n=18) vs. TAU (n=20)	38	Counseling 58.1 (7.96) TAU 54.95 (13.10)	58	1. PI, BOP (but not reported), toothbrushing, interdental cleaning, self-efficacy	Patients with mild to moderate chronic periodontitis, visiting a private dental clinic	Faraquhar´s six-step method 3 sessions (10min, after TAU, once a week), provided by one dentist. TAU, Traditional oral hygiene instruction, 3 sessions (20min, once a week), provided by one dental hygienist
Little, 1997, USA	RCT	4 months	FFP (n=54) vs. TAU (n=53)	107	56.9 (sd not reported)	FFP 50 TAU 66	1. PI, GB, BOP 2. PPD, attachment loss	Patients with mild to moderate periodontal disease, in a dental Health Maintenance Organization	FFP, group-based intervention (with groups of 7-10people), 5 sessions (90min, once a week), provided by a dental hygienist. TAU, Usual dental care including periodontal maintenance therapy, not supplemented by the study
Philippot, 2005, Belgium	RCT	4 weeks	Behavioral educational intervention vs. TAU n per group not stated	33	39 (20-68)	61	1. PI	Patients with periodontal problems, new to treatment for periodontitis, at the University Periodontology Consultation Service	Behavioral educational intervention, including MI components, and the use of diary between sessions (1-2). It is unclear who provided the intervention. TAU, Treatment regularly applied at the University Consultation Service of Periodontology, 2 sessions (the second 2 weeks after the initial session)
Stenman, 2012, Sweden	RCT	6 months	MI (n=22) vs. TAU (n=22)	44	MI 51.9 (8.9) TAU 48.9 (12.1)	30	1. MBI 2. PI	Patients with moderate chronic periodontitis, recruited at a consultation visit with a specialist in Periodontology	MI, 1 session close to baseline (on average 44min, range 20-90min), in a room outside the periodontal clinic, conducted by a clinical psychologist with extensive experience and knowledge of the specific method. TAU, Conventional educational intervention and non-surgical periodontal treatment. In total five clinical examinations. 1) Baseline, 2) +2weeks, 3) +4weeks, 4) +12weeks, 5)+26weeks), performed by four experienced dental hygienists
Tedesco, 1992, USA	RCT	9 months	Social Cognitive Intervention (n=111) vs. TAU (n=56)	167	Social Cognitive Intervention 32.9 TAU 31.3	52	1. PI, GI, cognition variables (self-efficacy, oral hygiene intentions, attitudes and values)	Volunteers with mild to moderate gingivitis, new to periodontal therapy	Social Cognitive Intervention, 7 visits in total, intervention given at visit 2 through 5 TAU, Standard regular treatment, 7 visits in total, 3month follow-up at visit 6, 9 month follow-up at visit 7 Both Social Cognitive intervention and TAU were delivered by a specially trained hygienist

BMI=Brief Motivational Interviewing, BOP=Bleeding On Probing, CSCCM=Client Self-Care Commitment Model, FFP=Freedom From Plaque, GB=Gingival Bleeding, GI=Gingival Index, ITOHEP=Individually Tailored Oral Health Educational Programme, MBI=Marginal Bleeding Index, MI=Motivational Interviewing, MRCA=Motivation/Readiness/Confidence to Adhere, OHKQ=Oral Health Knowledge Questionnaire, PD=Pocket Depth, PPD=Periodontal Probing Depth, PI=Plaque Index, RCT = Randomized controlled trial, TAU=Treatment as usual, including information/education and/or standard dental treatment, TSRQ=Treatment Self-Regulation Questionaire, TSRQ-C/-A=Self-regulation scores regarding Conrol vs. Autonomy

Appendix 3 – Excluded articles

Study (author, publication year)	Reason for exclusion
Albandar 1994	Wrong population (no defined oral disease), wrong intervention
Albandar 1995	Wrong population (no defined oral disease), wrong intervention
Aleksejuniene 2012	Wrong population (age, no defined oral disease)
Almomani 2009	Wrong population (not independent, no defined oral disease)
Axelsson 1994	Wrong population (age, no defined oral disease)
Bagely 1992	Wrong population (no defined oral disease), wrong intervention
Brukiene 2012	Wrong population (age)
Buischi 1994	Wrong population (age), wrong intervention
Clarkson 2009	Wrong population (no defined oral disease)
Dermen 2013	Wrong population (no defined oral disease)
Fjellström 2010	Wrong population (no defined oral disease)
Gao 2013	Wrong population (no defined oral disease)
Garbin, 2013	Wrong population (no defined oral disease), wrong intervention
Halvari, 2006	Wrong population (no defined oral disease)
Hashemian, 2012	Wrong population (no defined oral disease), wrong intervention
Hugosson, 2003	Wrong population (no defined oral disease), wrong intervention
Hugosson, 2007	Wrong population (no defined oral disease), wrong intervention
Jönsson, 2012a	Wrong outcome (Cost-effectiveness analysis)
Jönsson, 2012b	Duplicate (outcome reported in Jönsson, 2009)

