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Among Norwegian adults a cross sectional study which is Comparative risk judgements for oral health risks.

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Abstract

Background: This study identified optimistic biases in health and oral health hazards, and explored whether comparative risk judgements for oral health hazards vary systematically with socio- economic characteristics and self-reported risk experience.

Methods: A simple random sample of 1,190 residents born in 1972 was drawn from the population resident in three counties of Norway. A total of 735 adults (51% women) completed postal questionnaires at home.

Results: Mean ratings of comparative risk judgements differed significantly ($p < 0.001$) from the mid point of the scales. T-values ranged from -13.1 and -12.1 for the perceived risk of being divorced and loosing all teeth to -8.2 and -7.8 ($p < 0.001$) for having gum disease and toothdecay. Multivariate analyses using General Linear Models, GLM, revealed gender differences in comparative risk judgements for gum disease, whereas social position varied systematically with risk judgements for tooth decay, gum disease and air pollution. The odds ratios for being comparatively optimistic with respect to having gum disease were 2.9, 1.9, 1.8 and 1.5 if being satisfied with dentition, having a favourable view of health situation, and having high and low involvement with health enhancing and health detrimental behaviour, respectively.

Conclusion: Optimism in comparative judgements for health and oral health hazards was evident in young Norwegian adults. When judging their comparative susceptibility for oral health hazards, they consider personal health situation and risk behaviour experience.

Background

Perceived vulnerability to disease and injury is assumed to be a motivating factor for behaviour change in a number of theoretical models [1]. Health education campaigns have focused on influencing people's risk perceptions by exposure to relevant risk information. However, there is a notion that people do not draw personal implications from risk information. This, in turn, has been related to self-enhancing processes of social comparisons or unreal- istic optimism [2], the tendency to perceive negative events as less likely and positive events as more likely to self than to others [2,3]. From a practical point of view this phenomenon could hinder the adoption of preventive be- haviour and thereby undermine the effectiveness of health educational efforts. If health and oral health haz- ards primarily concern other people and not oneself – there might be no reason to adapt ones behaviour.

A sizeable literature has confirmed optimism in compara- tive risk judgements with respect to various health and safety risks, ranging from catching a cold to having AIDS and experiencing an accident [4–7]. People might not, however, be optimistic about all health problems and the amount of optimism varies substantially from hazard to hazard. According to social comparison theory, people would be more likely to underestimate their comparative health risk particularly if the

illness /injuries are perceived to be under control or are something that they have not yet experienced [1,2]. Adolescents estimate their risk for developing serious chronic diseases as much lower than others, but are less optimistic about more common haz- ards such as avoiding a flu or breaking a leg [8]. So far, studies related to comparative risk judgements for oral health hazards are almost lacking. Moreover, studies re- garding optimistic biases in adult populations share the limitation of gathering data from convenient groups of generally healthy college students. It is not obvious that those findings apply to the rest of the population. Unreal- istic optimism might be gender dependent and vary with health situation and other social and behavioural charac- teristics in the population. This study, therefore, examined perceived vulnerability to oral health hazards focusing a representative sample of young Norwegian adults.

In early research on perceived vulnerability among school-aged children, girls felt more vulnerable than boys to minor illnesses and were more likely to engage in pre- ventive behaviours [9]. In a study by Morrongiello and Rennie [10], boys engaged in more risk behaviours than girls but were even though more optimistic about avoid- ing injury. On the other hand, Whalen et al [8] and Eye et al [11] did not identify any gender differences with respect to the perceived vulnerability for illness and injuries among school-aged children.

A number of studies have provided evidence consistent with the notion that people primarily use direct personal experience when inferring their susceptibility to health hazards [6]. Weinstein [1] argued that people seem able and willing to incorporate knowledge about their family history, personality and physical and psychological condi- tions into their risk perceptions, but do not easily recog- nise the relationship between their own actions and the risks they run. A study of adolescents and their parents did show that girls whose mother had cancer felt more vulner- able to cancer than their counterparts with healthy moth- ers [12]. It is evident from studies of children and adults, that more experience with previous risk-taking behaviour associates with higher risk appraisals for future negative events [6,13]. A positive relationship between an in- creased sense of vulnerability and preventive behaviours has been demonstrated as well [6,13]. In Norway, adult smokers take account of smoking risks when deciding whether or not to continue to smoke [14], whereas ado- lescents consider their vulnerability to oral health hazards when deciding whether or not to engage in preventive be- haviours [15]. During the last 30 years, oral health has im- proved considerable among Norwegian adults, particularly among the younger cohorts [16] In 2000, the mean DMFT at age 18 was 5.1, which represents a 50% re- duction since 1985 [17]. On the other hand, the national consumption of carbonated soft drinks per capita in- creased from 89 litres in 1992 to 118 litres in 2000 [18] and research suggest a concomitant increase at the indi- vidual level particularly in youth [19]. It seems relevant to study the proximity of perceived risks about oral health hazards in young Norwegian adults.

