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Health education and self-care in dentistry -surveys and interventions.

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HEALTH EDUCATION AND SELF CARE IN DENTISTRY
- SURVEYS AND INTERVENTIONS

ANNE JOHANNE SØGAARD

Thesis
Submitted to partial fulfilment of the requirements
for the Degree of Doctor Philosophiae
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INNHOLD: SIDE:

1. FORORD

De enkelte delarbeider i denne rapporten er gjennomført takket være mange personers innsats og medvirkning. De fortjener alle en varm takk for støtte og hjelp underveis.

En spesiell takk vil jeg rette til:

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- Alle de som har deltatt i innsamlingen av de ulike datamaterialene - f.eks. tannpleierne, tannlegene og lærerne som bidro til at evalueringen av Tannvernuka kunne gjennomføres. Spesielt må nevnes direktør Johan R. Ringdal og Norsk Tannvern som sto for den tekniske og administrative gjennomføring av denne undersøkelsen.

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Tromsø, april 1989
Anne Johanne Søgaard

2. LISTE OVER ARTIKLENE

I. HELØE, L.A., AARØ, L.E. & SØGAARD, A.J.: Dental health practices in Norwegian adults. Community Dent. Oral Epidemiol. 1982:10:308-312.

II. SØGAARD, A.J., AARØ, L.E. & HELØE, L.A.: Irregular users of dental services among Norwegian adults. Acta Odontol. Scand. 1987:45:371-381.

III. SØGAARD, A.J., TUOMINEN, R., HOLST, D. & GJERMO, P.: The effect of 2 teaching programs on the gingival health of 15-year-old schoolchildren. J. Clin. Periodontol. 1987:14:165-170.

IV. SØGAARD, A.J. & HOLST, D.: The effect of different school based dental health education programmes in Norway. Community Dent. Health, 1988:5:169-184.

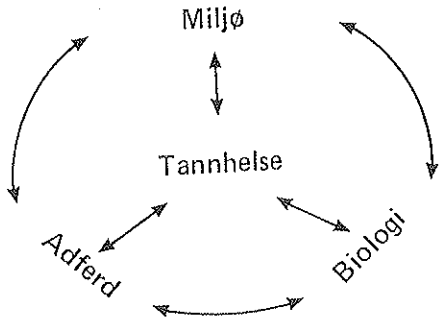
V. SØGAARD, A.J.: Effect of a nationwide periodontal health campaign on dentists awareness, attitude and behavior in Norway. Community Dent. Oral Epidemiol. 1988:16:30-35.

VI. SØGAARD, A.J.: The effect of a mass media dental health education campaign. Health Educ. Res. 1988:3:243-255.

3. INNLEDNING

3.1 Opplysningsvirksomhet som forebyggende tiltak

Tannhelse kan påvirkes ved å endre biologiske faktorer, miljøfaktorer (indre og ytre) eller adferdsmessige faktorer. Adferd har en direkte effekt på tannhelse, men kan også virke indirekte gjennom de andre to, som vist i figur 1.



En mer detajert modell over hvilke faktorer som påvirker tannhelsen er gjengitt i Frandsen (ed) (1982, s.166). Inntil man har funnet vaksiner mot karies og periodontitt, vil den viktigste måten å forebygge tannsykdom på, være gjennom helseopplysning med sikte på påvirkning av folks vaner, slik WHO skriver i sin siste rapport om forebygging av tannsykdom: "Every available preventive oral health procedure includes educational components" (WHO, 1984, s. 29). Forståelsen av folks tannhelseadferd, hvordan den dannes og hvordan den endres, er derfor av avgjørende betydning for alt forebyggende tannhelsearbeid.

3.2 Helseopplysningsforskning. Bakgrunn for arbeidene

Viktigheten av helseopplysning som virkemiddel innenfor forebyggende arbeid har vært sterkt understreket i flere dokumenter og meldinger på 70-tallet og begynnelsen av 80-årene. En av dem som startet diskusjonen var Canadas sosialminister Marc Lalonde - som med sitt helhetssyn på helse, med vektlegging av samfunnsfaktorenes betydning for folks

helsetilstand - satte preg på den helsepolitiske debatt i mange land (Lalonde, 1974). Verdens helseorganisasjon, Europarådet og nasjonale myndigheter i Norge fulgte senere opp dette arbeidet - gjennom programforslag, utredninger og rapporter som direkte og indirekte styrket helseopplysning som virkemiddel i det forebyggende arbeidet (WHO, 1974; Sosialdep., 1977-78; WHO, 1978; WHO, 1981a; Council of Europe, 1981; Sosialdep., 1981-82a).

Også forebygging av tannsykdom - inkludert tannhelseopplysning, ble omtalt i et eget dokumentet fra Verdens helseorganisasjon (WHO, 1970). I planarbeidet foran den nye Lov om tannhelsetjenesten er viktigheten av forebygging og helseopplysning fremhevet (Sosialdep., 1973-74; Sosialdep., 1982) noe som også klart gjenspeiles i selve lovteksten, der det offentlige bl.a. får ansvar for å organisere forebyggende tiltak for hele befolkningen (Sosialdep., 1982-83).

I slutten av 70-årene ble helseopplysning definert relativt snevert:

> "Health education: Any combination of learning opportunities and teaching activities designed to facilitate voluntary adaptions of behaviour conducive to health" (Green, 1979).

Helseopplysning fokuserer her på endring av individuelle egenskaper, f.eks. å forbedre kunnskaper om, forståelse for, holdninger til eller ferdigheter knyttet til risikoadferd. Denne strategien plasserer i stor grad ansvaret for samfunns- eller miljøskapte problemer hos enkeltindividet. Etterhvert ble man klar over at denne strategien hadde endel uheldige konsekvenser. Det viste seg at mange mennesker ble frustrert fordi de ikke greide å følge alle "reglene" - og helseinformasjonen ble av mange oppfattet som utidig mas (Aarø et al., 1982). Mye tydet også på at denne typen helseopplysning oppmuntret mere til ego omsorg enn til egenomsorg, at den virket sosialt skjevt og ga uttrykk for en "blaming the victim"-holdning (Hjort, 1981). Dessuten var det relativt få undersøkelser som kunne vise at denne strategien var effektiv (Gatherer et al., 1979).

Dette var situasjonen innenfor helse/tannhelsopplysning da det foreliggende arbeid ble igangsatt. I det etterfølgende brukes forøvrig helseopplysning i stor grad som en generell term, der tannhelseopplysning også inngår.

På slutten av 70-tallet var det mange innenfor forebyggende helsearbeid som mente at resten av helsevesenet hadde mye å lære av tannhelsetjenesten. Tannlegene hadde virkelig lykkes med å forebygge sykdom, ble det hevdet fra ulikt hold. Europarådet uttrykker seg, i en rapport fra et møte i Madrid i 1981, i rosende ordlag om resultatene av opplysningsvirksomheten innenfor tannpleien:

> "Preventive work in the dental sector enjoys a status entirely different from that in the health and medical organization at large. The favourable experience of the dental profession in health education and preventive care in these countries could surely, in various ways, stimulate and enrich thinking in other sectors." (Council of Europe, 1981).

Forklaringen på reduksjonen i karies i de vestlige industriland er nok likevel ikke så enkel. Løkken og Birkeland (1978) konkluderte f.eks. slik:

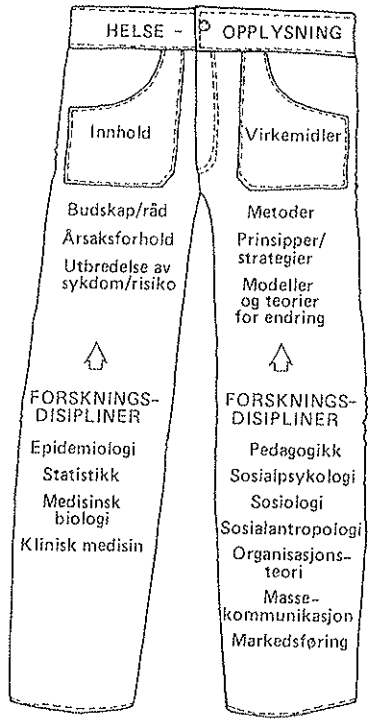
> "Better oral hygiene, less frequent in-between eating, more sucrosefree products, and an increasing number of dentists may also have contributed to the improvements. Fluoride, however, is likely to be the dominant contributor to the benefits."

Det som imidlertid er typisk for denne utviklingen, er at man ikke har forskning som kan si noe sikkert om hvorfor nedgangen er skjedd. Man har som regel satt igang tiltak uten at dette er gitt en forskningsmessig utforming og dermed liten mulighet for å evaluere.

Innenfor samfunnsodontologi i Norge og Norden har man de siste 15-20 år vært mest opptatt av epidemiologisk forskning - studiet av sykdommers fordeling og årsaksforhold i befolkningen. Undersøkelser av folks adferd har vært gjort som

ledd i å kartlegge risikofaktorer for ulike sykdommer, men adferd er sjelden brukt som avhengig variabel. F.eks. har det vært gjort få forsøk på å finne determinanter for ulike typer av tannhelseadferd og kartlegge hvilke forhold som får folk til å endre slik adferd. Helseopplysningsvirksomhet innenfor tannhelsesektoren har hovedsakelig bestått i praktiske forsøk på å bringe det budskapet forskerne har kommet frem til, ut til befolkningen. Mye forskningsressurser har vært satset på å komme frem til et faglig korrekt budskap, mens det å frembringe kunnskap om måten budskapet skulle formidles på har vært lite vektlagt.

Dette to-sidige fundament som all helseopplysning er bygget på, er illustrert i figur 2.



Mens det venstre benet ble viet relativt stor oppmerksomhet innenfor samfunnsmedisin og -odontologi på 1970- og begynnelsen av 1980-årene, hadde forskning vedrørende virkemidler, strategi og metode i det forebyggende arbeidet en svak stilling i disse årene.

Tiltross for at WHO allerede i 1969 og 1970 dokumenterte behov for helse- og tannhelseopplysningsforskning og foreslo en rekke forskningsfelt (WHO, 1969; WHO, 1970), ble ikke dette fulgt opp med praktiske prosjekter.

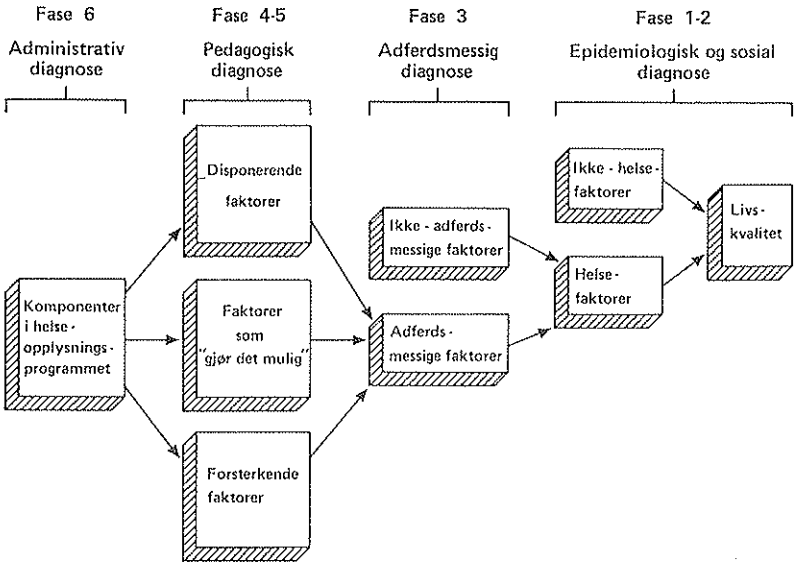
Da det foreliggende arbeid ble igansatt var det, som ovenfor beskrevet, nye politiske visjoner og vilje til å satse på helseopplysning og forebygging, men det var lite forskning som kunne vise hvordan dette arbeidet skulle utføres for å ha størst mulig effekt.
Tannhelseopplysningsforskning i Norge hadde ingen tradisjon, det fantes ikke noe forskningsmiljø som var skolert på dette feltet, og det var gjort svært lite forskning utover enkelte epidemiologiske studier - som inkluderte noen variable om tannhelseadferd.

Som illustrert i figur 2, må forskning på tannhelseopplysning ta utgangspunkt i empiri og teori fra forskning innenfor andre fagfelt - både i og utenfor odontologien, f.eks. tannhelseepidemiologi, pedagogikk, sosialpsykologi og kommunikasjonsforskning. Før man kan gå i gang med slik forskning (pkt. 6 nedenfor), må de forutgående 5 stegene i oversikten nedenfor være gjennomført:

1. Kartlegge utbredelsen og fordeling av tannsykdom.
2. Undersøke årsaksforhold.
3. Bestemme hva slags adferd som påvirker de kartlagte tannhelseproblemer, samt utbredelse og fordeling av disse vaner.
4. Undersøke hvilke bakenforliggende faktorer som predikerer de aktuelle vaner.

5. Bedømme hvilke av disse determinanter som er viktigst.
6. På bakgrunn av den empiri som er innhentet, og anerkjente teorier og modeller om påvirkning av adferd og adferds-determinanter, prøve ut praktiske tannhelseopplysnings - tiltak under kontrollerte betingelser.

Figur 3 gir en skissemessig oversikt over denne prosessen - fra høyre mot venstre.



(Etter Green et al., 1980)

De epidemiologiske undersøkelsene som ble foretatt i 60-, 70- og begynnelsen av 80-årene kartla sykdomsutbredelse og fordeling av tannsykdom i befolkningen (Heløe, 1974; Norheim, 1980; Holst, 1982; Rise, 1984; Bærum et al., 1984; Ambjørnsen, 1985). Punkt 2 og tildels 3, i oversikten ovenfor, var i stor grad gjennomført eller igangsatt i 1980, da mine undersøkelser startet.

I begynnelsen av 80-årene var man på mange måter kommet til et brytningspunkt, der andre forskningsoppgaver enn de som

hadde vært rådende, ble anbefalt. USA's National Institute of Dental Research la i 1983 fram en forskningsplan for 1985-89 - der de bl.a. oppsummerer retningslinjer for forskningen slik (NIDR, 1983):

"A greatly expanded research effort is needed to delineate how behavioral, social and cultural factors influence the causes and epidemiology of oral disease and conditions, and to understand and predict the behavioral and socio-cultural determinants of effective disease prevention, health promotion, and dental treatment. In pursuit of these goals, the following research objectives are important" (3 av de 9 målene er gjengitt):

Epidemiology

Determine how behavioral, social and cultural factors relate to the incidence, prevalence and distribution of oral diseases and conditions.

Improvements in the sensitivity and reliability of socio-behavioral measures of disease as well as predictors of risk are needed to provide a foundation for progress.

Prevention

Identify the factors determining whether and how individual oral health-promoting behaviors are learned from early childhood to old age.

It will also be important to identify factors influencing long-term maintenance of oral disease-preventing behaviors. Various behavioral interventions designed to increase effective self-care practices should be developed and evaluated (e.g., mass media approaches, programs based at specific locales such as workplaces or schools).

Dental utilization and treatment

Identify the predictors and determinants of utilization of services.

The prevalence and characteristics of dental anxiety and associated behaviors of utilizers and non-utilizers of

dental services should be determined. Health-promoting utilization patterns should be enhanced. The effect of such patterns on oral health status is an essential part of this research.

De foreliggende arbeid tar sikte på å belyse noen av disse problemstillingene og bygger på den empiri man hadde om tannsykdommenes utbredelse, fordeling og årsaksforhold rundt 1980. (Se f.eks. Frandsen (ed), 1982).

Et annet utgangspunkt for mine undersøkelser, var erkjennelsen av at kariesproblemet var sterkt redusert i løpet av de siste 10 årene, i det minste i den yngre del av befolkningen. Det var derfor naturlig å fokusere på tannkjøttsykdommene - gingivitt og periodontitt.

To andre forutsetninger er også gjort i denne studien. For det første at gingivitt er en tannkjøttsykdom som kan forårsake periodontitt og senere festetap - og for det andre at det er en årsakssammenheng mellom dårlig tannhygiene og gingivitt/periodontitt.

I de senere år har det vært en del diskusjon om sammenhengen mellom gingivitt og periodontitt. Et sitat av professor Harald Løe - en betydelig forsker på dette området gjennom de siste 20 år - vil være klargjørende. Etter en state-of-the-science workshop i Bethesda, Maryland i februar 1985, konkluderer han slik:

"Gingivitis is defined as the initial lesion in periodontal disease. This initial lesion is characterized by the presence of inflammatory cells, dissolution of the connective tissue, and certain alterations in the epithelium". "Other tissues become involved in the progression from gingivitis to periodontitis, but these events are secondary to the inflammatory responses taking place in the soft tissues. I think this is a very important feature of the pathology of periodontal disease, especially as we try to understand the continuum from gingivitis to periodontitis. Gingivitis is a prerequisite

> for the development of periodontitis. So, when somebody says that a little gingivitis may be good, my question is "How little ?" or "How much ?"
> Not all gingivitis proceeds to periodontitis. That is common knowledge. It is also common knowledge that at this time we have no way of predicting whether or not a superficial inflammatory lesion will progress to an advanced lesion. However, I believe that we have enough information to state that if we have periodontitis, it has been preceded by gingivitis. This is an important doctrine in itself. It also forms the basis for the prevention of periodontal diseases. At present, the prevention of gingivitis is prevention of advanced periodontal disease, and the main preventive measure remains plaque control. Study after study of oral hygiene practices has confirmed that plaque control constitutes an effective measure for the prevention of periodontal destruction, and that toothbrushing is the preferred method" (Løe & Kleinman, 1986).

De seneste oversiktsartikler innenfor dette området støtter Løe's konklusjon fra 1985 - f.eks. rapporten fra konferansen om "Clinical trials in periodontal diseases" (J. Clin. Periodontol, 1986) og rapporten fra konferansen "Periodontology Today" (Guggenheim (ed), 1988).

Selvom Burt (1988) i et foredrag på den siste konferansen slår fast at: "Most gingivitis does not progress to periodontitis", blir det på samme konferanse igjen poengtert at det er en sterk sammenheng mellom disse to tilstandene. Ainamo (1988) understreker f.eks. viktigheten av å oppdage og forebygge gingivitt i tidlig alder - også ut fra andre hensyn enn en eventuell utvikling til periodontitt:

> "From a health services point of view it would seem "important" to outline and try to reduce the amounts of gingival bleeding, suppuration from periodontal pockets, bad taste in the mouth and fear of bad breath which certainly, for patient comfort, are important in many countries. In addition, achievement of a general improvement in periodontal health at young age, of which there

already exists some evidence, would seem like the most logical and promising approch to the prevention of loss of tooth attachment in the future".

3.3 Problemstillinger

Epidemiologiske data om tannsykdom, utbredelse, fordeling og årsaksforhold, samt viten om ulike teorier for adferdsendring, dannet basis for de problemstillinger de foreliggende arbeider tok sikte på å finne svar på:

1) Hvordan fordeler de ulike tannhelsevaner seg i befolkningen, hvordan er sammenhengen mellom dem, og hvordan korrelerer de med andre helsevaner?

2) Hvilke prediktorer for tannhelseadferd er sterkest, og hvilke av disse er det mulig å påvirke gjennom opplysningsvirksomhet?

3) Finnes det noen teorier eller modeller for adferdsendring som fungerer bedre enn andre i en tannhelseopplysningssammenheng?

4) Hvordan når man frem til de grupper som har høyest risiko for tannsykdom og dårligst tannhelse?

5) Hva fremmer/hemmer effekten av ulike tannhelseopplysningstiltak overfor ulike målgrupper?

4. OVERSIKT OVER ARBEIDENE. MATERIALE, METODE, RESULTATER OG HOVEDKONKLUSJONER

For å finne svar på problemstillingene, ble 7 ulike datasett analysert. Beskrivelsen av arbeidene er delt i to: En deskriptiv del som beskriver artikkel I og II - og en intervensjonsdel som beskriver artikkel III til VI.

4.1 Deskriptiv del

4.1.1 Utbredelse og fordeling av forskjellige tannhelsevaner og deres sammenheng med ulike demografiske, sosiale, personlige og adferdsrelaterte faktorer

Artikkel I og II forsøker å belyse problemstilling 1 og 2 ovenfor - og er basert på intervjudata av 1511 personer i alderen 16-79 år innsamlet av Statistisk Sentralbyrå i 1979/80. Det er en tverrsnittsundersøkelse av ulike typer tannhelseadferd (bruk av tannbørste, -tråd og -stikker, fluor i ulike former og tannlegebesøk), andre helsevaner (røyking, kosthold, alkoholbruk, bilbeltebruk og fysisk aktivitet) - samt variable som har sammenheng med adferd. I tillegg ble demografiske og sosioøkonomiske opplysninger innhentet.

Artikkel I omhandler utbredelse og sammenheng mellom ulike tannhelsevaner - og mellom tannhelsevaner og andre helsevaner. Flere kvinner enn menn rapporterte gunstige tannhelsevaner. Årlig tannlegebesøk var den tannhelsevanen som i sterkest grad korrelerte med de andre tannhelsevanene. Bruk av tannstikker syntes på den annen side å være mer uavhengig av det øvrige vanemønster.

Personer i den yngste aldersgruppen, de som var i gruppen med lengst utdanning og høyest inntekt, hadde best tannhelsevaner - når de ulike adferdskomponenter ble slått sammen i en additiv index. Henholdsvis 18.1% og 18.7% av variansen i tannhelseadferd for menn og kvinner ble forklart ved seks bakgrunnsvariable.

Sammenhengen mellom tannhelsevaner og andre helsevaner viste seg å være svak. Ingen sammenheng ble f.eks. funnet mellom den enkeltes forsøk på å redusere sukkerkonsumet og positiv tannhelseadferd.
Vi fant imidlertid en positiv sammenheng mellom regelmessig fysisk aktivitet og tannhelseadferd - noe sterkere for menn enn for kvinner. Artikkelen konkluderer med at kvinner og menn trolig tilhører ulike "helsekulturer" - og at enkelte helsevaner utføres pga. andre motiv enn for å oppnå bedre helse. Man reduserer sukkerkonsumet for å bli slank - eller bruker tannstikker for å fjerne irriterende matrester mellom tennene.
I artikkel II blir den tannhelsevanen som viste sterkest sammenheng med øvrig tannhelseadferd - nemlig regelmessig/uregelmessig bruk av tannhelsetjenester - analysert i mer detalj. Artikkelen ser på hvilke faktorer som påvirker bruk av tannhelsetjenester, og drøfter spesielt hva som karakteriserer de irregulære brukerne. Både disponerende faktorer (f.eks. kjønn, sivil status, alder, utdanning, yrkeskategori, kunnskap) og forsterkende faktorer (f.eks. sosialt nettverk, kommunikasjon om helse) er med som forklaringsvariable i analysene. Det legges forøvrig vekt på å finne frem til faktorer som det vil være mulig å påvirke ved hjelp av helseopplysning.

Etter at tannløse individer var ekskludert, rapporterte 17.4% av kvinnene og 21.7% av mennene at de ikke gikk årlig til tannlege. I en multivariat analyse - som justerte for betydningen av de øvrige demografiske og sosioøkonomiske variablene - viste det seg å være flest irregulære brukere blant de eldste, blant dem med kort utdanning og lav inntekt. (Et unntak var de med aller lavest inntekt, der det sannsynligvis befinner seg en del studenter).

I en korrelasjonsanalyse - der de ovenfor nevnte bakgrunnsvariable ikke var med - viste følgende faktorer en signifikant ($p < 0.05$) positiv sammenheng med uregelmessig bruk av tannhelsetjenester:
1) uregelmessig eller ingen bruk av fluorider, 2) ikke daglig interdentalt renhold, 3) negativ holdning til helse/tannhelse, 4) svakt sosialt nettverk, 5) lite helsekunnskap og 6) lav helsemessig kontrollplassering (HLC) (=liten tro på egen evne til å gjøre noe for å forhindre sykdom). Av de faktorene som kan påvirkes gjennom helseopplysning var det bruk av interdentale hjelpemidler, bruk av fluorider, sosialt nettverk og holdning (gjaldt bare kvinner), som diskriminerte sterkest mellom regelmessige og uregelmessige tannlegesøkere.
En av problemstillingene for dette arbeidet var å forsøke å finne ut noe mer om bakgrunnen for den store sosiale gradient i tannhelseadferd - f.eks. bruk av tannhelsetjenester - og belyse forhold som kunne forklare denne forskjellen.
I art.II ble det derfor ved hjelp av multivariate analyser undersøkt hvor mye mer vi kunne forklare i variasjonen i bruk av tannhelsetjenester ved først å kjøre en analyse med bare de demografiske og sosioøkonomiske variablene inne, deretter en analyse hvor bare de personlige faktorene og adferds-indexene var inne - og sammenligne disse to analysene med en analyse der de personlige faktorene og adferds-indexene først ble lagt inn - deretter de demografiske og sosioøkonomiske.

Oversikten nedenfor viser at demografiske/sosioøkonomiske variable bare i liten grad økte forklaringen av variasjonen i bruk av tannhelsetjenester når man sammenligner med hva de personlige variablene og adferds-indexene forklarte alene.

	Forklart varians	
	Menn	Kvinner
Demografiske/sosioøkonimiske variable (alder, utdanning, inntekt, yrkeskategori, sivilstatus)	0.13	0.15
Personlige variable/adferds-indexer (bruk av fluor, interdentalt renhold, kommunikasjon, holdning, kunnskap, HLC, sosialt nettverk - samt alder)	0.13	0.24
Personlige variable/adferds-indexer først introdusert i analysen - deretter demografiske/sosioøkonomiske	0.17	0.27

Utfra det kjennskap vi idag har til karakteristika ved irregulære brukere av tannhelsetjenesten, burde det være mulig å nå denne gruppen med selektive tilbud og programmer med sikte på å bedre deres tannhelse.

4.2 Intervensjonsdel

4.2.1 Effekt av to ulike skolebaserte tannhelseopplysnings-programmer

Artikkel III og IV vurderer effekten av to ulike skolebaserte tannhelseopplysningsprogram sammenlignet med en referansegruppe.
Den årlige Tannvernuka som tilbys som en egen tannhelseopplysningspakke til alle landets skoler hvert år, ble evaluert høsten 1981. Samtidig ble et alternativt undervisningsopplegg prøvet ut - basert på utvalgte prinsipper fra sosial læringsteori, samt aktiv elevdeltakelse og involvering av foreldre.

Analysene ble basert på data innhentet gjennom kliniske undersøkelser av gingivalstatus blant skolebarn og data innsamlet ved hjelp av spørreskjema til barna og til lærerne. Undersøkelsen ble foretatt blant 1167 15-åringer fordelt på 15 skoler i 5 ulike kommuner. Endepunktene som ble målt var kunnskap, motivasjon, "self-efficacy", (selv-vurdert evne til å forebygge tannsykdom), kommunikasjon i nærmiljøet, mediaeksposisjon, holdning, adferd og gingival helse.

Tannkjøttet ble klinisk undersøkt ved hjelp av Non-Bleeding Papillae System 3 uker før og 3 uker etter Tannvernuka. Elevene fylte ut spørreskjemaet 3 uker etter avsluttet undervisning og lærerne ble tilskrevet vel et år etter undersøkelsen. På bakgrunn av lærernes opplysninger om de fulgte det oppsatte program eller ikke, ble de 3 gruppene noe omgruppert, slik at den virkelige effekten av programmet skulle komme frem.

Som det fremgår av artikkel III - som belyser problem-stillingene 3,4 og 5 (s. 16), viste det tradisjonelle undervisningsprogrammet ingen effekt mht. bedring av skolebarns tannkjøttforhold. Etter justering for sosialstatus, kjønn og gingival-score før Tannvernuka startet, var det en signifikant ($p < 0.05$) forskjell mellom programmene, i favør av det mest omfattende. Dette undervisningsprogrammet, med mer deltaker-aktivitet og diskusjon, viste størst effekt blant dem som hadde dårligst utgangspunkt. I dette programmet var det spesielt jenter - og ungdom som hadde planer om å gå på yrkesskole, som kom best ut, etter at det var justert for den initiale gingivale status.

Begge de to eksperimentgruppene og referansegruppen viste en signifikant ($p < 0.05$) forbedring i gingival-forholdene fra første til siste undersøkelse. Program-met med mest deltakeraktivitet så ut til å nå grupper

vi vanligvis ikke når med tradisjonell faktaorientert helseopplysning.

Av artikkel IV som belyser problemstilling 2, 3 og 5 (s. 16), går det frem at de elevene som gjennomgikk det mest omfattende programmet, hadde signifikant bedre kunnskap om tannkjøttbetennelse, de hadde et klarere gingivitt-forebyggende motiv for tannrengjøring, og de trodde i større grad at de selv kunne forebygge tannkjøttsykdom (self-efficacy) - i forhold til referansegruppen. Elevene i dette programmet hadde også en mer positiv holdning til Tannvernuka enn elevene som hadde fulgt den tradisjonelle Tannvernuka. Den første gruppen rapporterte også i større grad enn den siste, å ha blitt mer nøye med tannbørstingen i løpet av den siste måneden. Det var imidlertid ingen forskjell mellom gruppene mht. bedring i bruk av tanntråd og/eller tannstikker.

Det som betydde mest for om ungdommene hadde god tannhelseadferd, var kommunikasjon om tannhelse med foreldre/venner om tannhelse i løpet av de siste 2 månedene før etterundersøkelsen. Det som deretter betydde mest blant guttene var det å ha hørt om tannhelse i radio/TV i løpet av de siste 2 månedene, samt utdanningsambisjon - dvs. det å ha planer om videre skolegang. Den nest viktigste faktor blant jentene var en positiv holdning til tenner og tannhelse. De andre faktorene som var med i regresjonsanalysen - bl.a. kunnskap og andre sosioøkonomiske variable - var ikke signifikant på 5% nivå.

Siden kunnskap ikke ser ut til å være noen viktig faktor når det gjelder ungdoms tannhelseadferd, vil det trolig være viktigere i fremtiden å satse på tiltak som stimulerer aktivitet, deltakelse og kommunikasjon, enn å fortsette med tradisjonell faktainformasjon.

4.2.2 Effekten av en landsomfattende tannhelseopplysnings-kampanje overfor tannleger og publikum

Artikkel V og VI vurderer effekten av en landsomfattende kampanje mot tannkjøttbetennelse som ble arrangert i 1980/81 i et samarbeid mellom Den norske tannlegeforening (NTF), Helsedirektoratet og Norsk Tannvern. Kampanjen var lagt opp i to faser. Den første delen av det såkalte "Perio-året" gikk ut på å skolere tannlegene gjennom kursvirksomhet, tilsendt materiell etc. (art. V). Den andre delen var lagt opp som en massemedia-kampanje rettet mot publikum (art. VI).

Datagrunnlaget for artikkel V, som begrenser seg til å belyse deler av problemstilling 4 og 5 (s. 16), er innhentet via en enquete til et tilfeldig utvalg av landets tannleger (n=280). Utvalget ble i desember 1981 bl.a. spurt om de hadde engasjert seg i noen av tilbudene i forbindelse med Perio-året (lest artikler, gått på kurs, vært oppmerksom på massemedia-kampanjen). I tillegg til en del bakgrunnsopplysninger ble de også spurt om de hadde endret noen vesentlige rutiner mht. diagnose/behandling av pasienter med periodontitt - samt forelagt et 10-punkts holdnings-skjema. Av de 71.8% av tannlegene som svarte på under-søkelsen var nesten alle oppmerksom på massemedia-delen av kampanjen, og over 90% hadde lest artikler om emnet i ulike tidsskrifter. Et overveiende flertall var positive til NTF's engasjement i en slik kampanje og 49% hadde deltatt på etterutdanningskurs i perio-dontitt-profylakse/diagnose/behandling. Spesielt gjaldt dette tannleger i aldersgruppen 36-55 år.

53% av tannlegene hadde endret en eller flere praksis-rutiner. De som i størst grad hadde gjort endringer var de som hadde gått på kurs, de over 35 år, de som praktiserte i spredtbygd strøk, og de som hadde en positiv holdning til NTF generelt og til kampanjen

spesielt.
Kampanjens første del blir betegnet som relativt vellykket basert på resultatene fra denne evalueringen.
Tannlegene er trolig blitt påvirket gjennom flere kanaler - via NTF, massemedia og gjennom direkte pasientforespørseler.

Å få flere tannleger til å ta etterutdanningskurs, vil trolig være en måte å bedre praksis på både mht. forebygging, diagnose og behandling av de ulike tannsykdommene. Å skolere tannlegene mht. tannhelseopplysning vil også være en effektiv måte å nå publikum på, da 83% av den norske befolkning med egne tenner, går til tannlege minst en gang i året (art. I).

Artikkel VI belyser problemstillingene 3, 4 og 5 (s. 16), men ser også på utviklingen av determinanter for tannhelseadferd over tid (problemstilling 2). Datagrunnlaget i denne artikkelen, som omhandler publikumsdelen av Perioåret, er basert på 4 intervjuundersøkelser gjennomført av Norges Markedsdata i 1981 (n=1376) - som var før massemedia-delen av Perio-året startet - og 3 etterfølgende undersøkelser i 1982 (n=1410), 1983 (n=1410) og 1985 (n=1340).