Appendix 3 – Excluded articles

Study (author, publication year)	Reason for exclusion
Kay, 1998	Wrong population (age)
Mayer, 2003	Wrong population (no defined oral disease), wrong intervention
McCaul, 1992	Wrong population (age)
Morgan, 1998	Wrong population (age)
Munster, 2012	Wrong population (no defined oral disease)
Pakpour, 2013	Wrong population (no defined oral disease)
Renz, 2007	Wrong population (no only defined oral disease)
Schuz, 2009	Wrong population (no defined oral disease)
Stewart, 1991	Wrong population (no defined oral disease)
Stewart, 1996	Wrong population (no defined oral disease)
Weinstein, 1996	Wrong study design
Wolfe, 1996	Wrong population (no defined oral disease)
Yang, 2009	Wrong population (no defined oral disease), wrong intervention
Ziebolz, 2009	Wrong population (no defined oral disease), wrong intervention

Appendix 4.1. Outcome variable: Periodontitis (PD or PPD). The p-values refer to the comparison between intervention and control group.

* + No problem
? Some problems
- Major problems

Author, year	Country	Study design	Number of patients n=	With drawals - dropouts	Result		Comments	Directness*	Study limitations *	Precision *
					Intervention	Control				
Brand, 2013	USA	RCT	56 I=29 C=27	3 I=0 C=3	BMI <u>Pocket depth 4-6 mm</u>* Baseline: 23.8 (sd 15.8) 6 weeks: 23.5 (sd 19.0) 12 weeks: 20.3 (sd 15.0) p=0.006 <u>Pocket depth >7 mm</u>* Baseline: 2.0 (sd 4.1) 6 weeks: 1.7 (sd 3.0) 12 weeks: 1.7 (sd 3.9) ns.	TAU <u>Pocket depth 4-6 mm</u>* Baseline: 23.3 (sd 23.1) 6 weeks: 18.9 (sd 19.9) 12 weeks: 16.1 (sd 21.4) <u>Procket depth >7 mm</u>* Baseline:1.8 (sd 6.9) 6 weeks: 2.7 (sd 11.8) 12 weeks: 1.4 (sd 5.7)	Assessed at baseline, 6 and 12weeks * Percent of periodontal pockets 4-6 mm * Percent of periodontal pockets >7 mm	+	+	?
Jönsson, 2006	Sweden	RCT	35 I=19 C=16	0	CSCCM <u>Pocket depth >4mm</u># Baseline: 5.8 (95% CI: 3.9-7.7) 12-14 weeks: 2.7 (95% CI: 1.2-4.1) ns.	TAU <u>Pocket depth >4mm</u># Baseline: 4.9 (95% CI: 1.3-8.4) 12-14 weeks: 2.9 (95% CI: 1.2-4.5)	12-14 weeks follow-up #Number of periodontal pockets >4 mm.	?	-	-

Appendix 4.1. Outcome variable: Periodontitis (PD or PPD). The p-values refer to the comparison between intervention and control group.

* + No problem
? Some problems
- Major problems

Author, year	Country	Study design	Number of patients n=	With drawals - dropouts	Result		Comments	Directness*	Study limitations *	Precision *
					Intervention	Control				
Jönsson, 2010	Sweden	RCT	113 I=57 C=56	5 I=4 C=1	ITOHEP <u>Probing pocket depth 4-5mm†</u> Baseline: 31.0 (sd 14.3) % 3 months: 12.7 (sd 8.1) % 12 months: 10.4 (sd 7.9) % ns. <u>Probing pocket depth ≥6mm†</u> Baseline: 9.2 (sd 9.3) % 3 months: 1.6 (2.8) % 12 months: 1.6 (2.9) % ns.	TAU <u>Probing pocket depth 4-5mm†</u> Baseline: 33.0 (sd 14.0)% 3 months: 14.6 (sd 11.4) % 12 months: 12.2 (sd 10.8) % <u>Probing pocket depth ≥6mm†</u> Baseline: 9.3 (sd 11.0) % 3 months: 1.7 (sd 3.5) % 12 months: 1.5 (sd 3.2) % .	12 months follow-up †Mean percentage 4-5 mm periodontal pockets †Mean percentage ≥6 mm periodontal pockets	+	+	?
Little, 1997	USA	RCT	107 I=54 C=53	9 I=4 C=5	FFP <u>Pocket depth all teeth</u> Baseline: 2.47 mm 4 months: 2.43 mm ns. <u>Pocket depth 3-6 mm</u> Baseline: 3.94 mm 4 months: 3.45 mm p=0.004 <u>Pocket depth >6 mm</u> Baseline: 6.72 mm 4 months: 5.83 mm ns.	TAU <u>Pocket depth all teeth</u> Baseline: 2.62 mm 4 months: 2.63 mm <u>Pocket depth 3-6 mm</u> Baseline: 3.90 mm 4 months: 3.63 mm <u>Pocket depth >6 mm</u> Baseline: 7.15 mm 4 months: 6.29 mm	4-month follow-up	?	-	?

