

Effects of Oral Health on Quality of Life

⌘ findings from national health surveys ⌘

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Health-related quality of life

"The first goal of Healthy People 2010 is to help individuals of all ages increase life expectancy and improve their quality of life."

"Healthy People 2010" US DHHS, p8
(emphasis in original)

"Oral health problems can lead to needless pain and suffering, causing devastating complications to an individual's well-being, with financial and social costs that significantly diminish quality of life and burden American society."

Donna E. Shalala, Secretary, US DHHS, in
"Oral Health in America: A Report of the Surgeon General"

History - the dark ages

- Lay perceptions of health among Canadians (Gerson, 1972)
 - oral conditions should not constitute a justification for exemption from work
 - Oral conditions not regarded as illnesses because they do not conform with the "sick role"
- Perceptions of health in UK population (Dunnell and Cartwright, 1972)
 - headaches, rashes, burns and troubles with teeth were seen as "trivial" problems
 - not recognized or accepted as ill health
- 1st International Dental Collaborative Study (Davis, 1976)
 - aside from pain or rare life-threatening neoplasms, oral disease is associated only with aesthetics or perceptions of self-esteem, rather than effects on social roles

Societal impact of dental problems

- 1981 NHIS: 4.87 million dental conditions caused:
 - 17.7 million days of restricted activity
 - 6.73 million days of bed disability
 - 7.05 million days of work loss (Reisine SR, 1985)
 - oral conditions caused more work loss days than stroke and, in younger adults, as much work loss as all neoplasms combined
- 1989 NHIS oral health care supplement (Gift HC, 1992)
 - hours lost from work/school in previous 2 weeks because of dental problems or visits
 - no. of additional days in previous 2 weeks when normal activities were reduced because of dental problems or visits
- Mean impacts levels: 1.48 hours of work loss per worker; 1.17 hours or school loss per school-child; 0.17 days of additional reduced activity per person
- Higher mean impact levels among: females, non-whites, low education, low income, non-dentally-insured

Limitation of work loss measures

- Cross sectional telephone interview survey of 2,527 employed persons randomly sampled from Hartford, CT
 - hours of work loss due to dental symptoms or visits during the previous year
- 25.1% of persons had some work loss; mean work loss= 1.7 hrs (all persons), 6.2 hrs (people with work loss)
 - 95% of work loss episodes were attributed to preventive or curative dental visits rather than relief of symptoms
- Higher prevalence of work loss among: males, middle-aged, married, higher education, higher income, regular dental utilizers

Reisine ST et al, J Dent Res 1984; 63:1158-61

Prevalence and impact of pain in the US

Type of pain	% reporting pain	% of people with pain who were restricted for one or more days in:	
		Work/routine activities	Sleep
Headache	73	36	30
Backache	56	43	40
Muscle pains	53	28	30
Joint pains	51	32	38
Stomach pains	46	42	41
Menstrual pains	40	29	32
Dental pain	27	44	50

From: Nuprin Pain Report. New York: Louis Harris and Associates, Inc.; 1985.

What is quality of life?

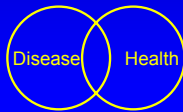
Healthy People 2010

- "a personal sense of physical and mental health and the ability to react to factors in the physical and social"

Surgeon General's Report on Oral Health

- "a multidimensional construct that reflects (among other things) people's comfort, eating, sleeping, social interaction, self-esteem and satisfaction with respect to oral health"

Locker, Chapter 2 in *Measuring oral health and quality of life*, 1997



Multiple dimensions

Concept	Domain
Opportunity	Social or cultural handicap; Individual resilience
Health perceptions	Satisfaction with health; General health perceptions
Functional status - social	Limitations in usual roles; Integration; Contact; Intimacy
Functional status - psychological	Affective states; Cognitive capacity
Functional status - physical	Activity restrictions; Fitness
Impairment	Complaints; Signs; Self-reported disease; Diagnoses
Death and duration of life	Mortality; Survival; Longevity

From: Patrick and Erickson, 1993

Measuring oral health and quality of life*

Measure (No. of items)	Content areas	Studies
Sociodental Scale (14)	Chewing, talking, smiling, laughing, pain, appearance	X-sectional Intervention
RAND Dental Health Index (3)	Pain, worry, conversation	X-sectional
Sickness Impact Profile (73)	Rest, home tasks, social interaction, speech, intellectual, work, leisure	Intervention
Geriatric Oral Health Assessment Index (12)	Chewing, eating, social contacts, appearance, pain, worry, self-consciousness	X-sectional Longitudinal Intervention
Dental Impact Profile (25)	Appearance, eating, speech, confidence, happiness, social life, relationships	X-sectional
Oral Health Impact Profile (49)	Function, pain, physical disability, psychological disability, social disability, handicap	X-sectional Longitudinal Screening

