

Exploring avoidance of dental care due to dental fear and economic burden –A cross-sectional study in a national sample of younger adults in Norway

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Abstract

Aim: To assess the prevalence of dental avoidance due to dental fear and economic burden and its distribution by utilization of dental care and socio-behavioural characteristics.

Method: A sample of 9052 Norwegian adults aged 25–35 years was invited to participate, and 2551 completed electronic questionnaires regarding lifetime prevalence of dental avoidance due to fear and last year prevalence of dental avoidance due to economic burden.

Results: Cancelled- and avoided ordering appointments due to fear amounted to 14.7% and 30.5%, respectively. Avoidance of dental visits due to cost was 37.7%. Frequency of cancelled appointments due to fear was 30% and 16.6% among participants attending dental care several times annually and seldom, respectively. Multiple logistic regression revealed that avoiding dental visits due to cost was less likely among participants with higher household income (OR 0.4, 95% CI 0.3–0.5) and more likely among participants with dental care need (OR 1.8, 95% CI 1.2–2.7). Cancelled and avoided appointments due to fear was most likely among those with need for dental care and lower education. Early unpleasant experience with dental care remained a covariate of avoidance behaviour due to fear.

Conclusion: 14.7%, 30.5%, and 37.7% confirmed cancelled appointments due to fear, avoided ordering appointments due to fear, and avoided visiting the dentist due to cost. Avoiding dental care due to fear and economic burden was more and less common among participants with respectively, frequent and seldom use of dental care. Dental avoidance behaviours were highest among socially disadvantaged groups, indicating a hole in the welfare state model that needs political consideration.

KEYWORDS

avoidance behaviour, dental fear, use of dental care, young adults

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1 | INTRODUCTION

In Norway, children and adolescents are offered free dental care, regular check-ups, and preventive measures at intervals decided by individual risk assessments.¹ Currently, about 90% of Norwegian children and adolescents receive regular appointments with a dentist or dental hygienist in the public dental health care services (PDHS).² In spite of public financed dental care, missed and cancelled dental appointments occur quite frequently.^{3,4} Among Norwegian and Swedish adolescents, the prevalence of dental avoidance behaviour in terms of unregular and problem-oriented attendance as well as delayed-, cancelled-, and no-show appointments has been estimated to reach 20%.^{4,5,6}

For Norwegian adults above 20 years, dental health care costs are primarily (70%) covered from out-of-pocket payments to private practitioners.^{1,7} Grytten et al.^{8,9} found small differences in utilization of dental services across income strata with about 80% of Norwegian adults having visited a dentist during the last year. According to the official Statistics of Norway in 2016, the prevalence having visited dental health care services during last year was highest among 45–66- and lowest among those aged 21–24- year-olds.¹⁰ Holst et al.¹¹ reported that 76% of 21–29-year-old Norwegian adults had visited a dentist the last 2 years. Åstrøm et al.¹² found a decline from 62% in 1997 to 44.6% in 2007 in the proportion of 25- year-olds who attended annually for a dental check-up. In a prospective survey following Norwegian older adults, irregular dental attendance declined with increasing age from 14.5% at age 65% to 12.2% at age 70.¹³

Dental avoidance behaviours have been associated with environmental-, situational-, and individual factors among adolescents and adults.^{5,6,14,15} Dental fear /anxiety and financial cost of care have been identified as main reasons for failure to seek dental care in spite of confirmed treatment needs.^{16,17,18,19} Consistent with research findings elsewhere, a positive relationship was observed between dental fear and less frequent dental attendance in younger Norwegian adults,¹² for review see^{20,21} A recent Swedish study reported that financial problems and lack of social support were associated with refraining from seeking dental care.²² From Australia, it has been reported that approximately twice the percentage of uninsured dentate people avoided dental care due to financial constraints compared to insured people.¹⁴ Avoidance of dental care is also associated with unpleasant/adverse experiences, such as unfinished dental treatment, pain experiences, and insufficient effect of local anaesthesia^{19,23–24} and in turn with more emergency visits and poorer oral health.^{24–26}

Epidemiological studies focusing on the relationship between dental avoidance and possible background factors in nationally representative studies are rare. Few studies have assessed dental avoidance due to fear and economic burden in the general, non-insured younger adult Norwegian population. To facilitate continuation of regular attendance patterns and maintenance of good oral health into middle and older ages, it is important to address avoidance of dental care and its background factors among younger adults in Norway.