BMI = Brief motivational interviewing, based on self-regulation theory, CSCCM = Client self-care commitment model, based on client empowerment model, FFP = Freedom From Plaque, ITOHEP = Individually tailored oral health educational programme, TAU = Treatment as usual, including information/education and/or standard dental treatment.

* + No problem
? Some problems
- Major problems

Appendix 4.2. Outcome variable: Gingival index. The p-values refer to the comparison between intervention and control group.

Author, year	Country	Study design	Number of patients n=	With drawals - dropouts	Result		Comments	Directness*	Study limitations *	Precision *
					Intervention	Control				
Jönsson, 2006	Sweden	RCT	35 I=19 C=16	0	CSCCM Gingival index* Baseline: 0.73 (95%CI: 0.66-0.79) 12-14 weeks: 0.38 (95%CI: 0.28-0.48) Δ (%): -47.8 (95%CI: -59.9 to -35.7) % ns.	TAU Gingival index* Baseline: 0.65 (95%CI: 0.53-0.77) 12-14 weeks: 0.39 (95%CI: 0.39-0.46) Δ (%): -33.8 (95%CI: -52.3 to -15.4) %	12-14 weeks follow-up *According to Löe & Silness	?	-	-
Jönsson, 2009	Sweden	RCT	113 I=57 C=56	5 I=4 C=1	ITOHEP Gingival index* Baseline: 0.92 (sd 0.28) 3 months: 0.27 (sd 0.14) 12 months: 0.21 (sd 0.16) p<0.001	TAU Gingival index* Baseline: 0.92, SD= 0.23 3 months: 0.52, SD= 0.20 12 months: 0.50, SD= 0.17	3 and 12-month follow-up *According to Löe & Silness	+	+	?
Little, 1997	USA	RCT	107 I=54 C=53	9 I=4 C=5	FFP Gingival index# Baseline: 9% 4 months: 4% p=0.001	TAU Gingival index# Baseline: 10% 4 months: 10%	4-month follow-up #According to Löe & Silness, but dichotomized in 'bleeding' or 'no bleeding'	?	-	?
Tedesco, 1992	USA	RCT	167 I=111 C=56	76 I=49 C=27	Social cognitive intervention Gingival index‡ Baseline: 1.61 3 months: 0.97 9 months: 1.06 ns	TAU Gingival index‡ Baseline: 1.61 3 months: 1.08 9 months: 1.05	9-month follow-up ‡According to Löe & Silness	-	-	-

BMI = Brief motivational interviewing, based on self-regulation theory, CSCCM = Client self-care commitment model, based on client empowerment model, FFP = Freedom from plaque, ITOHEP = individually tailored oral health educational programme, TAU = Treatment as usual, including information/education and/or standard dental treatment.

* + No problem
? Some problems
- Major problems

Appendix 4.3. Outcome variable: Bleeding on probing. The p-values refer to the comparison between intervention and control group.

Author, year	Country	Study design	Number of patients n=	With drawals - dropouts	Result		Comments	Directness*	Study limitations *	Precision *
					Intervention	Control				
Brand, 2013	USA	RCT	56 I = 29 C = 27	3 I = 0 C = 3	BMI <u>Bleeding on probing</u> Baseline: 50 (sd 18) % 6 weeks: 31 (sd 14) % 12 weeks: 33 (sd 15) % ns.	TAU <u>Bleeding on probing</u> Baseline: 55 (sd 18) % 6 weeks: 40 (sd 19) % 12 weeks: 36 (sd 20) %	6 and 12-week follow-up	+	+	?
Jönsson, 2006	Sweden	RCT	35 I=19 C=16	0	CSCCM <u>Bleeding on probing</u> Baseline: 46.8 (95%CI: 40.2-53.5) % 12-14 weeks: 18.7 (95%CI: 14.7-22.8) % Δ (%): -58.4 (95%CI: -66.9 to -49.8) % ns.	TAU <u>Bleeding on probing</u> Baseline: 39.0 (95%CI: 30.5-47.5) % Final exam: 16.3 (95%CI: 13.3-19.3) % Δ (%): -51.5 (95%CI: -64.6 to -38.3) %	3-month follow-up Measured as presence or absence of bleeding	?	-	-
Jönsson, 2010	Sweden	RCT	113 I=57 C=56	5 I=4 C=1	ITOHEP <u>Bleeding on probing</u> Baseline:70 (sd 20) % 3 months: 24 (sd 12) % 12 months: 19 (sd 13) % p<0.001	TAU <u>Bleeding on probing</u> Baseline: 75 (sd 18) % 3 months: 33 (sd 15) % 12 months: 29 (sd 14) %	12-month follow-up Presence or absence of bleeding within 15 s after probing	+	+	?
Little, 1997	USA	RCT	107 I=54 C=53	9 I=4 C=5	FFP <u>Bleeding on probing</u> Baseline: 24% 4 months: 15% p=0.009	TAU <u>Bleeding on probing</u> Baseline: 26% 4 months: 21%	4-month follow-up Measured as presence or absence of bleeding	?	-	?