Oppmerksomheten omkring tannkjøttssykdom og profylakse steg i forbindelse med Perio-året. Kunnskapen om "perio-profylakse" økte også signifikant ($p < 0.05$), men bare vel 1/5 av de spurte gjenkjente "logoen" eller gjennomgangsfiguren for kampanjen - som f.eks. var gjengitt på førstesiden av den spesielle brosjyren som ble laget til Perio-året. Generelt var holdningen til tannhelsekampanjen positiv - og folk følte ikke at de ble "overdynget" med tannhelseinformasjon. Ingen endring i tannhelsevaner (regelmessig besøk, daglig bruk av tannstikker, tanntråd og /eller fluorider) kunne føres tilbake til Perio-året.
Imidlertid var det en positiv utvikling i alle disse

adferdsvariablene i perioden 1981-85. (Utviklingen i menns bruk av tanntråd og tannsikker var ikke signifikant ($p > 0.05$) i denne perioden). Det var gjennomgående flere i gruppen med god kunnskap om "perioprofylakse" som gikk årlig til tannlege, sammenlignet med gruppen med dårlig kunnskap. Det som betydde mest for god tannhelseadferd (additiv index), var god kunnskap om forebyggelse av tannkjøttbetennelse. Det å være kvinne og bo i tettbygd strøk hadde også en positiv betydning ($p < 0.05$).
Både mht. oppmerksomhet, kunnskap og de ulike adferdsvariablene var det flere kvinner enn menn med positiv respons. Denne undersøkelsen støtter tidligere studier som viser at økt kunnskap ikke nødvendigvis fører til endringer i adferd, selvom kunnskap er en viktig determinant. Fordi Perio-året hovedsakelig ble konsentrert om informasjon gjennom aviser - og i noe mindre grad TV, radio og ukeblader, er det ikke overraskende at man bare fikk effekt mht. oppmerksomhet og kunnskap.

Noen av årsakene til den begrensede effekten av kampanjen var trolig manglende kunnskap om og definering av målgruppen på forhånd, ingen pretesting av budskapet, manglende eksperthjelp i planleggingen og ingen klart definert målsetting. I tillegg besto budskapet av flere tannhelseråd (de 5 tannvettreglene), mens tidligere studier tyder på at man bør begrense antall budskap som blir presentert.

5. GENERELL DISKUSJON

Som nevnt i innledningen var det en gryende vilje til aktiv og positiv satsing på helseopplysning som virkemiddel i det forebyggende arbeidet i slutten av 1970- og begynnelsen av 1980-årene.
Etterhvert ble imidlertid bevisstheten omkring de uheldige sidene ved den ensidige og endimensjonale måten å drive helseopplysning på så sterke, at man lanserte et nytt begrep istedenfor "Health

education" - nemlig "Health promotion". Dette nye begrepet siktet ikke bare inn mot individuelle ferdigheter, men også mot miljøforhold og samfunnsforhold - slik som lovgivning, avgifter og helsefremmende tiltak i lokalsamfunnet. Blant de første definisjonene av dette begrepet finner vi Green's fra 1979:

> "Health promotion: Organizational, political, and economic interventions designed to facilitate behavioural and environmental adaptations that will improve or protect health" (Green, 1979).

"Health promotion" er langt mer politisk og miljøorientert enn "Health education", men sistnevnte strategi inngår som en viktig del av helsefremmende arbeid, som man har valgt å kalle "Health promotion" i Norge. Helsefremmende arbeid tar sikte på å gjøre noe med de underliggende årsaker til helseproblemer, dvs. å angripe strukturelle forhold. Det betyr bl.a. at man i samfunnsplanlegning tar større hensyn til helse. Nutbeam (1986) uttrykker det slik: "Health promotion is the process of enabling individuals and communities to increase control over the determinants of health and thereby improve their health". Helsefremming betyr dermed at befolkningen kommer sterkere med i definisjon av problemer, i planlegning, gjennomføring og evaluering av tiltak. Det betyr også at man aktivt skal fremme et støttende, sosialt miljø - og at psykososiale forholds betydning for helsen blir mer sentrale (WHO, 1986).

I dette arbeidet blir helseopplysning brukt generelt - uten at det nødvendigvis alltid betyr den relativt snevre betydningen av ordet. F.eks. er ideen bak og strategien for det mest sammensatte Tannvernuke-programmet nettopp i tråd med flere av prinsippene bak "Health promotion".

Denne erkjennelsen av helseopplysning som noe mer enn individrettet informasjon fra en autoritet med kunnskap til en passiv uvitende mottaker, finnes igjen i flere av verdens helseorganisasjons ekspertrapporter (WHO, 1982, WHO, 1983; WHO/SHEG, 1984), diskusjonsnotater (WHO-EURO, 1984) og internationale strategidokumnter (WHO, 1986; WHO, 1988). Også nasjonalt har dette syn etterhvert kommet til uttrykk i Stortingsmeldinger (Sosialdep.,

1987-88a), utredninger (Sosialdep., 1983; Sosialdep., 1984), lovforslag (Sosialdep., 1981-82b; Sosialdep., 1986-87, Sosialdep., 1987-88b) og gjennom konkrete forslag til planer og tiltak (Aalvik et al., 1982; Helsedir., 1987a).

Også innenfor tannhelsesektoren har et mer aktivt og positivt syn på helseopplysning kommet til uttrykk i ulike dokumenter (WHO, 1984; Sosialdep., 1982-83; Helsedir., 1987b).

Men tiltross for de senere års sterke fokusering på viktigheten av å satse mer på den type forebyggende arbeid og helseopplysning som her er beskrevet, har det vært drevet lite forskning omkring helsefremming - inkludert helseadferd, livstil og helseopplysning i Norge. Vi står i dag - pga. myndighetenes positive vilje til å satse på forebygging - i fare for å sette igang en rekke tiltak, uten at vi har tilstrekkelig viten om f.eks:
Hvordan vi kan påvirke helserelaterte vaner for å bedre folks helse på kort og lang sikt, hvilke metoder som virker overfor hvilke grupper, hvordan vi kan bevisstgjøre befolkningen om miljøforhold som har sammenheng med helse, hvordan vi kan mobilisere folk til aktiv deltakelse og innsats for egen helse - og hva det nære miljøet har å si for folks helsevaner?
For å bruke et bilde: Vi står i fare for å bygge et hus der store deler av grunnmuren mangler.
De siste par årene har imidlertid forskningsmiljøene og myndighetene blitt klar over dette problemet. Epidemiologisk forskning - det venstre benet i figur 2 - har fått sitt eget forskningsprogram (NAVF/RMF & RSF, 1986), mens forskning vedrørende virkemidler i forebyggende og helsefremmende arbeid - det høyre benet i figur 2 - er utredet (Rimpelä, 1987), foreslått (NAVF, 1987) og vedtatt satt igang (NAVF/HEMIL, 1988). De politiske myndigheter har også det siste året understreket viktigheten av denne type forskning (Sosialdep. 1987-88a; Helsedir. 1988).

Grunnen til den svake stilling helseopplysnings- og helseadferdsforskningen har hatt og har i Norge, er trolig flere. En grunn er at denne type forskning er vanskelig, den stiller store krav til presisjon både mht. utforming og gjennomføring - og den krever god kunnskap om relevante analysemetoder.

Det stilles større krav til denne type forskning, enn til tradisjonell epidemiologisk forskning - spesielt fordi man står overfor fenomener som er svært vanskelig å måle. Å måle blodtrykk, med de mange målefeil som det impliserer, kan være komplisert nok. Men å få et eksakt, reliabelt og valid mål på noen av de endepunkter som brukes i helseopplysningsforskning, f.eks. kunnskap, holdning, motivasjon, oppfatning av egen evne til å forebygge sykdom, intensjon om vaneendring, samt mellommenneskelige forhold som kommunikasjon og sosialt nettverk - er meget komplisert. Selv måling av helsevaner kan være vanskelig nok, med de problemer vi kjenner til mht. ulike "response-sets" ved spørreskjema og intervju-undersøkelser - f.eks. "carelessness", "social desirability", "acquiescence (yea-saying)" og "extremity of response" (Topf, 1986).
Vi må imidlertid ikke resignere overfor de store måle- og metodeproblemene innenfor helseopplysning - og helseadferdsforskning. Vi må prøve å komme videre, selv om det ikke finnes enkle løsninger.

Denne type forskning er også svært ressurs- og tidkrevende, noe som bidrar til at forskere kvier seg for å sette igang slike prosjekter. På grunn av de mange tilfeldige målefeil i slik forskning, må man ha store grupper og intervensjoner som går over lang tid, for å oppdage effekter. For å illustrere dette kan nevnes at det kjente intervensjonsprosjektet i Nord-Karelen i Finland kostet over 10 mill. norske kr. (WHO, 1981b), og at Minnesota Heart Health Program pt. sysselsetter 18 vitenskapelig ansatte, 24 i teknisk/administrative stillinger og i tillegg har 64 i hel - eller deltids-arbeid (Blackburn et al., 1984).
Et annet forhold som har vært medvirkende til den korte tradisjon norsk helseopplysnings- og helseadferdsforskning har, er trolig problemet som er illustrert i figur 2. Denne type forskning kan ikke bli god uten at man benytter kunnskap fra såvel medisinske som fra samfunnsvitenskapelige fagfelt. I motsetning til i England og USA - der man i mange år har hatt Schools of Public Health - med egne "Divisions of Health Education and Behavioral Sciences", har vi i Norge først i de aller siste årene kommet i gang med slike utdanningstilbud, som gir studentene innblikk i

helseadferdsteori - og i ulike forskningsprosjekter innenfor helseopplysning. Det er derfor håp om at man i årene fremover vil få en ekspansjon innenfor forskning på dette feltet.

Forenklet kan man si at forskning om virkemidler i det forebyggende og helsefremmende arbeid kan deles i 3 (Aarø, 1988a):

1) Beskrivende undersøkelser (f.eks. undersøkelser av tannhelsevaner blant barn eller undersøkelser av adferdsendringer over tid i spesielle kohorter eller deler av befolkningen) som særlig tar sikte på å vise en tilstand, vurdere omfanget av et problem eller identifisere målgrupper.

2) Analytiske undersøkelser som særlig forsøker å forklare et fenomen (f.eks. hvilke miljøfaktorer og personlige karakteristika som får noen barn og unge til å begynne å spise mye slikkerier, mens andre nesten ikke spiser noe). Hensikten med denne type studier er å identifisere prediktorer, skaffe kunnskap om de prosesser som fører til en spesiell helseadferd - og å identifisere nøkkeldeterminanter i slike prosesser.

3) Evalueringsundersøkelser, ofte basert på eksperimentell design, der en prøver å si noe om effekter av tiltak og materiell. Slike tiltak kan også være lover, prisendringer, markedsføring eller utbyggning av friluftsområder.

I sin doktoravhandling "Health behaviour and socioeconomic status" skiller Aarø mellom livsstilforskning, helsefremmende forskning og helseopplysningsforskning (Aarø, 1986):

"Lifestyle research includes research where lifestyle is an important element, particularly when the purpose is to describe, predict and explain how the lifestyles of individuals or of specific social groups develop and change. Health promotion research is research on actions intended to change aspects of lifestyle or environment relevant to health, including research on the effect of such actions. Health education research is limited to studies of actions where information or education plays an important role, or

studies of the aspects of health promotion activities relating to education or information".

Mitt arbeid kan vanskelig avgrenses i henhold til disse definisjonene, men vil vesentlig belyse tannhelseproblemstillinger innenfor den første og den siste kategorien.

I art.I beskrives utbredelsen av ulike tannhelsevaner, sammenhengen mellom disse og sammenhengen mellom tannhelsevaner og enkelte helsevaner. Art. II analyserer mer dyptgående den tannhelsevanen som viste seg å korrelere sterkest med de øvrige tannhelsevanene - nemlig bruk av tannhelsetjenester. Spesielt ble det i denne artikkelen lagt vekt på å finne determinanter for bruk av tannhelsetjenester som kunne påvirkes gjennom helseopplysning. Art. III - VI går et skritt videre - nemlig ved å prøve ut strategier for påvirkning av tannhelseadferd - og faktorer relatert til adferd, først i et skoleprosjekt (art. III og IV) og senere i en masse-mediakampanje - der tannlegene var en indirekte målgruppe (art. V og VI).

Diskusjonen er delt opp i 4 deler - en generell del om materiale og metode og 3 deler som diskuterer noen spesielle og gjennomgående hovedfunn fra artiklene - nemlig skolebasert tannhelseopplysning, forholdet mellom kvinner og menns tannhelsevaner og faktorer relatert til vaner - og til slutt forholdet mellom tannhelsekunnkap, -holdning og -adferd.

5.1 Materiale og metode

I sin helhet bygger arbeidet på 7 ulike datasett. Arbeidet med å utforme undersøkelsene, samle og tilrettelegge data og analysere materialene har vært krevende og utfordrende - og har gitt mulighet til å prøve ut en rekke analyseteknikker. Dette må sies å være en vesentlig styrke ved arbeidet. Det ville på alle måter vært enklere å ha hatt ett hovedmateriale å forholde seg til, men det ville ikke gitt muligheter til å prøve ut ulike måter å samle inn data på eller gitt innblikk i både surveymetoder - og feltstudier/ eksperimenter.

5.1.1 Utvalg - generaliserbarhet

Når det gjelder datamaterialet som ble brukt som basis for artikkel I og II var dette en del av en større

helseopplysningsundersøkelse. Datainnsamlingen ble foretatt av Statistisk Sentralbyrå - og samplingprosedyren er beskrevet i detalj andre steder (Statistisk Sentralbyrå, 1977). Den prosedyren som følges av byrået gir økt trygghet for at både totalutvalget og undergruppene kan analyseres med antakelse om statistisk representativitet. Aarø (1986) baserer sin avhandling på dette datasettet og konkluderer med at frafallet (non-responders) ikke avviker i særlig grad fra dem som har besvart intervju-undersøkelsen (Response rate 76%). Han baserer bl.a. denne konklusjonen på en annen undersøkelse - foretatt på samme tidspunkt - og som ga nøyaktig samme prosentandel daglig røykere. Han sier videre:

> "The main reason for the good correspondence, is probably due to the manner of occurrence of non-response. The non-responders are usually not persons who refuse to participate in the study. They are simply difficult to find at home at the time of the data collection. Persons who are difficult to reach at a certain time, may not necessarily have a lifestyle which differs from the lifestyle of the general population".

Det er viktig å unngå systematiske feil som kan forårsakes av en høy non-respons rate, når man er opptatt av eksakte estimater av forekomst av ulike helsevaner, mens det er mindre viktig hvis man er opptatt av sammenhenger mellom variable - slik vi i stor grad var i de to første artiklene. Slike sammenhenger er mere robuste overfor mulige feil forårsaket av non-responders.

I Tannvernuke-studien (art. III og IV) - var utvalget av skoler ikke tilfeldig, men basert på kontakter med interesserte overtannleger. Skolene ble derimot randomisert til de to eksperimentgruppene.
Senere ble det imidlertid foretatt en omgruppering av enkelte klasser slik at elevene ble

plassert i det program de virkelig hadde mottatt. Denne omgrupperingen ble foretatt på bakgrunn av opplysninger som fremkom gjennom intervjuer med overtannlegene og spørreskjemaundersøkelse til lærerne. 126 elever ble også ekskludert på grunn av manglende opplysninger vedrørende hvilken gruppe de virkelig hadde tilhørt. Studien kan dermed ikke sies å være et randomisert forsøk.
Oppslutningen var meget høy blant 15-åringene i de utplukkede skolene (91% - etter omgruppering 81%) - noe som er fordelen med å utføre undersøkelser på skolen - med innlevering av det utfylte spørreskjemaet i klasserommet.
Studien må sees på som et eksplorativt arbeid - for å prøve ut en alternativ strategi for tannhelseopplysning i skolen.

Fordi randomiseringen i denne studien er brutt, er det naturlig å bruke dette materialet til å gå litt nærmere inn på diskusjonen vedrørende generaliserbarhet. Green & Lewis (1986) bruker begrepene intern og ekstern validitet i relasjon til evalueringens design - og definerer disse begrepene slik:

> "The term external validity refers to the assurance that the results obtained from an evaluation can be expected to apply anywhere else under typical conditions".
> "The term internal validity refers to the assurance that the results obtained from an evaluation can be attributed to the intervention being evaluated".

Validitet i denne sammenheng må ikke blandes med validitet mht. måling av ulike fenomener som vil bli diskutert under pkt. 5.1.2.

Når det gjelder diskusjonen om validitet i forbindelse med evalueringen av Tannvernuka, vil jeg dele den i to - trusler mot den eksterne og den interne validitet.

Ekstern validitet

Hvilke faktorer kan ha medvirket til at resultatene fra denne studien eventuelt ikke kan overføres til andre skoler og skoleklasser i andre deler av landet? Punktene nedenfor er hentet fra Green og Lewis (1986).

1. Testeffekten - eller Hawthorne-effekten - var nok til stede, noe som er diskutert i art. III, men er neppe av vesentlig betydning for resultatet.

2. Effekten av sosialt ønskverdig svar.
Dette problemet er trolig mindre i denne undersøkelsen enn i mange andre med mer "følsomme" data, selv om den ikke helt kan utelukkes da navn ble påført for å kunne koble opplysningene til den kliniske undersøkelsen. Det kan f.eks. hende at noen av dem som svarte at de var blitt mer nøye med tannbørsting,tanntråd/tann-stikker osv. enn før, svarte dette fordi de visste at undersøkerne ønsket det (at det var "riktig" å bli mer nøye med tannhygienen). Et slikt svarmønster kan være en av forklaringene på den svake sammenhengen som ble funnet mellom bedrede tannhelsevaner og bedret gingival helse. Korrelasjonskoeffisienten mellom endrede interdentale vaner og endret gingivital helse var 0.05 for alle gruppene samlet, men ikke statistisk signifikant i noen gruppe da hver gruppe ble analysert for seg. Dette resultatet kan også tyde på en noe lav nøyaktighet når det gjelder spørsmålet om elevene var "mer nøye med å passe på tennene nå i høst enn før".

3. Placebo effekt.
Dette er neppe noe alvorlig problem i denne studien.

4. Pygmalion effekten - også kalt Rosenthal-effekten (Rosenthal, 1964).
"The Pygmalion effect has been defined as the belief that if one expects something to happen strongly enough, it can and will happen. (Green & Lewis, 1986)."

Dette er neppe en aktuell trussel - fordi hverken elever, lærere eller foreldre var klar over forsøkets utforming - og fikk ikke vite resultatene etter første undersøkelse.

5. Nyhetseffekten.
Dette er et aktuelt problem i den gruppen som fikk det mest sammensatte programmet, fordi de utførte ting som sannsynligvis hadde nyhetens interesse - f.eks. dyrket de plaque. Samme opplegg ville sannsynligvis ikke ha samme effekt hvis det ble gjentatt i samme klasse, men for nye elever vil dette programmet trolig ha samme effekt.

6. Interaksjonseffekt mellom eksperiment og undervisning.
Dette punket overlapper en del av de øvrige - og er tildels diskutert under pkt. 1.

Intern validitet
Green og Lewis (1986) angir 7 forhold som kan svekke den interne validiteten mht. evaluering av en intervensjon: Historisk effekt, modning/utvikling, drop-out, seleksjon, test-effekt, instrumenteffekt og regressionseffekt.
Bare de som har betydning for Tannvernuke-studien vil bli kommentert.
Historisk effekt: Er det noen utenforliggende hendelse som kan være årsak til de effekter vi fant på endepunktene? NRK ble tilskrevet og kunne meddele at det i den aktuelle perioden - mellom pre- og posttest ikke var noe radio- eller TV-program om tenner og tannhelse. Imidlertid var det en del stoff om tannkjøttbetennelse i aviser og ukeblad i forbindelse med Perioåret (se art. V og VI) som ble arrangert på samme tid.
Denne truslen mot den interne validitet er imidlertid til dels tatt vare på i og med bruk av kontrollgruppe. Men ikke helt. I denne effekten inngår også utenfor-

liggende hendelser som kan ha innvirket negativt på resultatet. Fordi Tannvernuka blir administrert og ledet av Norsk Tannvern, var forfatteren ikke engasjert i selve organiseringen av Tannvernuka - dvs. utsending av materiell, kontakt med skole, lærere, overtannleger osv. Usikkerheten mht. hvem som fikk hvilken informasjon, er derfor tilstede - selv om et strukturert telefonintervju med samtlige overtannleger etter undersøkelsen ga forsikringer om at "alt var gått greit". En ytterligere sjekk på om planen var fulgt, når det gjaldt selve undervisningsprogrammet, ble gjort via et spørreskjema til alle lærerne. Dette ble imidlertid sendt ut så lang tid etter Tannvernuka's avslutning (1 år og 3 mnd.) at resultatene neppe er til å stole på fullt ut. Resultatet av denne usikkerheten var at gruppene ble omgruppert - og 126 personer ble eksludert for å være sikker på at det var selve programmet som ble evaluert. Den eksterne validiteten svekkes ved dette, mens den interne styrkes.

Et annet moment som også gjør resultatene usikre, er det forhold at intensiteten og varigheten av undervisningen innenfor den ene oppsatte uken er ukjent. Dette forhold er imidlertid trolig tilfeldig - og vil bare svekke sammenhengene.

Når det gjelder seleksjons-effekten oppdaget vi at fedrene til elevene i gruppen med mest deltaker-aktivitet (Comprehensive group), hadde lavere sosial status basert på oppgitt yrke, enn de to andre gruppene. Tradisjonelt skulle dette være et forhold som ville resultert i dårligere effekt av et helseopplysningsprogram, da effekt av helseopplysning vanligvis er nært korrelert med sosial status (Aarø, 1986). Det er derfor mulig at den effekten vi fikk i dette programmet ville vært større hvis gruppene hadde vært like. En annen mulighet er at dette alternative opplegget, som spilte mer på følelser, aktivitet og

deltakelse, nådde nettopp disse gruppene bedre enn hva det tradisjonelle programmet ville gjort. Enkelte undersøkelser tyder på at: "Logical appeals work better for intelligent, sophisticated audiences, while emotional appeals may be influential in activating the already convinced or attracting interests of indifferent persons" (Atkin, 1979)."

Om generaliserbarheten i denne studien er svak, styrker det konklusjonene at Aarø brukte en lignende strategi blant et tilfeldig utvalg av skoleklasser i Valdres, med positiv effekt mht. reduksjon av sigarettrøyking (Aarø et al., 1983).

For å bedømme om de 201 tannlegene som besvarte enqueten om Perio-året (art. V), er representative for alle norske praktiserende tannleger som behandler voksne, må vi stille følgende 3 spørsmål:

1. Er tannleger som ikke er medlemmer av Den norske tannlegeforening (NTF) på noen måte forskjellig fra medlemmene ? Utvalget ble trukket fra lister over medlemmer i NTF.

2. Er utvalget systematisk forskjellig fra den delen av medlemsmassen den skal representere ?

3. Er de som ikke svarer systematisk forskjellig fra dem som svarer ?

Når det gjelder spørsmål 1 vet vi svært lite, bortsett fra at tannleger som oppholder seg i utlandet ofte ikke er medlemmer. Man kan imidlertid tenke seg at ikke-medlemmene - ca. 10% av tannleger utdannet i Norge - har en annen holdning til foreningen enn andre - og at de kanskje ikke går på foreningens kurs og leser NTF's tidende. Dette får imidlertid bare betydning mht. angivelse av absolutte prosent-tall - f.eks. andelen som hadde lest og hørt om Perio-året.

Når det gjelder styrken på sammenhengen mellom ulike variable vil den bare bli influert hvis responsen har sammenheng både med den uavhengige og den avhengige variable.

Når det gjelder spørsmål 2 og 3 foran, går det frem av art. V at utvalget samsvarer godt med den aktuelle populasjon - og at respondentene ikke avviker fra utvalget hverken når det gjelder kjønn eller praksistype. Det er rimelig å anta at resultatene fra undersøkelsen er representativ for norske tannleger som behandler voksne pasienter, med forbehold om at prosentene på enkelte variable kan være noe høye.

Når det gjelder den siste artikkelen - som baserer seg på 4 ulike datasett, er diskusjonen mht. utvalg og generaliserbarhet mye lik den som gjelder mht. art. I og II. Norges Markedsdata har sin egen samplingprosedyre - som bl.a. omtales i de oversiktsheftene som tilsendes oppdragsgiver (Institutt for samfunnsodontologi, 1981, 1982, 1983, 1985). I disse heftene sammenlignes utvalg og populasjon (basert på offentlig statistikk) mhp. kjønn, bostedsområde, distriktstype og alder. Gjennomgående er forskjellene mellom populasjon og utvalg meget små. Det eneste som systematisk går igjen i alle de 4 undersøkelsene er en svak underrepresentasjon av eldre kvinner (60 år og eldre) og yngre menn (15-29 år). Dette fører til en viss overvekt i de andre aldersgruppene - noe forskjellig i de enkelte undersøkelsene. Denne alders-skjevheten betyr neppe noe mht. generaliserbarheten, som gjelder den voksne norske befolkning med egne tenner.

5.1.2 Metode - målefeil

Datas validitet og reliabilitet er beskrevet på ulike måter i ulike lærebøker. Validitet i denne forbindelse, må som før nevnt, ikke blandes sammen med den validiteten som ble diskutert i pkt. 5.1.1 - i samband med evaluering og generaliserbarhet.

I Hellevik (1980) blir reliabilitet og validitet omtalt som følger:
Reliabilitet bestemmes av hvordan målingene som leder frem til tallene i datamatrisen er utført. Betegnelsen sikter til nøyaktigheten i de ulike operasjonene i denne prosessen.
Vi har høy reliabilitet dersom uavhengige målinger av det samme fenomenet gir tilnærmet identiske resultater. Høy reliabilitet sikrer altså data en pålitelighet som gjør dem egnet til å belyse en vitenskapelig problemstilling.
Validiteten avhenger av hva det er som er målt, om dette er de egenskapene problemstillingen gjelder. Validiteten betegner altså datas relevans for problemstillingen i undersøkelsen - om vi f.eks. ved de spørsmål vi bruker i et spørreskjema virkelig måler det vi er ute etter å måle. Validiteten avhenger av hvor mye den manifeste egenskapen egentlig forteller om den latente.

Både reliabilitet og validitet blir vanligvis oppdelt i undergrupper - se f.eks. Hellevik (1980).

Reliabiliteten er blitt forsøkt testet når det gjelder datagrunnlaget som artikkel I og II bygger på. Aarø (1986) konkluderer med at resultatet av reliabilitetsanalysen var tilfredsstillende, men det er klart at dette er svært vanskelig å teste. Både validiteten og reliabiliteten vil imidlertid øke ved bruk av velkonstruerte indexer (Gjermo & Rise, 1988), slik tilfellet var i denne studien.

Av praktiske hensyn er det ikke utført reliabilitets- eller validitetstester av de andre datamaterialene. Cook og Campbell (1979) hevder at: "randomizations takes care of many threats to internal validity", men legger til at det fortsatt finnes forhold som en randomiseringsteknikk ikke utelukker.
Det vil aldri være mulig å unngå målefeil i sammenheng

med surveys. Hvis vi imidlertid antar at disse fordeler seg tilfeldig, vil både de bivariate og de multivariate sammenhengene bli svekket (Asher, 1983). I denne type undersøkelser, som er omtalt i artiklene III - VI, vil man derfor lett kunne begå type-II feil - dvs. at man konkluderer med at det ikke er noen forskjell - at det ikke er noen effekt av en intervensjon, når det i virkeligheten er en effekt. Når man bruker indirekte måleinstrumenter, vil sammenhengene lett forsvinne, og man finner ikke reelle forskjeller. Dette problemet blir diskutert noe nærmere i kap. 5.4.

I det følgende vil jeg kort drøfte reliabilitet og validitet i relasjon til Tannvernuke-undersøkelsen. Når det gjelder den kliniske undersøkelsen - med Non Bleeding Point-systemet (NBP) - er det umulig med en reundersøkelse av samme individ like etter, da gingiva interdentalt er provosert av en tannstikke. Det er innlysende at en ny provokasjon ikke vil være noen mulig reliabilitetstest - selvom første forsøk ikke ga blødning. Det vil med andre ord være umulig med en skikkelig reliabilitetstest.
Når de gjelder "inter-examiner reliability" ble det av praktiske og økonomiske årsaker bare kjørt kalibreringskurs for undersøkerne i 3 av kommunene. Det ble imidlertid ikke funnet signifikante forskjeller mellom de elevene som ble undersøkt av kalibrerte og ikke-kalibrerte undersøkere (art. III).

Validiteten av NBP-systemet har vært testet og er omtalt i artikkel III.
Når det gjelder spørreskjemaet, ble det bare utfylt etter at intervensjonen var over. Dette begrenser i stor grad mulighetene for å konkludere - men som Moser og Kalton (1972) understreker, er det mange problemer mht. test-retest av slike variable som kunnskap, holdning og adferd:

> "Ideally one would wish to gauge reliability by repeating the scale (or test) on the same people

using the same methods. The practical difficulty of the test-retest methods is however self-evident; and even if persons were to submit themselves to repeat questioning, a comparison of the two sets of results would hardly serve as an exact test of reliability, since they could not be regarded as independent. At the retest, respondents may remember their first answers and give consistent retest answers, an action which would make the test appear more reliable than is truly the case."
"The longer the interval between test and retest, the less is the risk of the memory effect but the greater is the risk of intervening events causing respondents to change their views."
"A different possibility is the alternate forms method, in which two supposedly equivalent versions of the scale are given to the same individuals and the results correlated. Here there is the difficulty that differences between the two sets of answers will be a mixture of unreliability and differences between the items used, and there is no way of separating the effects."

Vi valgte delvis også av praktiske grunner ikke å foreta en pretest av disse variablene, men istedet brukte vi en ex post facto design - en "post-test-only design" med kontrollgruppe - med de begrensninger det innebærer med hensyn til å trekke sikre konklusjoner (Cook & Campbell, 1979).

5.1.3 Bruk av intervju, enquete og spørreskjema

I arbeidet er det benyttet både intervjuundersøkelser (art. I, II og VI), enquete-undersøkelse (art. V) og spørreskjema som ble innlevert etter at utfyllingen var ferdig (art. III & IV). Intervjuundersøkelser har vist seg å være tilfredsstillende metoder mht. validitet og reliabilitet når det gjelder informasjon om bruk av tannhelsetjenester, antall tenner og plateproteser (Heløe, 1972, Norheim, 1980, Könönen et al.,

1986). Når det gjelder måling av tannhelsekunnskap, holdning og adferdsvariable ved hjelp av intervju, enquete og spørreskjema, kjenner ikke forfatteren til noen studier som har forsøkt å reliabilitets- og validitets-teste disse. Aarø & Løchsen (1981) fant en underrapportering på 15 % mht. røyking - ved å sammenligne salgstall i en viss periode med intervju-data om røyking fra samme periode. Lignende tall er funnet for andre vaner av mer eller mindre "følsom karakter". Slike forhold skulle ikke i samme grad ramme spørsmål om tannhelsevaner, selv om man ikke kan utelukke svar av typen "Social desirability".

Frafall er alltid et problem når det gjelder post-sendte spørreskjemaer (enqueter). Ulike studier har vist ulike karakteristika ved dem som ikke responderer (se diskusjon i Koster Jacobsen, 1988). Dette proble-met har vært diskutert under pkt. 5.1.1 når det gjelder tannlegeundersøkelsen i art. V.

Spørreskjemaer utlevert og besvart i skoleklasser (art. III og IV) sikrer høy responsrate, den hindrer respondenten i å overlate til andre å svare (foreldre, venner, søsken), men den sikrer ikke fullt ut at elevene ikke konfererer eller ser hva sidekameraten skriver. Det ble gitt instruksjon til lærerne om full stillhet under utfylling, uten at man har noen garanti for at dette er oppfylt.

5.1.4 Multivariat analyse

Forskning når det gjelder helseadferd og helseopplys-ning er av natur mangedimensjonal. De fenomener vi ønsker å beskrive, forklare eller predikere er komplekse: kunnskap, holdning, motivasjon, helsemessig kontrollplassering, "self-efficacy", intensjon, sosial støtte, kommunikasjon, osv. Både helsekunnskap og adferd har vist seg å være multidimensjonale fenomener (Kannas, 1981; Aarø, 1986; Falkum, 1988).

Mange av disse variablene er interkorrelerte - og hver av dem er påvirket av bakgrunnsfaktorer som kjønn, alder, utdanning, bosted osv. Multivariate metoder gjør det mulig å studere hvordan mange ulike uavhengige variable påvirker en eller flere avhengige. Man har også muligheten til å studere en uavhengig variabels innflytelse på en eller flere avhengige varible - justert for alle de andre uavhengige variablene.
Gjennom multivariate analyser ønsker vi 1) å bli istand til å forklare en større del av variasjonen i den avhengige variabelen gjennom å bruke flere uavhengige variabler, 2) å danne oss et bilde av hvilken av de uavhengige som har størst effekt på den avhengige variablen og 3) å kunne avdekke samspill-effekter eller interaksjoner mellom de uavhengige variablene - dvs. å se om effekten av en uavhengig variabel er betinget av hvilken verdi enhetene har på de øvrige variablene. Disse 3 muligheter de multivariate analyseteknikker gir, er grundig diskutert av Rise (1984), og vil derfor ikke bli nærmere drøftet her.