This study aims to assess the life-time prevalence of dental avoidance due to fear and last year prevalence of dental avoidance due to economic burden and its association with current use of dental care services and socio-behavioural characteristics as defined by Andersen's theory of health care utilization and in a life course perspective.^{27,28}

2 | METHODS

2.1 | Study population

The present study used data from a national survey conducted in Norway in 2016. A sample of 9052 younger adults aged 25–35 years, randomly selected from the Norwegian National Population Registry, was invited to participate. An introductory letter explaining the purpose of the study and an electronic questionnaire were sent to all eligible participants. The study was undertaken with the understanding and written consent of each participant in accordance with ethical principles and the guidelines of the Declaration of Helsinki. Ethical permission was granted by the Ombudsman, Norwegian Center for Research Data (no: 49241). NORSTAT (www.norstat.no) was responsible for sending out questionnaires and data collection. A total of 2625 individuals filled in and returned the questionnaire (response rate 29%). We excluded from the analyses 74 individuals providing incomplete information. Thus, the final sample size was 2551 individuals.

2.2 | Outcome variables

Three indicators of dental avoidance behaviour were utilized as outcome measures; (a) ever cancelled dental appointment due to dental fear, (b) ever avoided ordering dental appointment due to dental fear, and (c) avoided dental visiting due to economic burden last year. Participants were asked (a) have you ever cancelled a dental appointment due to dental fear? (b) have you ever avoided to order a dental appointment due to dental fear? Responses were given on Likert scales ranging from (1) never to (5) always. Each question was dichotomized into (0) never and (1) confirmed cancelled dental appointment/avoided ordering dental appointment due to fear at least once. (c) Avoidance of visiting the dentist due to economic burden was assessed by asking "Have you avoided to visit a dentist due to cost during the last year" – with response alternatives (1) yes several times, (2) once in a while, and (3) never. For analyses, this item was dichotomized into (0) never and (1) confirmed avoidance due to cost at least once in a while.

2.3 | Exposures

Andersen's behavioural model of health care utilization is a framework intended to explain dental care utilization by groups of exposures in terms of predisposing-, enabling-, and need-related factors.²⁷

Early life course predisposing variables were assessed in terms of “Unpleasant experience with dental care in childhood or adolescence” and “Mothers' educational level.” Participants were asked the following question “Have you ever had unpleasant or frightening experiences during dental treatment as a child or adolescent” response alternatives were, (1) yes, several times, (2) yes, sometimes, and (3) no/do not remember. Individuals who replied “I do not remember” were not included in the analyses. Mothers' level of education was recoded into (1) lower level of education (including primary and secondary school at age about 7–15) and (0) higher level including high school (at age about 16–18/19/university/college, at age 20–25).

Later, life course-enabling- and need-related variables were assessed in terms of household income, own education, smoking status, treatment need, satisfaction with oral health, and belief in keeping teeth for life. Household income per year was recoded into (1) 0–400000NOK, (2) 400,001–900,000 NOK and (3) >900,000 NOK. Own educational level was coded into (1) lower level (primary/secondary) and (0) higher educational level (including high school/university). Smoking status was assessed by the question “Do you smoke” with response alternatives (1) yes, daily, (2) yes sometimes, (3) no have quit, and (4) never smoked. This variable was dichotomized into (1) current smoking (including yes daily and yes sometimes) and (0) no smoking (including the initial response categories 3 and 4). Satisfaction with oral health was assessed by the question; “How satisfied are you with your oral health” originally coded (1) very satisfied, (2) satisfied, (3) not satisfied nor dissatisfied, (4) dissatisfied, and (5) very dissatisfied. For analysis, the variable was dichotomized into (1) dissatisfied (including the original categories 3–5) and (0) satisfied (including the original categories 1–2). Keeping teeth for life was assessed by asking “If you consider the condition of your gums – how sure are you that you will keep your teeth for life” – with response categories ranging from (1) very unsure to (5) I do not know. For analyses, this variable was dichotomized into (1) unsure (including very unsure and unsure) and (0) sure (including sure and very sure). The category ‘I do not know’ was not included in the analyses. Treatment need was assessed as a sum variable of two items; “Have you been told by your dentist that you have periodontal inflammation”, and “Did the dentist treat caries the last time you had a dental check-up. Response alternatives were given as yes (1) and no (0). A sum variable of treatment need was categorized into (0) no treatment need, (1) some treatment need, and (2) large treatment need. Current use of dental care services was assessed by the question “How often do you attend a dentist nowadays.” Response alternatives were (1) two or several times a year, (2) once a year, (3) every second year, and (4) more seldom. Those who confirmed seldom use of dental care were asked to rate the most important reason for not attending more frequently.