* + No problem
? Some problems
- Major problems

Appendix 4.3. Outcome variable: Bleeding on probing. The p-values refer to the comparison between intervention and control group.

Author, year	Country	Study design	Number of patients n=	With drawals - dropouts	Result		Comments	Directness*	Study limitations *	Precision *
					Intervention	Control				
Stenman, 2012	Sweden	RCT	44 I=22 C=22	5 I=3 C=2	MI <u>Bleeding on probing</u> Baseline: 36.6 (sd 17.1) % 2 weeks: 33.9 (sd 16.9) % 4 weeks: 26.0 (sd 17.1) % 12 weeks: 21.0 (sd 12.5) % 26 weeks: 18.8 (sd 10.9) % ns.	TAU <u>Bleeding on probing</u> Baseline: 33.0 (sd 12.4) % 2 weeks: 34.9 (sd 15.9) % 4 weeks: 24.0 (sd 14.2) % 12 weeks: 16.2 (sd 13.4) % 26 weeks: 18.4 (sd 14.1)%	6-month follow-up Measured as presence or absence of bleeding	+	+	?

BMI = Brief motivational interviewing, based on self-regulation theory, CSCCM = Client self-care commitment model, based on client empowerment model, FFP = Freedom from plaque, MI = Motivational interviewing, based on self-regulation theory, ITOHEP = individually tailored oral health educational programme, TAU = Treatment as usual, including information/education and/or standard dental treatment

Appendix 4.4. Outcome variable: Dental plaque. The p-values refer to the comparison between intervention and control group.

* + No problem
? Some problems
- Major problems

Author, year	Country	Study design	Number of patients n=	With drawals - dropouts	Result		Comments	Directness*	Study limitations *	Precision *
					Intervention	Control				
Brand, 2013	USA	RCT	56 I=29 C=27	3 I=0 C=3	BMI <u>Plaque index*</u> Baseline: 2.4 (sd 0.6) 6 weeks: 1.9 (sd 0.6) 12 weeks: 2.1 (sd 0.7) ns.	TAU <u>Plaque index*</u> Baseline: 2.6 (sd 0.5) 6 weeks: 2.2 (sd 0.4) 12 weeks: 2.3 (sd 0.7)	12 weeks follow-up * According to modified Quigley-Hein Plaque Index (grading 0-5)	+	+	?
Godard, 2011	France	RCT	51 I=27 C=24	7 I=5 C=2	MI <u>Plaque index#</u> Baseline: 55 (sd 15) % 4 weeks: 34 (sd 20) % p<0.001	TAU <u>Plaque index#</u> Baseline: 58 (sd 12) % 4 weeks: 54 (sd 12) %	4 weeks follow-up # According to O'Leary Plaque index (absence or presence of plaque)	+	-	-
Jönsson, 2006	Sweden	RCT	35 I=19 C=16	0	CSCCM <u>Plaque index†</u> Baseline: 0.59 (95%CI: 0.51-0.67) 12-14 weeks: 0.25 (95%CI: 0.20-0.30) Δ (%): -56.2 (95%CI: -64.9 to -47.5) % p=0.03	TAU <u>Plaque index†</u> Baseline: 0.59 (95%CI: 0.44-0.75) 12-14 weeks: 0.33 (95%CI: 0.27-0.39) Δ (%): -35.1 (95%CI: -51.7 to -18.6) %	12-14 weeks follow-up † According to Sillness & Löe	-	?	?
Jönsson, 2009	Sweden	RCT	113 I=57 C=56	5 I=4 C=1	ITOHEP <u>Plaque index†</u> Baseline: 0.74 (sd 0.34) 3 months: 0.17 (sd 0.11) 12 months: 0.14 (sd 0.13) p<0.001	TAU <u>Plaque index†</u> Baseline:0.73 (sd 0.31) 3 months: 0.32 (sd 0.22) 12 months: 0.31 (sd 0.16)	3 and 12-month follow-up † According to Sillness & Löe	+	+	?

Appendix 4.4. Outcome variable: Dental plaque. The p-values refer to the comparison between intervention and control group.