Forskningen på området livsstil og helseadferd har nærmest gjennomgått en revolusjon gjennom introduksjon av multivariate analyse-teknikker på lett tilgjengelige programpakker. I dette arbeidet er det benyttet mange ulike multivariate analyseteknikker, kovarians- og varians analyse, multippel regression, faktor-analyse, partiell og kanonisk korrelasjonsanalyse og diskriminant analyse. Dette kan både være en styrke og en svakhet. Man får innblikk i og forståelse for hvordan man bruker de ulike analysene - og i hvilke sammenhenger de egner seg best, men man får ikke en dypere kjennskap til og innsikt i noen av dem. Det vil bli for omfattende i denne diskusjonen, å gjennmgå fordeler og ulemper ved de ulike analysemetoder. Det henvises istedet til utmerkede beskrivelser bl.a. i Afifi og Clarke (1984), Nie et al., (1975) og Ker-

linger (1981).

Når det gjelder faktoranalyse har det hevdet seg en del kritiske røster - bl.a. fordi teknikken er meget komplisert og vanskelig å forstå. Etter å ha gjennomgått og diskutert de fleste motargumentene, konkluderer imidlertid Kerlinger (1981) slik:

> "If we examine empirical evidence rather than opinion, we must conclude that factor analysis is one of the most powerful tools yet devised for the study of complex areas of behavioral scientific concern."

De to norske forskerne som har tatt norsk dr. grad innenfor helseopplysning og helseadferdsforskning - nemlig L.E. Aarø (1986) og E. Falkum (1988) har begge i utstrakt grad benyttet faktor analyse - og det vises til grundige redegjørelser i deres avhandlinger.

Den analysemetoden som gjennomgående er mest brukt i de ulike delarbeidene, er "Multiple Classification Analysis" (MCA) (Andrews et al., 1973) - en type regresjonsanalyse hvor kategorielle prediktorer kan benyttes. I helseadferd- og helseopplysningsforskning er dataene stort sett av denne typen, med mindre man konstruerer indexer som kan brukes som kontinuerlig variable. I forhold til alternativet - en vanlig multippel regresjonsanalyse med bruk av en rekke dummy-variable - er MCA lett å bruke og resultatene lettere å tolke/forklare. Andrews og medarbeidere (1973) skriver at:

> "Multiple Classification Analysis (MCA) is a technique for examining the interrelationships between several predictor variables and a dependent variable within the context of an additive model. Unlike simpler forms of other multivariate methods, the technique can handle predictors with no better than nominal measurement, and interrelationships of any form among predictors or between a predictor and

the dependent variable. The dependent variable, however, should be an intervally scaled (or a numerical) variable without extreme skewness or a dichotomous variable with two frequencies which are not extremely unequal. The statistics printed by the program show how each predictor relates to the dependent variable, both before and after adjusting for the effects of other predictors, and how all the predictors considered together relate to the dependent variable."

5.2 Skolebasert tannhelseopplysning

Fordi man i skolen har mulighet til å nå nesten alle barn i relativt ung alder, blir det en viktig oppgave for tannhelsepersonell å få tannhelseopplysning inn i skolen - og få den til å fungere. Ulike modeller for tannhelseopplysning har vært prøvet i ulike land:

1) Tannhelseopplysning som en integrert del av undervisningsplanen (Mulholland, 1976; Clinton et al., 1976, Gill, 1980; Craft et al., 1981a; Craft et al., 1981b; Craft et al., 1981c; Craft et al., 1984).

2) Kampanjer med varighet fra noen få timer til flere år (Podshadley & Shannon, 1970; Graves et al., 1975; Albino, 1978; Hamp et al., 1978,;, Melsen & Agerbæk, 1980).

3) Årlig tilbakevendende Tannhelseuker (Horowitz & Frazier, 1980; Jodaikin, 1981) eller Tannhelsemåneder (ADA, 1984; CDA, 1984).

Rasjonaliteten bak disse programmene er at forebygging er nøkkelen til kontroll med tannsykdom, at karies og periodontal sykdom i stor grad kan forebygges gjennom individuell adferd og at skolemiljøet er et logisk sted å lære forebyggende tannhelsevaner (Flanders, 1987). I en slik skoleklassesituasjon vil man bl.a. anta at gruppedynamiske prosesser vil virke inn på en positiv måte (Lewin, 1951). Til tross for de utallige prosjekter og programmer som er

gjennomført (for oversikt - se Young, 1970; Cohen & Lucye, 1970; Rayner & Cohen, 1971; Rayner & Cohen, 1977; Silversin & Kornacki, 1984) har mange av programmene ikke hatt særlig effekt hverken på plaque forekomst eller gingivitt (Podshadley & Shannon, 1970; Eiseman, 1972; Graves et al., 1975; Stamm et al., 1975; Melsen & Agerbæk, 1980).

Det meste av den empiri som er samlet når det gjelder tannhelseopplysningstiltak indikerer at klasseroms-undervisning alene ikke er en god nok forebyggende metode i seg selv (Frazier, 1981). Ingen støtte finnes heller for at isolerte engangstiltak, som den norske Tannvernuka, har noen varig effekt, uten at det støttes og følges opp over lengre tid - eller blir en integrert del av undervisningen - der lærere, elever og foreldre er involvert. Resultatene fra det tradisjonelle Tannvernuke-programmet som ble evaluert i 1981 (art. III og art. IV), støtter disse funn. Selvom det ble funnet enkelte korttidseffekter på det kognitive og affektive nivå, var effektene relativt små.

Det finnes imidlertid enkelte skolebaserte programmer som har hatt en kortidseffekt på gingivaltilstand og/ eller plaque (Green, 1971; Roder et al., 1977; Albino, 1978; Hamp et al., 1978; Jensen, 1981, Craft et al., 1981a). Craft et al., (1984) kan endog vise til langtidseffekter i sitt Natural Nashers-program. Noe av det spesielle med dette programmet var at forskerne først startet med å spørre foreldrene hva de syntes det var viktig at barna lærte på skolen. Ikke uventet fikk de som svar at det var regning og skriving. Derfor tok lederne for programmet utgangspunkt i dette uttrykte ønsket i sin videre planlegging og hadde dermed sikret seg foreldrenes støtte. Deretter ba de en gruppe lærere om råd om hvordan tannhelse kunne integreres i undervisningen i matematikk og morsmål. Noen lærere ble så glade for at helsepersonell ba dem om råd at de deltok i utviklingen av læreplaner og læremidler - og fulgte prosjektet fremover. Dette undervisningsprogrammet er nå i bruk i mange skoler i England og Skotland (Craft, personlig meddelelse).

Studerer man mange av de ovenfor nevnte prosjekter - samt andre som har gitt positive resultater, viser det seg at følgende faktorer eller prinsipper er viktige for effekten:

- Innovative programmer som inkluderer mulighet for personlig oppdagelse (Gatherer et al., 1979; Craft et al., 1984).

- Det at foreldrene involveres og at det opprettes et nært lærer - foreldre samarbeid (Young, 1970; Rayner & Cohen, 1974; Greenberg, 1977; Rayner & Cohen, 1977; Craft et al., 1984; Olsen et al., 1986).

- Stor entusiasme fra lærerne - og en samarbeidsvillig lærerstil (Green et al., 1980; Craft et al., 1981b).

- Bruk av modell-læring og identifikasjon (Rayner & Cohen, 1977).

- At man baserer anbefalinger om adferdsendringer på individets/målgruppens verdier og normer (Young, 1970; Craft, 1981a).

- Bruk av påvirkning fra en jevnaldrende "leder" (peer leadership/peer influence) (Newcomb, 1974; Rayner & Cohen, 1977; Silversin & Kornacki, 1984), og sterk involvering av lærerne (Jensen, 1981; Craft 1981b).

- At folk aktiviseres, får medvirke og praktisere det de har lært (Bakdash, 1979; Silversin, 1979; Jensen, 1981; Craft et al., 1981a; Craft et al., 1981c; Craft et al., 1984).

- Tett overvåket læring gjennom flere kontakter/besøk med gjentatt forsterkning (Rayner & Cohen 1977; Melcer & Feldman, 1979; Craft et al., 1981a; Blinkhorn, 1981; Bartlett, 1981; Horowitz et al., 1987).

- En kombinasjon av læringsmetoder og bruk av mer enn en tilnærming (Gatherer et al., 1979; Melcer & Feldman, 1979; Green et al., 1980).

- Omhyggelig utarbeidede råd og positiv påvirkning av følelser har større effekt mht. endring av tannhelseadferd enn fryktskapende påvirkning (Evans et al., 1970; Tones, 1982).

- Manglende effekt kan være forårsaket av for liten oppmerksomhet omkring det å vedlikeholde endringer som oppnås - og at man ikke i tilstrekkelig grad setter tannhelseopplysning i skolen inn i en større og bredere sammenheng (Haefner, 1974; Tones, 1982; Walsh 1985).

Flere av de prinsipper som er nevnt over, ble forsøkt inkorporert i det utvidede Tannvernuke-programmet (art. III og art. IV). Dette viste seg å ha korttidseffekt på kunnskap, motivasjon, "self-efficacy", holdning og tannbørsting, samt på gingivaltilstanden hos dem med dårligst utgangspunkt. Virkningen på adferd og gingivaltilstand var imidlertid moderat. Noen av grunnene til dette er trolig for dårlig oppfølgning, for dårlig kontakt mellom tannhelsetjeneste og skole og for kort og lite intens intervensjonsperiode.

Det er viktig at skolebaserte opplysningsprogrammer om tannhelse i fremtiden tar hensyn til den kunnskap som til nå er samlet på dette området, før man starter opp. Fordi tannhelsen blant barn og ungdom i den vestlige verden nå er blitt så god, vil det være svært vanskelig å finne programmer og tiltak som vil være cost-effective. Man kunne kanskje fristes til å foreslå - bl.a. på bakgrunn av tannhelsetjenestens åpenbare begrensede effekt på folks tannhelstilstand (Sheiham, 1986) - at de forebyggende ressursene ble satt inn på andre felter enn tannhelse. På den annen side kan tannhelseopplysning egne seg godt som forsøksfelt for utprøving av generelle teorier og modeller mht. adferdsendring. Horowitz et al. (1987) mener f.eks. at "Promoting oral health awareness and behavior change may deter adoption of other

health-risk behaviors". Disse forfatterne skriver videre:

> "The authors believe it is easier to motivate oral hygiene behavior compared to other lifestyle changes associated with risk-factors reduction such as smoking cessation, making oral health and hygiene a good model for personal health promotion, particularly with children, as it is likely that health behavior change is facilitated by experiencing mastery arising from effective performance".

Dessuten er den offentlige tannhelsetjenesten godt organisert, har systematiske innkallingsrutiner og registreringssystemer, årsaksforholdene mht. tannsykdom er klare, innholdet i budskapet er konkret og enkelt - og endepunktet tannhelse er relativt lett å måle. Man har også gode objektive indikatorer på virkelig adferd (måling av plaque og gingivaltilstand) - og slipper utelukkende å stole på selvrapportert adferd.
Det kan hende at det er lett å starte med tannhelse også for å vinne innpass for helseopplysning i skolen - og for å oppnå bedre samarbeid mellom helsevesenet på den ene siden - og lærere og foreldre på den andre (konf. Crafts erfaringer fra oppstartingen av Natural Nashers-programmet). Den offentlige tannhelsetjenesten har tross alt nesten årlig kontakt med praktisk talt alle barn og ungdom mellom 2-3 år og 18 år - samt mange av de yngste barnas foreldre.
En slik fremgangsmåte fordrer imidlertid at tannhelsetjenesten i langt større utstrekning enn tilfellet er i dag blir en integrert del av helsetjenesten - at man ikke bare arbeider med tenner, isolert fra all annen helse - men at man ser tenner som en del av den totale helsen. Offentlig tannhelsetjeneste sitter inne med svært mye erfaring mht. systematisk, organisert forebyggende arbeid som kunne vært anvendt i helsevesenet forøvrig. Da må man imidlertid være villig til å samordne innsatsen og samarbeide over profesjonsgrensene.

5.3 Forholdet mellom kvinner og menns tannhelsevaner

Alle mine delarbeider (art. I-VI) støtter hypotesen om at menn og kvinner i større eller mindre grad tilhører ulike

"helsekulturer". Denne hypotesen er bl.a. fremsatt av sosiologen Schou-Wetlesen (1980) som diskuterer hvordan kjønnsroller kan disponere for sykdom.
Kvinnene/jentene har gjennomgående gunstigere tannhelse-adferd, mer positiv holdning til tenner og tannhelsein-formasjon og bedre kunnskap om tannhelseforhold enn menn/-gutter, selv om forskjellene er mindre blant 15-åringer (art. IV) enn blant voksne (art. I, II og VI).
Lignende forskjeller mellom kjønnene er rapportert i utallige studier (for oversikt se f.eks. Heløe et al., 1979; Kierke-gaard & Borgnakke, 1985; Honkala, 1985; Cohen & Bryant, 1984; Gjermo (ed), 1986).
Jenter/kvinner synes også å respondere bedre enn gutter/menn på tannhelse-informasjon (Graves et al., 1975; Jensen, 1981; Craft et al., 1984; Walsh, 1985) selvom forskjellene var små i vår undersøkelse (art. III, IV og VI).

Forskjellene mellom menn og kvinner når det gjelder tann-helse, korresponderer godt med funn når det gjelder generell helseadferd. Etter å ha undersøkt 71 ulike helsevaner eller vaner relatert til helse, konkluderer Aarø (1986) slik:

> "The only kind of health behaviour which seems to be more negative among women than among men, is eating between-meals meals".

Den store kjønnsforskjellen når det gjelder helsevaner bekreftes i Botten og Bjerkedals (1988) analyser fra Helse-undersøkelsen 1979/80 og kommer også klart til uttrykk i Tromsø-undersøkelsen 1979/80 (Jacobsen & Thelle, 1988).
Kvinner ser ut til å motta mer informasjon om tannhelse (art. VI) og helse fra massemedia (Falkum, 1988) og rapporterer også i større grad enn menn å ha fått ny kunnskap om helse i forbindelse med "Hjerte for livet"-aksjonen i 1987 (Fønnebø & Søgaard, i manuskript).
At kvinner ser ut til å motta mer helse- og tannhelseinfor-masjon fra aviser enn menn (Falkum, 1988; art. VI) - til tross for at menn leser mer aviser enn kvinner - tyder på en spesiell interesse for - og selektiv utvelgelse av helsestoff blant kvinner.

Også når det gjelder endring av helsevaner kommer kvinnene bedre ut. Etter Hjerte-aksjonen høsten 1987 var det flere kvinner enn menn som rapporterte endringer i en eller flere helsevaner (Fønnebø & Søgaard, i manuskript).
Etter "Trim-glad"-aksjonen i Sogn og Fjordane i 1983 økte kvinner mer mht. mosjonsaktivitet enn menn (Eriksen et al., 1984), og de var i flertall blant dem som rapporterte flere samtidige vane-endringer - endringer på andre helserelaterte områder. Kvinnene var også mer positivt innstilt til aksjonen enn mennene - og hadde større tiltro til virkningen, samtidig som de i sterkere grad vektla kontaktmotiv og sosiale motiv for å delta.
Det eneste funnet som avviker fra dette generelle mønster - at kvinner ligger bedre an enn menn - er generell helse-kunnskap. I vår artikkel II er kunnskaps-scoren basert på måling av generell kunnskap om helse - og her scorer menn bedre enn kvinner.
Det er mulig vi istedenfor kunnskap om tannhelse, i denne undersøkelsen måler noe av det samme som dekkes av begrepet "self-efficacy" (art. IV) eller "Helsemessig kontroll-plassering" (art. II), der gutter og menn også scorer høyere enn jenter/kvinner.

Kanskje den helsekunnskapen kvinner har er mer praktisk, en kunnskap som ikke så lett lar seg måle ved rene kunnskaps-tester. Anderssen (1983) drøfter i sin hovedoppgave muligheten for at kvinner har en alternativ kunnskap - basert på erfaring ervervet gjennom generasjoner. Denne kunnskap er mer konkret, den forvaltes av kvinner og formidles gjennom de tette sosiale nettverk som finnes mellom kvinner f.eks. i en bygd. Anderssen peker på at dette bl.a. er kunnskap om hvilke symptomer som krever legekontakt og hvilke sykdommer man kan kurere selv.

At kvinner scorer høyere enn menn når det gjelder kunnskap om tenner kan bety at validiteten på spørsmålene er bedre. En skandinavisk oversikt over tannhelsekunnskap, - holdning og - adferd konkluderer med at kvinner jevnt over har bedre

tannhelsekunnskap enn menn (Søgaard, 1986). Også data fra USA viser det samme - f.eks. Mann et al. (1981). En alternativ forklaring kan være at tannhelse-kunnskap i større grad knyttes til interessefelt som er mer spesifikke for kvinner: estetikk og kosmetikk. I følge Kannas (1981) danner tannhelse en egen dimensjon, og denne er relativt sterkt korrelert til generell hygiene. Også Honkala (1985) og Ito et al., (1987) rapporterer lignende funn. Adferd som har med tenner å gjøre er antakelig motivert ut fra andre hensyn enn bedre helse. Dette syn støttes av en annen studie av 15-åringer i Norden (Rise et al., 1987b). I sin gjennomgang av litteraturen på dette området, fastslår Rise (1988) at tannbørsting foretas av kosmetiske og utseendemessige årsaker. Det er forøvrig også vist at heller ikke tannhelseadferd blant 18-åringer er noe endimensjonalt fenomen, men kan deles i en tannbørste/-fluortannkrem-dimensjon, en tanntråd/tannstikke-dimensjon og en søtsak/sukkerdimensjon (Rise et al.,1987a). Alle disse funnene har stor betydning for hvordan tannhelseopplysning skal legges opp i fremtiden.

Det er også interessant å legge merke til hvor stor rolle sosialt nettverk og kommunikasjon har, når det gjelder kvinners/jenters tannhelseadferd (art. II, IV). I 1983 ble det også i Norges Markedsdatas intervjuundersøkelse spurt om respondentene hadde snakket med noen om tenner eller tannpleie i løpet av siste halvår. Kvinner hadde i langt større grad enn menn - henholdsvis 25.4% og 13.4% - snakket med venner/arbeidskamerater om tannhelse (Rise & Søgaard, i manuskript). Kjønn var forøvrig den faktor som betydde mest for hvorvidt man hadde kommunisert eller ikke - sett i forhold til utdanning, sivil status, alder, bosted, tannhelsekunnskap, antall tenner, mottatt informasjon om tenner, m.m. Kommunikasjon betydde mer i forklaringen av variasjonen i tannhelseadferd for kvinner enn for menn. Dette kom frem da den MCA-modellen som ble benyttet i art. IV ble kjørt med kommunikasjon i tillegg til de andre faktorene - for dataene innsamlet i 1982 (Søgaard, upubliserte data).
I art. IV går det også frem at den forklarte variansen (R^2) mht. bruk av tannhelsetjenester, økte langt mer for kvinner

enn for menn da personlige og adferdsrelaterte faktorer ble introdusert i den multivariate modellen i tillegg til demografiske og sosio-økonomiske faktorer (kvinner R^2: 0.15 -> 0.27; menn R^2: 0.13 -> 0.17).

I Falkums (1988) studie av helsekunnskaper, holdninger og adferd finner han bl.a. at venners interesse for helse-spørsmål var den sterkeste prediktor for om man selv hadde mottatt helseinformasjon. Også når det gjaldt andre endepunkt i Falkums studie, viste venners interesse for helse å være av betydning. Han kommenterer disse sammenhenger slik:

> "They seem to be in line with the findings that the contents of mass communication are interpreted in social networks and that their effects should be evaluated in the broad perspective of social interaction. One of the forces behind the apparent importance of the interest in health matters among friends may be the existence of a social network allowing for continuous reinforcement of attention and receptivity".

Dessverre har Falkum i sin studie ikke splittet på kjønn, så vi vet ikke om kvinner er mer påvirket av venners interesse for helse enn menn.

Også holdninger ser ut til å være en viktigere forklarings-variabel for kvinner enn menn (art. II, IV). I følge Janis og Field (1959) endrer kvinner holdning lettere enn menn, og de tilpasser seg også lettere andres oppfatning (Freedman et al., 1970). I følge Block (1982) engasjerer kvinner seg i mer "prosocial behaviors and maintain closer proximity to friends than men do".

Sammenholdt med de refererte funn mht. helseadferd/helse-informasjon - og generell empiri mht. kjønnsroller, synes våre resultater å bekrefte hypotesen om kjønnsspesifikke helsekulturer. Tradisjonelt er omsorg for helse i familien definert som et kvinneansvar, kvinner diskuterer helse-spørsmål seg imellom, de er interessert i ny informasjon om dette emnet, de er mer eksponert for helsestoff i massemedia,

og de har gjennomgående bedre helsevaner enn menn. Bakgrunnen for en slik ulikhet ligger nok først og fremst i rollefordelingen i familien - der mannen er lønnsarbeider eller produsent og kvinnen reprodusent. Kvinnens omsorgsfunksjon blir ikke bare definert til å omfatte stell av hus/barn/mann, men gjelder også ansvar for helse og sykdom i familien (Anderssen, 1983).
Selv om Aarø (1986) har vist at forskjellene i helsevaner mellom menn og kvinner trolig vil utviskes etter hvert som flere kvinner blir lønnsarbeidere, er dette trolig et kjønnsrollemønster som i noen grad vil vedvare også i de kommende generasjoner. De kjønnsforskjeller vi (art. III og IV) og andre (Honkala, 1985; Rise et al., 1987b; Wold & Aarø, 1986) har vist blant jenter og gutter, tyder på at det skjer en tidlig sosialisering til forskjellig livsstil.

Eriksen og medarbeidere (1984) trekker den slutning fra sin Trim-glad studie at kvinner og menn trolig har forskjellige forutsetninger for å endre adferd. Den hypotesen som vi fremsatte i art. II, at kvinner i større grad endrer adferd etter følelsesmessig involvering og påvirkning, mens menn trenger mer faktakunnskap, synes å være styrket etter denne diskusjonen av litteraturen. Når det gjelder tannhelse, finnes noen av de samme konklusjoner i Rise's avhandling om tannhelse blant eldre (1984).
Det tilsynelatende paradoks at kvinner - tross sine sunnere helse- og tannvaner - og hyppigere besøk hos lege/tannlege, rapporterer mere sykdom og plager enn menn, vil ikke bli drøftet i denne sammenfatningen, som i hovedsak dreier seg om helse/tannhelse adferd. Det er imidlertid nærliggende å anta at økt opptatthet av helse også gjelder kunnskap og bevissthet om symtomer og kroppsfunkjsoner, noe som kan være en forklaring på kvinnenes høyere forbruk av helsetjenester. Det er vist at de som ofte mottar helseinformasjon også har et høyt forbruk av helsetjenester (Falkum, 1988).

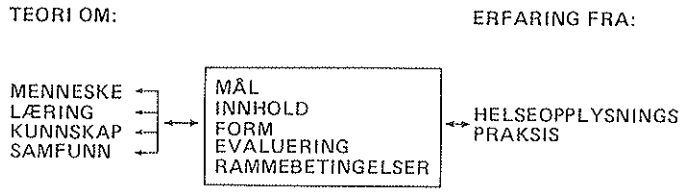
Hvilke konsekvenser vil denne kunnskapen om forskjeller i helseadferd mellom menn og kvinner ha for forebyggende og helsefremmende tiltak - inkludert helseopplysning?

Det er åpenbart at jenter og gutter tidlig sosialiseres til ulik adferd - og at adferd som er negativ for helsen eller direkte risikopreget, er noe som er nært knyttet til mannsrollen. Det ville derfor være naturlig å lage målrettede, selektive forebyggende tiltak rettet mot gruppen gutter og unge menn. Men slike fremstøt ville trolig møte motforestillinger - ikke minst på etisk grunnlag. Gutter/menns adferdsmønster - inkludert helserelatert adferd, ligger trolig dypt nedfelt i deres verdisystem. Gutter skal ikke la seg skremme, de skal ta sjanser og være "barske" - og gjør de ikke det er de "pysete". At denne type adferd i vår vestlige, moderne verden, ofte kommer til uttrykk i slike former at det også setter andres liv på spill eller belaster våre felles ressurser, er et stort problem. Det er nok å nevne råkjøring med bil, fallskjermhopping fra fjell og broer, fjellklatring osv. Ofte foretar individene bevisste valg i slike situasjoner - og spørsmålet blir hvor grensen går for helsepersonells og myndigheters adgang til å gripe inn for å beskytte. Det er klart at man lett kan komme til å gripe inn i individenes frihet - en frihet som mange allerede føler er for begrenset.

Helseopplysning kan lett bli indoktrinerende og passiviserende - istedenfor bevisstgjørende og aktiviserende (Søgaard & Fylkesnes, 1983). Det ligger f.eks. en klar utfordring i å drive helseopplysning på en måte som øker helsebevisstheten - uten at resultatet blir et stadig høyere forbruk av helsetjenester og urealistiske forventninger til hva helsevesenet kan løse. Helseopplysning kan virke medikaliserende - noe det er viktig å være klar over ved fremtidig satsing på forebyggende tiltak.

Helseopplyseren må være klar over de verdivalg som gjøres når hun/han intervenerer - enten det er via individrettet informasjon eller via strukturelle tiltak - som lover og forbud. Helseopplysning kan aldri bli verdinøytral (Søgaard & Fylkesnes, 1983). Planlegging og gjennomføring av opplysningsarbeid bygger alltid på en rekke valg - bevisste eller ubevisste. Når en velger metode eller undervisningsform, kan dette ikke sees isolert fra andre deler - som f.eks. mål, innhold, evaluering og rammefaktorer. De valgene

vi treffer henger også sammen med hvilket syn vi har på menneske, samfunn, læring og kunnskap. Det må være sammenheng mellom de ulike kategoriene i læringsmodellen - slik som vist i figur 4:



(Omarbeidet etter Haavelsrud, 1979)

Det er uten tvil etiske problemer forbundet med helseopplysning overfor grupper der adferden er så sterkt knyttet til kjønnsrollen og verdisystemet. I tillegg er det spørsmål om i hvilken grad man vil lykkes med intervensjon overfor denne målgruppen.

Fra pedagogikken vet vi at man må ville lære for å kunne lære. Det er også kjent at man blir mer påvirket av opplysning om noe man har høy risiko for å bli skadet/rammet av, enn av noe som er svært alvorlig, men som forholdsvis få rammes av. Når vi også vet at individer normalt ikke endrer adferd hvis dette kommer i konflikt med sterke personlige interesser - og at mange opplever det enklere å være i "utakt" med seg selv, enn å være i utakt med andre - er det klart at helseopplyserne står overfor store utfordringer når det gjelder å endre gutter/menns adferd i helsepositiv retning.
Skal man ha noen mulghet til å lykkes, er det sannsynligvis viktig å ta hensyn til følgende hovedprinsipper:

- Ta utgangspunkt i det gruppen er opptatt av - personenes interesser og behov. Helseopplysningen må foregå på målgruppens premisser - og ta hensyn til de normer som råder i målgruppen. Svært mye av grunnlaget for folks livsstil ligger nedfelt i de sosiale rammer de lever innenfor. En må med andre ord se mennesket i en sosial

sammenheng - som deltaker i et sosialt system som former og bestemmer individets og gruppens adferd. Til dette kreves god kjennskap til det sosiale miljøet, til menneskene og til normene i den målgruppen man skal arbeide sammen med.

- Folks adferd styres primært av kortsiktige konsekvenser. Det er viktig å sette opp nære mål - og finne umiddelbare gevinster som kan oppleves/observeres.
- Aktivitet er svært viktig for den type læring som er nødvendig for å endre helsevaner. Det å delta, bli involvert, føle ansvar og medinnflytelse er viktig for effekten.
- Det er viktig å bruke medspillere til å "spre budskapet". Lekfolk er ofte bedre helseopplysere enn eksperter. Det er vist at effekten øker hvis man greier å stimulere til diskusjon og debatt om temaet mellom venner, familie, naboer, arbeidskamerater osv. Vi vet også at effekten øker ved bruk av opinionsledere - personer i nærmiljøet som folk konsulterer eller hører på når de skal gjøre seg opp en mening. Derfor er det viktig å kjenne til kommunikasjonsstrømmen og vite hvem som tar initiativ til diskusjon i et lokalsamfunn, på en skole, i en bedrift eller i en ungdomsgjeng. Hvis man ønsker å påvirke gutters/menns helseadferd i positiv retning, vil det sannsynligvis være viktigere å skape sosial støtte for handling - enn å besørge mer faktainformasjon.

5.4 Sammenhengen mellom tannhelsekunnskap, -holdning og -adferd

I følge Green (1979) er det overordnede mål for all helseopplysning "to facilitate voluntary adaptions of behaviour conducive to health." Richards (1975) minner imidlertid om at når man prøver å endre folks adferd, er det også viktig å kjenne og være klar over betydningen av den eksisterende kunnskap, holdning, og de normer og vaner som finnes i målgruppene.

At det er et nært forhold mellom kunnskap, holdning og adferd hersker det ingen tvil om i litteraturen. Derimot er det ikke enighet om hvor viktig f.eks. kunnskap er for adferd - og i

hvilken rekkefølge endringene skjer.

Den grunnleggende modellen består av en serie av mentale og adferdsmessige stadier som en person går igjennom når hun/han lærer om et emne - f.eks. tannhelse. De tre hovedstadiene eller nivåene er "kognitiv", "affektiv" og "konativ". Det "kognitive" nivå omfatter oppmerksomhet, bevissthet, kunnskap og oppfattelse, mens det "affektive" nivå består av interesse, vurdering, holdning, følelse, overbevisning og ettergivenhet. Intensjon, adferd og handling er gruppert under det "konative" nivå. Den typiske rekkefølge mellom disse nivåene er fra kognitiv via affektiv til konativ. Dette er den tradisjonelle "information processing model" (McGuire, 1978) - også kalt "the learning hierarchy". Mange helse-opplysningstiltak f.eks. innenfor tannhelsesektoren har vært basert på denne modellen - at endring i tannhelsekunnskap automatisk ville føre til holdningsendring, som så igjen ville føre til endring i adferd.

Flere forskere - også innenfor tannhelseopplysning - har imidlertid satt spørsmålstegn ved denne enkle, lineære årsaksmodellen (Rayner & Cohen, 1971; Jensen, 1973; Heløe, 1975; Heløe & König, 1978; Hamp et al., 1982; Murtomaa et al., 1984).

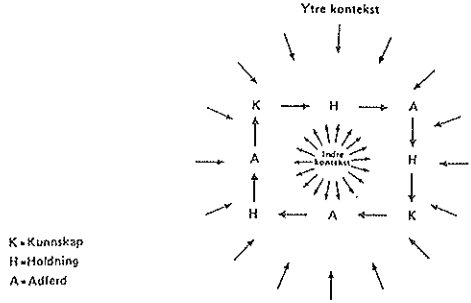
Andre mulige sammenhenger og rekkefølger mellom de ulike nivåer har vært lansert. I sin avhandling refererer Aarø (1986) en rekke forfattere som gjengir sine hypoteser og teorier om sammenhengen mellom holdning og adferd. Etter en grundig litteraturgjennomgang konkluderer Aarø slik:

> "Studies in the relationship between attitudes and behaviour in the field of health behaviour and lifestyle indicate a significant, but weak association. Several reviews of litterature (cf. Ajzen & Fishbein, 1977) conclude that the association is too low to count for any substantial proportion of variance, and these negative findings have led many investigators to reconsider the nature of the attitude-behaviour relation" (Aarø, 1986).

Andre forfattere har sett nærmere på ulike rekkefølger av nivåene kognitiv, affektiv og konativ (Ray, 1973). På basis av disse 3 komponentene foreslår Ray tre forskjellige modeller - eller effekt-hierarkier. De varierer med hensyn til hvilken komponent som kommer først. Hvilken modell som passer best til en gitt situasjon, avhenger av i hvor stor grad individene er involvert i temaet og avstanden mellom handlingsalternativene.
I tillegg til "the learning hierarchy" - der rekkefølgen var kognitiv -> affektiv -> konativ, lanseres "the dissonance - attribution hierarchy" - der rekkefølgen er konativ -> affektiv -> kognitiv - og "the low-involvement hierarchy" - der rekkefølgen er kognitiv -> konativ -> affektiv.

Disse hierarkiene vil sannsynligvis alle ha aktualitet i ulike situasjoner, under ulike forhold, mht. ulike temaer og i ulike målgrupper. Når det gjelder tannhelse er det vanskelig å si hvilket av hierarkiene som er mest aktuelt. Folk er generelt ikke sterkt involvert i tannhelsespørsmål (Kegeles, 1974; Aarø et al., 1982) - noe som er en av betingelsene for at læringshierarkiet og dissonanshierarkiet skal komme i betraktning. Det siste omtalte hierarkiet - lav-involverings-hierarkiet - forutsetter liten forskjell mellom handlingsalternativene. Men de fleste vil sannsynligvis anse det for en stor endring f.eks. å begynne å bruke tanntråd hver dag, noe som også utelukker at denne modellen er direkte appliserbar i tannhelseopplysning. Ingen av disse modellene ser m.a.o. ut til å være direkte anvendbar når det gjelder tannhelse. En utdyping av diskusjonen om disse hierarkiene sett i en tannhelsekontekst finnes i Søgaard (1986), Rise (1988) og Gadgil & Søgaard, (i manuskript).
Selv om Flay (1981) mener læringshierarkiet passer best for helseopplysning, antyder vårt korte resonnement at dette kanskje ikke er tilfelle når det gjelder tannhelseopplysning. Men kanskje kan en kombinasjon av modeller brukes. En kampanje kan bygges opp i to trinn, slik Flay (1981) foreslår i sin utvidede "Information-processing model". Første trinn er å skape oppmerksomhet, som igjen vil skape sterkere involvering - slik at læringshierarkiet kan anvendes i trinn 2.