Purpose

The present study examined whether an optimistic bias is present in the comparative risk judgements for various health-and oral health hazards among Norwegian adults. Moreover, this study explored whether risk judgements for oral health hazards vary systematically with gender and socio-economic status and whether young adults take account of personal risk experience when considering their susceptibility to oral health hazards.

Methods

Subjects and procedure

A simple random sample of 1,190 residents born in 1972 (48% was women) was drawn by the Directorate of Taxes from a population of 13,550 persons (sampling fraction 8.8%) resident in 3 Norwegian counties on 1st January 1997. Twenty-three subjects were lost because of wrong addresses, living abroad and due to mental retardation. A mail questionnaire with an explanatory letter and a self- addressed and pre-paid envelope for the reply was posted in March 1997. To promote participation, the subjects were invited to write sender and address on the envelope, thereby entering the draw of a return voyage for two be- tween Bergen (Norway) and Newcastle (England). Those who had not answered within 14 days received a reminder comprising a letter, questionnaire and stamped addressed envelope.

Sixty-two percent of the eligible sample responded after one reminder. Of the 735 adults who re- plied, 360 (50.7%) was women and 58% reported 12 years of education or less. These figures deviate only slightly from the corresponding population characteris- tics.

Questionnaire

The postal questionnaire (additional file 1), contained questions with fixed response alternatives and graphic rat- ing scales.

Measures

Comparative risk judgements were measured using the di- rect method [4], which has been employed extensively, for instance in national health surveys [20]. Respondents were asked "As compared to other people of your own age and gender, how do you think your own risk are for some- times during your life experience; lung cancer, serious toothdecay, serious gum disease, loss of all teeth, having cancer, being divorced and experiencing serious pollu- tion". The response categories were given as: (-3) "much lower", (-2) "lower", (-1) "some lower", (0) "same risk as others", (+1) "some higher", (+2) "higher", (+3) "much higher". For logistic regression analysis, dummy variables were constructed regarding oral health hazards (loss of all teeth, dental caries and gum disease) yielding the re- sponse categories (1) "below the risk of others" (including -3, -2 and -1), (0) "same or greater risk than others" (in-cluding 0, +1, +2 and +3).

Health enhancing and health detrimental behaviours were measured by asking how often each of the specified items (fruits, vegetables, whole wheat bread, vitamins/cod liver oil, cakes/biscuits, chips, soda, chocolate/sweets) were consumed during the past 3 months. Five-point re- sponse scales were used ranging from (1)"several times a day" to (5) seldom or never. Smoking habits were record- ed as (1) "daily", (2) "sometimes" and (3) "never", where- as alcohol consumption (wine, beer, spirits) was assessed from a scale (1) "6–7 times a week to (8) "not during the last 3 months". Use of dental floss, toothpicks, tooth- brush and fluoride containing mouth rinse were recorded on 7-point scales, ranging from (1) "several times a day" to (7) "never". A PCA analysis (with the 12 original measures of health and oral health related behaviours) re- vealed two factors. The activities included in the two factors were added into two sum scores: "health enhanc- ing behaviour" (Mean = 30, SD 2.4, range 4–20, Cron- bach's alpha = .45) and health detrimental behaviour (Mean = 15.5, SD= 2.4, range = 4–20, Cronbach's alpha.60). For a detailed description of the PCA and the con- struction of the two behavioural indices see [21].

Self-assessed health status was measured by one question,
i.e "On a scale from 0 = no health problems to 10 = great health problems where will you fit in"? For analysis the re- sponses were dichotomised using a cut-off point ≤ 1, where (1) "at most one problem" and (2) "more than one problem".

Satisfaction with teeth was assessed by one question in terms of "How satisfied are you with your teeth as they are today" The responses ranged from (1) "very satisfied" to
(5) "very dissatisfied". A dummy variable was constructed for logistic regression analysis (1) "satisfied" (2) "dissatis- fied"

Gender was coded as (1) "male" and (2) "female".