* + No problem
? Some problems
- Major problems

Author, year	Country	Study design	Number of patients n=	With drawals - dropouts	Result		Comments	Directness*	Study limitations *	Precision *
					Intervention	Control				
Jönsson, 2010	Sweden	RCT	113 I=57 C=56	5 I=4 C=1	ITOHEP <u>Plaque index</u>† Baseline: 59 (sd 18) % 3 months: 17 (sd 10) % 12 months: 14 (sd 12) % p<0.001	TAU <u>Plaque index</u>† Baseline: 57 (sd 17) % 3 months: 28 (sd 17) % 12 months: 28 (sd 13) %	3 and 12-month follow-up † According to Sillness & Löe	+	+	?
Kakudate, 2009	Japan	RCT	38 I=18 C=20	0	Faraquhar´s six-step method <u>Plaque index</u>‡ Baseline: 56.90 (sd 15.75) % 3 weeks: 15.98% (sd 8.71) % p<0.01	TAU <u>Plaque index</u>‡ Baseline: 49.78 (sd 13.35) % 3 weeks: 20.82 (sd 7.93) %	3-week follow-up ‡Plaque Control Record (PCR) of O´Leary et al. (absence or presence of plaque)	?	?	-
Little, 1997	USA	RCT	107 I=54 C=53	9 I=4 C=5	FFP <u>Plaque index</u>∞ Baseline: 82% 4 months: 76% p=0.002	TAU <u>Plaque index</u>∞ Baseline: 80% 4 months: 80%	4-month follow-up ∞According to Poshadley Haley (absence or presence of plaque)	?	-	?
Philippot, 2005	Belgium	RCT	33	3 Not stated per group	Behavioural educational intervention (n=15) <u>Plaque index</u>‡ Baseline: 1.63 (sd 0.43) 1 month: 0.24 (sd 0.19) p<0.05	TAU (n=15) <u>Plaque index</u>‡ Baseline: 1.88 (sd 0.41) 1 month: 0.88 (sd 0.38)	1-month follow-up ‡According to Sillness & Löe	-	-	-
Stenman, 2012	Sweden	RCT	44 I=22 C=22	5 I=3 C=2	MI <u>Plaque index</u>α Baseline: 50.2 (sd 21.5) % 2 weeks: 46.2 (sd 19.5) %	TAU <u>Plaque index</u>α Baseline: 43.1 (sd 19.2) % 2 weeks:40.2 (sd 21.3) %	6-month follow-up α Absence or presence of plaque following staining (Diaplac).	+	+	?

Appendix 4.4. Outcome variable: Dental plaque. The p-values refer to the comparison between intervention and control group.

* + No problem
? Some problems
- Major problems

Author, year	Country	Study design	Number of patients n=	With drawals - dropouts	Result		Comments	Directness*	Study limitations *	Precision *
					Intervention	Control				
					4 weeks: 28.4 (sd 16.5) % 12 weeks: 27.1(sd 15.2) % 26 weeks: 25.2 (sd 15.4) % ns.	4 weeks: 26.2 (sd 17.1) % 12 weeks: 19.0 (sd 13.3) % 26 weeks: 18.6 (sd 13.2) %				
Tedesco, 1992	USA	RCT	167 I=111 C=56	76 I=49 C=27	Social Cognitive Intervention <u>Plaque index</u>[¥] Baseline: 1.35 3 months: 0.92 9 months: 0.92 ns.	TAU <u>Plaque index</u>[¥] Baseline: 1.26 3 months: 1.00 9 months: 0.92	9-month follow-up [¥]According to Sillness & Löe	-	-	-

BMI = Brief motivational interviewing, based on self-regulation theory, CSCCM = Client self-care commitment model, based on client empowerment model, FFP = Freedom from plaque, MI = Motivational interviewing, based on self-regulation theory, ITOHEP = individually tailored oral health educational programme, TAU = Treatment as usual, including information/education and/or standard dental treatment.

Appendix 4.5. Outcome variable: Oral health behaviors. The p-values refer to the comparison between intervention and control group.