En mulig forklaring på de mange ulike modeller og teorier som er lansert og diskutert når det gjelder forholdet mellom kunnskap, holdning og adferd kan simpelthen være at det foregår en kontinuerlig interaksjon mellom de ulike nivåene som antydet i figur 5.



Alle hierarkiene er egentlig til stede - i ulike personer til ulike tider - avhengig av den indre og ytre kontekst. Det hierarki vi finner avhenger av på hvilket tidspunkt vi går inn og måler - m.a.o. hvor vi setter punktum. Denne meta-modellen er nærmere beskrevet i Gadgil & Søgaard (i manus-kript).

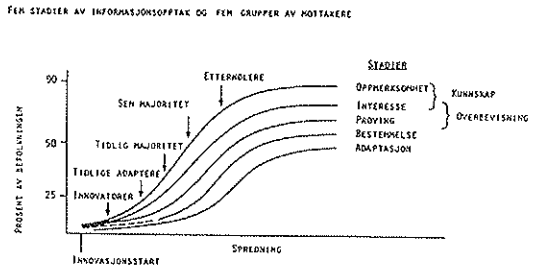
Mange forfattere har hevdet at det er det kognitive nivå som er lettest å påvirke (Young, 1971; Atkin, 1979). Både vår studie av skolebarn (art. IV) og evalueringen av Perio-året (art. VI) bekrefter dette. Når det gjelder Perio-året var oppmerksomhet og kunnskap de eneste endepunkt man med rimelighet kunne si hadde økt i forbindelse med massemedia-kampanjen mot tannkjøttbetennelse. Men bedre kunnskap kan forsåvidt være positivt i seg selv. Det kan gi større trygghet og dermed økt trivsel. Gode kunnskaper på ett område kan også komme til nytte i nye livssituasjoner, selvom de i øyeblikket ikke har praktisk nytte eller fører til endret adferd (Rise, 1988).

Når det gjelder hvilken betyding kunnskap har for tannhelse-adferd, er våre funn noe motstridende. Mens kunnskap var den sterkeste determinant for tannhelseadferd blant voksne i

årene 1981, 1982, 1983 - og nest viktigst i 1985 (art. VI), var den ikke en signifikant prediktor for tannhelseadferd blant skoleelever (art. IV). Kunnskap var heller ikke blant de variable som signifikant skilte regulære fra ikke-regulære brukere av tannhelsetjenester i art II. I denne siste studien var kunnskapsscoren basert på generell helsekunnskap. Som tidligere nevnt i kap. 5.3 om kvinner og menns tannhelse/-helsevaner, danner tannhelse trolig en egen helsedimensjon - slik at generell helsekunnskap neppe er noe godt kunnskapsmål på dette området. Falkum (1988) konkluderer for øvrig også med at kunnskap om helse ikke er noe endimensjonalt fenomen, etter å ha funnet at helsekunnskap ikke hadde noen sammenheng med respondentens forsøk på å redusere fett og sukker i kosten. Når det gjelder den manglende betydning av kunnskap for tannhelseadferd blant ungdom, er dette også funnet i andre studier fra Skandinavia (Hamp et al., 1982; Børresen et al., 1983), men ikke fra andre steder - f.eks. USA (Mann et al., 1981). Dette kan bero på at kunnskapsnivået mht. tannhelse generelt er høyt i denne aldersgruppen i Norden - slik at spredningen blir liten.

Selvom god kunnskap hverken i våre eller andre studier viser seg å være tilstrekkelig for en gunstig helseadferd, er det studier som kan tyde på at man trenger en viss basis - eller grunnleggende kunnskap for å kunne velge en helsepositiv livsstil (Antonovsky & Kats, 1970), men at kunnskap over dette nivå neppe gir store gevinster i form av endret adferd. Oppnår man derfor å nå nye grupper med informasjon - grupper som ikke har nok kunnskap - vil man kunne oppnå adferds-endring. For å nå disse må man trolig ta utradisjonelle metoder, kanaler og virkemidler i bruk, slik det f.eks. ble gjort under "Hjerte for livet"-aksjonen i Norge i 1987. Nasjonalforeningen for folkehelsen, som kombinerte penge-innsamling med helseopplysnig, brukte blant annet under-holdning, utnyttet humor, spilte på folks følelser og engstelse - og oppmuntret til egenaktivitet i sin meget intense og mangfoldige kampanje (Fønnebø & Søgaard, inn-sendt). En slik hypotese - at andre virkemidler må brukes hvis man ønsker å nå nye grupper passer godt med modellen

for "diffusion of innovations" lansert av Rogers & Shoemaker (1971). Modellen er senere videreutviklet av Rogers (1983) og satt inn i en helsemessig sammenheng av Green et al. (1980) og Green & McAlister (1984). Modellen er noe forenklet vist i figur 6.



(Etter Green et al., 1980)

Figuren illustrerer f.eks., hvordan et budskap diffunderer med forskjellig hastighet i ulike grupper av befolkningen. Noen tar opp budskapet tidlig - andre sent. Noen endrer adferd raskt - nesten umiddelbart etter at de er blitt oppmerksom på forholdet, andre endrer aldri adferd. Den tradisjonelle faktaorienterte helseopplysning har nok i stor grad nådd dem som i denne modellen er kalt innovatører, tidlige adaptere og tidlig majoritet. De utgjør under halvparten av befolkningen - og for disse er det relativt kort vei (horisontalt) fra det å bli oppmerksom på en ting - f.eks. å bruke tanntråd, til de interesserer seg aktivt for emnet, prøver det, bestemme seg for å bruke det - og til det blir en vane. Denne veien er mye lengre for dem som her kalles sen majoritet og etternølere. Mange av dem er nok oppmerksom på at tanntråd finnes - har kanskje noe kunnskap om betydningen av å bruke det, men har ikke prøvd. Mange av disse vil sannsynligvis heller aldri prøve uten at de blir påvirket på annen måte enn gjennom tradisjonelle holdnings-kampanjer via massemedia. Det skal helt andre strategier til for å få en innovatør til å endre en helsevane enn å nå frem til en etternøler (Green et al., 1980). Mens de første kan plukke opp et budskap fra massemedia og handle utfra det, må de siste også ha påvirkning gjennom personlig kontakt,

gjennom veiledning, "skill-training", gjennom aktiv deltakelse, gjennom gruppepress og/eller gjennom støtte fra omgivelsene.
Denne modellen er forøvrig den eneste av de mange modellene, som prøver å forklare adferd/adferdsendring (Søgaard & Gadgil, i manuskript), som har innebygget tidsperspektivet. Ut fra denne diffusjonsmodellen kan også de sosiale forskjellene i helse- og tannhelseadferd til en viss grad forklares. Supplerende forklaringer på den sterke sosiale gradient mht. helseadferd i befolkningen finnes i Aarø (1986).

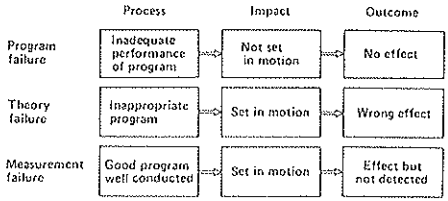
Diffusjonsmodellen gir også mening hvis man f.eks. ser på utviklingen i prosentvis daglig røykere i de ulike sosiale lag de siste 20-30 år (Aarø, 1988b). De høyerer sosiale lag som var de første som tok opp røyking da det ble moderne, var også de som først sluttet da det ble klart hvor helsefarlig røyking var. Kraft & Hølund (1986) har forøvrig gitt eksempel på hvordan diffusjonskurven kan brukes i planlegging av offentlige tannhelsekampanjer.

Selvom det i denne gjennomgangen klart går fram at forholdet mellom kunnskap, holdning og adferd er meget komplisert - og sannsynligvis svært avhengig av sosiale og situasjonsbestemte forhold, verdier, meningsklima, normer i lokalmiljøet osv. (Aarø, 1986) er det ikke desto mindre viktig å måle de faktorer vi vet har sammenheng med adferd - bl.a. for å kunne si noe om hvorfor en intervensjon eller kampanje har effekt eller ikke. At det ikke er nok bare å måle adferdsedring uttrykkes klart av Kreuter & Green (1978) i en vurdering av helseopplysning i skolen:

> "Making cause-effect linkage to human behavior is difficult even under the most carefully-controlled circumstances using the most sophisticated multivariate analysis. The infinite number of variables interacting in the school and the home environment, together with the short-term nature of most possibilities for evaluation of school health education, make it virtually impossible to tie classroom activities directly to health behaviors that show up over time. The multifaceted nature of human health

behavior suggests that it is the interplay of variables, and not undimentional factors, that shape health outcomes".

Disse forfatterne fastslår forøvrig at det vil være teknisk og politisk naivt å bruke umiddelbar adferdsendring som det eneste kriterium for suksess når det gjelder helseopplysning i skolen.
Nødvendigheten av flere endepunkter er forøvrig nærmere diskutert i art. IV.
Uten andre mål enn adferdsendring er det f.eks. ikke mulig å skille mellom teorifeil, programfeil og målefeil (Green & Lewis, 1986). I figur 7 vises hvordan man i forbindelse med evaluering av et program kan mislykkes i å vise noen effekt.



(Etter Green & Lewis, 1986)

For det <u>første</u> kan gjennomføringen av prosjektet være inadekvat, man kan mislykkes i å sette igang den årsakskjeden som forbinder karakteristika ved programmet med resultat eller virkning. Programmet kan være basert på riktig modell eller teori, men vi observerer liten eller ingen effekt fordi programmet er dårlig administrert eller fulgt opp. Hvis vi f.eks. ikke hadde undersøkt hvordan/om Tannvernuka var gjennomført i alle klassene, ville vi ikke ha fått korrigert for de klassene som skulle ha hatt en bestemt undervisning, men som ikke fikk den. Vi ville feilaktig konkludert med at sosial læringsteori ikke hadde noen effekt (den teorien det mest omfattende - "Comprehensiveprogram" - var basert på).
For det <u>andre</u> - hvis teorien eller de prinsipper vi baserer vårt program på ikke holder, kan vi komme til å si at hele

oppleggert slo feil selvom gjennomføringen og administrasjonen av prosjektet var vellykket. Til en viss grad kan vi si at vi finner denne type feil i Perio-år-kampanjen - der de overordnede målene var å bedre folks tannhelse - ihvertfall å endre folks hygiene/besøksvaner, mens virkemidlene utfra massekommunikasjonsteori bare kunne oppnå endringer på det kognitive nivå. I Perio-året var det imidlertid også programfeil tilstede. De pauseprogrammene som ble spesiallaget for visning i TV - og som var basert på de fem Tannvett-reglene - ble ikke sendt slik som avtalt. Pga. enkeltstående, men intense protester fra et par fluor-motstandere som ringte NRK, ble reglene bare sendt en gang (Søgaard, 1984).

Den tredje mulighet for ikke å finne noen effekt, beror på målefeil. Programmet kan både være basert på riktig teori og være godt gjennomført, men pga. feil ved måleinstrument eller størrelsen på utvalget, kan vi feilaktig konkludere at intervensjonen ikke hadde noen effekt - mens vi egentlig kan ha oppnådd det ønskede resultat. Denne type feil - beslektet med den klassiske type-II feil (at vi mislykkes i å oppdage en virkelig forskjell), har vært nærmere drøftet i kap. 5.1.1.

Hvilke implikasjoner har så alt dette for fremtidig tann-helseopplysning?

- Det er viktig å kjenne målgruppens kunnskap, holdning og adferd - slik at man kan sette iverk tiltak som møter målgruppens behov. Det har f.eks. vist seg at ungdoms kunnskap om smittemåter når det gjelder AIDS er meget høy, mens adferden mht. kondombruk er lav.
  Utfordringen ligger med andre ord i å finne virkemidler som stimulerer det affektive og konative nivå - istedenfor å fortsette med helseopplysning på det kognitive nivå.
- I og med at personer befinner seg på ulike stadier i diffusjonsprosessen - og sannsynligvis på ulike steder i den kontinuerlige prosess vi antar foregår mellom de tre nivåene - kognitiv, affektiv og konativ - vil man måtte satse på en kombinasjon av metoder, strategier og kanaler for å nå flest mulig. Ingen enkeltmetode har vist seg

bedre enn noen annen (Green et al.,1980).

- Strategier som "Community involvement" og Community action" - der man bl.a. tar i bruk mange metoder og strategier, har vist lovende resultater. Hvis man i tillegg kobler slike strategier - der store deler av målgruppen er engasjert/involvert - med individuell veiledning med utgangspunkt i personlige behov og verdier, vil flere kunne nås. I tillegg er det viktig å spille mer på folks følelser, humør, positiv forsterkning - og forsøke å styrke folks selvtillit.
- Det er viktig å målrette tannhelseopplysningen til folk som allerede har et ønske om å endre adferd. Overfor folk som ikke er motivert er det to muligheter:
  Enten kan man forsøke å argumentere med at god tannhelse er viktig - slik at folk endrer på rekkefølgen av sine motiv og plasserer tannhelsemotivet høyere på motivskalaen. Eller - man kan spille på andre motiv som er sterke hos målgruppen - f.eks. kosmetiske, sosiale, økonomiske - og koble helsebudskapet til dette/disse motivene som allerede er tilstede. Denne siste strategien er mye brukt i markedsføring, mens helsepersonell har vegret seg for å bruke den av etiske grunner.
- Selvom det er stor forskjell mellom markedsføring og helseopplysning, bør vi kunne lære noe av all den kunnskap denne bransjen sitter inne med - f.eks. viktigheten av gode forundersøkelser, spesifikke valg av målgruppe, bruk av "peer-leaders" - og vektlegging av den affektive del av budskapet - ikke bare den kognitive.

6. KONKLUSJONER

I denne korte konklusjonen vil jeg forsøke å belyse i hvilken grad de ulike arbeidene - samt enkelte andre resultater funnet i litteraturen - har gitt svar på de problemstillinger som ble satt opp i pkt. 3.3:

1) Hvordan fordeler de ulike tannhelsevaner seg i befolkningen, hvordan er sammenhengen mellom dem, og hvordan korrelerer de med andre helsevaner?
   Tannbørsting er blitt en innarbeidet hverdagsvane - uten store variasjoner med hensyn til kjønn, alder eller sosial

status. Daglig bruk av tannstikker praktiseres av vel 40% av den voksne norske befolkning med egne tenner - og øker med økende alder. 20-30% av dem med egne tenner rapporterer daglig bruk av tanntråd. Denne vanen er mer utbredt i de yngre aldersgrupper.
Regelmessig bruk av tannhelsetjenester stiger med stigende utdanning og inntekt - og synker med stigende alder. Av dem med egne tenner går ca. 80% årlig til tannlege.
Jenter/kvinner rapporterer gjennomgående å ha bedre tannhelsevaner enn gutter/menn.
Sammenlignet med andre skandinaviske land ligger nordmenn gunstig an mht. de fleste tannhelsevaner - både blant yngre og eldre.

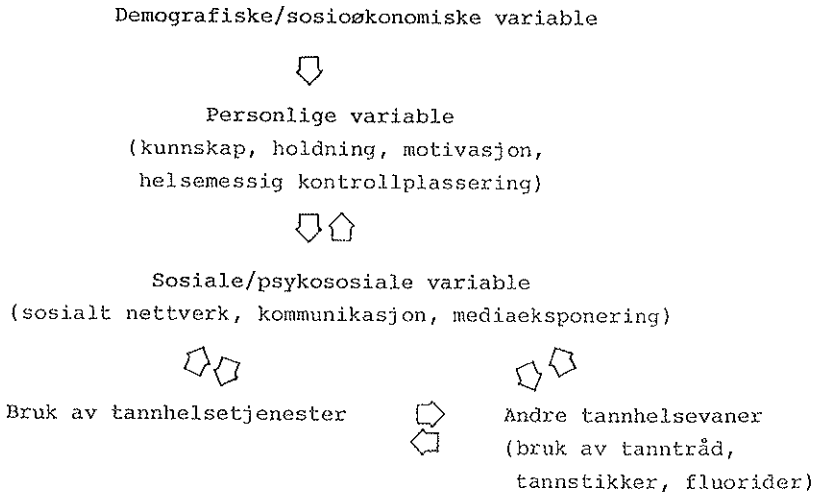
Bortsett fra fysisk aktivitet, ser ikke andre helsevaner ut til å korrelere særlig sterkt med tannhelseadferd. Det virker som tannhelsevaner danner en egen dimensjon. Også tannhelsevaner ser ut til å bestå av ulike dimensjoner, med regelmessig bruk av tannhelsetjenester som en sentral vane som korrelerer positivt med de andre.
Tannhelsevaner er trolig motivert ut fra kosmetiske, sosiale og estetiske behov - heller enn ut fra det å ha god tannhelse i seg selv.

2) Hvilke prediktorer for tannhelseadferd er sterkest, og hvilke av disse er det mulig å påvirke gjennom opplysningsvirksomhet?
Det er en relativt sterk sammenheng mellom tannhelsekunnskap og -adferd blant voksne, men ikke blant ungdom. Det er mulig at kunnskapen blant ungdom er så god at spredningen blir liten - og at en ytterligere økning ikke vil gi særlig utslag i bedre tannhelsevaner.
Jenter/kvinner har gjennomgående gunstigere tannhelseadferd, mer positiv holdning til tenner og tannhelseinformasjon og bedre kunnskap om tannhelseforhold enn gutter/menn, selvom forskjellene er mindre blant ungdom enn blant voksne.
De med høy sosioøkonomisk status og de som bor i tettbygd strøk har bedre tannhelseadferd enn andre grupper.
Det å diskutere spørsmål vedrørende tannhelse/helse, det å ha

et tett sosialt nettverk - samt det å rapportere en positiv holdning til helse/tannhelse er også faktorer som betyr noe positivt i forhold til gode tannhelsevaner. Det ser ut som disse faktorene betyr mer for jenters/kvinners tannhelse-adferd enn for gutters/menns. Kunnskap, helsemessig kontroll-plassering og "self-efficacy" slår derimot sterkere ut for gutter/menn.

Det er viktig ved fremtidige helseopplysningstiltak å være klar over hvilken betydning normer i den gruppen man tilhører, har å si for adferden. Likeledes bør man vektlegge betydningen av den enkeltes verdier - og det sosiale nettverk, det kommunikasjonsmønster og den sosiale støtte man har rundt seg.

Hvis vi bruker resultatene fra art. II, kan følgende modell for tannhelseadferd settes opp:



Kunnskap om de ulike faktorer i denne modellen - og kunnskap om det kompliserte forhold som eksisterer mellom tannhelse-opplysning og tannhelse, gjør det enklere å planlegge effektive opplysningstiltak, men viser også klart hvilke

begrensninger man har til å påvirke tannhelse gjennom tannhelseopplysning alene.

3) Finnes det noen teorier eller modeller for adferdsendring som fungerer bedre enn andre i en tannhelseopplysningssammenheng? Ut fra våre undersøkelser er det vanskelig å trekke klare konklusjoner mht. denne problemstillingen. På bakgrunn av våre og andre studier kan en likevel slå fast at enkelte prinsipper er sentrale mht. endring av tannhelseadferd, både når det gjelder skolebasert og massemediabasert tannhelse-opplysning:

Skolebasert:

- Man bør ta hensyn til lærerens rolle som opinionsleder og modell, oppmuntre til en entusiastisk og samarbeidende lærerstil, involvere foreldrene og aktivisere elevene.
- Man bør kjenne til de normer, verdier og behov som er rådende blant skoleungdom, og ta utgangspunkt i hva de synes er viktig, før man setter igang helseopplysnings-tiltak. Den kunnskapen man har om "peer-leadership" og gruppedynamiske prosesser bør kunne brukes positivt.
- Lærerne og den offentlige tannhelsetjenesten bør opprette et nærmere samarbeid, slik at tannhelseopplysning kan integreres i annen undervisning. Tannhelseopplysning blir dermed ikke enkeltstående begivenheter, men et tema som stadig kommer igjen - i ulike former og blir forsterket på ulike måter. Man bør likeledes i større grad samordne tannhelseopplysning med annen helseopplysning - slik at tenner ikke blir isolert fra kroppen forøvrig.

Massemedia:

- Tannhelseopplysning via massemedia har begrenset effekt på adferd, men kan øke folks oppmerksomhet og kunnskaper om tenner og tannhelse.
- Det er viktig at budskapet er enkelt, og at det gjentas flere ganger. Det ser ut som en intens og mangesidig kampanje over en kort periode - er mer effektiv enn noen "drypp" nå og da over tid.
- Det må legges mer vekt på planleggingsfasen når det

gjelder helseopplysning i massemedia - inkludert det å sette konkrete mål, definere målgruppe, pre-teste budskapet og velge metoder og kanaler i forhold til de kunnskaper man har om målgruppen.

4) Hvordan når man frem til de grupper som har høyest risiko for tannsykdom og dårligst tannhelse?
Heller ikke denne problemstillingen kan våre resultater gi noe fullgodt svar på. Men sammenholdt med andre studier er det mulig å gi visse retningslinjer:
- Gjennom deltakeraktivitet, gjennom visualisering og ferdighetstrening, gjennom involvering av foreldre og engasjement av lærere, vil det trolig være mulig å nå frem til flere av dem vi hittil har hatt vanskeligheter med å nå - slik tilfellet var med det mest omfattende og sammensatte programmet i Tannvernuka.
- Å oppmuntre til diskusjon i et nærmiljø - styrke det sosiale nettverket rundt personer i målgruppen og oppmuntre til små, enkle endringer som gir positiv effekt på kort sikt, vil sannsynligvis bidra til at flere av dem med dårligst utgangspunkt får en helsegevinst.

5) Hva fremmer/hemmer effekten av ulike tannhelseopplysningstiltak overfor ulike målgrupper?
- Ytterligere faktaorientert helseopplysning, fremført på tradisjonell måte, ser ut til å forhindre oss i å nå de lavere sosiale lag.
- Et multidimensjonalt helseopplysningsprogram - med bruk av flere kanaler, metoder og strategier vil lettere føre til adferdsendring blant dem som har ugunstigst helseadferd fra før.
- Tannlegenes grunn- og etterutdanning, interesse for utviklingen innen faget og holdning til forebyggelse, ser ut til å være faktorer som betyr noe for tannlegenes engasjement i forebyggende tiltak - både på individ- og gruppenivå.

  En kunnskapsrik, entusiastisk og forebyggende orientert tannlegestand vil trolig ha positiv virkning på folks tannhelseadferd og tannhelse.

- Svikt i planlegging, organisering - eller gal/manglende bruk av den teori og empiri som finnes om helseopplysning og adferdsendring, hindrer oss ofte i å få målbar effekt. Det er viktig at de som planlegger helseopplysning og forskning på forebyggende og helsefremmende tiltak, blir mer kritiske til sin egen virksomhet og ikke setter i gang prosjekter uten en nøye vurdering og planlegning. På den annen side må man ikke bli så redd for å sette igang, at nye spennende ideer og prosjekter aldri blir startet opp.

Som nevnt i innledningen til kap. 5 er det skjedd en utvikling i synet på helseopplysning i løpet av de siste 10-15 årene. Begrepsmessig har man beveget seg fra Health Education, via Education for Health - til Health Promotion - og til sist til Healthy Public Policy. Parallelt med denne begrepsmessige utviklingen har det skjedd endringer i synet på hva som er effektive virkemidler, metoder og strategier for å bedre folks helse. Disse endringene har bare delvis vært begrunnet i forskning innenfor feltet helseopplysning. Derimot har man hentet en del kunnskap fra andre fagfelt - som f.eks. sosialpsykologi, pedagogikk og massekommunikasjonsforskning.

Resultatene fra våre studier har imidlertid bekreftet flere av de hovedendringene som har skjedd når det gjelder synet på hva som er effektiv helseopplysning. Noe av det som kan dokumenteres gjennom våre studier er den dreining som har skjedd:

- fra individrettet faktainformasjon - til virkemidler som appellerer til følelser - og som tar hensyn til de sosiale rammer folk lever innenfor.
- fra enveis, passiv informasjonsoverføring - til involvering og aktivitetsskapende tiltak som bl.a. stimulerer til økt kommunikasjon.
- fra enkeltstående, lite målrettede tiltak - til målgruppe-rettede, multidimensjonale strategier som gjør bruk av flere metoder og kanaler, med større vekt på tverrsektorielt/ tverrfaglig samarbeid.

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7. FEIL

Det har dessverre sneket seg inn enkelte feil i artiklene:

Art. I:

I referanselisten er referanse nr. 2 ufullstendig. Det korrekte skal være:
AARØ, L.E. & BREKKE, T.H.: Fysisk aktivitet i den voksne befolkningen. En survey av adferd, holdninger, kunnskaper og kommunikasjon. Tidskr. Nor. Lægeforen. 1983:103 (spesialnr.):402-409. (English summary p. 502).

Art. II:

I referanselisten er et "the" blitt borte i referanse nr. 7. Det korrekte skal være:
Kim J-O, Kohout FJ. Analysis of variance and covariance: Subprograms ANOVA and ONEWAY. In: Nie NH, Hull CH, Jenkins JG, Steinbrenner K, Bent DH, eds. Statistical package for the social sciences. 2nd ed. New York: McGraw-Hill Book Co., 1975;398-433.

I abstract er det i siste linje oppstått en ombytting mht. forholdet mellom "sociopsychologic/behavioral" og "demographic/economic". Setningen skal lyde:
To a great extent, demographic and economic variables seemed to act through the sociopsychologic and behavioral factors in predicting the regularity of dental attendance.

Art. II og Art. IV:

I referanselisten er en referanse ufullstendig. Det korrekte skal være:
Block, JH: Gender differenses in the nature of premisis developed about the world. In: Shapiro EK, Weber, E, eds. Cognitive and affective growth:

Developmental interaction, pp. 147-169. New Jersey: Lawrence Erlbaum Ass., 1981.

Art. III:

I tabell 2 er det sneket seg inn enkelte feil i tall og prosenter under "Educational aspiration" og "Mother's work status". De riktige tallene er gjengitt i tabell 2 i artikkel IV.

I figur 1 står det 3 steder NPB istedenfor NBP (Non Bleeding Papillae).

Art. IV:

I adressen øverst på s.169 har det sneket seg inn en "c" for mye i Faculty.
I figur 1 på s.174 er "Positive" skrevet med to s'er i teksten under det sjette settet av stolpediagrammer.
Siste ord på åttende linje nedenfra på s.176, "sex", skal strykes.

Art. VI:

I den 9. linjen i abstract skal det stå en tankestrek istedenfor et "on". Den riktige setningen skal lyde:
To assess the effect of the campaign - exposure, awareness, knowledge, attitude, intention and behaviour were measured by interviewing representative samples of the Norwegian population aged 15 or more in 1981, 1982, 1983 and 1985.

I tabell IV på s.246 er det oppstått en forskyvning i plassering av punktum i øverste linje, siste kolonne:
7.16 skal være 71.6.

Artikkel I

Dental health practices in Norwegian adults

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Helöe, L. A., Aaró, L. E. & Sögaard, A. J.: Dental health practices in Norwegian adults. Community Dent. Oral Epidemiol. 1982: 10: 308–312.

Abstract – A nationwide sample of 1511 Norwegian adults were interviewed in 1979–80 concerning health habits, including dental habits. While daily toothbrushing and regular treatment attendance appeared to have become the rule among young and middle aged individuals, use of dental floss and especially of fluoride tablets or rinses, still are the exception. Dental health habits were clustered around the variable treatment attendance with slightly different patterns for men and for women. Measures of sugar consumptions were only slightly correlated with background variables and dental health behavior. While the latter was socially dependent, consumption of sugar probably was attached to personal characteristics or situational factors. The correlations between dental health behavior and other health behavior practices were generally weak, and somewhat different for men and women. Two separate types of motives for preventive behavior were distinguished between: health motives and cosmetic motives.

Key words: dental health behavior; dental practices; socioeconomic status, sugar consumption.

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The Norwegian Dental Association declared 1981 "The Year Against Periodontal Disease". The main purpose was to attract the public's attention to symptoms of periodontal disease and to how it can be defeated. Five rules for the prevention of "gum infection" and "tooth decay" were introduced in the mass media:

1. Keep your teeth clean
2. Beware of periodontal disease ("gum infection")
3. Avoid in-between sweets
4. Protect your teeth with fluorides
5. Regular dental visits render increased safety

It is of importance to know how well these dental health practices were established in the population before the campaign started. As part of a comprehensive project on health education, some questions of dental health were included (2). In this paper some of these data are analyzed to explore

- the extent to which the rules given above already are lived by,
- how dental behavior pattern is related to background characteristics, and
- whether there is a consistency of behavior across several health behaviors.

MATERIAL AND METHODS

Sampling and data collection – A nationwide sample covering the total Norwegian population aged 16–79 was drawn by the Norwegian Central Bureau of Statistics. The sampling design was two-stage with stratification in the first stage and one primary sampling unit selected from each stratum. Each primary sampling unit comprised usually one municipality, municipalities of less than 3000 inhabitants were combined into sampling units. The stratification was performed according to size, geographical region and type of economic activity. In the second stage the sample of 2000 individuals was selected from the Central Register of Persons. A detailed description of the sampling strategy is given elsewhere (1). In all, 1511 persons (774 women and 737 men), or 76% of the original sample, were interviewed during the winter 1979–80 by trained interviewers using a structured questionnaire. A series of questions concerning dental health were asked. 86 men and 91 women were excluded due to edentulousness as part of a comprehensive study of health behavior and attitudes towards health information (2). The wording of the questions dealt with in this report is given in the Results.

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RESULTS

TREATMENT OF THE DATA

1. The data were cross-tabulated against the independent variables sex, age, degree of urbanization, region, type of work, education and income.

2. The data derived from Questions 1 and 4 (Table 1) (use of toothpicks and fluoridated dentifrice) were dichotomized into "daily" versus "more seldom", the data from Question 2 (use of dental floss) into "at least 1–2 times per week" versus "more seldom", the data from Question 3 (use of fluoride tablets or solutions) into "use at all" versus "never", and the data from Question 5 (dental visits) into "twice a year" versus "more seldom". These dummy variables were run against each other in an analysis using the Pearson's "r" correlations.

3. The five original variables on dental health behavior were combined into an additive index denoted "dental health behavior". Each of the five components/items were given equal weight. An index for reduced sugar consumption was constructed by adding items on how and how often the intake of sugar eventually was limited. Each of these two indices were run against the independent variables. They were also evaluated by means of Multiple Classification Analysis (MCA) as well as by canonical correlation analyses to detect the strength and relative importance of the independent variables, and to study patterns in the relationship between the independent variables and each component/item included in the indices.

4. The relationship between the index "dental health behavior" and several other health characteristics (3), including reduced sugar consumption, were analyzed by means of Eta-correlations.

As can be seen, more women than men reported favorable dental habits, regardless of type. While regular use of toothpicks seemed to increase with age, and was highest among persons around 50 years of age, use of fluoride tablets, rinses and fluoridated dentifrice and regular treatment attendance were most common among young individuals.

RELATIONSHIP BETWEEN DENTAL HEALTH HABITS

The association between the components of the index for dental health behavior appears in Fig. 1. Regular dental visits was the characteristic most intertwined with the other components. In contrast, use of toothpicks appeared as an isolated behavior pattern independent of most of the other dental health habits.

Table 1. Questions and distribution of the answers

	Total	Men	Women
Question 1: "How often do you use toothpicks?"			
Daily	29.3	24.2	34.2
3–6 times per week	12.3	13.4	11.1
1–2 times per week	13.8	14.6	12.9
More seldom	18.4	20.0	16.9
Never	26.2	27.8	24.9
	100.0	100.0	100.0
Question 2: "How often do you use dental floss?"			
Daily	8.9	5.4	12.4
3–6 times per week	5.0	3.2	6.8
1–2 times per week	6.3	5.7	6.9
More seldom	18.6	18.0	19.1
Never	61.1	67.7	54.8
	99.9	100.0	100.0
Question 3: "How often do you take a fluoride tablet, or rinse with a fluoride solution?"			
Daily	2.2	1.4	2.9
3–6 times per week	0.7	0.3	1.0
1–2 times per week	2.6	1.5	3.7
More seldom	3.5	4.5	2.7
Never	91.0	92.3	89.7
	100.0	100.0	100.0
Question 4: "How often do you use a fluoridated dentifrice?"			
Daily	81.2	80.6	81.7
3–6 times per week	2.6	2.8	2.3
1–2 times per week	0.9	1.5	0.3
More seldom	2.3	2.9	1.8
Never	13.1	12.2	13.9
	100.1	100.0	100.0
Question 5: "How often do you visit the dentist?"			
Twice a year	41.5	37.4	45.5
Once a year	39.0	41.0	37.1
Every second or third year	8.9	9.8	7.9
Every 4–6 year	3.7	4.7	2.6
More seldom	7.0	7.1	6.9
	100.1	100.0	100.0
Question 6: "Have you made any attempts to restrict your sugar consumption?"			
Yes	52.5	39.2	65.2
No	47.5	60.8	34.8
	100.0	100.0	100.0

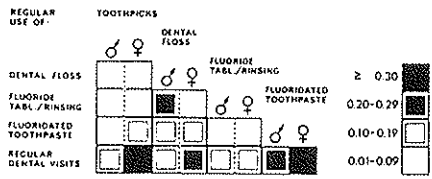

Fig. 1. Correlations (Pearson's r) between five dental health habits.