Social position/social class – Two measures were used, one relating to occupational prestige and income and one relating to level of education. The measure for occupa- tional status was derived by coding job and employment descriptions according to the classification of the Central Bureau of Statistics, grouping occupations mainly accord- ing to training and qualifications needed for the job. The codes were finally converted into three categories (1) "manual worker" (fisherman, farmer, semiskilled and un- skilled manual workers, driver) (2) "non-manual worker" (teachers, self-employed, health worker, manager, trades people and (3) "full time university students". The second measure of social class was based on years of schooling. The highest qualification received, when leaving school was used to construct a four-point educational status score. Educational status was categorised as (1) ≤ 12 years (i.e. lower level, including those who had left school at age 15 and 18 and were without further education) and (2) > 12 years (i.e. higher level including the holders of technical trade, diplomas and higher degrees).

Statistical analyses

Univariate analyses were performed using cross-tabula- tion and Chi square statistics. Optimistic bias in compar- ative risk assessments for health and oral health hazards was assessed by use of one-sample t-statistics. Multivariate analyses were performed using General Linear Models (GLM), and logistic regression analysis. For all analyses, a two-sided significance level of 5% was applied.

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Results

One sample t-statistics to indicate whether the mean rat- ings of the questions assessing comparative risk judge- ments were different from the mid-point of the scales (i.e. indicating an optimistic bias) provided significant effects ($p < 0.001$) for the eight comparative risks judgements in- vestigated. As shown in table 1, t-values ranged from t = -13.1 and t = -12.1 ($p < 0.001$) for being divorced and loosing all teeth to t = -1.7 and t = -1.8 ($p > 0.05$) for experi- encing cancer and pollution, respectively. Multivariate analysis of variance (GLM) with the eight comparative risk judgements revealed a significant multivariate effect, F =43.34 $p < 0.000$. Significant effects occurred for the risk judgements of having lung cancer F = 76.6 ($p < 0.001$), gum disease F = 60.7 ($p < 0.001$), toothdecay F = 63.6 ($p< 0.001$) and tooth loss F = 143.4 ($p < 0.001$). In other words, 36.1% of the respondents reported their compara- tive risk of having lung cancer to be below average and 19.8% reported their risk to be above average. The corre- sponding figures regarding gum disease were 29.1% and 14.6%, regarding tooth-decay 38.7% and 19.5% and re-garding tooth loss 33.9% and 9.7%.

A GLM with educational level, social position and gender as fixed factors and the eight comparative risk judgements

Table 1: One sample t-statistics of comparative risk judgements for health and oral health hazards among young adults.

	N	Mean	SD	t	Sig. 2-tailed
Lung cancer	731	-.41	1.28	-8.6	.000
Gum disease	731	-.31	1.08	-7.8	.000
Accident	726	-.33	1.03	-8.5	.000
Tooth decay	728	-.39	1.29	-8.2	.000
Dentures	724	-.52	1.15	-12.1	.000
Divorce	725	-.56	1.15	-13.1	.000
Cancer	728	-.006	1.00	-1.7	.080
Pollution	721	-.005	0.73	-1.8	0.061

Table 2: Pearson's correlations among health enhancing behaviour, health detrimental behaviour, perceived number of health com- plaints and satisfaction with teeth and perceived comparative risk judgements for gum disease, tooth decay and loosing all teeth.

Comparative risk judgements			
	Gum disease	Toothdecay	Tooth loss
Health enhancing behaviour	.18**	.12**	.07
Health detrimental behaviour	-15**	-.17**	-.13**
Perceived health status	.17**	.24**	.16**
Satisfaction with teeth	.30**	.48**	.34**

** $p < 0.001$ * $p < 0.05$

Table 2 depicts Pearson's correlation coefficients among comparative risk judgements for gum disease, toothdecay and tooth loss and personal risk experience in terms of self-reported health enhancing behaviour, health detrimental behaviour, health status and satisfaction with teeth. Preason's r varied form -.17 ($p < 0.001$) to .48 ($p < 0.001$).

as dependent variables, controlling for all two-way inter- actions revealed multivariate main effects of gender $F=2.049$ $p < 0.05$, social position $F = 1.749$, $p < 0.05$ and ed- ucational level $F= 2.890$, $p < 0.05$. Estimated marginal risk judgement of gum disease than did men (-.39 versus -.19, $p < 0.05$). Social position varied systematically with perceived risk of having gum disease ($F = 3.47$, $p < 0.05$), tooth decay ($F = 5.58$, $p < 0.05$) and experiencing pollution ($F = 3.1$, $p < 0.05$). The estimated marginal means regarding gum disease amounted to -.27, -.17 and

-.45 for manual workers, non-manual workers and full time university students, respectively. The corresponding figures regarding comparative risk judgements for toothdecay were -.17, -.43 and -.59. Educational level varied systematically only with comparative risk judgements for experiencing an accident ($F = 13.1$, $p < 0.000$). The mean comparative risk judgements amounted to -.46 and -.11 among lower and higher educated adults, respectively.