* + No problem
? Some problems
- Major problems

Author, year	Country	Study design	Number of patients n=	With drawals - dropouts	Result		Comments	Directness*	Study limitations *	Precision *
					Intervention	Control				
Jönsson, 2006	Sweden	RCT	35 I=19 C=16	0	CSCCM <u>Interdental cleaning</u>* Baseline: 4/19 (21%) 12-14 weeks: 19/19 (100%) Δ (%): 79% p=0.008 <u>Tooth brushing habits</u> 12-14 weeks: no change	TAU <u>Interdental cleaning</u>* Baseline: 10/16 (63%) 12-14 weeks: 11/16 (69%) Δ (%): 6% <u>Tooth brushing habits</u> 12-14 weeks: no change	*Self-reported interdental cleaning ≥5 times/week Tooth brushing data not reported	?	-	-
Jönsson, 2009	Sweden	RCT	113 I=57 C=56	5 I=4 C=1	ITOHEP <u>Interdental cleaning</u># Baseline: 26/57 (46%) 3 months: 45/57 (79%) 12 months: 45/57 (79%) p=0.021	TAU <u>Interdental cleaning</u># Baseline: 21/56 (38%) 3 months: 37/56 (66%) 12 months: 33/56 (59%)	#Self-reported interdental cleaning, at least once a day	+	+	?
Kakudate, 2009	Japan	RCT	38 I=18 C=20	0	Faraquhar´s six-step method <u>Interdental cleaning</u>† Baseline: 1.22 (sd 1.80) 3 weeks: 11.56 (sd 4.93) p<0.001 <u>Tooth brushing duration</u> Baseline: 3.38 (sd 0.95) min 3 weeks: 6.16 (sd 2.20) min p<0.01 <u>Daily tooth brushing frequency</u> Baseline: 2.11 (sd 0.43) 3 weeks: 2.53 (sd 0.40) ns.	TAU <u>Interdental cleaning</u>† Baseline: 0.85 (sd 1.63) 3 weeks: 3.48 (sd 3.11) <u>Tooth brushing duration</u> Baseline: 3.68 (sd 1.73) min 3weeks: 4.38 (sd 1.16) min <u>Daily tooth brushing frequency</u> Baseline: 2.13 (sd 0.32) 3 weeks: 2.35 (sd 0.81)	†Self-reported, weekly frequency of interdental cleaning Self-reported data Self-reported data	?	?	-

CSCCM = Client self-care commitment model, based on client empowerment model, ITOHEP = individually tailored oral health educational programme, TAU = Treatment as usual, including information/education and/or standard dental treatment.

Appendix 4.6. Outcome variable: Oral health beliefs, attitudes and cognitions.
The p-values refer to the comparison between intervention and control group.

* + No problem
? Some problems
- Major problems

Author, year	Country	Study design	Number of patients n=	With drawals - dropouts	Result		Comments	Directness*	Study limitations *	Precision *
					Intervention	Control				
Brand, 2013	USA	RCT	56 I=29 C=27	3 I=0 C=3	BMI <u>OHKQ knowledge scores</u> Baseline: 7.5 (sd 1.9) 6weeks: 7.9 (sd 2.3) 12weeks: 7.3 (sd 1.3) ns. <u>MRCA motivation scores</u> Baseline: 46.2 (sd 5.4) 6weeks: 45.1 (sd 5.9) 12weeks: 45.8 (sd 5.8) ns. <u>TSRQ-C self-regulation scores</u> Baseline: 27.1 (sd 8.0) 6weeks: 26.4 (sd 8.5) 12weeks: 27.3 (sd 8.1) ns. <u>TSRQ-A self regulation scores</u> Baseline: 31.3 (sd 4.4) 6weeks: 31.2 (sd 5.8) 12weeks: 32.6 (sd 3.0) ns.	TAU <u>OHKQ knowledge scores</u> Baseline: 7.9 (sd 2.0) 6weeks: 7.3 (sd 2.2) 12weeks: 7.8 (sd 1.6) <u>MRCA motivation scores</u> Baseline: 41.9 (sd 6.5) 6weeks: 42.3 (sd 6.9) 12weeks: 42.6 (sd 6.3) <u>TSRQ-C self-regulation scores</u> Baseline: 26.7 (sd 6.3) 6weeks: 26.1 (sd 7.8) 12weeks: 26.7 (sd 7.3) <u>TSRQ-A self-regulation scores</u> Baseline: 30.2 (sd 4.2) 6weeks: 29.1 (sd 6.9) 12weeks: 29.8 (sd 3.4)		+	+	?
Kakudate, 2009	Japan	RCT	38 I=18 C=20	0	Farquhar´s six-step method <u>Self-efficacy tooth brushing</u> Baseline: 16.22 (sd 3.23) 3weeks: 22.06 (sd 1.95) p<0.001	TAU <u>Self-efficacy tooth brushing</u> Baseline: 16.55 (sd 3.14) 3weeks: 18.90 (sd 3.04)		?	?	-

Appendix 4.6. Outcome variable: Oral health beliefs, attitudes and cognitions.
The p-values refer to the comparison between intervention and control group.