* Slade GD (ed) *Measuring oral health and quality of life*, 1997

Measuring oral health... (cont)

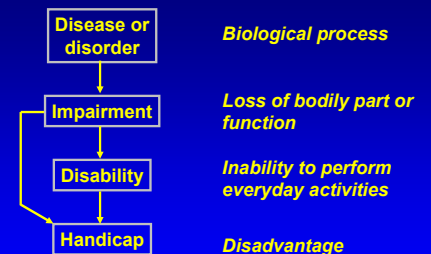
Measure (No. of items)	Content areas	Studies
Subjective Oral Health Status Indicators (42)	Chewing, speaking, symptoms, eating, communication, social relations	X-sectional
Oral Health Quality of Life Inventory (66)	Oral health (15 items); Nutrition; self rated oral health; overall quality of life	X-sectional
Dental Impact on Daily Living (36)	Comfort, appearance, pain, daily activities, eating	X-sectional
Oral Health-Related Quality of Life (3)	Daily activities, social activities, conversation	X-sectional
Oral Impacts on Daily Performances (9)	Performance in eating, speaking, oral hygiene sleeping, appearance, emotion	X-sectional

Development of the Oral Health Impact Profile*

- Identification of conceptual model
- Qualitative interviews with dental patients
- Classification and sorting of unique items
- Rating importance of items to develop item weights
- Internal and test-retest reliability
- Field testing and analysis of OHIP-49 for construct validity
 - ie. hypothesized relationships with oral status, dental care and socio-demographics
- Item reduction through factor analysis and regression analysis (OHIP-14)

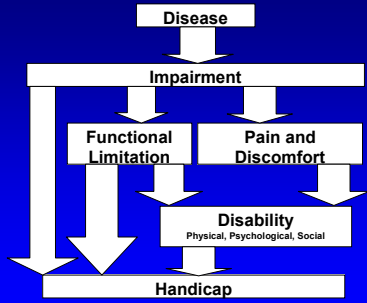
* Slade and Spencer, *Community Dental Health* 11:3-11, 1994
 Slade GD, *Community Dent. Oral Epidemiol.* 25:284-90, 1997

Impairment, Disability and Handicap*



* From: *International Classification of Impairment, Disability and Handicap*, Geneva, WHO 1980

Locker's Conceptual Model of Oral Health*



* Locker D. Community Dental Health 1988; 5:5-13

Oral Health Impact Profile*

How often during the last 12 months...

Have you had painful aching in your mouth... VERY OFTEN FAIRLY OFTEN OCCASIONALLY HARDLY EVER NEVER

Have you had difficulty chewing foods... VERY OFTEN FAIRLY OFTEN OCCASIONALLY HARDLY EVER NEVER

because of problems with your teeth, mouth or dentures?

Ordinal coding of responses:

Never=0, Hardly Ever=1, Occasionally=2, Fairly Often=3, Very Often=4

Derived summary variables:

Number of items reported occasionally, fairly often or very often

Sum of ordinal responses

Sum of weighted, ordinal responses

Slade GD, Spencer AJ. Community Dental Health, 1994; 11:3-11.

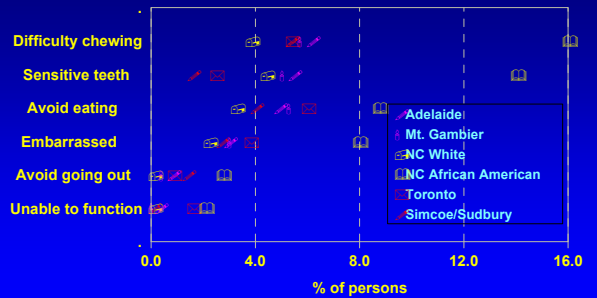
Slade GD, Community Dent Oral Epidemiol 1997; 25:284-90