2.4 | Statistical analyses

Data were analysed using SPSS version 25.0 (IBM Corp. Released 2013, IBM SPSS Statistics for Windows: IBM Coprp). Predisposing-,

enabling-, and need-related factors were compared across categories of early unpleasant experience with dental care using Chi-square test. Chi-square test was also used in bivariate analyses comparing the three outcome measures with early- and later life-course predisposing, enabling-, and need-related factors. Level of statistical analyses was set to a *p* value under 0.05. We used multivariable logistic regression analysis with odds ratios (OR) and 95% confidence interval (CI) to model three indicators of avoidance behaviour as a function of exposure variables. For each outcome variable, two models were fitted. Model 1 adjusted for early life course predisposing variables in terms of gender, age group, mothers' education, and early unpleasant experience with dental care. Model 2 additionally adjusted for later life course enabling- and need-related factors in terms of household income, own education, smoking, need for dental treatment, satisfaction with oral health, and belief in keeping teeth for life. Odds ratio (OR) determines whether probabilities of an event are the same or differ across high- and low-risk groups. The range of OR is from 0 to infinity. As the value of OR increases and decreases away from 1, the association becomes increasingly stronger. Odds ratios have been recognized to give a good approximation of relative risk (RR) at specific disease rates. Cohen's *d* (the standardized mean difference between group means) might be used to evaluate effect sizes as small, *d* = 0.2, medium with *d* = 0.5 and large with *d* = 0.8. In this study, as an indication of the strength ORs, equivalent Cohen's *d* has been calculated where rates of outcomes in unexposed groups were at 10% and below.²⁸

3 | RESULTS

A total of 2551 Norwegian adults aged 25–35 years [mean (standard deviation – SD), 30.1 (3.2) years] of whom 42.7% men and 43.9% in the younger age group (25–29 years) participated in the study. In total, 53.3% of study participants did not report unpleasant experiences with dental care in childhood, while 29.3% and 16.4% reported unpleasant experiences a few times and several times, respectively.

To assess the potential for selection bias, the responding sample was compared with that of the Norwegian population aged 20–44 year by December 2016. The age distribution of the study participants was 43.7% younger and 56.3% older participants. Corresponding figures in the Norwegian population were 46.3% and 53%. Men accounted for 43% in the study sample and 51.3% in the population. Among the participants 27.3%, 38.6%, and 34.1% reported, respectively, primary/secondary -, high school -, and college/university level of education. Corresponding figures in the general population were 26.5%, 37.8%, and 32.9%.

Table 1 summarizes early- and later life predisposing-, enabling-, and need-related factors overall and according to participants' early unpleasant experience with dental care. The percentages having mothers with lower education, lower household income, and lower own education were higher among participants reporting unpleasant experience several times compared to those who had never had such experiences (*p* < 0.05). Participants reporting early unpleasant