Table 3: Logistic regression in terms of odds ratios, OR and 95% Confidence Interval, CI, for young adults' comparative risk judge- ments for gum disease (1 = below the risk of others, 0 = the same risk as others and above) according to gender, social position and various aspects of personal risk experience

Comparative risk judgements for gum disease

	OR	95% CI
Gender		
Female versus male	1.1	0.7–1.6
Social position		
Manual versus student	0.7	0.4–1.0
Non-manual versus student	0.8	0.4–1.0
Health enhancing behaviour		
High versus low engagement	1.8	1.2–2.6
Health detrimental behaviour		
Low versus high engagement	1.5	1.1–2.2
Perceived health status		
Good versus bad	1.9	1.2–3.0
Perceived oral health status		
Satisfied versus dissatisfied	2.9	1.7–4.4

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Table 4: Logistic regression in terms of odds ratios, OR and 95% Confidence Interval, CI, for young adults' comparative risk judge- ments for toothdecay (1 = below the risk of others, 0 = the same risk as others and above) according to social position and various aspects of personal risk experience

Comparative risk judgements for toothdecay	R	95%CI
Social position		
Manual versus student	0.6	0.4–0.8
Non-manual versus student	0.7	0.5–1.0
Health enhancing behaviour		
High versus low engagement	1.2	0.8–1.7
Health detrimental behaviour		
Low versus high engagement	1.5	1.0–1.9
Perceived health status		
Good versus bad	1.6	1.0–2.4
Perceived oral health status		
Satisfied versus dissatisfied	4.7	3.0–7.3

Table 5: Logistic regression in terms of odds ratios, OR and 95% Confidence Interval, CI, for young adults' comparative risk judge- ments for tooth loss (1 = below the risk of others, 0 = the same risk as others and above) according to various aspects of personal risk experience

loss Comparative risk judgements for tooth	OR	95% CI
Health enhancing behaviour		
High versus low engagement	1.2	0.9–1.8
Health detrimental behaviour		
Low versus high engagement	1.3	1.0–1.9
Perceived health status		
Good versus bad	1.8	1.1–2.5
Perceived oral health status		
Satisfied versus dissatisfied	3.2	2.1–4.8

Table 3,4,5 depict the estimated multivariate models, ad- justed odds ratio and 95% CI of comparative risk judge- ments for gum disease, toothdecay and tooth loss, applied as binary outcome variables (1= below the risk of others, 0= as big or bigger risk than others). The odds ratio for be- ing comparatively optimistic with respect to the perceived risk of having gum disease were 2.9, 1.9, 1.8 and 1.5 if be- ing satisfied with oral health status, satisfied with own health status, if having high involvement in health en- hancing and low involvement in health detrimental be- haviour, respectively. The odds ratio for being unrealistic optimistic about having toothdecay were 4.7, 1.6 and 1.5 if being satisfied with oral health, viewing health situation favourably and engaging in less health detrimental behav- iour, respectively. As compared to being a full-time uni- versity student, manuals were less likely of being unrealistically optimistic about having toothdecay. The only statistical significant predictors of comparative risk judgements of having tooth loss were perceived oral health status and perceived health status with odds ratios of 3.2 and 1.8, respectively. Significant second order ef- fects in terms of regression coefficients (B) were identified for the terms gender by health detrimental behaviour (B = 0.70, $p < 0.05$) and gender by health enhancing behaviour (-0.85, $p < 0.05$) on comparative risk judgements for hav- ing tooth loss and toothdecay, respectively. Odds ratios for being comparatively optimistic about toothdecay if engaged in health enhancing behaviour was 2.4 (95% CI, 1.5–3.9) for men and 1.1 (95% CI 0.8–1.8) for women. Correspondingly, the risk of being unrealistic optimistic about tooth loss, if involved with health detrimental be- haviour, was 0.5 (95% CI 0.5–1.3) and 0.4 (95% CI 0.2–0.7) among men and women, respectively.