Oral health impact in three countries

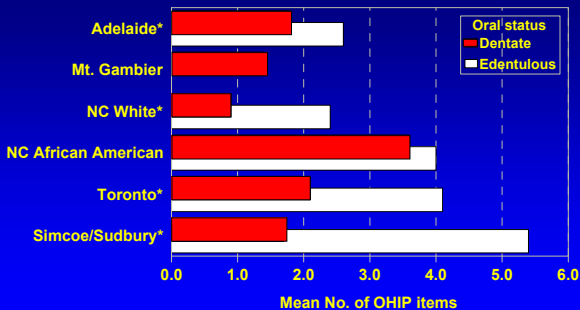
- **NC: Piedmont 65+ Dental Study**
 - random sample of community dwelling residents aged 65+ at baseline (1988) in five central NC counties (pop. 310,000)
 - n=202 African-Americans and 225 whites
- **South Australia: SA Dental Longitudinal Study**
 - random sample of community dwelling residents aged 60+
 - n=859 Adelaide (pop. 1.1 million) and 358 Mt. Gambier (pop. 24,000)
- **Ontario: Study of Adult Dental Health**
 - random sample of community dwelling adults aged 50+
 - n=396 Toronto (pop 1.1 million) and 298 Simcoe/Sudbury (pop. 230,000)

Slade GD et al, J Dent Res, 1996; 75:1439-50

OHIP items reported by dentate people



Dentate status and mean no. of OHIP items



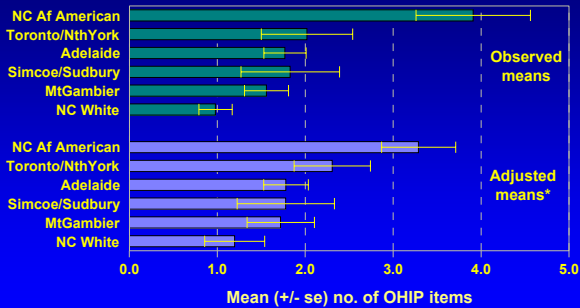
* Difference between dentate and edentulous significant (P<0.05)

Multivariate analysis - dentate people

Dependent variable: No. of OHIP items reported fairly or very often

Independent variable	β	se	P-value
No. of missing teeth	0.07	0.02	<0.01
No. of decayed surfaces	0.31	0.09	<0.01
No. of retained roots	0.46	0.20	0.02
Maximum pocket depth (mm)	0.24	0.10	0.01
Problem visit (1=Yes, 0=No)	0.90	0.34	0.01
Population group (6 categories)			<0.01

Observed and adjusted OHIP means



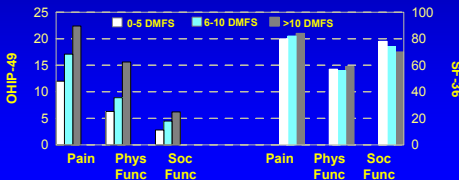
* Adjusted means from regression model controlling for oral status and dental visits

Other cross-sectional studies

Authors	Population	Groups identified with poorer OHRQoL
Cushing et al, 1985	UK workers	<functioning teeth; >decayed teeth
Gooch et al, 1989	US insured adults 18-61 yrs	>decayed teeth; >periodontal disease; non-whites; <education; <income
Atchison and Dolan, 1990	US Medicare recipients aged 65+ yrs	<teeth; perceived need for dental care; wearing removable denture
Leao and Shelham, 1995	Brazil, aged 35-44 yrs	<teeth; >decayed teeth; >gingival bleeding; >calculus; periodontal probing depths; <social class
Kressin et al, 1996	US men aged 47+ yrs	Problem based dental visits
Gift et al, 1996	US, aged 18+ yrs	<education; non-white; last dental visit >2yrs

Generic vs. oral health related QoL

- Cross sectional study of disadvantaged minority adolescents in Newark, NJ (n=93)
- All subjects completed SF-36 and OHIP-49 questionnaire
- 76 completed clinical dental examination (DMFS)
- Moderate correlations ($\rho = -0.21$ to -0.57) between subscales of OHIP and SF-36
- OHIP, but not SF-36, varied significantly among tertiles of DMFS



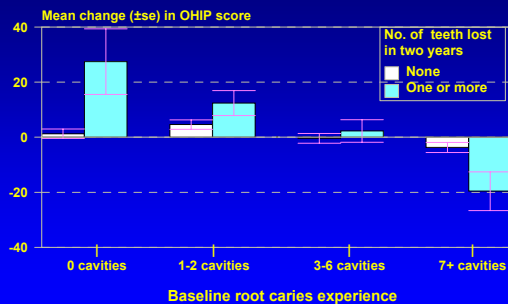
* Broder H et al, J Public Health Dent, 2000

Longitudinal study

- Random sample of community-dwelling adults aged 60+ at baseline, Adelaide and Mt. Gambier, Sth Australia
- Baseline OHIP-49 and oral examinations for clinical indices and treatment needs (n=912 dentate people)
- Two-year follow-up OHIP-49 and clinical examination (n=498 people)
 - Identification of people who experienced no tooth loss versus loss of 1+ teeth
 - Changes in OHIP-49 scores computed
- Tooth loss was predictive of increase in OHIP scores
 - however, relationship was conditional on baseline clinical status...