DENTAL HEALTH BEHAVIOR AND BACKGROUND CHARACTERISTICS

Fig. 2 gives the results of the Eta-correlation analyses between, on one hand, the composite index for dental health behavior and the variable reduced sugar consumption, and on the other, the predictor variables age, degree of urbanization, region, type of work, education and income for males and females separately. The dental health behavior was related to all the predictor variables, most clearly to age, education and income.

The tendency to have favorable dental habits increased somewhat with degree of urbanization, with increasing education and income and decreased with increasing age and with physical strain in job or daily activity. The characteristic "reduced sugar consumption" was only slightly positively related to age, education and income, and not at all to the three other predictor variables.

EXPLANATORY POWER OF THE PREDICTOR VARIABLES

By the MCA analyses of the index for dental health behavior, which were performed for men and women separately, the total explanatory power of the six predictors amounted to 18.1% (R^2 adjusted = 0.181) for the men, and 18.7% (R^2 adjusted = 0.187) for the women. The relative importance of the predictors as measured by eta and beta statistics appears in Table 2. The beta coefficient, however, still confirms the findings from the bivariate analyses: that age, education and income are the most important predictors. When controlling for other predictors, the explanatory power of each predictor is somewhat reduced. Although another 10 independent variables were introduced as predictors, these only added negligibly to explanation of variance of dental health behavior.

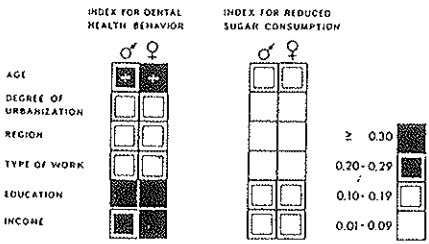

Fig. 2. Correlations (Eta-correlations) between, on one side, indices for dental health behavior and for reduced sugar consumption, and on another, six background variables.

Table 2. Dental health behavior (index) by age, degree of urbanization, region, type of work, education, and income (Multiple Classification Analyses)

Predictors	Males Eta	Males Beta	Females Eta	Females Beta
Age	0.29	0.19	0.35	0.21
Urbanization	0.12	0.03	0.10	0.09
Region	0.16	0.12	0.11	0.11
Type of work (Sedentary/ medium/heavy manual)	0.16	0.09	0.11	0.07
Education	0.31	0.20	0.33	0.18
Income	0.30	0.22	0.32	0.20
	$R = 0.426$		$R = 0.432$	
	$R^2 = 0.181$		$R^2 = 0.187$	

The MCA analysis of the index for reduced sugar consumption among the men gave only 3.7% (R^2 adjusted = 0.037) explained variance using six predictors, which increased to 4.3% (R^2 adjusted = 0.04) using all 16 predictors. The corresponding figures for the women were 3.5% and 6.5%, respectively.

The canonical correlation analyses revealed no substantial increase in the correlation coefficients compared to those from the multiple correlations in the MCA analyses. Thus, a different weighting of the components/items of the indices could evidently not have added explanatory power to the above MCA analyses.

DENTAL HEALTH BEHAVIOR AND GENERAL HEALTH BEHAVIOR

The connection between dental health behavior and other health behavior characteristics appears in Fig. 3. In general, the relations were weak, and

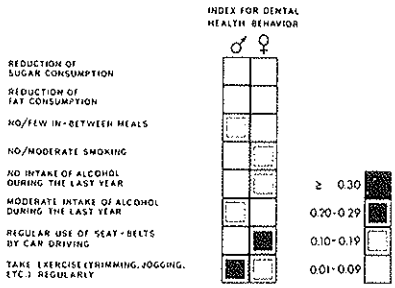

Fig. 3. Correlations (Eta-correlations) between index for dental health behavior and eight other health habits.

somewhat different for men and women. A positive correlation with the habit to take exercise appeared, however, for both sexes.

DISCUSSION

While daily toothbrushing and frequent treatment attendance have become the rule among young and middle-aged individuals, use of dental floss, and especially of fluoride tablets or rinses, still appear to be the exception. However, the vast majority brush with a fluoridated toothpaste and about every second person reported use of toothpicks at least weekly. The habits are closely attached to the generations, a finding which calls attention to the impact made by public dental programs upon the younger generations (4).

The relationship between the dental health habits varied. Regular dental visits was, however, a key variable closely related to most of the others. The regular treatment attenders were the most likely to use toothpicks, dental floss or fluoridated toothpaste frequently. Concerning the use of toothpicks, it seems justified to distinguish between two deviant patterns: one which forms an integral part of a complex dental health behavior, and one which appeared to be a habit more or less on its own. The latter was most common among men and elderly individuals. Among these, use of toothpicks are probably not a dental health routine, but more likely a technique for removing impacted food particles.

The dental behavior was generally more favorable among the women than among the men, a finding that is in universal agreement with those from a number of previous studies (5). In addition, more women than men reported to have restricted their sugar consumption. These observations, and the deviant relationships with health behavior patterns outlined in Fig. 3, support the hypothesis that men and women constitute separate health cultures (6). The canonical correlation analyses revealed that the effect of the socioeconomic variables, income and education upon the dental health behavior was somewhat different for men and women. For men, high versus medium socioeconomic status distinguished between regular and irregular users of dental floss and fluoride rinses, while for women, medium versus low consituted the dividing line. It seems likely that dental preventive skills, such as flossing, which presumably are learned in clinical settings, will mature into habits only in patients who already have a value structure to support this kind of behavior (7). Such values are conceivably more disseminated among women than among men in the lower middle class. However, increasing standardization of beliefs, values and life styles together with increasing use of dental services, will hopefully lead to universal acceptance of preventive dental practices with reduced differences between population subgroups (8).

The index for restricted sugar consumption was only weakly correlated with the background variables, compared to the close association found for dental health behavior. While the latter characteristic is still socially dependent, the willingness to restrict the intake of sugar seems attached to personal characteristics such as tendency to put on weight. Briefly, among adults, promotion of dental health is probably not a main motive for reducing sugar consumption, while fear of obesity is.

Two principally different types of motives for preventive dental behavior should be distinguished between: health motives, which are characterized by willingness to invest in own health, and cosmetic motives, derived from desire for immediate profit ("white teeth", "fresh breath"). A pro-health value-structure is also related "to a general sense of efficacy or power to influence one's world" (7).

Low socioeconomic status tends to go with unfavorable health practices in several fields. Recent data thus reveal that only 18% of men in Oslo, aged 40–49 of the highest socioeconomic stratum, are daily smokers compared to 66% of those in the

lowest (9). Health practices involving active self-care, for instance jogging, are dependent upon surplus of vitality after working hours (2). The percentage of physically inactive persons is shown to be lower in high education and high income groups (3), and the proportion reporting inadequate habits concerning the use of seat belts is also lower in high status segments of the population (10).

The cumulative effect of several unfavorable health practices, together with unsatisfactory labor and working conditions, are well-known causes of the clustering of health problems in the lower socioeconomic strata (11).

However, health behavior patterns are manifold. In addition to social status as a common denominator, each habit apparently has its own specific predictors. Judged from the patterns appearing in Fig. 3 it seems as if a positive dental health behavior is a set of skills which, for the most part, is isolated from other health habits. However, the correlation with physical activity is an exception to this rule (12). But even though the target groups for the promotion of healthy behavior may be different for each habit, the common pedagogic and scientific foundations of health education call for a close cooperation between the different sectors of this field (13).

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Artikkel II

Irregular users of dental services among Norwegian adults

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In 1979–80 a nationwide random sample of 1511 Norwegians, aged 16–79 years, were asked a series of questions about dental health and related factors (behavior, attitude, knowledge, social network, interpersonal communication, and 'health locus of control'). The purposes of the study were to describe the irregular users of dental services and to find mutable factors that could distinguish the regular from the irregular users. 17.4% of the dentate women and 21.7% of the men reported visiting the dentist less than once a year. Among the background variables, age and income/education were the most powerful predictors of use of dental services. Different patterns of behavioral characteristics were found among women as compared with men. The mutable factors that made a significant distinction between the regular and irregular users were use of interdental remedies, use of fluoride, social network, and health attitude (only among women). To a great extent, sociopsychologic and behavioral factors seemed to act through the demographic and economic variables in predicting the regularity of dental attendance. □ *Attitude to health; dental health behavior; knowledge of health; social support; use of dental services*

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Use of dental services is closely related to dental health, although it is difficult to show a direct causal relationship (1). Assuming that the use of dental services causes an overall improvement of dental health, utilization rates should be increased, and the dental profession urged to emphasize preventive services. To increase the number of regular treatment attenders, more knowledge should be gained about individuals who do not see a dentist on a regular basis, including their barriers to regular use of dental services.

Demographic and socioeconomic characteristics are well known to influence the utilization pattern. Even though their relative importance can be influenced, their impact can hardly be changed through dental health education. Other factors, which can be modified, should therefore be focused on—like communication patterns, social network characteristics, belief in control over one's own health, and behavioral traits concerning dental health. Such factors are, however, rarely used as predictors for the use of dental services.

The purposes of this study were 1) to describe the use of dental services by means of demographic, economic, sociopsychologic, behavioral, and personal characteristics, with particular emphasis on the utilization pattern of irregular uses, and 2) to find the mutable variables that could distinguish the regular from the irregular users of dental services.

Materials and methods

Sampling and data collection

A nationwide random sample covering the total Norwegian population aged 16–79 years was extracted by the Norwegian Central Bureau of Statistics. More detailed descriptions of the sampling design and strategy are given elsewhere (2, 3).

Altogether, 1511 persons (774 women and 737 men), which made up 76% of the original

sample, were interviewed during the winter 1979–80 by trained interviewers using a structured questionnaire.

A series of questions concerning dental health were asked as part of a comprehensive study of health behavior and attitudes towards health information. Some of these questions are quoted by Heløe et al. (3). The interview also contained information about social network, attention to dental hygiene, and the respondents' belief in controlling their own health. A list of the questions used in this paper is given in Appendix I. In addition, demographic and socioeconomic data were collected. Eighty-six men and 91 women (11.7%) were excluded from the dental health part of the interview because they were edentulous.

Missing data for some of the questions caused a variation in the number of cases in the tables.

Dependent variable

The information about the regularity of visits to a dentist was dichotomized into regular users—those visiting a dentist at least once a year—and irregular users—those visiting a dentist less frequently.

Independent variables

Age (year), coded as
1 = 16–35
2 = 36–55
3 = 56–79

Family income (NOK), coded as
0 = not declared
1 = ≤ 19,000
2 = 20–59,000
3 = 60–99,000
4 = 100,000+

Education, coded as
1 = primary school
2 = high school
3 = college/university

Marital status, coded as
1 = unmarried
2 = married, living together
3 = widow, widower, divorced

Number of children, coded as
0 = none
1 = 1–2
2 = 3+

Category of occupation, coded as (4)
1 = high (teaching, administration, medical/health care, technical work, sales work, marketing)
2 = low (other categories of occupation, including pensioners, students, and unemployed)

Location of residence, coded as
1 = urban area
2 = rural area

In addition, seven new indices were constructed:

Use of fluorides
1 = daily use of fluoridated dentifrice and/or use of fluoride tablets/fluoridated rinsing water
0 = less than daily use of fluoridated dentifrice and no use of fluoride tablets/rinsing water (Appendix I, question 1 and 2)

Interdental hygiene
1 = daily use of toothpicks and/or dental floss
0 = less than daily use of toothpicks and dental floss (Appendix I, question 3 and 4)

Communication

The communication index was constructed on the basis of questions 5–9 in Appendix I. Points were given for articles read on dental health during the past month and for discussing dental health issues with family, friends, and other people during the previous week (scores ranking from 0 to 5)

Knowledge of health

This index was based on answers to 14 different statements about risk factors and aspects of life style (Appendix I, questions 10 to 23) (scores ranking from 0 to 14)

Social network

The frequency of friendly gatherings and the number of close friends were used as indicators of social network (Appendix I, questions 24 to 26) (scores ranking from 0 to 3)

Attitude to health

The attitude index comprised nine items about the importance of and opinion of dietary, dental, and general health education and the value of dental health (Appendix I.

questions 27 to 35) (scores ranking from 0 to 27—the lower the score the more positive the attitude)

Health Locus of Control

The index comprised 18 standardized items (5) on attribution on control of one's own health (Appendix I, questions 36 to 54) (scores ranking from −72 to 72)

Health Locus of Control Scale stems from the social learning theory and was designed to evaluate whether one perceives oneself as being in control of one's own health (internal locus of control), whether this is more related to external influences like other people (external locus of control), or whether one believes one's health is determined by fate or by pure chance (missing control). Wallston et al. (5) indicate that this conception in people leads to specific expectations, which influence behavior.

The index for 'net internal health locus of control' was used in accordance with the formula: 2 × (internal control) − (external control + missing control) (6).

Data analysis

Cross-tabulations between use of dental services and all the background characteristics were computed and tested by means of chi square. The demographic and socioeconomic variables that turned out to be significant ($p < 0.05$) were used in a multiple classification analysis (MCA), a program suited for analysis of categorical independent variables (factors) (7).

When the dependent variable is dichotomized, as in our case, the MCA gives the percentage of irregular users of dental services in subgroups of the independent variables, unadjusted and adjusted for the effect of the other variables. The program also provides a simple correlation coefficient (eta) and a partial-regression coefficient (beta) for each variable. The eta^2 for each factor indicates the proportion of variation in the dependent variable explained by each factor. The rank order of the betas indicates the relative importance of the factors in explaining the variance in the dependent variable, when all other independent variables are held constant. Finally, R^2 indicates the goodness of fit of the full multivariate model.

Associations between use of dental services and the constructed indices were computed by means of partial correlation, with age as control variable. Age showed a significant association with use of dental services for both sexes—that is, more irregular users in the older age groups.

To find the variables that distinguished the regular from the irregular users of dental services, discriminant analysis was carried out (8). We also wanted to explore to which extent the demographic and socioeconomic variables could add to the predictive power of the discriminant function when the personal factors and those variables related to dental health were already taken into account. A stepwise procedure was therefore performed, with forced inclusion of all the personal and behavioral variables (the indices) at step 1, and forced inclusion of all the demographic and socioeconomic variables as a second step. The sample distribution of the cases on the dependent variable was used as the groups' prior probabilities.

The posterior probabilities were calculated on the basis of a logistic approach in accordance with a procedure described by Afifi & Clark (9). The following formula was used to calculate the posterior probabilities:

$$P = \frac{1}{1 + \exp(-Z + C)}$$

where exp (−Z + C) indicates e raised to the power of (−Z + C). In the equation P is the probability of belonging to the irregular users of dental services, C is a constant, and Z is Fisher's discriminant function.

$$Z = a_1 X_1 + a_2 X_2 \ldots + a_n X_n$$

where a_1, a_2 . . . . a_n are the differences between the pairs of classification function coefficients (9).

Results

17.4% of the women and 21.7% of the men reported visiting the dentist less than once a year (irregular users) (Table 1). Through

Table 1. The percentages of irregular users of dental services (less than once a year) among subjects 16–79 years old

	Total, *n*	Irregular users	
		n	%
Men	651	141	21.7*
Women	683	119	17.4*
Total	1334	260	19.5

* $p < 0.05$.

cross-tabulations we found that the proportion of irregular users of dental service among women increased with increasing age, decreasing education, and decreasing family income (except for the lowest income group and those who did not answer). The proportion was higher among those with a low category of occupation, among widows/divorced, among those living in rural areas, and among women with no children ($p < 0.05$). Except for residence and number of children, the same variables were associated with use of dental services among men ($p < 0.05$).

The variables that showed a significant association with the dependent variable in both sexes were used as factors in a multiple classification analysis. When all the other factors were adjusted for, age, family income, and education showed the highest beta values for both men and women. The comparable explained power of each variable, unadjusted (eta) and adjusted (beta), for men and women is shown in Table 2.

The adjusted mean percentage irregular users of dental services in each category of the independent variables can be seen in Fig. 1, separately for men and women (only the three statistically significant factors are illustrated).

In Table 3 the mean value and the standard deviation of the seven indices are listed. Women had a higher mean than men on the communication index, the attitude index, and social network index, whereas men had a higher mean score on knowledge of health index and net internal health locus of control ($p < 0.05$). The difference in regular use of fluoride was minor between men and women, whereas more women (40.6%) than men (27.4%) used dental floss and/or toothpicks on a daily basis ($p < 0.05$).

Infrequent or no use of fluoride, infrequent use of dental floss and toothpicks, negative attitude, low internal health locus of control, little knowledge and weak social network correlated with irregular use of dental services among both men and women ($p < 0.05$) (Table 4). In general, the correlation coefficients were higher among women than among men. Among women there were particularly higher intercorrelations among the three behavioral factors than among men, whereas men's knowledge correlated more strongly with most of the other indices than was the case among

Table 2. Use of dental services according to the relative importance of five independent variables. The relative importance of the variables are expressed in terms of unadjusted (eta) and adjusted (beta) coefficients

	Men, $n = 651$		Women, $n = 683$	
	Unadjusted eta	Adjusted† beta	Unadjusted eta	Adjusted† beta
Age*	0.26	0.17	0.31	0.16
Education*	0.26	0.16	0.30	0.17
Family income*	0.22	0.17	0.27	0.14
Category of occupation	0.12	0.04	0.14	0.06
Marital status	0.11	0.03	0.17	0.05
R^2		0.13		0.15

* $p < 0.05$.
† Adjusted for the other variables.

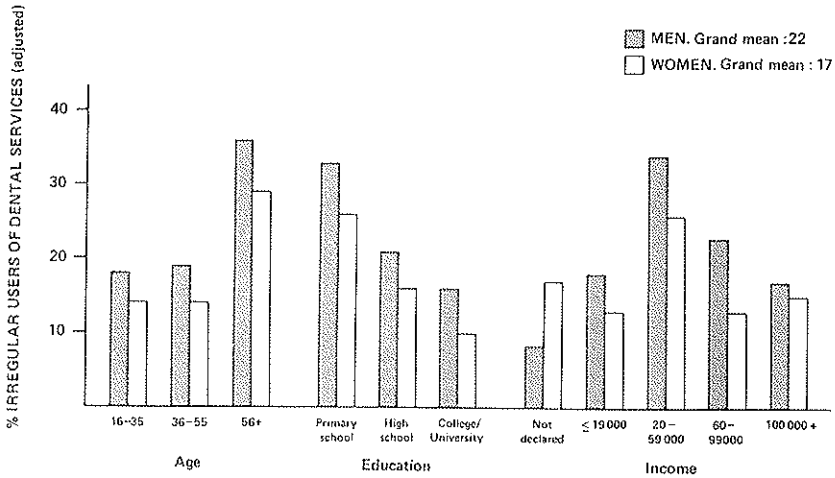

Fig. 1. Percentage of irregular users of dental services in groups of independent variables. The percentages in each subgroup are adjusted for category of occupation, marital status, and the other variables illustrated in the figure. Income is given in Norwegian *kroner*.

women (Table 4). For both men and women attitude correlated significantly with all the other indices, except with social network (Table 4).

When all these indices were used in a multivariate analysis together with age, they explained 12.8% and 23.9% of the variance in use of dental services for men and women, respectively. The explained variance increased to 16.7% for men and 27.3% for women when all the demographic and socio-economic factors were introduced in the analysis, in addition to the indices.

Among men, education, use of fluoride, and social network were the three factors that discriminated most between the irregular and regular users of dental services, whereas interdental hygiene, social network, and attitude to health were the strongest discriminating variables among women. Table 5 shows, separately for men and women, the standardized canonical dis-

Table 3. Mean ($\bar{x}$) and standard deviation (SD) of the constructed indices of dental health behavior and variables related to behavior, in men and women 16–79 years old

Index	Men		Women		Significance, p
	$\bar{x}$	(SD)	$\bar{x}$	(SD)	
Use of fluoride	0.81	(0.39)	0.83	(0.38)	0.47
Interdental hygiene	0.27	(0.45)	0.41	(0.49)	0.00
Communication	0.34	(0.70)	0.48	(0.85)	0.00
Attitude of health†	11.84	(4.40)	11.30	(4.62)	0.03
Net internal health locus of control	7.04	(14.26)	4.84	(14.00)	0.01
Knowledge of health	11.56	(2.07)	11.20	(2.37)	0.00
Social network	1.91	(1.14)	2.17	(1.08)	0.00

† The lower the score, the more positive the attitude.

Table 4. Partial correlation coefficients, adjusted for age, between use of dental services and selected variables, for men (M) and women (F)

			1	2	3	4	5	6	7
1.	Use of dental services								
2.	Use of fluoride	M	0.15						
		F	0.24						
3.	Interdental hygiene	M	0.13	0.09					
		F	0.22	0.11					
4.	Communication index	M	0.04	0.01	0.08				
		F	−0.02	−0.00	0.02				
5.	Attitude to health index†	M	−0.13	−0.12	−0.16	−0.10			
		F	−0.19	−0.10	−0.12	−0.14			
6.	Net internal health locus of control	M	0.08	0.01	−0.01	0.03	−0.23		
		F	0.10	0.02	0.05	0.07	−0.14		
7.	Knowledge of health index	M	0.10	0.15	0.05	0.12	−0.30	0.18	
		F	0.11	0.11	0.06	0.01	−0.26	0.12	
8.	Social network index	M	0.15	0.01	−0.01	0.06	0.01	0.06	0.08
		F	0.14	−0.01	−0.4	0.03	−0.06	0.09	0.06

† The lower the score, the more positive the attitude
When $r \geq 0.07$ $p \leq 0.05$.
When $r \geq 0.09$ $p \leq 0.01$.
When $r \geq 0.12$ $p \leq 0.001$.

Table 5. Standardized canonical discriminant function coefficients, the classification function coefficients (Fisher's linear discriminant function), and the F-values for the variables that discriminated significantly ($p < 0.05$) between regular and irregular users of dental services, for men (M) ($n = 555$) and women (F) ($n = 534$) separately

		Canonical discriminant function coefficients	Classification function coefficient		F-value (degrees of freedom: M 20/534 F 20/513)
			Irregular	Regular	
Interdental hygiene	M	0.246	3.20	3.80	4.72*
	F	0.317	3.01	4.09	13.5*
Use of fluoride	M	0.264	5.86	6.65	5.56*
	F	0.259	5.08	6.30	8.30*
Social network	M	0.248	0.90	1.15	5.16*
	F	0.267	1.75	2.18	9.09*
Attitude to health	M	−0.173	1.14	1.10	2.31 NS
	F	−0.268	0.90	0.80	9.07*
Education†	M	−0.340	10.92	10.01	5.95*
‡	F	−0.214	5.73	6.49	4.60*
Constant	M		−106.35	−105.32	
	F		89.63	−88.19	

In addition to variables listed above, the following non-significant variables were used in the discriminant analysis: communication index, net health locus of control, knowledge of health index, age (dummy variables), year of birth, category of occupation, income (dummy variables), location of residence, number of children, marital status.

* $p < 0.05$; NS = not significant on a 5% level.

† The dummy variable was primary school education; high school was reference category.

‡ The dummy variable was college/university education; high school was reference category.

criminant function coefficients for the variables that discriminated significantly ($p < 0.05$) between the irregular and the regular users of dental services.

The discriminant function, with the demographic, socioeconomic variables and all the constructed indices as discriminating variables, classified correctly 81.4% of the men and 87.5% of the women (Table 6).

Thus far the classification procedure has assigned an individual to either of the two groups—regular or irregular users. Since there is always a possibility of making the wrong classification, we decided to compute the probability that the individual has come from one group or the other. The classification function coefficients listed in Table 5 and the formula quoted previously were used to calculate the posterior probabilities. Only the variables that contributed statistically to the discriminant function were used. For a man with primary school education the probability of being an irregular user of dental services was 9.4% if he had a strong social network and was a regular user of fluoride and interdental remedies. If the same man had generally 'negative' scores on these three variables, the probability of being an irregular user was 40.8%. The probability of being an irregular user for a woman with the corresponding education was 1.1% if she had a positive attitude to health, had a strong social network, and used fluoride and dental floss/toothpicks regularly. If this woman had generally 'negative' scores on these four variables, she had a probability of 40.8% of being an irregular dental visitor.

Table 6. Predicted and actual group membership of regular/irregular users of dental services in accordance with the classification of the discriminant function. Number of cases (n)

Actual group	Predicted group membership			
	Irregular		Regular	
	Men	Women	Men	Women
Irregular users	31.0 (35)	49.4 (43)	69.0 (78)	50.6 (44)
Regular users	5.7 (25)	5.1 (23)	94.3 (417)	94.9 (424)

Percentage of the grouped cases correctly classified: men, 81.4%; women, 87.5% (96 men and 149 women had at least one missing discriminating variable. They were excluded from the analysis).

Discussion

This study group constituted a representative sample of the total adult population in Norway with regard to the background variables chosen (2, 3). This ensures representativeness but not accuracy of the answer to the questions posed. The respondents might want to answer more optimistically than their actual behavior warrants. However, a high degree of reliability has been found in earlier Scandinavian studies (10, 11) to questions similar to the ones asked in this study. Smedby (12) suggested, however, on the basis of a methodologic study, that information on recent visits is generally overreported. In our study, about one-fifth of all dentate Norwegians between 16 and 79 years of age reported not having seen a dentist on a yearly basis. This is a lower rate of irregular use than has been found in the four subsequent studies of use of dental services among Norwegians aged 15 and more (Institute of Community Dentistry, Dental Faculty, University of Oslo. Unpublished observations). This might be due to minor differences in the formulation of the question regarding yearly use of dental services and/or the fact that subjects more than 79 years old were not included in the present study.

It could be questioned whether it was logical to introduce use of interdental measures and fluoride as independent variables. In this study it was done only for analytical purposes. We wanted to find mutable characteristics about regular/irregular users and to study the predictive power of these variables in relation to use of dental services.

Previous studies have shown that the proportion of irregular users of dental health services in the total Norwegian population gradually decreases (13; Institute of Community Dentistry, Dental Faculty, University of Oslo. Unpublished observations).

This process, however, does not occur at the same rate in all segments of the population. Rise (14) found no equalization concerning regular use of dental services between social groups from 1973 to 1983. Even when the cost barriers are removed in the low-income groups, the utilization rate does not necessarily rise (15). If the costs are reduced in all groups, those with high socioeconomic status are the most likely to seek treatment (16). It has been suggested that the perceived quality of life and value preferences in each social class and the different levels of knowledge are partially responsible for differences in utilization rates (1, 17).

The most important demographic/socioeconomic predictors of irregular use were high age and low income/education. The effect of age is, at least partly, a cohort effect. Both the attitude to keeping one's own natural teeth and the availability of dental services have contributed to make the starting point for the older age groups worse than they are for young people of today. Although persons with no teeth were excluded, the variable age still seemed to reflect variations in dental status. The number of remaining teeth is primarily explained by age, education, and income (18).

When excluding the edentulous people, we simultaneously reduced the number of individuals in the highest age group, who are the most likely to have the lowest income/education. Most people left in the low-income group were young, with many of their own teeth remaining, and thus likely to be regular attenders. This probably explains the low percentage of irregular users found in the lowest income group. This finding also confirms our hypothesis about the decreasing significance of the economic factor *per se*, discussed in more detail below. A large proportion of those who did not state their income probably belonged to the highest income group, and should therefore have been included among those individuals on the right side of the diagram (Fig. 1).

The importance of the demographic and socioeconomic variables in explaining the variation in use of dental services is well documented (1). We wanted to explore whether other variables could be just as powerful if they were included in the analysis at step 1 and the demographic and socioeconomic at step 2.

We found that the demographic and socioeconomic variables contributed only moderately in addition to what the personal and dental health-related factors could explain of the variance in use of dental services. Although our data stem from a cross-sectional study, which limits our inferring potential, particularly because of the intercorrelations present, the demographic and socioeconomic variables seemed to a great extent to act *through* the behavioral and personal factors—that is, the seven indices.

The mutable factors that statistically distinguished the regular from the irregular users were as follows: use of interdental remedies, use of fluoride, social network, and attitude (only among women). Although the demographic and socioeconomic variables were forced into the analysis at step 2, education contributed significantly to the discriminant function and was among the most important factors among men.

Knowledge of the characteristics of the irregular users has enabled us to predict a respondent's irregularity of dental attendance more accurately than the frequency distributions of the use of dental services could tell us (Table 1). By changing the values of the most important mutable factors in the equation of posterior probability from positive to negative, the probability of being an irregular user increased from 9.4% to 40.8% for men and from 1.1% to 40.8% for women.

The difference between the two sexes concerning use of dental services is the same as found in numerous other studies (1). In general, women have more favorable dental health behavior than men (19). In our study more women than men used interdental means on a regular basis, but there were no differences in use of fluoride. The intercorrelations between the behavioral indices were also higher among women than among men (Table 4).

Knowledge was, in general, more strongly connected to the other variables among men than among women. Women seemed to be able to act positively in matters concerned

with dental health without necessarily having the same high level of knowledge as men have. Women usually demonstrate greater compliance to authority than men do, and they manifest more concern about behaving in ways that are socially approved (20).

In the present study women got higher mean scores on the communication index and the social network index than men did. According to Block (20), women engage in more prosocial behavior and maintain closer proximity to friends than men do. Women are generally more susceptible to all forms of social influence than men (21). A reasonable hypothesis would be that women change behavior after emotional stimulation and through influence from close friends, whereas men need more facts about the subject before they decide to change.

There is obviously no simple answer to the question of why some people choose to take an active role in caring for their teeth, while others do not. Numerous studies have been aimed at both identifying and explaining the determinants of use of dental services (22–25). Cummings et al. (26) brought 99 variables in 14 different theoretical models, advanced to explain health actions, into 6 broad interpretable factors: 1) accessibility to health care, 2) attitude towards health care, 3) perception of symptoms and threat of disease, 4) social network characteristics, 5) knowledge about disease, and 6) demographic characteristics.

Only four of these sets of factors that influence dental treatment pattern could be derived from our data:

1) Attitudes to dental health and health care, such as the anxiety about dental treatment and the attitude to health authorities.

2) Perception of and action against the threat of dental disease, such as attitudes about susceptibility to dental disease, use of dental floss/toothpicks, and use of fluoride.

3) Interpersonal factors, such as the strength of the social network.

4) Demographic factors, such as sex and education.

In our study the second group of variables (use of fluoride, interdental measures, and attitude/perception) emerged as the set of variables which made the most significant distinction between the regular and irregular users of dental services (Table 5). The statement 'It is unpleasant to go to the dentist, so I always dread it' (Appendix I, question 34) was the one attitude statement out of all the attitude items used in the index which explained most of the variance in use of dental services.

It seems likely that the methods and estimates of the present study may provide some means for the planning of dental health education, particularly because mutable predictors of use of dental services have been identified. To increase the proportion of regular users of dental services, the socio-psychological and behavioral factors that have been accorded little importance should be given more attention in the future. Men and women show different patterns of behavioral characteristics; thus different strategies should be used to reach the irregular users among men and women.

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Appendix I

Question no.	Index name	The wording of the question
	Use of fluoride	
		How often do you use:
1		Fluoride tablets/rinse
2		Fluoride toothpaste
	Interdental hygiene	
		How often do you use:
3		Toothpicks
4		Dental floss
	Communication	
5		Have you, in the past month, read anything about dental hygiene?
6		Have you, in the course of past week, discussed or talked with anyone concerning the dangers associated with unsatisfactory dental hygiene?
		If yes:
		Who have you talked/discussed it with?
7		Family
8		Friends/workmates
9		Others
	Knowledge of health	
		I shall now read out some assertions. Will you state in each case whether you consider the assertion wrong or correct?
10		All kinds of fat give the same risk of various coronary diseases

11		Smoking may cause bronchitis
12		People are required by law to use seatbelts in cars
13		In the opinion of nutrition experts, the diet should contain more iron
14		Smoking is injurious to health, but only if you smoke more than 10 cigarettes a day
15		The heart beats more slowly if a person is in good physical form
16		If you drink only a small amount of alcohol, your ability to react is improved
17		Many lives could have been saved in traffic if everyone used a seatbelt in cars
18		Experts on exercise say that it is enough to exercise once a week as long as you exercise hard enough
19		Power training is the same as condition training
20		The number of men in this country who smoke has increased in the last few years
21		After sleeping 7–8 h you may be sure that all alcohol has left the body
22		It is not necessary to use a seatbelt at speeds of less than 40 km/h
23		Alcohol has a high calorie content
	Social network	
24		How often are you together with friends outside your own family in your leisure time?
25		Other than members of your own family, do you have anyone who is close to you and to whom you can talk about personal problems?
26		Approximately how many such friends do you have?
	Attitude to health	
27		How important do you think it is at present to try to change people's habits with regard to dental hygiene?
28		There is no point in following the advice of nutrition experts. What is considered bad for your health today can just as well be thought good for your health tomorrow
29		Most people have enough problems without adding to these by fussing about all the things that may be dangerous to their health
30		The food that the experts tell us to eat is not as interesting as other food
31		Food that is good for your health is much more expensive than other food in the long run
32		People are so different that food that is bad for the health of one person might just as well be good for the health of another
33		Health experts often use such complicated words and phrases that it is difficult for ordinary people to understand what they are saying
34		It is unpleasant to go to the dentist, so I always dread it
35		If a person is born with bad teeth, it does not help much to look after them properly
	Multidimensional health locus of control (MHLC) scale	
36	(I)*	If I get sick, it is my own behavior that determines how soon I get well again
37	(M)*	No matter what I do, if I am going to get sick, I will get sick
38	(E)*	Having regular contact with my physician is the best way for me to avoid illness
39	(M)	Most things that affect my health happen to me by accident
40	(E)	Whenever I do not feel well, I should consult a medically trained professional
41	(I)	I am in control of my health
42	(E)	My family has a lot to do with my becoming sick or staying healthy
43	(I)	When I get sick I am to blame
44	(M)	Luck plays a big part in determining how soon I will recover from an illness
45	(E)	Health professionals control my health
46	(M)	My good health is largely a matter of good fortune
47	(I)	The main thing that affects my health is what I myself do
48	(I)	If I take care of myself, I can avoid illness
49	(E)	When I recover from an illness, it is usually because other people (for example, doctors, nurses, family, friends) have been taking good care of me
50	(M)	No matter what I do, I am likely to get sick
51	(M)	If it is meant to be, I will stay healthy
52	(I)	If I take right actions, I can stay healthy
53	(E)	Regarding my health, I can only do what my doctor tells me to do

* (I) = measure of internal health locus of control; (E) = measure of external health locus of control; (M) = measure of missing health locus of control.