* + No problem
? Some problems
- Major problems

Author, year	Country	Study design	Number of patients n=	With drawals - dropouts	Result		Comments	Directness*	Study limitations *	Precision *
					Intervention	Control				
Tedesco, 1992	USA	RCT	167 111/56	76 49/27	Social cognitive intervention TRA Brushing & Flossing (10 items) ns. Self-efficacy Brushing & Flossing (6 items) ns.	TAU TRA Brushing & Flossing (10 items) Self-efficacy Brushing & Flossing (6 items)	Data through 6-months are reported TRA=Theory of reasoned action questionnaire,	-	-	-

BMI = Brief motivational interviewing, based on self-regulation theory, CSCCM = Client self-care commitment model, MRCA = Motivation/readiness/confidence to adhere, OHKQ = Oral health knowledge questionnaire, TAU = Treatment as usual, including information/education and/or standard dental treatment, TSRQ-C/-A = Treatment self-regulation questionnaire, self-regulation scores regarding control vs. autonomy.

Project: Oral health
Appendix 5 - Summary of Findings

Outcome variable Number of studies	Design	Study limitations	Consistency	Directness	Precision	Publication bias	Magnitude of effect	Mean difference (CI 95%)	Certainty of evidence GRADE
Periodontitis 4	4 RCT	Some limitations (?)[1]	No serious inconsistency	Serious indirectness (-1)[2]	Uncertain precision (?)[3]	Unlikely	Not relevant	Not applicable (different outcome measures)	⊕⊕◯◯
Gingivitis 7 (BI) 3 (MI)	7 RCT (BI) 3 RCT (MI)	Serious Limitations (-1)[1]	Some inconsistency (?)[4]	Uncertain precision (?)[2]	No imprecision	Unlikely	Not relevant	Gingival index, BI: -0.13 (-0.37, 0.10) Favours intervention[5] Bleeding on probing, BI: -1.61 (-8.98, 5.76) Favours intervention[6] Bleeding on probing, MI: -2.81 (-11.54, 5.91) Favours intervention[7]	⊕⊕◯◯
Dental plaque 10	10 RCT	Serious Limitations (-1)[1]	No serious inconsistency	Serious indirectness (-1)[2]	No imprecision	Unlikely	Not relevant	Plaque index, BI: -0.12 (-0.17, -0.07) Favours intervention[8] Plaque presence, BI: -6.59 (-10.86, -2.33) Favours intervention[9]	⊕⊕◯◯

Project: Oral health
Appendix 5 - Summary of Findings

Outcome variable Number of studies	Design	Study limitations	Consistency	Directness	Precision	Publication bias	Magnitude of effect	Mean difference (CI 95%)	Certainty of evidence GRADE
Oral health behaviors 4	4 RCT	Serious Limitations (-1)[1, 10]	No serious inconsistency	Serious indirectness (-1)[2]	Uncertain precision (?)[3]	Unlikely	Not relevant	Not applicable (different outcome measures)	⊕⊕◯◯
Oral health beliefs 3	3 RCT	Serious Limitations (-1)[1, 10]	No serious inconsistency	Some uncertainty (?)[2]	Uncertain precision (?)[3]	Unlikely	Not relevant	Not applicable (different outcome measures)	⊕⊕◯◯

High certainty of evidence = ⊕⊕⊕⊕
Moderate certainty of evidence = ⊕⊕⊕◯
Low certainty of evidence = ⊕⊕◯◯
Very low certainty of evidence = ⊕◯◯◯

Footnotes:
BI = Behaviour intervention, MI = Motivational interview.
1. Some studies have limitations in blinding and measurement of outcomes
2. Adults (>50 yrs.) overrepresented, specialist clinics.
3. Possible unfavourable effects included in CI 95%, but this was consistent across the studies.
4. Different effect magnitude, and direction of effect across the studies.
5. Based on meta-analysis of data from Jönsson 2006, and 2009.
6. Based on meta-analysis of data from Brand 2013, Jönsson 2006, 2010, and Stenman 2012.
7. Based on meta-analysis of data from Brand 2013, Jönsson 2010, and Stenman 2012.
8. Based on meta-analysis of data from Jönsson 2006, 2009, and Philippott 2005.
9. Based on meta-analysis of data from Kakudate 2009, and Stenman 2012.
10. Self-reported outcome data.