* Slade GD, Community Dent Oral Epidemiol, 1998

2-yr change in OHIP scores



Randomized trial of implant prostheses*

- Randomized controlled clinical trial of prosthodontic treatments in Montreal dental school
- Edentulous patients seeking replacement complete dentures assigned at random to receive:
 - mandibular implant-supported overdenture + maxillary conventional denture (IMP, n=54) OR
 - mandibular + maxillary conventional dentures (CD, n=48)
- Baseline and 2-month post-Tx OHIP-49 questionnaire
 - additional physiological measures of chewing function
- Baseline OHIP-49 scores and chewing function equivalent between treatment groups
- Significant post-treatment reduction in OHIP scores for IMP group (mean = 34.5) but not for CD group (mean = 9.4)
- No significant differences in physiological chewing function for either group

* Awad MA et al, J Dent Res 2000

Frequency of oral health impacts in three industrialized countries

Gary Slade¹, Nigel Nuttall², Anne Sanders³, Satu Lahti⁴, Jimmy Steele⁵, Finbarr Allen⁶

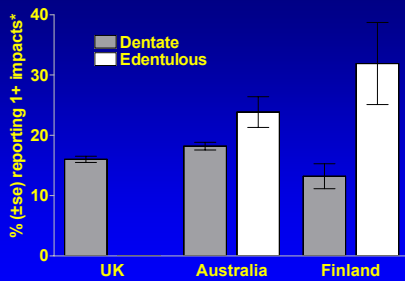
¹University of North Carolina, ²University of Dundee, Scotland, ³University of Adelaide, Australia, ⁴Oulu University, Finland, ⁵National University of Ireland, ⁶University of Newcastle upon Tyne, UK

Methods

Three national surveys of oral health that used OHIP-14

- 1998 U.K. Adult Dental Health Survey (Kelly et al, 2000)
 - Personal interviews, including OHIP-14, with 5,270 dentate adults (16+ yrs) in England, Scotland, Wales and Northern Ireland
 - Dental examinations of 3,817 dentate subjects
- 1999 Australian Dental Health and Lifestyle Factors
 - Telephone interviews with 6,093 dentate and edentulous adults (18+ yrs) in all States and Territories
 - Mail questionnaire, including self-complete OHIP-14 questionnaire, received from 3,473 subjects
- Finnish National Health 2000 Survey – pilot survey
 - 311 adults (21-94 yrs) in three Finnish towns (Espoo, Jyväskylä and Kemi)
 - Self-completed, Finnish translation of OHIP-14

Prevalence of impacts – dentate and edentulous



* Impacts reported "fairly often" or "very often"

Dentate people: prevalence, extent and severity of impact

	UK	Australia
Prevalence: % reporting 1+ impacts*	16%	18%
95%CI	15-17%	17-19%
Extent: mean no. of impacts*	0.36	0.46
95%CI	0.33-0.39	0.41-0.50
Severity: mean OHIP score	5.1	7.5
95%CI	4.9-5.2	7.2-7.7

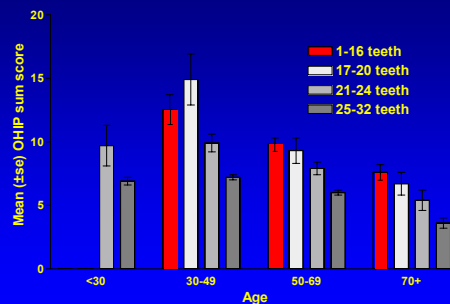
* Impacts reported Fairly Often or Very Often