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Artikkel III

The effect of 2 teaching programs on the gingival health of 15-year-old schoolchildren

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Abstract. The present study evaluated the effect of 2 different dental health education programs on schoolchildren's gingival health and identified the subgroups best reached with these programs. The traditional program was the same as the yearly recurrent Dental Health Week (DHW) – comprising an informational package submitted to the teachers. The comprehensive program was in addition to the DHW-package, based on principles in social learning theory and research. Data from 15 schools in 5 municipalities, comprising 1167 students, were used. 1/3 of the children made up a reference group. Each subject was clinically examined 3 weeks before and 3 weeks after the intervention, and rated by using the non-bleeding papillae index (NBP). A questionnaire was completed by each of the 15-year-olds at the time of the second examination. The overall increase in NBP-index scores was from 38.9% to 43.1% in the traditional program and from 45.4% to 52.1% in the comprehensive one. The difference between the programs was not significant. After adjusting for social status variables, sex and initial bleeding, an effect of the comprehensive program appeared ($p < 0.01$). The strongest effect of the comprehensive program was found among the schoolchildren with poor initial gingival health. Our findings support the theory of active participation, visualization and involvement of parents.

Key words: Dental health education – schoolchildren – social learning theory.

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The Dental Health Week (DHW) is an annual event offered to all primary schools in Norway by Norsk Tannvern (NT) – i.e., The Norwegian Association for the Promotion of Oral Health. The same kind of annually recurring programs are carried out in other countries as well (Jodaikin 1981, ADA 1984). In general, the majority of interventional studies in this field have, so far, failed to show any lasting effect on oral health (for review see Young 1970, Rayner & Cohen 1971, Haefner 1974, Frazier 1981).

In 1981, NT decided to evaluate the DHW. The topic this year was gingival health, and the importance of interdental cleaning was emphasized.

In addition to an evaluation of the effect of the DHW, NT wanted to test a specific educational approach based on selected learning principles in social psychology. Research aimed at changing attitudes and behavior has shown the importance of *active participation* and *social network involvement* (Zimbardo et al. 1977). *Visualizing, modeling, self-monitoring* and *skill training* are emphasized in social learning theory (Bandura 1977, Parcel & Baranowski 1981). This theory argues that it is possible to change any specific behavior by changing the expected consequences for engaging in a crucial behavior.

An anti-smoking campaign among Norwegian schoolchildren used some of these principles (Aaro et al. 1983). The more of the factors the children were exposed to, the more substantial was the reduction in the cigarette consumption. Based on the encouraging results from this study, we wanted to see if the same principles could be successfully used in a dental health education program carried out as a school-based municipality clinical trial. The purposes of the present study were:

1. To evaluate the effect of DHW on gingival health of 15-year-old schoolchildren.
2. To compare the effect of 2 different ways (traditional and comprehensive) of performing the DHW teaching program.

Material and Methods

Study group

15-year-old students in 15 schools in 5 selected municipalities present at the pre- and/or post-interventional examination, were included. The 1167 participants constituted 91% of the total number of students enrolled in the selected schools that term. 1038 students were present at both the clinical examinations.

Study design

The study design is schematically shown in Table 1. The students were examined clinically 3 weeks before the intervention, which took place within a period of 1 week, and 3 weeks after. At the 2nd examination, the students filled out a questionnaire.

Table 1. Study design

	Before	Intervention						After
Group	clinical examination	didactic teaching	process oriented teaching	teacher booklet and information	student booklet	student activity	student reinforcement	parent involvement	clinical examination
Traditional	×	×		×					×
Comprehensive	×		×	×	×	×	×	×	×
Reference	×								×

Dependent variable

Gingival health was assessed according to the Non Bleeding Papillae system (NBP) (Gjermo 1984). A wooden toothpick was inserted in 6 selected areas (mesial to first molars and central incisors). The % of papillae which did not bleed after provocation, expressed the gingival health status. The examination took place in ordinary chairs, without drying the teeth, and without extra light, handmirror, or explorer. Local public dentists and dental hygienists performed the examinations. Calibration procedures were carried out for some of the examiners. Concerning changes in NBP, no difference was found between groups examined by calibrated and non-calibrated examiners ($p = 0.46$).

The validity of the NBP system has been reported to be satisfactory for epidemiological purposes (Gjermo 1984). In order to estimate the reliability of the system, the correlation between the individual scores obtained at the first and the second examination was computed. For the traditional, the comprehensive and the reference groups, the correlation coefficients were 0.36, 0.30 and 0.44, respectively.

Independent variables

The questionnaire provided information about the parents occupation and the students educational aspiration. The students were grouped in social classes according to father's occupation (Swedner 1970), and subgrouped according to whether or not their mothers were employed. The third social class indicator was their educational aspiration (see, for example, Arnliot (1979)). The independent variables and their categories are shown in Table 2.

The traditional program of DHW comprised a written information to the teachers about gingival disease, its diagnosis and prevention. In addition, some student-information material was included in the traditional "DHW-package". The teachers were asked to perform in the way they usually did. The comprehensive program contained, in addition to the "DHW-package", a booklet on periodontal disease and prevention for each student. The teachers were encouraged to base their teaching on the following three principles from social learning theory (Bandura 1977) and empirial research (Zimbardo et al. 1977): visualization, active involvement and social support. Student activity and visualization were included by having the students to disclose their own plaque, by growing their own bacteria from this plaque and by discussing gingival health topics in the classroom. Parents were involved throught receiving a folder with information about gingival health and the program executed at school. They were also told how they could actively support the program by discussing the issue with their children.

In addition to the schools arranging the traditional and the comprehensive

Table 2. Distribution of participants according to examined groups and some background characteristics *after* regrouping

	Groups							
	Traditional ($n = 301$)		Comprehensive ($n = 240$)		Reference ($n = 500$)		Total ($n = 1041$)	
Characteristics	*n*	%	*n*	%	*n*	%	*n*	%
Sex								
girls	153	50.8	115	47.9	257	51.4	525	50.4
boys	148	49.2	125	52.1	243	48.6	516	49.6
Educational aspiration*								
college	125	41.8	77	32.4	226	45.7	428	41.5
technical school	49	16.4	55	23.1	84	17.0	188	18.2
other†	58	19.4	42	17.6	85	17.2	185	17.9
none/don't know	67	22.4	64	36.9	99	20.0	230	22.3
Mother's work status								
home	93	31.2	60	25.6	99	27.0	287	27.9
outside home	204	68.7	174	74.4	362	73.0	740	72.1
Father's occupational status*								
social class 1	43	14.8	18	7.9	112	23.1	173	17.3
social class 2	98	33.8	84	36.8	181	37.4	363	36.2
social class 3	149	51.4	126	55.3	191	39.5	466	46.5

* The difference between the program-groups is significant ($p < 0.05$).
† Other: get a job, be an apprentice, attend other types of school.

Table 3: The % NBP before and after the intervention, and the mean change in NBP-score before and after regrouping the data

	Before regrouping gross effect					After regrouping program effect				
groups	(*n*)	NBP before	NBP after	$\bar{d}$	s.d.	(*n*)	NBP before	NBP after	$\bar{d}$	s.d.
traditional	(395)	34.5	38.1	3.6	25.2	(301)	38.9	43.1	4.2	28.0
comprehensive	(390)	43.2	48.1	4.9	26.8	(240)	45.4	52.1	6.7	29.0
reference	(382)	40.5	45.5	5.0	26.9	(500)	37.1	41.6	4.5	25.0

Table 4. % change in NBP-scores in the traditional, comprehensive and reference group adjusted for sex, socio-economic characteristics and initial bleeding. Unadjusted/adjusted mean and unadjusted (η)/adjusted (β) coefficients (MCA)

	Unadjusted mean	η	Adjusted mean	β
traditional program	4.47		4.20	
comprehensive program	6.35		10.00	
reference group	4.38		2.80	
		0.03		0.11
R^2		0.01		0.29

DHW-program, 5 schools, which had not accepted the DHW program this year, were included for comparison as a reference group (Table 1). To avoid dissemination, each school arranged only one of the programs.

Data analysis

Between-group differences in percent change in NBP were tested by one-way analysis of variance. Within-group changes were analyzed by means of a paired *t*-test.

Succeeding the field work, questionnaires distributed to all participating teachers (response rate 80%) and interviews with the 5 Chief Dental Officers, revealed that some teachers failed to carry out their program according to the plan. Therefore, to compare the net effect of the different programs, the participants were redistributed according to which program they really had received (Table 3). 5 classes (126 students) had to be excluded due to lack of information.

A multiple classification analysis (MCA), suited for analysis of categorical independent variables, was applied to study the program effects and the effect of the programs on subgroups of students with different initial gingival health status (Andrews et al. 1973).

The relative effect of the independent variables on the dependent variable was estimated by means of analysis of covariance (Wildt & Athola 1978).

Results

In the 1st stage of analysis, the Dental Health Week's *gross* effect was studied by using data from the three original groups. All the groups examined showed improvement in gingival health, measured as increased percentage of NBP (Table 3). However, the differences between the groups were not significant at the 5% level.

The same analysis was then performed for the regrouped data, in order to detect the *net* effect of the different teaching programs. All groups showed improvements between the 2 examinations ($p<0.05$). The average NBP increased from 38.9% to 43.1% in the traditional, from 45.4% to 52.1% in the comprehensive, and from 37.1% to 41.6% in the reference group (Table 3). The differences between the groups were, however, still not significant at the 5% level. After adjusting for the social status variables, sex and initial bleeding, the mean differences in the traditional, comprehensive and reference groups were 4.2%, 10.0% and 2.8%, respectively ($p<0.01$) (Table 4).

The covariate, initial bleeding, came out highly significant ($p=0.001$). Therefore, the students were divided into 3 groups according to their initial bleeding score: the "poor", the "fair" and the "good" group (see Fig. 1). Students with poor gingival health at the 1st examination improved their gingival health more if they received the comprehensive educational package than if they received either the traditional one or no education at all ($p<0.01$). Among students with an initial gingival health of "fair" or "good" we did not find any significant difference between the programs (Fig. 1).

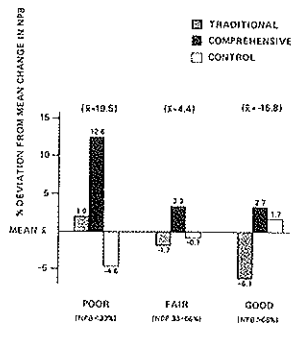

Fig. 1. Deviation from mean % change in NBP-score in the 3 examined groups of school children within each category of initial gingival status.

Table 5. % change in NBP-scores in groups of independent variables within each of the 2 program groups, adjusted for initial gingival health status and the other independent variables

	Traditional program Adjusted mean	β	Comprehensive program Adjusted mean	β
Sex		0.01		0.13
girls	4.8		10.5	
boys	4.1		3.0	
Aspiration		0.09		0.12
college	2.7		5.4	
technical school	6.4		11.5	
others	2.0		0.6	
none/don't know	8.6		7.6	
Father's social class		0.06		0.08
1	5.1		3.3	
2	2.1		9.6	
3	5.9		5.0	
Mother's work status		0.00		0.03
home	4.5		5.3	
outside home	4.4		7.0	
R^2 (adjusted for independents)		0.04		0.05
R^2 (adjusted for independents and covariate)		0.35		0.39

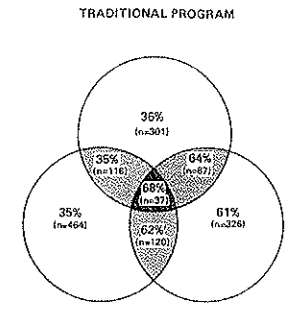

Fig. 2. % of 15-year-old school children improving their gingival health, in different subgroups and in combinations of subgroups.

The 2 DHW programs were then studied separately, adjusting for the initial NBP-score as well as the other independent variables. In the traditional program, educational aspiration explained most of the variance ($\beta = 0.09$), in the comprehensive program sex exhibited the highest beta value (0.13) (Table 5). All the variables in the analysis of covariance explained 35% and 39% of the total variance, for the traditional and the comprehensive programs, respectively.

Finally, for each program the best predictors of improvement were studied

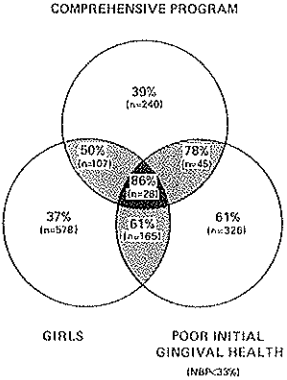

Fig. 3. % of 15-year-old school children improving their gingival health, in different subgroups and in combinations of subgroups.

together. 36% of the students receiving the traditional program improved their gingival health. Among those who also had poor initial gingival health and college aspirations, 68% showed improvement (Fig. 2). In the comprehensive program, in general 39% of students showed improvement, while 86% of the girls in this program with initially poor gingival health improved (Fig. 3).

Discussion

A number of recent studies on schoolbased dental preventive programs (for review, see Melcher & Feldman 1979, Silversin & Kornachi 1984) have shown limited effect on oral health of "one-shot" of dental health information. In retrospect it may not be surprising that the overall effect of the *traditional* DHW was modest. However, our evaluation warrant a careful analytic design. When the general oral health is good it would be unlikely to expect further improvement across all individuals. In aggregate, the gains would be hidden by the already adequate gingival health among a number of individuals.

Furthermore, it should not be disregarded that part of an effect of the traditional program may be overlooked due to measurement error. Assuming that the two NBP-registrations are subject to random measurement errors, it is to be expected that bivariate correlations and regression coefficients tend to be attenuated (Asher 1983). An empirical indication of random measurement error was the lack of difference found between groups examined by calibrated and non-calibrated examiners.

A clear effect of the comprehensive program emerged when differencies in sex, socio-economic status and initial bleeding were adjusted for. Also among those with initially low NBP-score, we found the comprehensive program to be effective. To reach individuals with poor dental health status has been the problem for dental health educators for years, and the importance of targeting interventions to high-risk individuals has been emphasized (Silversin & Kornacki 1984).

Our findings support the theory of active participation and social network involvement (Zimbardo et al. 1977) and the principles in social learning theory (Bandura 1977). The learning principles involved have been found to promote *behavioral* changes, not necessarily to improve health. It is to be expected that the statistical association between program and health would be weaker than a direct effect of program on behavior in terms of brushing, flossing etc. It is therefore noteworthy that these principles also seem to be effective when *health* is measured as the endpoint. Our approach is new in a dental health education setting, but *parts* of our program have been tested in other studies. "Learning by doing" and student activity have been shown to be effective in improving gingival health (Gravelle et al. 1967, Bakdash 1979, Craft et al. 1981). Moreover, involvement of parents have been successfully used in many dental health education programs (Rayner & Cohen 1971, Rayner 1974, Greenberg 1977, Hart & Behr 1980, Jensen 1981).

The observed interaction between type of program and educational aspiration upon changes in gingival health suggests that students aspiring for a high social status are able to take advantage of the traditional program, i.e., learning from reading and didactic teaching. Furthermore, students more likely to aspire for a lower social status, i.e., to perform through technical skills, seem to learn more efficiently through the learning principles built into the comprehensive program (Isling 1984). Across types of skill, girls in their mid-teens seem to be more receptive than boys to information about their dental health, particularly those receiving the comprehensive program. That girls seem to improve more than boys, corresponds with earlier findings (Gravelle et al. 1967, Graves et al. 1975, Jensen 1981).

The fact that all 3 groups improved, could partly be due to the well-known "reactive testing effect" (Moser & Kalton 1972), i.e., that behavioral changes are seen when a group gets any kind of attention, e.g., an examination. This phenomenon is also well-documented in the dental health education literature (Podshadley & Shannon 1970, Evans et al. 1975, Greenberg 1977, Melcher & Feldman 1979). To find out how much effect the first examination might have had on the improvement of gingival health, we compared the students who were present at both examinations with the students present at the second examination only ($n = 48$). The difference in NBP between the students present at both examinations and those who did not participate the first time, was 8.1% in favor of the former. This indicates

that the first examination may account for at least a part of the overall improvement.

The aim of the DHW was to improve gingival health and the overall results were promising. However, we have only measured short-term effects. Evans et al. (1970) underline the limitations of investigations involving only immediate postinterventional measures of the effect. Repeatedly, it has been found that improvements in oral health regress to baseline when supervision or other stimuli are removed. The exceptions that are found (Albertini et al. 1973, Jensen 1981, Craft et al. 1981), are characterized by containing many of the same elements and principles that were incorporated in our comprehensive program.

Before we can establish the described method to be effective in improving gingival health among schoolchildren, we need to do a long-term experimental field trial containing repeating reinforcement.

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Zusammentassung

Der Effekt zweier Unterweisungsprogramme auf die Zahngesundheit von 15 Jahre alten Schulkindern

Die hier zusammengefasste Studie wertet den Erfolg zweier unterschiedlicher Zahngesundheitsprogramme bei Schulkindern aus und identifiziert die Untergruppen, die mit diesen Programmen am besten erreicht wurden. Das traditionelle Programm entspricht dem Programm einer sich jährlich wiederholenden Zahngesundheitswoche (DHW). Es besteht aus einem Informationspaket das den Lehrern überantwortet wird. Das hier aktuelle, umfangreiche Programm wurde zusätzlich zu dem DHW-Unterweisungspaket durchgeführt und geht prinzipiell von der Theorie des sozialen Lernens aus, sowie von Forschungsergebnissen. In 15 Schulen in 5 Gemeinden wurden Daten ausgewertet, die bei 1167 Schülerinnen registriert worden waren. Ein Drittel der Kinder bildete eine Referenzgruppe. Jede Versuchsperson wurde 3 Wochen vor und 3 Wochen nach dem Stattfinden des Versuchsprogrammes untersucht und nach dem "Index nicht blutender Papillen" (NBP) eingestuft. Ausserdem wurde von den 15-jährigen Versuchspersonen anlässlich der 2. Untersuchung ein Fragebogen ausgefüllt. Bei dem traditionellen Programm wurde ein allgemeines Ansteigen der NBP-Beurteilungseinheiten von 38.9% auf 43.1% festgestellt und bei dem umfassenden Programm von 45.4% auf 52.1%. Der Erfolgsunterschied zwischen den Programmen war nicht statistisch abgesichert. Nach Adjustierung sozialer Statusvariabler sowie der Variablen Geschlecht und initiale Zahnfleischblutung, wurde der Effekt des umfassenden Programmes offenbar ($p < 0.01$). Der nachhaltigste Effekt wurde bei Schulkinder mit anfangs schlechter gingivaler Gesundheit konstatiert. Unsere Resultate unterstreichen die Theorien der aktiven Teilnahme, der Visualisierung und der elterlichen Teilnahme.

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Résumé

L'effet de deux programmes d'enseignement sur la santé gingivale d'élèves de 15 ans

La présente étude a évalué l'effet de deux programmes différents d'enseignement en hygiène buccale sur la santé gingivale d'élèves et identifié les sous-groupes les mieux touchés par ces programmes. Le programme traditionnel était semblable à celui annuel de semaine de santé dentaire (DHW), comprenant un matériel d'information donné aux professeurs. Le programme complet était en outre basé sur des principes d'apprentissage social de théorie et de recherche. Les données proviennent de 15 écoles situées dans cinq communautés, totalisant 1 167 écoliers. Un tiers des enfants constituait un groupe de référence. Chaque sujet a été examiné cliniquement trois semaines avant et trois semaines après l'intervention d'une durée d'une semaine, et évalué en utilisant l'indice de non-saignement papillaire (NBP). Un questionnaire a été rempli par chacun lors du second examen. L'augmentation générale des scores NBP était de 38.9% à 43.1% dans le groupe à programme traditionnel et de 45.4% à 52.1% dans celui à programme complet. La différence entre les programmes n'était pas significative. En ajustant les variables dues au niveau social, au sexe et au saignement initial, un effet du programme complet est apparu ($p < 0.01$). L'effet le plus marqué a été découvert parmi les élèves avec pauvre santé gingivale au départ. Ceci supporte la théorie de participation active, de visualisation et de participation des parents.

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Artikkel IV

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Some of the programmes which have been successful in changing dental health behaviour among schoolchildren (Lattal, 1969; Evans *et al.*, 1975; Albino, 1978; Craft, Croucher & Dickinson, 1981; Jensen, 1981) have, in their planning and implementation, been based on one of the following models: persuasive communication, behaviour modification, 'belief-consistency' technique, social learning theory or group dynamics; including active participation, a high level of teacher cooperation and parent involvement.

Principles from social learning theory, eg visualization, involvement and reinforcement, were used in the present campaign carried out among Norwegian schoolchildren. The study had a twofold purpose:

(1) To evaluate the effect of two different teaching programmes, a traditional Dental Health Week (DHW) and a more comprehensive programme, on schoolchildren's dental health behaviour and factors associated with behaviour.

(2) To find the predictors which could explain the variation in dental health behaviour for girls and boys.

Material and methods

Study group and design

The study design is shown schematically in Table 1. Fifteen-year-old children in 15 schools at five selected municipalities were included in the study. The Chief Dental Officer randomly assigned 10 of the schools to one of the two experimental groups. Five schools which had not accepted the DWH programme that year were included as a reference group. The schoolchildren were examined clinically three weeks before and three weeks after the campaign, which took place within a period of one week. All the 1167 children who completed the questionnaire at the end of the campaign were included in the study. They constituted 91 per cent of the total number of children enrolled in the selected schools that term in 1981.

Table 1. *Study design. The examinations were carried out 3 weeks before and 3 weeks after the 1 week campaign period.*

	Clinical examination of gingival health	*Campaign*	*Self-administered questionnaire and clinical examination of gingival health*
Group/programme			
Reference	x		x
Traditional	x	x	x
Comprehensive	x	x	x

After the field work, questionnaires distributed to all participating teachers (response rate 80 per cent) and interviews with the five Chief Dental Officers revealed that some teachers had failed to carry out their programme according to the plan. Therefore, to compare the net effect of the different programmes, the participants were redistributed according to which programme they really had received. Five classes (126 children) had to be excluded due to lack of information about this matter. Results from the clinical examination before and after redistribution are given elsewhere (Sϕgaard *et al.*, 1987).

The campaign

The traditional DHW-programme comprised written information for the teachers about gingival disease and its diagnosis and prevention. In addition, some information material for the children was included in this package. The teachers were asked to conduct the educational procedure in the manner in which they were accustomed.

The comprehensive programme contained, in addition to the DHW package, a booklet on periodontal disease and its prevention for each child. The teachers were encouraged to base their teaching on the following three principles from social learning theory (Bandura, 1977) and empirical research (Zimbardo, Ebbesen & Maslach, 1977): visualization, active involvement and social support. Student activity, involvement and visualization were included by getting the children to disclose their own plaque, by growing their own bacteria from this plaque and by discussing gingival health topics in the classroom. Parents were involved by giving them a folder containing information about gingival health and about the programme carried out at the school. They were also told how they could actively support the campaign by discussing the issue with their children.

Data collection

The children filled in a questionnaire 3 weeks after the termination of the campaign period. A precoded questionnaire provided information about socioeconomic and demographic characteristics of the children in addition to self-reported dental health knowledge, attitude and behaviour, and factors related to these.

Variables

Answers to simple questions were used, in the first part of the analysis, to evaluate the effect of the programme. In the second part, which was aimed at predicting dental health behaviour, several indices were constructed based on many of the same questions. The questions are given in the Appendix.

(a) Programme effect

Knowledge of gingival health. To evaluate the knowledge of gingival health, questions 1 and 2 in the Appendix were asked. Correct knowledge required four correct answers.

Knowledge of caries. Caries was not a topic in this campaign. Knowledge about how to avoid it was therefore used as an overall measure of pre-programme knowledge. (Question 3). One or two correct answers were judged as correct knowledge of caries.

Motive for tooth-cleaning. The children were categorized according to whether they cleaned their teeth to avoid gingival disease or whether they gave other reasons for cleaning them (Question 4).

Self-efficacy regarding prevention of gingival disease. Those who believed that they could avoid gingival disease were regarded as having high self-efficacy (Question 5).

Communication about dental health. Those children who reported that they had talked to their mother and father about dental health during the previous 2 months were regarded as having a positive communication pattern (Question 6).

Media exposure. Those children who had watched or listened to at least one programme about dental health on television or radio during the previous 2 months were regarded as having a high degree of media exposure (Question 9).

Attitude to and assessment of the educational programme received. Those children who agreed to statements 11 and 12 of the Appendix were regarded as having a positive attitude. Those in the reference group, who did not know the DHW programme from previous occasions, were asked to record the neutral category.

Dental health behaviour. More conscientious use of dental floss or wood points during the autumn of 1981, and more conscientious toothbrushing, were used as measures of positive behaviour change (Question 14).

(b) Predictors of dental health behaviour

Dependent variable: Dental health behaviour. An index was constructed based on the use of dental floss and wood points and the self-reported change in the use of dental floss, points and toothbrush (Questions 13 and 14 in the Appendix. The scores ranked from 0 to 5).

Independent variables: Knowledge of gingival health. An index was based on questions 1 and 2 in the Appendix. (The scores ranked from 0 to 4).

Motive for tooth-cleaning. Those who cleaned their teeth to avoid gingival disease scored 1, the others scored 0. (Question 4).

Self efficacy regarding prevention of gingival disease. Those who did not agree with the statement in question 5 scored 1, the others scored 0.

Communication about dental health. An index, with scores ranked from 0 to 3, was constructed, based on the answers to questions 6, 7 and 8.

Media exposure. Questions 9 and 10 formed the basis for the media exposure index, ranking from 0 to 3.

Assessment of the effect of the educational programme received. Those children who agreed to the statement in question 12 scored 1, the others scored 0.

Socio-economic and demographic variables. The children of both sexes were grouped in social classes according to the father's occupation (Swedner, 1970), and subgrouped according to whether or not their mothers were employed. The third social class indicator was their educational aspiration (Arnliot, 1979). The distribution of these variables is given in Table 2.

Table 2. *Distribution of the 15-year-old schoolchildren according to the programme groups and some background characteristics.*

	Groups							
	Traditional (n=301)		*Comprehensive (n=240)*		*Reference (n=500)*		*Total (n=1041)*	
	n	%	*n*	%	*n*	%	*n*	%
Sex								
Girls	153	50.8	115	47.9	257	51.4	525	50.4
Boys	148	49.2	125	52.1	243	48.6	516	49.6
Educational aspiration*								
College	125	41.5	77	32.1	226	45.2	428	41.1
Technical school	49	16.3	55	22.9	84	16.8	188	18.1
Other†	58	19.3	42	17.5	85	17.0	185	17.8
None/don't know	69	22.9	66	27.5	105	21.0	240	23.1
Mother's work status								
Home	93	31.2	60	25.6	134	27.0	287	27.9
Outside home	204	68.7	174	74.4	362	73.0	740	72.1
Father's occupational status*								
Social class 1	43	14.8	18	7.9	112	23.1	173	17.3
Social class 2	98	33.8	84	36.8	181	37.4	363	36.2
Social class 3	149	51.4	126	55.3	191	39.5	466	46.5

* The difference between the programme groups is significant ($P<0.05$).
† Other: get a job, be an apprentice, attend other types of school.

The programmes. The programme variables were transformed into two dummy variables with the reference group as the reference category.

Data analysis

(a) Programme effect. Cross-tabulations were applied to study the effect of the programme on the variables listed above. Ninety-five per cent confidence intervals were calculated for the positive values of each variable in the three groups. The distribution of each of the variables on the three programme groups and the sex distribution of the various variables were tested by means of χ^2, as were the differences in knowledge of gingival health and knowledge about caries between the three groups.

(b) Predictors of dental health behaviour. To find predictors for the use of tooth cleaning methods, multiple regression analyses were computed for boys and girls separately. First, a backward elimination method was used to select the variables which explained significant parts of the variance in dental health

behaviour ($P<0.05$). All the variables listed above were used in this first stage. Those variables which were still in the equation at the last step for girls and boys respectively were then employed in a new regression analysis with a fixed model.

Results

(a) Programme effect

Dental health knowledge. The proportion with correct knowledge about gingival health was higher in the comprehensive group than in the traditional and the reference groups; 28.4 per cent, 23.3 per cent and 19.1 per cent, respectively (Fig. 1). The difference was only significant between the comprehensive and the reference groups ($P<0.05$).

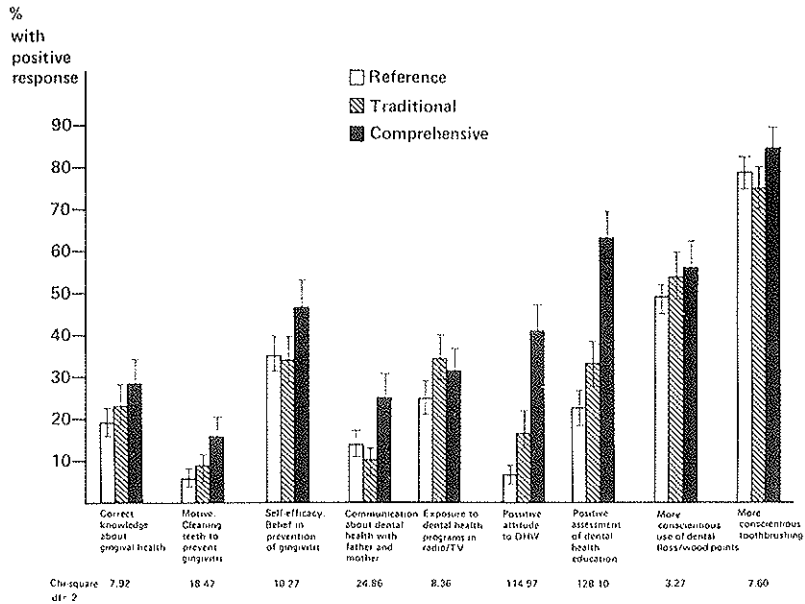

Fig. 1. *Percentages of 15-year-old schoolchildren with correct knowledge of gingival health, correct motive for toothcleaning, high level of communication and media-exposure, positive attitude to dental health education and positive change in dental health behaviours according to the programme groups.*

While the proportion with correct knowledge about gingival health was higher in the comprehensive group than in the reference group, the reverse was the case with regard to knowledge about caries (Fig. 2).

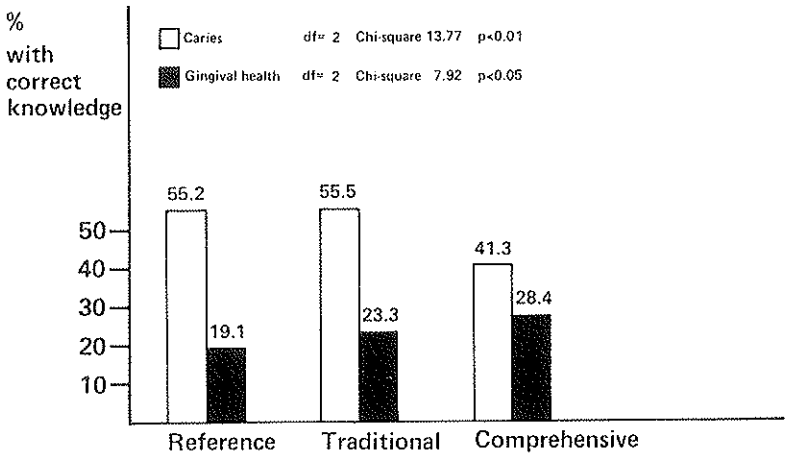

Fig. 2. *The percentage of 15-year-old schoolchildren with correct knowledge of gingival health and caries in the two educational groups and the reference group.*

Motive for toothcleaning. The main reason given by more than three quarters of the children for brushing their teeth was to prevent dental decay (Table 3). However, 15.5 per cent of the respondents in the comprehensive group compared with 8.3 per cent in the traditional and 5.7 per cent in the reference group brushed to prevent gingival disease (Fig. 1). The difference was significant only between the comprehensive group and the reference group ($P<0.05$).