Discussion

When assessed in comparative terms, the Norwegian adults, as a group, claimed, they were less at risk than sim- ilar others across various health-and oral health hazards, except for the comparative risk judgements of experiencing cancer and pollution. Hence, the unrealistic optimism effect, initially documented by Weinstein [1–4], in his studies of US-college students was replicated, with health and oral health hazards in a representative sample of young Norwegian adults. The hazards which adults thought they had most chance of experiencing in compar- ison to their peers were cancer and pollution. Absence of unrealistic optimism in comparative risk judgements for cancer has been documented elsewhere [2]. Kreuter and Stercher [22] and Whalen et al [8] compared cancer to several other health and environmental hazards (heart at- tack, stroke and motor vehicle crash) and found that the perceived risk of having cancer was much greater than for the other hazards investigated. Young adults might per- ceive their risk of having cancer and experiencing air pol- lution as uncontrollable and thus have greater fear of diseases and environmental hazards they do not know much about. On the other hand, the subjects investigated in this study were most unrealistically optimistic about their chances of experiencing a

divorce and loosing all their teeth.

A sizeable amount of literature has reported on optimistic biases in comparative risk assessments across different age, sex and cultures and across a variety of health, safety and environmental risks [see [23]]. In addition, there is evidence that perceived invulnerability occurs not only in relatively immune people but also among groups consid- ered at high risk [8]. This study adds to existing evidence by indicating the presence of optimistic biases in comparative risk judgements for various oral health hazards among young adults from the general population. The ex- istence of an optimistic bias might be true as long as the individuals who provided personal risk estimates are con- sidered fairly representative of the comparison group that they use. It remains unclear, however, whether this evi- dence reflects any underestimation of personal risk in ab- solute or true terms on the part of Norwegian adults at age25. A reduction in dental caries experience as well as in the prevalence of periodontal diseases has been observed among adults in Norway [24]. It is likely that the consist- ently low vulnerability observed in this study may be at- tributed to the fact that young people have little personal experience with those hazards enlisted that emerge later in life. This accords with Weinstein's [1] notion that condi- tions most likely to elicit unrealistic optimism are those associated with the often, incorrect belief that if the prob- lem has not yet appeared it is unlikely to occur in the fu- ture. This evidence is however still equivocal and other studies have shown that ill and healthy people do not dif- fer significantly in their unrealistic optimism scores [25].

The present finding which showed generally modest dif- ferences in the levels of optimism with respect to gender and social position are consistent with what has been re- ported previously [2–4]. Nevertheless, females felt more optimistic about their chances of getting gum disease than did their male counterparts. Mc Kenna et al. [26] reported a similar gradient in the results from a smoking popula- tion. Moreover, manual workers were less unrealistically optimistic about their chances of having toothdecay and gum disease than were university students. This probably reflects the statistics showing that in the overall young adult population lower socio-economic status groups are more at risk for oral diseases than their higher socio-eco- nomic counterparts [24]. A social comparison model would suggest that university students and girls report lower perceived risk due to lack of health knowledge and personal experience. Finally, females and university stu- dents might be relatively accurate in their perceived vul- nerability if they engage in more health enhancing and less health detrimental behaviours than do their manual worker-and male counterparts. A number of studies have demonstrated that individuals who report higher stand- ards of education and income are more likely to engage in preventive oral hygiene behaviours, less smoking and have better eating habits [27,28]. Compared to males, females are generally less likely to smoke, consume less alcohol, pay more attention to their diet and engage in more preventive oral health behaviour [29].

Consistent with previous findings in other health related domains [6], and at odds with others [25], Norwegian adults seem to consider personal risk experience when evaluating their susceptibility for oral health hazards. As shown in Table 3,4,5, adults who rated their health and oral health favourably, engaged in more health enhancing – and less health detrimental behaviour, were more likely to be optimistically biased regarding gum disease, tooth- decay and tooth loss than were their counterparts in the opposite groups. As far as oral health threatening behaviours are concerned, the biggest risk takers in the sample of Norwegian adults were those least likely to exaggerate their own invulnerability, an outcome not predicted by the invulnerability hypothesis. This systematic variation with reported standing on actual risk factors, indicates that at least in a relative sense adults' personal risk percep- tions were fairly accurate. Moreover, interaction effects suggest that when evaluating their comparative susceptibility for oral health hazards, females were more likely than males to consider oral health threatening activities. The importance of individual differences has been dem- onstrated previously [30] for instance in that personality style interacted with behavioural risk in predicting high school students' AIDS risk perceptions.

These results demonstrating the presence of unrealistic optimism have obvious practical implications. Providing young adults with vicarious experience in terms of risk in- formation about their own age group or people in general, might not lead them to accept this information as relevant to themselves. A more promising approach might be to provide self-relevant information, encouraging people to recognise their own vulnerability. Making the health and oral health risk information personalised (e.g. reviewing the family medical history, socio-economic differences in disease incidence) would be more likely to alter young adults' sense of risk than more conventional health educa- tion approaches. Identification of additional factors that influence perceived risk for oral health hazards appears to be an avenue for future research.

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