Largest between-country differences

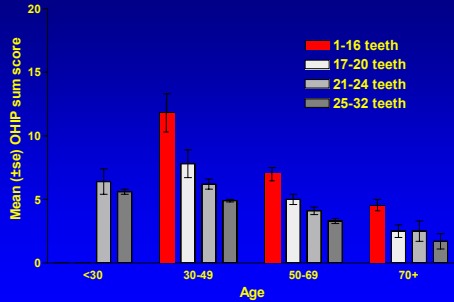
	# items	Severity (mean)		
		UK	AU	Difference
Pain+Phys. Disability*	4	2.12	3.44	1.32
Other impacts	10	2.94	4.03	1.08
Total OHIP score	14	5.06	7.47	2.41

* Painful aching; Uncomfortable to eat; Diet unsatisfactory; Interrupted meals

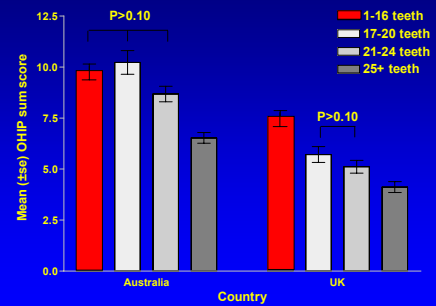
Age and tooth loss - Australia



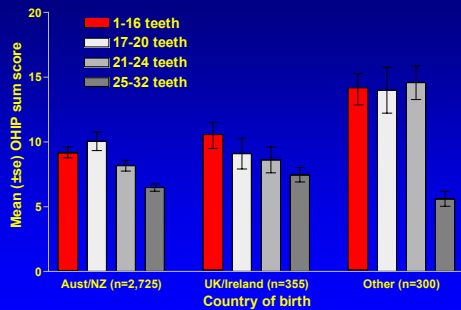
Age and tooth loss - UK



Age and tooth loss - AU and UK



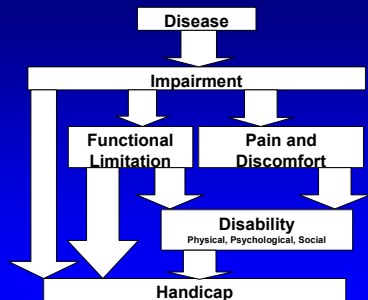
Age, tooth loss and country of birth - AU



Summary - descriptive findings

- It is feasible to measure Oral Health Related Quality of Life in national surveys using a standardized, validated questionnaire
- There was similarity in percentage of adults reporting impacts "fairly/very often" in previous 12 months
- Differences between UK and AU populations occurred for pain and eating disability and when "occasional" or less frequent impacts were enumerated
- Younger age associated with greater impact in UK and AU
- Fewer teeth associated with greater impact in UK and AU
- Critical tooth loss thresholds for severe deficits in OHRQoL occurred at 17-20 remaining teeth in AU and 1-16 teeth in UK
 - However, in AU the threshold was dependent on country of birth

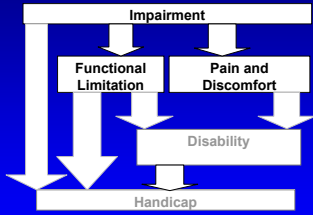
Locker's Conceptual Model of Oral Health*



OHIP-14 quality of life dimensions

- Functional Limitation
 - Trouble pronouncing words; Taste affected
- Pain and Discomfort
 - Painful aching; Uncomfortable to eat; Been self conscious; Felt tense
- Disability
 - Diet unsatisfactory; Interrupted meals; Difficult to relax; Been embarrassed; Been irritable; Difficulty doing jobs
- Handicap
 - Life less satisfying; Unable to function

Examples of causal interpretations



*Impairment can cause functional limitation

*Impairment can cause pain/discomfort

*Any joint occurrence of functional limitation and pain/discomfort is not due to one causing the other

*i.e. joint occurrence is due to impairment as the common, underlying cause

*Hence, pain/discomfort cannot cause functional limitation (and vice versa)

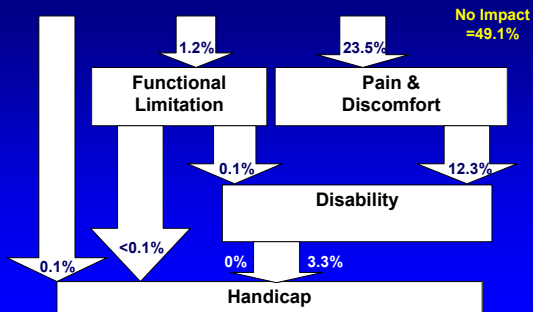
UK: impacts reported at least "occasionally"

Dimension	% of people
Functional Limitation	10.2
Pain/Discomfort	48.3
Disability	23.3
Handicap	7.1