Table 3. *The percentage of the 15-year-old schoolchildren grouped by the reason given for brushing in each of the programme groups.*

Main reason for brushing	*Reference (n=473)*	*Traditional (n=277)*	*Comprehensive (n=226)*
	%	%	%
To get white teeth, to avoid foul breath, to have a nice taste	9.5	7.6	6.6
To prevent dental decay	84.8	84.1	77.9
To prevent gingival disease	5.7	8.3	15.5

Chi-square: 19.57 d.f. = 4 $P<0.01$

Self efficacy regarding prevention of gingival disease. A higher proportion of children in the comprehensive group compared with the other two believed in their own ability to prevent gingival disease ($P<0.05$) (Fig. 1).

Communication about dental health. A significantly higher percentage of the children in the comprehensive group (24.9 per cent) reported that they had talked to their parents about dental health during the previous two months compared with the traditional (9.8 per cent) and the reference group (13.8 per cent) ($P<0.05$) (Fig. 1).

Media exposure about dental health. The percentage of the children who reported that they had watched or listened to one or more programmes about dental health on television or radio during the previous two months was higher in the two experimental groups compared with the reference group. The difference was only significant between the traditional and the reference group ($P<0.05$) (Fig. 1).

Attitude to and assessment of the educational programme. Regarding both the attitude to the DHW programme and the assessment of what they had learned about gingival health recently, a higher percentage of the children in the comprehensive group, compared with the traditional, had a positive response ($P<0.05$) (Fig. 1). The reference group could not be used as a comparison with regard to the first attitude question.

Positive change in use of toothbrush and interdental remedies. 84.4 per cent of the children in the comprehensive group reported more conscientious toothbrushing during the preceding autumn compared with 74.6 per cent in the traditional group ($P<0.05$) (Fig. 1). No difference was found between the three groups concerning those reporting more conscientious use of dental floss or wood points ($P>0.05$) (Fig. 1).

In all three programme groups a higher percentage of girls than of boys had a positive response concerning the nine different end points of evaluation, but the difference between the sexes was only significant for communication about dental health issues and more conscientious use of dental floss or wood points ($P<0.05$). The only exception from this general pattern was self efficacy. 52.0 per cent of the boys in the comprehensive programme believed that they could prevent gingival disease; the corresponding percentage for girls was 40.7 per cent ($P=0.08$).

(b) Predictors of dental health behaviour

The unstandardized and standardized regression coefficients for the use of tooth cleaning methods are listed in Table 4, for girls and boys separately. Communication about dental health issues with parents and friends was highly significant for both sex sexes ($P<0.001$). Among boys, listening to, watching and reading dental health subjects in the mass media together with education aspiration explained significant parts of the variance in dental health behaviour ($P<0.01$ and $P<0.05$, respectively). Among girls the attitude towards dental health education was significant ($P<0.05$). The fixed regression model was significant for both sexes ($P<0.001$). The explained variance was higher for boys ($R^2=0.08$) compared with girls ($R^2=0.05$).

Table 4. *The associations between dental health behaviour and different background variables among 15-year-old schoolchildren.* Unstandardized (B) and standardized regression coefficients (Beta) and t-values.

	Girls			*Boys*		
	B	*Beta*	*t-value*	*B*	*Beta*	*t-value*
Independent variables						
Communication about dental health	0.18	0.16	3.54	0.21	0.17	3.87
Media exposure	0.10	0.08	1.85	0.18	0.14	3.24
Attitude to dental health education	0.23	0.10	2.09	0.06	0.03	0.57
Educational aspiration*	-0.02	-0.01	-0.21	0.21	0.09	2.04
Programme (Dummy 2)**	-0.08	-0.03	-0.59	0.23	0.09	1.89
R^2		0.05			0.08	
F-value		5.84***			8.59***	

t> 1.96 $P<0.05$; t> 2.58 $P<0.01$; t> 3.29 $P<0.001$.

* Educational aspiration: those who planned to attend college or technical school received the value 1, the others the value 0.

** Comprehensive group=1

***$P<0.001$

Discussion

After the redistribution of the participants the study was no longer a randomized one. Study of the effect of the campaign was restricted by its limitation to only post-campaign information. The absence of a baseline test leads to the possibility that any difference between the groups could be attributed either to exposure or to selection differences between the groups. Since the schools were randomly allocated to the three groups, and only minor differences in the results were found when data were analysed *before* versus *after* regrouping, it may be assumed that the analyses were not seriously affected by selection bias. Therefore although these data stem from a cross sectional study, which limits the inferring potential about the effect of the campaign, the following comments and interpretations will assume that the reference group was equivalent to a baseline.

The lack of pre-programme information about the endpoints measured in this study is a serious limitation and may impair the drawing of conclusions. Each subject was, however, clinically examined before the educational programmes were initiated. No significant differences were found in gingival health status between the three groups measured by the Non Bleeding Papillae system (Sϕgaard *et al.*, 1987).

Another comment should be made about the method. The *reported* behaviour may not reflect the *actual* behaviour; ie the reported use of dental floss and wood points versus a *true* use of these interdental cleaning methods. When intra-

psychic and behavioural variables are employed, large measurement errors may be expected which are assumed to be equally distributed between the groups. If changes are observed the real effects are bigger, since measurement errors always attenuate the strength of a relationship.

(a) Programme effect

The *comprehensive* programme had an effect on all the factors which are found to be associated with dental health behaviour, such as dental health knowledge, motives for action, belief in own ability to prevent disease and communication about dental health issues. The children in the comprehensive group were also more positive about the DHW and reported that they had learned more about gingival health compared with the traditional group. The effect of the comprehensive programme on dental health behaviour was, however, only moderate. No difference was found concerning the more conscientious use of interdental cleaning methods between the three groups, while the percentage which reported more conscientious toothbrushing behaviour was significantly higher only compared with the traditional group ($P<0.05$). Use of wood points and in particular, dental floss, is difficult, and more instruction in their use is probably needed to attain any observable improvement. If the Public Dental Officers could follow up the yearly recurrent DHW by practical training in the use of interdental cleaning methods, a more pronounced effect on behaviour might appear as a result of the comprehensive programme.

More girls than boys obtained a positive score in most of the endpoint measures, although the differences were significant only for communication and use of interdental cleaning methods. The sex-related differences may be interpreted as expressions of how boys and girls take advantage of learning situations. Numerous studies have revealed more favourable dental health behaviour among women than among men (for review see Rayner & Cohen, 1971; Gift, 1984; Sϕgaard, 1986). Among adolescents significant sex role differences in dental health behaviour have also been reported (Jensen, 1973; Honkala, 1985; Sϕgaard, 1986). In their opinion-leader study Bay & Holstein (1981) also found girls more susceptible to behavioural influence than boys.

Women usually demonstrate greater compliance to authority than men do; they are more persuadable and manifest more concern about behaving in ways that are socially approved (Freedman, Carlsmith & Sears, 1970; Block, 1980).

The differences between the three groups in the knowledge of gingival health on the one hand and knowledge of caries on the other, confirm the effectiveness of the comprehensive programme. Knowledge of caries, which was not a topic of the DHW, was considered to be a base-line. It is reasonable to assume that the children participating in the comprehensive programme, which contained more with a lower socio-economic status than the other two groups (Table 2), also had a lower level of knowledge about dental health before the campaign. Among adults, socio-economic status and knowledge of dental health are strongly correlated (Sϕgaard, unpublished data). The fact that the difference between the two measures of knowledge was smaller in the comprehensive group compared with the other two lends weight to the conclusion.

An alternative explanation could be that the strong emphasis which was put on gingival health in the comprehensive group acted as a barrier against the acquisition of knowledge of other dental health issues.

The achievement of significant improvements in dental health knowledge are in accordance with several other studies (Anaise & Zilkah, 1976; Graves *et al.*, 1975; Stolpe *et al.*, 1971). Only a few have produced convincing evidence of positive changes in dental health behaviour. The reason for this may well be that such efforts have relied on traditional instruction models which rarely go beyond the teaching of concepts and skills (Rayner & Cohen, 1971). Authors have demonstrated that presenting information will not lead to changes in behaviour except in those persons already predisposed to change (Rayant, 1979).

The social learning theory, which was the basis for this programme, has been used to describe how individuals learn and change health-related behaviour (Bandura, 1977). The theory postulates that all behaviour is determined by the amount and the type of reinforcement that an individual receives or expects to receive. According to Bandura, behaviour is learned observationally through modelling. The only moderate effect found in the comprehensive programme group concerning behaviour change in the present study may have been caused by too little weight given to these two principles, rewards and modelling, combined with the fact that the programme was based on a short-term approach.

(b) Predictors of dental health behaviour

It seems evident from many studies, although not from all, that knowledge is indeed associated with preventive dental health behaviour. In the nationwide 1985 study in Norway (Sømgaard, unpublished data) knowledge came out as the strongest predictor of daily use of interdental cleaning measures, after adjusting for socio-economic and demographic variables. In another Norwegian study among adults, not only knowledge and attitude, but also social network indicators and interpersonal communication was found to correlate with dental health behaviour (Aarø, Helø & Sømgaard, 1982; Sømgaard, Aarø & Helø, 1987).

As in the present investigation, Hamp *et al.* (1982) found no correlation between knowledge and toothcleaning (both quantitative and qualitative) among young people in their late teens. Antonovsky & Kats (1970) called attention to the existence of threshold levels and suggest that above certain beliefs and knowledge there will be no gain in preventive behaviour.

In the present study, neither knowledge nor attitude were among the factors which could explain significant parts of the variance in dental health behaviour. Since the validity of the traditional KAP model (Knowledge of, Attitudes towards and Practice of a particular behaviour) (Hamilton, Belzer & Thiebaux, 1980) is limited, health educators have searched for alternative strategies for effective influence. To stimulate increased discussion and communication in a group or in a community setting could be an effective way to change dental health behaviour (Aarø, Helø & Sømgaard, 1982). The more schoolchildren discuss, communicate or are exposed to media concerning a particular issue, the more their behaviour seems to be influenced (Bay & Holstein, 1981).

These findings are in accordance with the present results. Communication about dental health issues was a highly significant predictor of dental health

behaviour in both sexes. A related variable, media exposure, was also significant, but only among boys. The only background variable with significant explanatory power was educational aspiration among boys. The great importance of communication and media exposure has to be emphasised when health education campaigns are planned and implemented.

The traditional system of dental health education seems to have reached the stage when results cannot be further improved solely by increasing the amount of information. If school based programmes are to result in a more important change, they must apply techniques which motivate behaviour rather than transmit information. Leventhal (1973) put up two goals as essential for influencing behaviour: first, to create a motive for change and second, to build a detailed, concrete and stepwise structure of action.

Conclusion

Evaluation of the campaign revealed that the schoolchild-centred programme had a significant effect on many of the factors supposed to be associated with dental health behaviour.

In this study the effect on behaviour was, however, only moderate. The toothbrushing rate was higher, while no difference was found in the use of interdental cleaning methods between the reference group and the two experimental groups. Because behaviour must be seen as interconnected with all the personal and social variables measured, it might be expected that this campaign, by its effect on knowledge, motive, self-efficacy, communication, media-exposure and attitude, has increased the chances for change in dental health behaviour in the future.

In concluding it should be remembered that the DHW was a campaign arranged by a national agency. Such an agency can only initiate a learning process which might lead to a certain behaviour. Inferring from social learning theory, a short-term campaign *alone* will have very limited effects, and if evaluated in isolation the results will be negative. This type of school based intervention should therefore be carried out only if it is followed by a coordinated response for example from the Public Dental Care. Follow-up repetitions, as part of the regular service, will thus act as the necessary reinforcement and the campaign should not be evaluated until the completion of a number of these reinforcement activities.

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Appendix

(The answers in italic were judged as correct/positive).

(1) *How do you know whether you have diseased gums?*
The children were asked to choose two answers from the following nine alternatives and rank their order of importance: *swollen gums*, reacting to the cold, toothache, a nasty taste in one's mouth, painful gums, *bleeding gums*, foul breath, *red and glistening gums*, a dry mouth.

(2) *What are the two best ways to avoid gingival disease?*
The children were asked to choose two from the following nine alternatives and rank their order of importance: Visit the dentist more frequently, take vitamins and cod liver oil, gentler brushing, *conscientious interdental cleaning*, daily gum-massage, use of fluoride rinses, *better toothbrushing*, use of a soft toothbrush, a change of diet.

(3) *What are the most important things one can do to avoid dental decay?*
The children were asked to choose two from the following seven alternatives and rank their order of importance: better toothbrushing, more frequent visits to the dentist/dental hygienist, daily use of dental floss, *less frequent eating of sweets*, eating fewer sweets everytime you do eat sweets, *daily use of fluoride*, eating more whole wheat bread and vegetables.

(4) *What is the most important reason for cleaning your teeth?*
The children were asked to choose one from the following five alternatives: to get whiter teeth, to avoid foul breath, *to avoid disease of the gums*, to have a good taste in the mouth, to avoid caries.

(5) *'Sooner or later it is likely that I will have gum disease!.'*
As a reaction to this statement the children were asked to choose one from the following three alternatives: agree, *disagree*, neither agree nor disagree (neutral).

(6) *Have you, during the last two months, talked to your parents about dental health or teeth-related topics?*
The children were asked to choose one or more from the following four alternatives: with my father, with my mother, with both, with neither of them.

(7) *Have you recently talked more, the same or less than usual with your parents about dental health care?*
The children were asked to choose one from the following three alternatives: *talked more*, talked less, no change.

(8) *Have you, during the last two months, talked to any of your friends about dental health care?*
The children were asked to choose one of the following two alternatives: *yes*, no.

(9) *Have you listened to the radio or watched anything on TV concerning dental health, during the last two months?*
The children were asked to choose one or more of the following four alternatives: at least twice, once, none, do not remember.

(10) *Have you read anything about dental health in newspapers or weekly magazines during the last two months?*
The children were asked to choose one of the following two alternatives: *yes*, no.

(11) *'The Dental Health Week programme (DHW) is good and interesting!.*
As a reaction to this statement the children were asked to choose one from the following three alternatives: *agree*, disagree, neither agree nor disagree (neutral).

(12) *'I have learned a lot about gingival health recently!'*
As a reaction to this statement the children were asked to choose one from the following three alternatives: *agree*, disagree, neither agree nor disagree (neutral).

(13) *How often do you use any of these: dental floss, wood points, fluoride tablets, fluoride rinse.*
For each of the articles the children were asked to choose one of four alternative answers: *every day*, every week, less frequently, never.

(14) *Are you taking better care of your teeth this autumn than you did before, or are you taking less care, or is there no change in your use of:*
Dental floss, wood points, fluoride tablets, fluoride rinse, toothbrush.
For each of the articles the children were asked to choose one from the following three alternatives: *more care now*, less care now, as before.

Artikkel V

Effect of a nationwide periodontal health campaign on dentists' awareness, attitude and behavior in Norway

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Abstract – In 1980 the "Year against Periodontal Disease" was launched in Norway. The campaign was planned in two steps and aimed: 1) to improve the dentists' professional skills and 2) to raise the awareness and knowledge about periodontal disease in the public. This paper deals with the evaluation of the first step: the dentist-directed part of the campaign, during which the dentists were offered intensified continuing education and information from the Norwegian Dental Association. Afterwards, a simple precoded questionnaire was sent by mail to a sample (280) of the dentists, asking for their awareness about and attitudes towards the campaign, their participation in campaign activities and the impact of the campaign on their working routines. Of the 72% of the sample who answered, 98% were aware of the campaign, 53% reported changes in working routines and 49% had participated in upgrading courses. The age group 36–55 attended upgrading courses more frequently than younger and older colleagues. Course attendance, age, location of practice and two attitude dimensions, which emerged from factor analysis, were the most powerful variables in explaining changes in working routines.

Key words: dental health education; evaluation; periodontal health

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Gingival and periodontal disease is widespread in the Scandinavian population (1), even though the proportion of severe damage is low in the younger age groups (2, 3). Studies have revealed a lack of knowledge regarding periodontal health in the Norwegian population (4) and dental health education is not widely practiced in the dental health office (4, 5). Norwegian dentists spend a minimum of their time on treatment of periodontal disease (6) and many patients have undiagnosed periodontal lesions (7, 8). There is evidence that the severity and accompanying complications of the disease can be reduced through dental hygiene (Review, see 9), but national survey data show that the frequency with which persons engage in preventive dental behaviors, such as the use of dental floss and toothpicks, is moderate (10).

It was therefore decided to launch a Year against Periodontal Disease in Norway in 1980. The main goal of this dental health education campaign, commonly called the "Perio-year", was to reduce periodontal disease in the population. The Norwegian Dental Association was the promoter of the 1980/81 campaign, supported also by the Ministry of Health and Social Affairs and the Norwegian Association for the Promotion of Oral Health.

The Perio-year was planned in two steps and directed towards two different target groups, the dentists and the general public. The purpose of the first part of the campaign was to make the dentists more skillful in diagnosis and treatment of periodontal disease, and to encourage them to carry out dental health education. The second part of the Year against Periodontal Disease, directed towards the public, was basically a mass-media campaign lasting for 3 months at the end of 1981 (11, 12).

This paper deals with the evaluation of the dentist-aimed part of the Perio-year. Because it is difficult to measure improved professional skills among the dentists, we decided to assess factors assumed to be connected to improved skillfulness: 1) the dentists' awareness of the campaign, 2) the dentists' attitude towards the campaign, their attitude about the involvement of the Dental Association and their opinion of the results of the Perio-year, and 3) the dentists' participation in different campaign activities and their self-reported changes in working routines caused by the campaign.

Material and methods

Campaign design

The first part of the campaign, lasting for 1 yr, compriced 1) upgrading courses in periodontics in all the local chapters of the Norwegian Dental Association, 2) 12 papers dealing with periodontics, published in the Norwegian Dental Journal, 3) a new patient record card emphasizing periodontal diagnosis and 4) information kits mailed to each member of the association, containing information about the cam-

Table 1. Dentists responding, sample and total population according to selected characteristics. Percentages

Characteristics	Replying dentists ($n = 201$)	Sample ($n = 280$)	Population ($n = 2640$)
Sex			
Women	15.6	16.8	15.8
Men	84.4	83.2	84.2
Type of practice			
Private	71.6	72.9	77.0
Public	28.4	27.1	23.0

paign, information about upgrading courses, a specially made brochure and the new patient record card. The Public Relation secretaries in the 19 local chapters of the Norwegian Dental Association were trained in internal and external marketing of the Perio-year (13).

The evaluation

Every 10th private practitioner and every 8th public health dentist were chosen from an alphabetic list containing all the members of the Norwegian Dental Association. Ninety percent of all practicing Norwegian dentists are members of this association. Dentists working only with children were excluded, making the study population 2640 dentists. When specialists were drawn from the sample, they were excluded and replaced by the name just above on the list.

In December 1981 a simple, precoded questionnaire was sent by mail to the sample, comprising 280 dentists altogether. No reminder was sent to the non-responders. The distribution of the replying group of dentists, the sample and the total population according to selected characteristics are shown in Table 1.

The dentists were asked about age, sex, type and location of practice, whether they had read the particular papers published on periodontal disease, had attended courses in periodontics and whether they were aware of the campaign going on in the mass-media. They were also asked whether the campaign had made any difference in 1) their record-keeping procedures, 2) their awareness of the patients' periodontal problems, 3) their treatment of the disease and 4) the routines of referring patients to specialists. Finally, the dentists were asked to take a stand on 10 attitude-statements: their opinion about the campaign, their attitude to the involvement of the Norwegian Dental Association, their opinion of the cost-benefit of the Perio-year and their impression of the patients' reactions. The wording of the statements is given in Table 3.

Statistical analysis

The 10 attitude-statements were employed as response variables in a factor analysis. Positive attitude towards the Dental Association and the campaign received a score of 3, neutral 2 and negative attitude 1. Factor analysis was done by orthogonal rotation based on principle-factor solution without iteration (14).

The evaluation of *course attendance* was based on analysis of covariance (ANOVA) with multiple classification analysis (MCA) (15). Age, sex, type and location of practice were used as independent variables, and the attitude factors from the factor analysis were used as covariables.

When the dependent variable is dichotomized, as in our case, the MCA gives the percentage of course attendance in subgroups of the independent variables, unadjusted and adjusted for the effect of the other variables (factors). The program also provides a bivariate correlation coefficient (eta) and a partial regression coefficient (beta) for each variable. The eta^2 for each factor indicates the proportion of variation in the dependent variable explained by each factor. The rank order of the betas indicates the relative importance of the factors in explaining the variance in the dependent variable when all other independent variables are held constant. Finally, R^2 indicates the goodness of fit of the full multivariate model. *Changes in working routines* were analyzed the same way. Course attendance was used as an independent variable in addition to the demographic variables.

Results

Two hundred and one (71.8%) of the dentists answered the questionnaire. Some of the forms were not completely filled in, thus giving a variation in the number of answers.

Among the respondents 56.8% had their practice in a city, 31.3% worked in densely populated areas, and 12.0% worked in sparsely populated areas. 29.2% of the dentists were 35 yr old or younger, 60.0% were aged 36–55 and 10.8% were 56 yr or above. The distribution of the replying dentists according to sex and type of practice is shown in Table 1.

Awareness

Most dentists (97.9%) were aware of the mass-media part of the campaign (Table 2). The media most frequently mentioned as sources were newspapers (81.6%) and television (78.6%).

Attitudes

The general attitudes towards both the Dental Association and the accomplishment of the Year against Periodontal Disease were positive among the den-

Table 2. Percentage of dentists who answered in the affirmative regarding questions in connection to "Year against Periodontal Disease"

	Total n	"Yes" (%)
* Did you take note of the public part of the "Perio-Year" in the mass-media?	194	97.9
* Did you read papers about periodontal disease in the Norwegian Dental Journal?	192	93.2
* Did you hand out the booklet "Vis Tannvett" ("Keep your teeth") to your patients?	193	72.5
* Was the booklet suitable for your patients?	188	55.3

tists. Ninety-two percent thought the Perio-year was a positive initiative, only 13.5% agreed that such campaigns were not the responsibility of the Norwegian Dental Association and 57.7% were of the opinion that the patients had become much more aware of their own periodontal health after the campaign. The distribution of the answers to the attitude statements is shown in Table 3.

A factor analysis was performed to 1) determine which statements belonged together in sets which were uncorrelated with each other and 2) to extract simplified attitude factors to be used in the subsequent analyses to predict dentists' course attendance and changes in working routines.

The factor analysis produced three main attitudes factors, explaining 58% of the total variance in the original statements. The first four statements in Table 3 received the highest loadings on factor 1. These variables dealt with general aspects of the role of the Norwegian Dental Association and were therefore called *overall attitude*. The next four attitude statements (Nos. 5–8 in Table 3), loading highest on factor 2, were more specifically directed toward the accomplishment and effect of the Year against Periodontal Disease. This second factor was denoted *campaign attitude*. In the third factor, named *patient related attitude*, the variables with the highest loadings, the two last statements in Table 3 (Nos. 9–10), described the patient's opinions about the campaign and the effect of the Perio-year on the patients.

Three attitude variables were then constructed based on the three factors extracted from the factor analysis. The values of the initial statements were standardized and weighted according to the highest factor score coefficient (regression weights) they had received (14) (Table 3).

Behavior

Among the responding dentists 93.2% had read articles about periodontal disease in the Norwegian Dental Journal during the first part of the campaign. Almost 3/4 of them had handed out the specially produced brochure to their patients, even though their assessment of the suitability of the booklet was only moderately positive (Table 2).

Table 3. The dentists' responses (%) to attitude statements – and factor score coefficients used as weights in constructing the three new attitude factors

Attitude	Response: Agree %	Disagree	Neutral	Factor score coefficient
1) The NDA(*) should continue to involve itself with information activities directed towards the public, despite minor expenses ($n=199$)	86.9	7.0	6.0	0.379
2) The NDA should involve itself only with questions dealing with professional and trade union affairs ($n=195$)	9.3	86.6	4.1	0.385
3) In fact, campaigns like this one are not the responsibility of the NDA ($n=193$)	13.5	79.3	7.3	0.290
4) The Year Against Periodontal Disease has been too expensive ($n=185$)	4.3	35.1	60.5	0.196
5) The patients have become much more aware of their own periodontal health after the campaign ($n=196$)	57.7	12.8	29.6	0.432
6) Campaigns like this have no particular effect ($n=193$)	13.5	67.4	19.2	0.343
7) NDA must be given credit for the accomplishment of the "Perio-year" ($n=195$)	59.0	3.6	37.4	0.348
8) The Year Against Periodontal Disease is a positive initiative ($n=199$)	92.0	1.0	7.0	0.192
9) The patients believe that lack of enough work is the reason for this campaign ($n=196$)	6.6	75.5	17.9	0.715
10) The "Perio-year" has made dentists more aware of patients' periodontal status ($n=191$)	59.2	6.8	34.0	0.552

(*) The Norwegian Dental Association.

Table 4. Percentage of those who participated in a *upgrading course* in connection with the "Perio-year", according to selected independent variables adjusted for the other variables and for the covariables. Multiple Classification Analysis

Total mean: 49%	Percentage: Unadjusted	Adjusted†	Coefficient: Eta	Beta†
Age (yr)			0.24	0.24*
≤35	38	42		
36–55	58	57		
56+	23	16		
Location of practice			0.14	0.15
City	44	42		
Densely populated area	59	59		
Sparsely populated area	45	53		
Type of practice			0.06	0.10
Private	51	52		
Public	45	42		
Sex			0.03	0.03
Women	45	52		
Men	50	48		
R^2 (adjusted for independents and covariables)				0.09

Covariables	Regression coefficients
The "overall attitude"	−0.082
The "campaign attitude"	0.103
The "patient related attitude"	0.018

* $P \leq 0.01$.
† Adjusted for independent and covariables.

Course attendance

About half of the dentists participated in courses concerned with periodontal disease (Table 4). Age accounted for a significant part of the variance in course attendance, when gender of dentist, location of practice, type of practice and attitudes were adjusted for (Table 4). Dentists aged 36–55 attended courses more often than their younger and older colleagues. None of the other independent variables or the attitude factors used as covariables were found to be significant on 5% level.

Changes in working routines

Almost 55% (110) of the dentists reported no change or only small changes in working routines in connection with the Perio-year (Table 5). Sixteen of these 110 respondents also marked off one or more changes in Table 5.

The dentists were classified into those who reported change in one or more routines and those reporting no change whatsoever. When adjusted for the independent variables (the demographic variables) and the covariables (the three attitude factors) in a multiple classification analysis, the following variables explained significant parts of the variance in change of routines: course membership, age, location of practice, "campaign attitude" and "patient related attitude" ($P < 0.05$) (Table 6). Altogether these variables explained 25% of the variance in change of working routines.

Table 5. Percentage of dentists who changed/did not change working routines in connection with "Perio-year" and type of change (marking off more than one change was possible)

	No. and percent of the dentists who put a cross against	
	n	%
No change or small changes only	110	54.7
New diagnostic routines, more attention to the patients' periodontal problems	81	40.3
New routines concerning record keeping	25	12.4
Changes in treatment procedures	25	12.4
More referrals to specialists in periodontists	24	11.9

Discussion

The sample and the study population did not differ in distribution of sex and type of practice ($P > 0.05$) (Table 1). Thus, the results may be representative for Norwegian dentists. However, the possibility exists that the 28.2% non-replying dentists have more negative attitudes to the campaign compared to the dentists who replied. The non-repliers might also be among the ones who did not attend courses or change working routines. If this is the case, the positive effect of the first part of the campaign may be overestimated in our study. No difference was, however, found in the distribution of the categories of the demographic variables sex and type of practice between the dentists who replied and those who did not ($P > 0.05$) (Table 1).

The Year against Periodontal Disease was planned as a "two-step process": The first step aimed to improve the dentists' professional skills, the second to raise the awareness and knowledge about periodontal disease and prophylaxis in the public. The first part of the campaign could be characterized as fairly successful based on the measured variables. We know that a majority of the dentists were aware of the campaign. Most of them were in one way or the other involved by the Perio-year: read papers, handed out brochures, registered more requests from patients, participated in courses, changed practice routines, etc. We may conclude that the campaign almost met the goal, expressed by the president of the Norwegian Dental Association: "No colleagues unaffected by the Perio-year" (6).

It is likely that the dentists were influenced from two directions, directly through the planned first step and indirectly through increased demand and more requests from the public. Figures from the 1982 opinion poll, evaluating the public part of the campaign, confirm the possibility of an indirect effect of the campaign (12). Every third person (age 15 or more) reported to have received infor-

Table 6. Percentage of those who *changed one or more practice routines* in connection with "Perio-year" according to selected independent variables, adjusted for other variables and the covariables. Multiple Classification Analysis

	Percentage		Coefficient	
Total mean: 53%	Unadjusted	Adjusted†	Eta	Beta†
Course membership			0.33	0.30**
No	36	38		
Yes	70	68		
Age (yr)			0.27	0.24*
≤35	35	35		
36–55	64	62		
56+	46	59		
Location of practice			0.16	0.24*
City	50	50		
Densely populated area	50	45		
Sparsely populated area	73	83		
Sex			0.13	0.07
Women	37	44		
Men	56	54		
Type of practice			0.03	0.01
Private	52	53		
Public	55	52		
R^2 (adjusted for independents and covariables)				0.25

Covariables	Regression coefficients
The "overall attitude"	0.099
The "campaign attitude"	0.133*
The "patient related attitude"	0.131*

** $P \leq 0.001$. * $P \leq 0.05$. † Adjusted for independents and covariables.

mation about dental health conditions from a dentist during the last 3 months of 1981. The many requests from the patients could also be seen as opportunities to change practice routines and a stimulation to further education. A comment from one of the responding dentists illustrates the last point: "Campaigns like this make people more aware of the problems and possibilities of treatment. We have to become more aware and do a better job, to avoid malpractice suits."

The high loading on the "campaign attitude" factor, particularly for the statement "The patients are much more aware of their own periodontal condition after the campaign", also confirms the impression of the patients as an important motivating factor. Perhaps the public should have been encouraged to demand more information about their own periodontal status.

Almost half of the respondents participated in one or more courses in periodontics during the Perio-year. Only age was found to be a significant predictor of attendance (Table 4). Among the youngest dentists, 42% participated in courses, among the oldest, 16% participated (adjusted percentages). The young and recently graduated dentists obviously feel they have the up-to-date knowledge and do not need training. They have, moreover, all gone through an extensive curriculum in periodontics.

Although the Norwegian Dental Association did not succeed in getting more than 4 out of 20 of the dentists aged 56 and above trained in periodontics, 59% of the respondents in this age group reported changes in working routines. They may have taken advantage of other components of the information package from the Dental Association.

The proportion of dentists who changed working routines was higher among the middle-aged, among those attending a course, among dentists practicing in sparsely populated areas and among the respondents with positive "campaign attitude" and "patient related attitude". Of the middle-aged and those attending a course, about 2/3 changed one or more of their everyday working routines (Table 6). Among those practicing in sparsely populated districts, more than 4/5 changed. Encouraging more dentists to take upgrading courses and establishing a more positive attitude among the dentists, will probably improve the working routines for prevention, diagnosis and treatment of periodontal disease. A practitioner's view of him/herself and his/her work influences the practitioners' attitude towards prevention (16).

Numerous approaches have been tried to improve periodontal health in the population, including distribution of printed material, utilization of health service announcements in the media and implementation of various mass media campaigns (17–20). To our knowledge, this is the first time the dental profession has been the target group in a periodontal health campaign primarily directed to the public. To train the dentists should be, in principle, an effective way of reaching the public. The dentists, seeing 83% of the dentate population on a regular basis (10), have an unique opportunity to inform their patients of prophylactic procedures.

Even though it is reasonable to conclude that this campaign has brought about increased skillfulness in diagnosis and treatment of periodontal disease among dentists, there is still a long way to go. Before the Norwegian campaign started, only 31% of the patient reported having any information about their periodontal condition at the last visit to the dentist (4). One year after the accomplishment of the campaign this percentage was increased to 41 (12). After 1 yr of intensified teaching of the dentists a more pronounced impact would have been expected.

To improve oral health generally, more training and information should be given to the dental profession especially training in how to communicate with the patient in the dental clinic setting (21, 22). Even though dentists agree that it is the job of the dental profession to educate the general public regarding oral health and preventive dentistry, they do not find it challenging enough (23). If the dentists lack the conviction and the enthusiasm necessary to support the development of a preventive periodontal program, the program will be stillborn (17).

The Dental Association should be urging more of the dentists in urban areas to take upgrading courses and it should be putting more energy into enhancing

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the dentists' attitudes about periodontal disease. It must be possible to reduce the disparity between the existence of periodontitis in the population and its recognition as a health problem among dentists.