Early unpleasant experience				
	Never % (n)	A few times % (n)	Several times % (n)	Total % (n)
Men	45.0 (596)	41.0 (292)	38.2 (152)	42.7 (1040)
Women	55.0 (727)	59.0 (420)	61.8 (246)	57.3 (1393)
Younger age group (25–29 y)	46.3 (613)	41.9 (298)	39.4 (157)	43.9 (1068)
Older age group (30–35 y)	53.7 (710)	58.1 (414)	60.6(241)	56.1 (1365)
Early life course predisposing				
Mothers' education - low	10.7 (142)	13.5 (96)	20.1 (80)	13.1 (318)
Mothers' education high	89.3 (1181)	86.5 (616)	79.9 (318)	86.9 (2115)
Later life course enabling				
Household income				
0–400,000	16.0 (212)	14.0 (100)	20.4 (81)	16.2 (393)
400,001–900,000	44.1 (584)	43.3 (308)	44.0 (175)	43.9 (1067)
>900,000	39.8 (527)	42.7 (304)	35.7 (142)	40.0 (973)
Own education - lower	25.2 (327)	25.3 (175)	36.5 (142)	27.1 (644)
Own education - higher	74.8 (969)	74.7 (518)	63.5 (247)	72.9 (1734)
Later life course need related				
Smoking - yes	11.0 (145)	14.0 (100)	23.4 (93)	13.9 (338)
Smoking - no	89.0 (1178)	86.0 (612)	76.6 (305)	86.1 (2095)
Satisfied oral health - yes	65.0 (860)	55.8 (397)	41.2 (164)	58.4 (1421)
Satisfied oral health - no	35.0 (463)	44.2 (315)	58.8 (234)	41.6 (1012)
Need for treatment				
No	64.9 (859)	51.4 (366)	39.2 (156)	56.8 (1381)
Some	30.9 (409)	41.6 (296)	50.0 (199)	37.2 (904)
Much	4.2 (55)	7.0 (50)	10.8 (43)	6.1 (148)
Belief in teeth for life- disagree	26.8 (343)	34.7 (240)	52.4 (194)	33.2 (777)
Belief in teeth for life - agree	73.2 (935)	65.3 (451)	47.6 (176)	66.8 (1562)

Note: Chi square test and statistical significance $p < 0.05$.

TABLE 2 Ever cancelled dental appointment due to fear, ever avoiding ordering dental appointment due to fear and avoiding dental visit (last year) due to cost according to frequency of current use of dental care services

Current dental attendance frequency	Total	Several times a year	Annually	Every second year	Seldom
	% (n)	% (n)	% (n)	% (n)	% (n)
Cancelled appointment due to fear	14.7 (376)	30.0 (61)	13.3 (160)	11.3 (61)	16.6 (94)
Avoided ordering visit due to fear	30.5 (778)	43.3 (88)	28.3 (341)	26.1 (141)	34.5 (208)
Avoided visiting dentist due to cost	37.7 (962)	47.8 (97)	27.3 (328)	39.1 (211)	54.1 (326)

dental experiences several times were more likely than those who had no such experience to report much need for dental treatment.

A total of 8.0%, 47.2%, 21.2%, and 23.6% of the study participants confirmed nowadays (current) use of dental care, two or several times a year, once a year, every second year, and seldom, respectively. Of those who confirmed that they used dental care

seldom ($n = 547$), the following reasons were cited as most important for not attending more frequently; too costly (60%), forget to order appointment (25.6%) fear of dentist (24.5%), being too busy (19.4%) and other reasons (15.9%) (not tabulated).

Table 2 summarizes ever cancelled dental appointment due to dental fear, ever avoiding ordering dental appointment due to fear,

TABLE 1 Early unpleasant experience with dental care by early and later life predisposing-, enabling-, and need-related factors.

and last year avoiding dental visit due to economic cost by frequency of nowadays use of dental care services. Totals of 14.7%, 30.5%, and 37.7% confirmed ever having cancelled appointment due to fear, ever having avoided ordering dental appointment due to fear, and avoided visiting a dentist due to cost during the last year, respectively. A total of 30% of participants, currently attending several times a year versus 16.6% attending seldom confirmed ever cancelled appointment due to fear. Corresponding figures for ever having avoided ordering appointment due to fear and avoided visiting dental care due to economic burden last year were, respectively, 43.3% versus 34.5% and 47.8% versus 54.1%.