Region Västra Götaland, HTA-centrum

Health Technology Assessment
Regional activity-based HTA

HTA

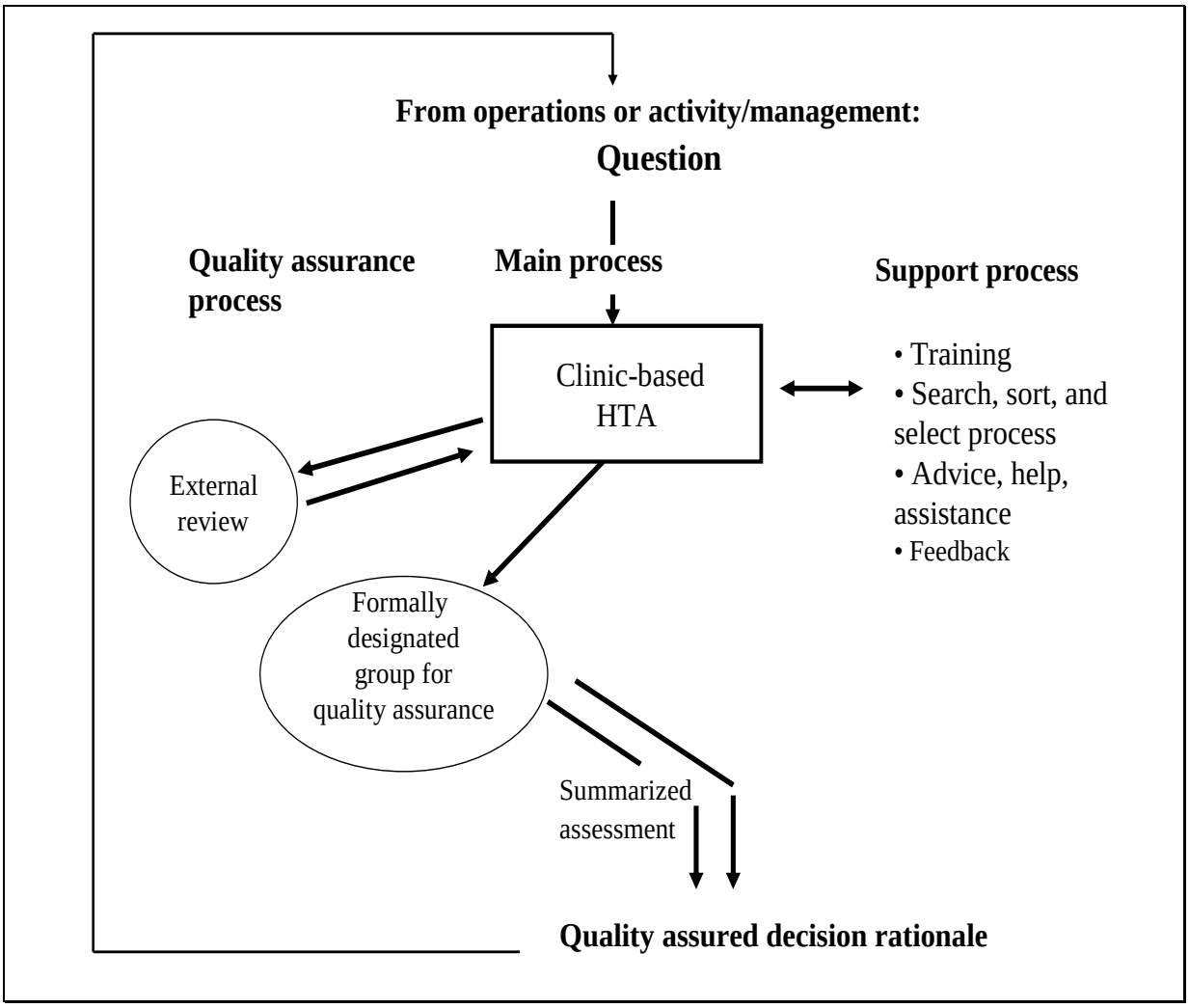
Health technology assessment (HTA) is the systematic evaluation of properties, effects, and/or impacts of health care technologies, i.e. interventions that may be used to promote health, to prevent, diagnose or treat disease or for rehabilitation or long-term care. It may address the direct, intended consequences of technologies as well as their indirect, unintended consequences. Its main purpose is to inform technology-related policymaking in health care.

To evaluate the quality of evidence the Centre of Health Technology Assessment in Region Västra Götaland is currently using the GRADE system, which has been developed by a widely representative group of international guideline developers. According to GRADE the level of evidence is graded in four categories:

High quality of evidence	= (GRADE⊕⊕⊕⊕)
Moderate quality of evidence	= (GRADE ⊕⊕⊕O)
Low quality of evidence	= (GRADE ⊕⊕OO)
Very low quality of evidence	= (GRADE ⊕OOO)

In GRADE there is also a system to rate the strength of recommendation of a technology as either “strong” or “weak”. This is presently not used by the Centre of Health Technology Assessment in Region Västra Götaland. However, the assessments still offer some guidance to decision makers in the health care system. If the level of evidence of a positive effect of a technology is of high or moderate quality it most probably qualifies to be used in routine medical care. If the level of evidence is of low quality the use of the technology may be motivated provided there is an acceptable balance between benefits and risks, cost-effectiveness and ethical considerations. Promising technologies, but a very low quality of evidence, motivate further research but should not be used in everyday routine clinical work.

Christina Bergh, Professor, MD.
Head of HTA-centrum


From operations or activity/management:
Question
Quality assurance process
Main process
Support process
Clinic-based HTA
• Training
• Search, sort, and select process
• Advice, help, assistance
• Feedback
External review
Formally designated group for quality assurance
Summarized assessment
Quality assured decision rationale

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