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Artikkel VI

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The effect of a mass-media dental health education campaign

Anne Johanne Søgaard

Abstract

This paper describes the evaluation of a mass-media periodontal health campaign lasting for 3 months in 1981. The public-directed campaign succeeded a dentist-directed training period of 1 year and comprised television and radio programmes, articles in newspapers and weekly magazines and a pamphlet presenting five common-sense rules for the care of teeth. To assess the effect of the campaign on exposure, awareness, knowledge, attitude, intention and behaviour were measured by interviewing representative samples of the Norwegian population aged 15 years or more in 1981, 1982, 1983 and 1985. The percentage of the interviewees who had received information about dental health through mass media increased. From the baseline survey in 1981 to 1983 a significant increase was found in the percentage who had correct knowledge of periodontal health. No specific effect of the campaign was, however, found concerning people's daily use of dental floss and toothpicks. Multiple classification analyses revealed that knowledge and gender were the strongest predictors of dental health behaviour across all years of the investigation. In conclusion, the impact of campaigns like this will be greater if: (i) involvement of the audience is encouraged, (ii) the message is simple and repeated over a longer period of time via multiple channels and (iii) more emphasis is given to the pre-programme planning, including defining the goals and target group explicitly, pretesting the message and selecting channels relevant for the target group.

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Introduction

The Norwegian Dental Association's information campagin about periodontal disease, popularly called the 'Perio-Year', was conducted in two phases from August 1980 to December 1981.

The first phase of the campaign was directed towards the dentists to increase their knowledge about, and awareness of, periodontitis and make them more skilful in diagnostics and treatment of the disease (Søgaard, 1988).

The second phase was an information campaign directed at the public. Owing to the fact that mass communication is more effective if it is reinforced by personal communication (Gatherer *et al.*, 1979, pp. 7–9; Green *et al.*, 1980, pp. 91–95), the Year Against Periodontal Disease was based on a modified model of the two-step flow of communication (Katz, 1957). Figure 1 illustrates how the communication process was expected to function during the Perio-Year.

According to the president of the Norwegian Dental Association the Perio-Year was launched to draw people's attention to the causes and symptoms of periodontal disease and create a good atmosphere for communication between dentist and patient about this problem (Norwegian Dental Association, 1979). The campaign was also intended to increase people's interest in their own dental health and make them aware of their responsibility in this respect. The principal objective, however, was to reduce the prevalence of periodontal disease in the Norwegian population (Norwegian Dental Association, 1980).

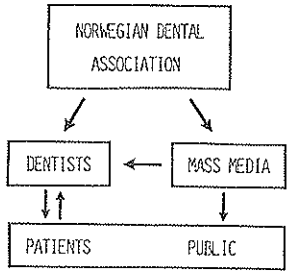

Fig. 1. The two-step flow of communication which occurred during the 'Year Against Periodontal Disease' in Norway.

This paper is aimed at evaluating the effect of the mass-media phase of the Perio-Year on people's: (i) exposure to the campaign message, (ii) awareness of the campaign, (iii) change in dental health knowledge, (iv) attitude to dental health education, (v) intention to change dental health behaviour and (vi) actual behaviour change. The results are assessed in relation to the communication factors: source, message, channel/media and audience.

Materials and methods

Campaign design

The second phase—directed at the general public—was introduced with a media seminar in May 1981, attended by ~20 representatives of the daily and weekly press, radio and television. The actual campaign to motivate the general public started with a press conference in October of the same year. In collaboration with the Ministry of Health and Social Affairs, the Norwegian Association for the Promotion of Oral Health and the Faculties of Dentistry, the Norwegian Dental Association's information committee planned a series of activities and measures directed at the public. These included several radio and television programmes. Sixty-five different newspapers printed short articles entitled 'Tips from the Dentist'. Altogether 409 newspaper articles about periodontal health were printed during the last 3 months of 1981.

Table I. *Number of participants and percentage of edentulousness according to sex and year of investigation*

	Total number		Percentage of edentulousness (*n*)	
	Men	Women	Men	Women
1981[a]	682	694	14.1 (95)	13.6 (94)
1982[a]	704	706	11.9 (83)	13.1 (92)
1983	699	711	13.4 (94)	12.8 (91)
1985[a]	666	674	11.6 (76)	10.4 (69)

[a]Information about number of teeth is missing for six men and four women in 1981, six men and two women in 1982 and 11 men and 11 women in 1985.

Weekly magazines followed up by printing more comprehensive articles concerning periodontal disease. The pamphlet 'Dental Common Sense' presenting five common-sense rules for care of the teeth—quoted in Helløe *et al.* (1982)—was distributed by dentists and dental hygienists, via pharmacies and in grocery shops all over the country. The manufacturers of dental health remedies increased their use of magazine and cinema advertisements in this period.

Materials

To assess the effect of the Perio-Year, representative two-stage stratified probability cluster samples of the Norwegian population aged 15 years or more were interviewed by the poll organization Norges Markedsdata A/S, on four separate occasions.

The first round of interviews was carried out in February 1981 before the public part of the campaign started. Results from this baseline study have been published earlier (Helløe and Søgaard, 1981). Several of the same questions were put to new samples in February of 1982, 1983 and 1985.

The sample sizes of the four subsequent surveys and the proportion of edentulousness are shown in Table I. The age distribution of the interviewees was not significantly different in all the four years of investigation ($P > 0.05$) (Table II).

Variables

The questions about exposure to and awareness of the campaign, received information about dental health, through which channels the information was

Table II. *Age distribution of the participants according to year of investigation*

	1981	1982[a]	1983	1985[a]
	% (n)	% (n)	% (n)	% (n)
15–19	7.3 (100)	6.5 (92)	6.9 (97)	7.2 (97)
20–29	21.4 (294)	22.8 (321)	21.8 (307)	20.6 (276)
30–39	22.7 (313)	21.7 (306)	20.6 (290)	21.5 (288)
40–49	11.3 (156)	11.8 (167)	13.3 (187)	16.0 (214)
50–59	13.4 (185)	12.9 (182)	11.8 (167)	11.6 (155)
60+	23.8 (328)	24.1 (340)	25.7 (362)	22.6 (303)
Total	99.9 (1376)	99.9 (1408)	100.1 (1410)	100.0 (1333)

$\chi^2 = 22.58$. $df = 15$. $P > 0.05$.
[a]Information about age is missing for two individuals in 1982 and seven individuals in 1985.

received and expected change in behaviour in the future, are quoted in the Results.

Knowledge of prevention of periodontal disease was assessed by asking how the respondent could avoid bleeding gums. The question had 11 possible answers of which: 'By more effective toothbrushing' and 'By use of dental floss or toothpicks', were considered to be correct. Correct knowledge required one or two of these answers – independently of how they answered in other respects.

Seven questions about attitude to dental health education were asked in February 1982, immediately after the campaign. Some of the statements are quoted in the Results.

Dental health behaviour was operationalized by asking the respondents about their current use of: toothbrush, toothpicks, dental floss and fluoride dentifrice. They were also asked if they had visited the dentist on a regular (yearly) basis during the last 5 years. The behaviour variables were dichotomized into daily/yearly versus more seldom and added together in an index ranging from 0 to 5.

The demographic and socio-economic variables used in the analysis were: age (three age-groups), sex, marital status (married/living together, unmarried, divorced/widow/widower), residence (city, village, rural area) and level of education (university/college, high school, primary school).

Data analysis

The distribution of exposure, awareness, expected future change in behaviour, correct knowledge of periodontal health and use of dental floss, toothpicks and fluoride dentifrice according to year of investigation, were tested by means of a χ^2 test for men and women separately. Use of different types of media (TV, radio, newspapers, etc.) according to sex were tested in the same way. Use of dental service according to year of investigation was analysed by means of a χ^2 test for linear trend (Armitage, 1971, pp. 363–365).

Finally, multiple classification analyses (MCA) (Kim and Kohout, 1975) were performed in every year of investigation to find the mean score of the behaviour-index, adjusted for the effect of the independent variables—knowledge of prevention, sex, residence, education, age and marital status, and the covariate number of teeth. MCA also estimates the relative importance of these background characteristics on dental health behaviour (index) before and after the Perio-Year—and the developmental trends. This analysis provides a partial-regression coefficient (β) which indicates the relative importance of the independent variables in explaining the variance in the dependent variable, when all other independent variables are held constant. R^2 indicates the goodness of fit of the full multivariate model.

Results

Exposure

In 1981, prior to the second phase of the Perio-Year, i.e. the public-oriented part of the campaign, 36.5% of the 1177 dentate persons who were interviewed said that they received information about the state of their gums during their last visit to the dentists. In 1983 (1 year after the Perio-Year) the proportion was 45.1%, i.e. 553 out of 1225.

Two months after the Perio-Year officially ended, in February 1982, 57.7% of the 1410 interviewees —more women than men—stated that they had received information about teeth and oral hygiene recently, e.g. through radio, newspapers, weekly magazines, TV, posters or cinema advertisements (Table III). The following year and 3 years later the corresponding figures were 47.7% and 46.6% respectively. The decrease from 1982 was statis-

Table III. *The percentage of the Norwegian population (15 years and above) who stated having received information on dental health recently (some of the respondents gave more than one answer)*

Have received information about teeth and dental health recently from	1982 Immediately after the Perio-Year	
	Men (704)	Women (706)
TV	21.4	27.6[a]
Newspapers	21.6	23.7
Visit to the dentist	17.3	21.0
Advertisements in weekly magazines	12.1	19.4[a]
Articles in weekly magazines	9.8	16.3[a]
Brochures	11.5	15.2
Cinema advertisements	10.7	8.8
Posters	7.5	8.5
Radio	5.3	8.4[a]

Altogether 53.4% of the men and 62.0% of the women received information.
[a]The difference between men and women is significant ($p < 0.05$)

tically significant ($P < 0.05$), and was almost equally distributed according to age.

Immediately after the Perio-Year 21.4% of the men and 27.6% of the women had heard about teeth and dental health through TV. The channels of information are shown in Table III.

Awareness

When the respondents in the 1982 survey were shown the cartoon figure used to symbolize the Perio-Year, only 18.7% and 25.0% of men and women respectively could recall this recurring motif—used, for example, on the front page of the Dental Association's pamphlet 'Dental Common Sense' (the theme picture is presented in Kraft *et al.*, 1986).

Knowledge of periodontal health

People's knowledge about what they can do themselves to prevent periodontal disease was charted at all four points of time.

From 1981 to 1983 we found an increase of 11.2% in the percentage of men who gave correct answers about how to prevent bleeding of the gums ($P < 0.01$). The corresponding figure for women was 13.1% ($P < 0.01$) (Figure 2). The increase was most distinct in the 20–49 age-groups and least

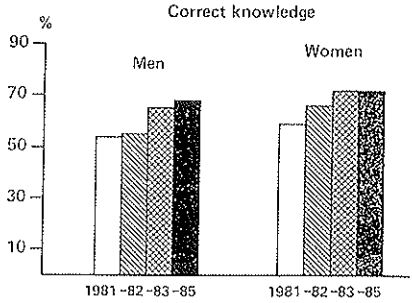

Fig. 2. The percentage of the Norwegian population (15 years and above) with correct knowledge about periodontal disease at four different points of time (edentulous excluded).

Table IV. *Percentage (number) with correct knowledge of prevention of periodontal disease according to sex, use of dental services and year of investigation (edentulous excluded)*

Sex	Use of dental services	1981	1982	1983	1985
Men	Regular[a]	60.8	59.5	68.2	7.16
		(233)	(242)	(283)	(270)
	Irregular[b]	41.4	46.8	59.7	57.1
		(77)	(94)	(111)	(80)
Women	Regular[a]	60.8	71.4	74.0	74.5
		(270)	(315)	(353)	(345)
	Irregular[b]	57.6	51.2	66.7	59.0
		(80)	(85)	(94)	(62)

[a]Regular: visiting the dentist every year during the last 5 years.
[b]Irregular: not visiting the dentist every year during the last 5 years.

prominent among young people (15–19). There was no particular increase after this period, i.e. from 1983 to 1985 (Figure 2).

In each year of the study period the proportion with correct knowledge was considerably higher among persons who visited the dentist regularly than among those who visited the dentist irregularly (Table IV). From 1981 to 1985 'irregular women' was the only subgroup without a significant increase in the proportion with correct knowledge ($P > 0.05$). In this time period the difference between 'regular' and 'irregular' men diminished, while the difference between women increased.

Table V. *The proportion of the Norwegian population (15 years and above) who, at different times, expected a change in dental health behaviour in the future (edentulous excluded)*

	1982 Immediately after the Perio-Year		1983 One year after the Perio-Year	
	Men	Women	Men	Women
Will take more pains with dental floss in future	25.2[a]	37.0	32.1[a]	38.1
Will take more pains with toothpicks in future	32.3[a]	40.0	38.2[a]	40.5

[a]Significant differences between the percentages at the first and second recordings ($P < 0.05$).

Attitudes to dental health education

In 1982, the interviewees were presented with a number of statements relating to information campaigns about teeth and dental health. It was found that 58.7% thought that such campaigns did have an effect, while 37.2% stated that they were not interested in campaigns of this kind. It was reported by 42.2% that such campaigns 'make me try to improve my habits', and 61.7% disagreed with the statement: 'people have enough problems without being bothered about dental health complaints as well'. Only 18.0% reported having had some difficulty in understanding the words and expressions used in the campaign.

People's own assessment of the value of teeth was positive. Only 7.8% agreed with the statement: 'teeth do not matter so much if one is healthy in other respects'.

People who gave the most positive answers to the parts of the questionnaire inquiring about attitudes, also reported the most favourable dental health habits.

Intention to change own behaviour

Table V shows that 1 year after the Perio-Year a greater proportion of the men interviewed thought that they would take more pains with dental floss and toothpicks in future than was the case immediatley after the Perio-Year ($P < 0.05$). This increase was most prominent in the 30–39 age-group and among those 60 and above. No corresponding change was seen among women. This question was only asked in 1982 and 1983.

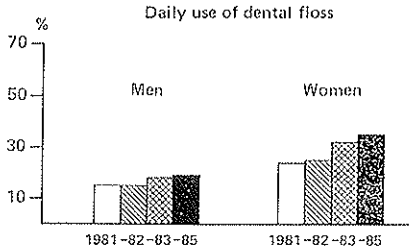

Fig. 3. The percentage of the Norwegian population (15 years and above) who reported daily use of dental floss at four different points of time (edentulous excluded).

Dental health behaviour

Both the baseline study and the three subsequent studies charted the devices people used to take care of teeth and gums. Figures 3–5 show a slightly increasing tendency to use dental floss, toothpicks and fluoride dentifrice every day. In general, more women than men reported behaviour which corresponded with the rules of 'Dental Common Sense'. Except for daily use of toothpicks and dental floss among men, the increase in use of dental remedies was significant during the time period 1981–1985 ($P < 0.05$). But no specific peak in the increase could be connected with the Perio-Year, except for dental floss among women which had a delayed increase from 1982 to 1983 ($P < 0.05$).

Regular use of dental services was one of the 'Dental Common Sense' rules. In Table VI the percentage of regular users is broken down by sex and year of investigation. No particular increase in

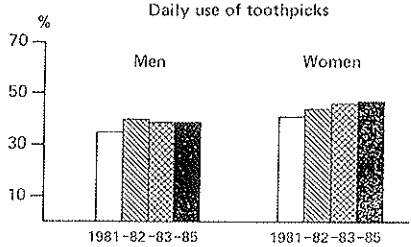

Fig. 4. The percentage of the Norwegian population (15 years and above) who reported daily use of toothpicks at four different points of time (edentulous excluded).

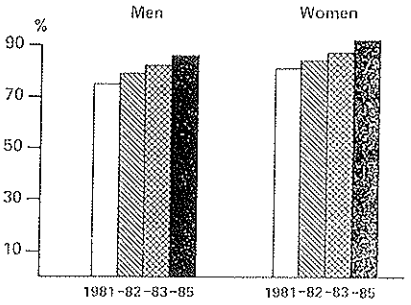

Fig. 5. The percentage of the Norwegian population (15 years and above) who reported daily use of fluoride dentifrice (edentulous excluded).

yearly dental visits could be seen in connection with the Perio-Year. For the time period as a whole there was an increasing tendency among both men and women ($P < 0.05$), when χ^2 tested for linear trend. The pattern in use of dental services was the same in all age groups. The increase was most prominent among those aged 60 and above.

Because we are searching for patterns of dental health behaviour which can be connected to the Perio-Year, we cannot just use single variables, but have to handle our information as a total collection

Table VI. *Percentage of regular dental visitors (yearly) during the last 5 years according to sex and year of investigation (edentulous excluded)*

	1981	1982	1983	1985
Men	67.0	66.6	69.1	71.8
Women	76.1	72.7	77.2	80.6

of data. Therefore an index of dental health behaviour was constructed and used as the dependent variable in a multivariate model with seven other variables as factors and covariates (Table VII).

Knowledge of prevention was the most important variable in explaining the variance in dental health behaviour in 1981, 1982 and 1983. In 1985 sex got a slight higher β-value than knowledge, and was beyond the strongest of the demographic and socio-economic variables at all the four points of time (Table VII).

Compared to men, women got a higher score on the behaviour index throughout the period 1981–1985.

Also, location of residence was of significant importance. Those living in rural areas got the least favourable scores ($P < 0.05$) (Table VII).

Discussion

Before the effect of the Perio-Year is discussed, it is essential to establish that behaviour change is not the only endpoint measurement for evaluation of dental health education. In communication research it is usual to distinguish between exposure, awareness, knowledge, attitude, intention and behaviour (Flay *et al.*, 1980). To evaluate the Perio-Year we decided to measure six stages in the process of behaviour change (Figure 6): thus using a modified information-processing model (McGuire, 1978).

The assumptions of causality in this mode, i.e. that changes in knowledge should automatically lead to changes in attitudes and ultimately behaviour, have been questioned by several researchers, e.g. Richards (1975). Nevertheless, the intermediate steps are still important. Firstly, changes anywhere in the model will help create changes in other areas because of the drive toward consistency (Abelson *et al.*, 1968).

Table VII. *Dental health behaviour index in each of the years of investigation adjusted for selected independent variables and the covariate (number of teeth)*

	1981		1982		1983		1985	
Grand mean:	3.01		3.03		3.20		3.36	
	Adj. mean	Adj. coeff.	Adj. mean	Adj. coeff.	Adj. mean	Adj. coeff.	Adj. mean	Adj. coeff.
Knowledge of prevention		0.17[c]		0.25[c]		0.18[c]		0.16[c]
Correct	3.17		3.25		3.33		3.47	
incorrect	2.80		2.69		2.91		3.11	
Sex		0.14[c]		0.10[c]		0.16[c]		0.18[c]
Men	2.85		2.92		3.02		3.16	
Women	3.17		3.14		3.37		3.54	
Location of residence		0.10[c]		0.09[b]		0.10[c]		0.08[a]
City	3.10		3.07		3.22		3.32	
Village	3.07		3.14		3.17		3.48	
Rural area	2.84		2.88		3.11		3.30	
Education level		0.05		0.09[b]		0.04		0.09[a]
Primary school	2.98		2 97		3.17		3.29	
High school	3.06		3.23		3.30		3.49	
College/university	3.14		3.09		3.21		3.46	
Age (years)		0.08[a]		0.05		0.09[a]		0.09[a]
15–29	2.88		3.04		3.10		3.23	
30–49	3.10		3.08		3.18		3.41	
50 and above	3.03		2.95		3.34		3.44	
R^2		0.160		0.165		0.153		0.143

The relative importance of the variables are expressed in terms of adjusted (beta) coefficients. Multiple classification analysis (edentulous excluded).
Martial status was also used in the analyses, but is not listed in the table ($P > 0.05$).
Significance of F: [a] ≤ 0.05; [b] ≤ 0.01; [c] ≤ 0.001.

In real-life situations it seems clear that meaningful and long-term change in any one element of the model (Figure 6) is more likely if there is also corresponding change in the other elements (Flay *et al.*, 1980). Secondly, increasing the levels of exposure, awareness, knowledge and attitude will also contribute to changes in the general social norms and values of the population and act as reinforcement factors in the process of behaviour change at the individual level. Finally, to interpret the effect of a campaign it is necessary to measure outcomes and their antecedent variables at all stages in the process of change. If the major outcome measured is dental health behaviour, then failure can be located at any one of the other steps in the process. Assessments of behaviour may answer questions of impact, but without other endpoint measurements questions about

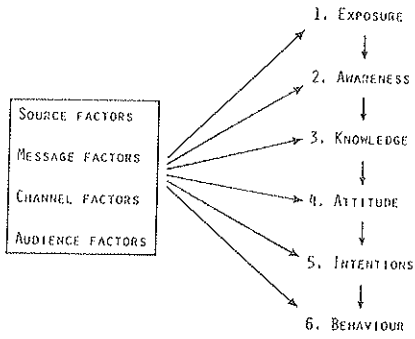

Fig. 6. A modified information-processing model of the behaviour change process (McGuire, 1978).

why a programme was or was not effective cannot be answered.

The evaluation of the Norwegian Dental Association's campaign against periodontal disease indicated that people's exposure to information about dental health issues had temporarily increased. More people received information about the subject during the campaign period than in the period after its termination. The increase in the proportion with correct knowledge of prevention of periodontal disease coincided with the campaign period and the succeeding year. Among men we also observed an increase in the proportion who intended to take more pains with interdental remedies in future. Regarding self-reported change in dental health behaviour, no change can be ascribed to the Perio-Year except a delayed increase in daily use of dental floss among women.

The discussion of the findings will firstly focus upon the effects of the Perio-Year on the different endpoint measurements. The next step will be to look more closely at the four communication factors—source, message, channel and audience—to find possible explanations for the moderate effects of the campaign. Finally, we will analyse the linear trends in dental health behaviour and behaviour-related variables. Because people change—independently of campaigns like the Perio-Year—we have to observe and describe the general trends and look for deviations from this pattern to be able to draw conclusions about the effects of the Perio-Year.

Even though increases in exposure, awareness and knowledge which could be attributed to the Perio-Year were registered, we cannot rule out the possibility that these changes might have taken place in any case. A study of the effect of an intervention should preferably establish whether the results are due to the programme, in this case the campaign against periodontal disease, or to external conditions, e.g. advertising. This criterion can never be satisfied, however, by a before/after study where, as in the case of this campaign, we did not have a control group (Cook and Campbell, 1979, pp. 95–146). To isolate a control group from information through mass media would have been practically impossible because most of the media covers the whole country.

In the two-step hypothesis, which formed the basic idea of the Perio-Year, the information was directed from the Norwegian Dental Association to the mass media and dentists (Figure 1). The dentists were supposed to act as formal leaders (Nypan, 1970) as well as informal opinion leaders. Opinion leaders are individuals who play a key communication role in the community and their words are given great importance when people make their decisions and form their attitudes (Rogers, 1983, pp. 281–288). The opinion leaders intepret, emphasize and modify the message they receive. The two-step hypothesis has been modified many times. It is possible, for example, that the diffusion process is more complex and involves more than two steps (Deutschmann and Danielson, 1960). Most people probably receive the message, but only the more influential and well-informed have the special qualifications necessary to decide how the message should be understood and assessed. It is also suggested that opinion leaders themselves, although more exposed to mass media than those they influence (Katz, 1957), are themselves initially influenced by other people (Renckstorf, 1973). This last addition incorporates an effective feedback mechanism, in this case from the patients to the dentists, and emphasizes the possibility that both the sender and the receiver could be the initiator of the communication (Westley and MacLean, 1957).

The fact that (i) 97.9% of dentists (Søgaard, 1988) had noted the Perio-Year in the mass media, and (ii) one-third of those who stated they had received information about dental health during the Perio-Year got their information when they visited the dentists, indicates that dentists have functioned as intermediaries in communicating the message about dental health. This is confirmed by the marked increase from 1981 to 1983 in the proportion who had been told about the state of their gums when they last visited the dentist. Indirect communication, in this case through the dentists, may serve to strengthen the impact of direct exposure to the same message through radio, television, newspapers, etc. (Gatherer *et al.*, 1979, p. 9; Flay *et al.*, 1980; Green *et al.*, 1980, pp. 91–95). It is, however, impossible to distinguish between the direct effect of the mass

media on the public and the indirect effect through dentists. This last effect could be the result of both phase 1 and phase 2 of the Perio-Year.

Our study confirms that increased knowledge about dental health does not necessarily lead to changed dental health care habits. There seems to be, however, a stronger association between knowledge and actual behaviour regarding dental health, than between knowledge and action in other health areas (Richards, 1975; Aarø *et al.*, 1986). The importance of knowledge in explaining dental health behaviour even increased in connection with the Perio-Year (Table VII). Because of the central importance of knowledge this variable was further explored. No consistent pattern concerning knowledge and use of dental services was found due to the Perio-Year, except for a significant increase among irregular users of dental services from 1982 to 1983 (Table IV). This could be explained by the so-called 'sleeper-effect' (Tan, 1981, pp. 113–115)—i.e. more of the desired changes were found 1 year after the message was disseminated than right after the campaign. After 1983 the proportion with correct knowledge did not change substantially in either of the groups. It may be the case that, because of the campaign in the mass media, dentists have considered that patients expected to receive information about teeth and gums and have therefore continued to pass on this information after the end of the Perio-Year itself.

We know from many studies that innovations diffuse at different rates—some abruptly and others very gradually. By assuming that the intervention occurred solely during the last 3 months of 1981, we may overlook the true effects of the campaign. The dentists and the marketing industry may both have contributed to an extended intervention period and caused a delayed effect. When the problems of delayed causation are added to the problems associated with information that affects a population slowly, causal inference is particularly difficult. This is because no knowledge exists of where to place the onset of the expected or desired effect, and effects might be expected at any point after the intervention is implemented. The longer the time after implementation, the more plausible it becomes to intepret a possible delayed campaign effect in terms of historical factors (Cook and Campbell, 1979, p. 227).

People's belief that they will change a health habit may be an indication of a future change in behaviour. Behavioural intentions are defined as one's personal estimate of the subjective probability of performing a certain behaviour (Ajzen and Fishbein, 1980, p. 12).

The relatively strong increase in the proportion of men who expected to improve their own oral hygiene may also be an indication that the Perio-Year has had a certain after-effect. However, their good intentions did not convert into corresponding good behaviour. There was no significant increase in the percentage of daily users of dental floss and toothpicks from 1983 to 1985. Changing an individual's behavioural intentions will, however, not necessarily lead to trying the corresponding behaviour. Beliefs concerning what 'important others' (e.g. peers, relatives) want us to do will also determine our behaviour. In addition, to maximize behavioural prediction the intention should be assessed just prior to the behaviour (Ajzen and Fishbein, 1980, p. 52). In the case of the Perio-Year the intention could have changed before the behaviour was registered.

Source

Source credibility consists of two components: expertise and trustworthiness (Tan, 1981, p.104). Even though dentists are naturally looked upon as experts on problems of dental health, their trustworthiness regarding the fifth of the rules of 'Dental Common Sense'—'regular dental visits render increased safety'—could be questioned. People might have believed that scarcity of work was the reason for the campaign, although only 6.6% of the dentists in 1982 had the impression that this was their patients' attitude (Søgaard, 1988).

Message

In spite of the fact that the Dental Association's campaign was christened the Perio-Year, and the goal was to improve the state of people's gums, the content of the campaign was characteristic of a general dental health campaign. To a certain extent the part concerning periodontal disease was swallowed up in a general message promoting dental

health—where the five common sense rules for dental health were repeated. As the results revealed, the recall rate concerning the motif used to symbolize the Perio-Year was low: only 21.8%. In a corresponding campaign in Finland, 49% remembered the main statement in the mass-media message (Murtomaa and Masalin, 1984). An extensive periodontal health campaign lasting for 3 months in five states in the USA, utilizing public service announcements, succeeded in reaching 36% of the population surveyed (Bakdash, 1983). Of these, only 27% correctly recalled the content of the message.

Perhaps the Dental Association's message during the campaign was too comprehensive. Research supports the sensible notion that simpler, more salient messages that are repeated frequently and consistently have the greatest likelihood of being acquired (Kline and Pavlik, 1981). If a specific target behaviour is to be changed, a non-specific programme cannot effect this change (Flay *et al.*, 1980). In a Norwegian campaign promoting less frequent consumption of sugar, where many of these factors were taken into account, the campaign motif was noticed by 40% of the whole sample—and as much as 61% of the target group (Kraft *et al.*, 1986).

It also seems that the personal, subjective messages used in the marketing of dental care devices may have been more forceful than the professional message about periodontal disease. The positive trend in the use of fluoride dentifrice, and the increase in the number of persons who answered 'soft toothbrush' to the question about how to avoid periodontal disease, confirm this assumption. Also, the fact that a considerable number of people stated that they had received information on dental health from advertisements, shows that advertising makes an important contribution to information on dental health. In their examination of dental health-related information in mass media during 1 week, Frazier *et al.* (1974) found three planned dental health educational communications and 837 commercials or advertisements of dental health-related products. Even though these figures are from the USA, which in contrast to Norway has advertisements on TV and radio, we know that marketing of dental health products in Norway is extensive (Augustson *et al.*, 1983).

Channel/media

During the autumn of 1981, only 1.25 h of broadcasting time on radio and TV was directly related to problems connected with people's gums. The newspapers, on the other hand, printed a substantial amount of material on this topic. Printed media have been shown to be a better means of influencing people's knowledge about a subject than electronic media (Kline and Pavlik, 1981). The Perio-Year presented the message through newspapers and was followed by an increase in the proportion of the population with correct knowledge.

We know from mass communication research that different groups of the population use the various mass media in different ways. In Norway men spend more time every day reading newspapers and watching TV than women do, while the differences between men and women are the opposite regarding weekly magazines and radio (Mathisen and Werner, 1982).

Compared to what should have been expected from this general pattern, more women seemed to have read about dental health in newspapers and watched the TV programmes about this topic. This could be due to selective exposure, i.e. individuals expose themselves to messages which they perceive as interesting. Health, dental health, self-care and family care have been connected to the traditional female role, and it is reaonsable to explain the higher rate of received information among women compared to men in these terms. Besides interest in the topic beforehand, the most decisive factors in people's receptiveness to a message communicated through the mass media is their perception of the salience, the novelty and the utility of the message and the rewards in the message (Tan, 1981, p. 170).

The second part of the Dental Association's campaign had no definite target group, which made it more difficult to choose the media to be employed and the form the message was to take. Kraft *et al.* (1986) have shown how the lack of consistency in the design of the public part of the campaign is reflected in the weak systematic pattern of awareness of the pamphlet 'Dental Common Sense'. Atkin (1979) and Flay (1987) point to the crucial role of pre-campaign planning, including audience analysis

and pilot testing of alternative sources and appeals, before the product is disseminated. Even if the Perio-Year was intended to reach all actual and potential patients with periodontal disease, it would probably have been an advantage to test out the message beforehand and limit the target group. For mass media programmes to be successful they must be targeted at people who already have a desire to change, or they must motivate the desire (Flay *et al.*, 1980).

Audience

There is evidence to indicate that half the population consider that the numerous health campaigns that are launched are a source of persistent worry (Aarø *et al.*, 1982). Therefore it must be considered positive when only 13% in our study reply in the affirmative when asked if people have enough problems without also being made aware of dental complaints. The campaign was probably not intensive enough to make people feel disagreeably pressured. It may even be possible to increase the general information about teeth and dental health without this having unfortunate consequences. One year before the Perio-Year began, 30% of the population wanted more information on the care of teeth (Aarø *et al.*, 1982).

Mass media campaigns are most effective if they last a certain length of time and the message is repeated time and again (Zimbardo *et al.*, 1977, p. 100). The part of the Perio-Year directed at the public itself lasted for only 3 months. Apart from a large number of articles in the newspapers, it cannot be said that the message was repeated very frequently in the mass media.

In her analysis of a dental health campaign in Scotland Schou (1987) suggests that mass-media national health education campaigns should combine the mass-media approach, to increase awareness, and active involvement of the target group, to stimulate behavioural changes. No such strategy of active participation and involvement of the public was planned in connection with the Perio-Year.

Developmental trends

Looking at the developmental trends in the characteristics of the audience regarding dental health behaviour, it is interesting to observe that no substantial equalization has occurred between men and women, between different socio-economic groups or between different age-groups. The subgroups which have gained most regarding dental health behaviour (index) from 1981 to 1985 are people living in rural areas, people with high school education and people aged 50 years and above.

Traditionally the groups with less favourable health habits are the ones most difficult to reach (Zimbardo *et al.*, 1977, p. 99; Aarø, 1986). It seems that some of these groups have changed their dental health behaviour between 1981 and 1985. Based on Rosenstock *et al.*'s (1959) findings, that individuals of lower social and educational status tend to obtain most of their health information from face-to-face contacts, it could be that the Perio-Year has had an impact through the dentists.

Conclusion

During the public part of the Perio-Year the whole emphasis was put on information. According to mass communication theory, a purely informational approach can only lead to changes in the cognitive part of the hierarchy of effects, i.e. exposure, awareness and knowledge. We may conclude that the Perio-Year did influence these three endpoints of measure, thus confirming the theory.

Even though no or only marginal change in dental health behaviour could be ascribed to the Perio-Year, the campaign has created a preparedness for later exposure to dental health messages. The first phase of the campaign (directed towards the dentists) has hopefully started a process that will continue to influence the public in the future.

On the basis of results from this study, and relevant mass communication research, it seems likely that the impact of the Perio-Year would have been greater if: (i) involvement, participation and activity of the audience had been encouraged; (ii) the message had been simpler and repeated over a longer period of time via multiple channels; and (iii) the pre-programme planning had been given more emphasis —including defining the goals and target group more explicitly, pre-testing message and selecting methods

and channels which corresponded with the target group.

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