One or more dimensions* 50.9

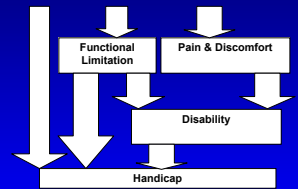
* Dimensions are not mutually exclusive

Frequency of causal pathways (total=89.6%)



Frequency of non-causal pathways (total=10.3%)

Pathway	% of people
FL-P/D-DI	3.5%
FL-P/D-DI-HC	3.0%
FL-P/D	2.1%
DI	1.0%
P/D-HC	0.5%
FL-P/D-HC	0.2%
DI-HC	<0.1%



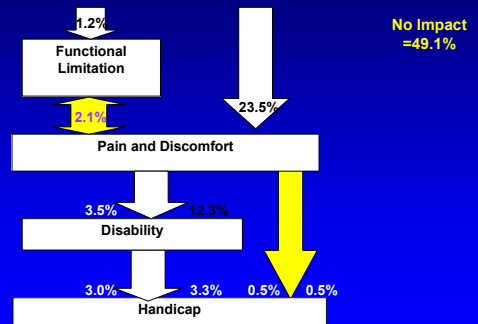
Functional limitation and pain/discomfort

Most frequent combinations of items in functional limitation (FL) and pain/discomfort (P/D) among 110 people reporting only pain and discomfort

FL	Trouble pronouncing	✓	✓	✓	✓	✓	✓
	Taste affected	✓	✓	✓	✓	✓	✓
P/D	Painful aching	✓	✓	✓	✓	✓	✓
	Uncomfortable to eat	✓	✓	✓	✓	✓	✓
	Self conscious						✓
% of people		17.3	11.8	10.9	7.3	4.5	4.5

(Total=56.3% of 110 people)

Proposed causal model (total=98.6%)

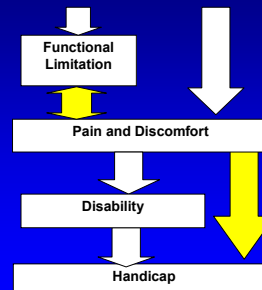


Validation dataset

- Dental Health and Lifestyle Study (Spencer and Sanders)
 - Adult respondents to Australian National Dental Telephone Interview Survey, 1999
 - OHIP-14 questionnaire completed by 3,900 subjects

		% of people	
		UK	Australia
Locker's model	No impact	49.1	37.4
	Causal	40.5	46.6
	Non-causal	10.4	16.0
Modified model	No impact	49.1	37.4
	Causal	49.5	61.0
	Non-causal	1.3	1.5

Interpretation of Proposed Causal Model



- Functional limitation can cause pain/discomfort (and vice versa)
- Functional limitation, alone, cannot cause disability or handicap
- Pain/Discomfort is a necessary pre-condition for handicap
- Pain/Discomfort alone can cause handicap

Conclusions

- Cross sectional studies within countries
 - OHIP is associated with clinical oral status (tooth loss, untreated caries, periodontal disease)
 - High levels of impact among groups traditionally disadvantaged with respect to oral health (low socioeconomic status, limited access to care)
 - Clinical oral status accounts for some, but not all, of elevated impact in those groups
 - Impacts of oral conditions are not captured in generic QoL measure (SF-36)
- 14-item OHIP is able to discriminate as effectively as 49-item OHIP
 - demonstrated feasibility of use in national health surveys
- National surveys
 - Greater heterogeneity in OHRQoL within countries than between countries

Conclusions (cont)

- Observational cohort study
 - OHIP scores increased among some people who experienced tooth loss
 - however, for people with high levels of clinical disease at baseline, OHIP scores reduced following tooth loss
- Clinical studies
 - Prosthodontic treatment to replace missing teeth produces substantial reductions in OHIP scores
 - OHIP is able to detect differences in outcomes between implant-retained and conventional dentures
 - in one study, OHIP detected treatment differences while physiological measures did not

Future directions

- Tools to measure QoL in additional population groups
 - eg. children and/or their caregivers
- Methods to capture positive dimensions of health
 - eg. to track improvements among people who initially are symptom-free
- Identifying additional determinants of QoL
 - eg. psychological, social, organization of health care
- Studies of impact of specific treatments on QoL
 - treatment of existing disease, prevention of disease, enhancement of health
- Integration and interpretation of QoL together with other health outcomes
 - clinical indices, patient satisfaction, longevity, costs