Table 3 summarizes findings regarding the association between early- and later life predisposing-, enabling-, and need-related factors and ever cancelled dental appointments due to fear. All exposures included in the multivariable logistic regression analyses were statistically significantly associated with cancelled appointments due to fear in unadjusted analyses. When adjusting for early life course predisposing factors (Model 1), the likelihood of cancelled appointment due to fear was higher in women than in men and higher if confirming early unpleasant experience with dental care a few times and several times. Adjusting for later life course enabling- and need-related factors (Model 2) attenuated the association with early unpleasant dental care experience. In the final model, the following variables, women early unpleasant experience a few times and several times, higher own education some and large treatment need, and dissatisfaction with oral health were independently associated with ever cancelled appointments due to dental fear. The odds ratios ranged from 1.7 (not satisfied versus satisfied with oral health) to 25.4 (unpleasant experience with dental care versus not). In terms of Cohen's *d*, these estimates indicate small and large effect sizes, respectively. Nagelkerke's *R* squared for model 2 amounted to 0.360, implying that the variables included explained about 36% of the variance in the outcome variable.

As shown in **Table 4**, after adjustment for early life-course predisposing factors in Model 1, the odds ratio of ever avoiding ordering dental appointment due to fear was 8.4 (95% CI 5.7–12.5) and 27.9 (18.7–41.7) if having early unpleasant experience with dental care sometimes and several times, respectively. After adjustment for later life-course enabling- and need-related factors in Model 2, odds ratio was reduced to 7.7 (95% CI 5.2–11.5) and 21.7 (95% CI 14.3–32.8). Sex, own education smoking, treatment need, and satisfaction with oral health were independently associated with ever avoided ordering dental visits due to fear in the final model. The odds ratios ranged from 1.9 (not satisfied versus satisfied oral health) to 21.7 (unpleasant experience several times versus never). In terms of Cohen's *d*, these estimates indicate small and large effect sizes, respectively. Nagelkerke's *R* squared for Model 2 was 0.414, implying that the variables in the model explained about 40% of the variance in the outcome variable.

According to **Table 5**, in Model 1, the odds ratio of avoided dental visit due to economic burden during last year was 1.3 (95% CI 1.0–1.5) and 2.5 (95% CI 1.9–3.2) if having early unpleasant experience a few- and several times, respectively. In Model 2, women, older age

group, own higher education, no smoking, much need for treatment, no satisfaction with oral health, and belief in keeping teeth for life associated statistically significantly with avoidance of dental visit due to economic burden. The likelihood of avoidance behaviour due to economic burden was OR 1.6 (95% CI 1.2–2.1) times greater if having early unpleasant experience several times as compared to being without such experience. Compared to the lowest income group, the income group 400,001–900,000 NOK had OR 0.6 (0.5–0.8) and the income group >900,000 had OR 0.4 (95% CI 0.3–0.5) for avoiding dental visits due to economic cost. *R* squared for Model 2 amounted to 0.184, implying about 18% explained variance in the outcome variable.

4 | DISCUSSION

The prevalence of avoidance behaviour among younger adults in Norway was largest with respect to avoiding dental visits due to economic burden during the last year, followed in descending order by ever avoiding ordering dental appointments due to dental fear and ever cancelled dental appointments due to dental fear. It is of concern that above one-third of younger Norwegian adults had avoided dental visit due to economic burden, whereas one-third and one-sixth had ever avoided and cancelled dental appointments due to dental fear. Current use of dental care services annually amounted to 47.2%, corroborating the rate reported among 25-year-old Norwegians in 2007.¹² However, as long as one quarter of younger adults reported dental visits less than every second year, their attendance rate is less satisfactory. Avoidance of dental care due to fear was most common among those who nowadays used dental care most frequently as well as in the oldest age group and least common among participants with higher education. In contrast, avoiding dental care due to economic burden was most common among those who attended dental care least frequently, who cited cost as the most important reason for not attending more often, in the youngest age group, and among those with low household income. Confirming early unpleasant experience with dental care remained an important covariate both with respect to avoidance of dental care due to fear and to economic burden. This study supports that early- and later life course socio-behavioural factors independently influence dental avoidance behaviour among young Norwegian adults.

Strengths of this study was its life-course conceptualization and the covariates that were identified in accordance with Andersen's theoretical framework of health care utilization.^{28,29} The commonly used socio-economic covariates in terms of household income and education reflect differences in access to material circumstances and non-economic social characteristics and are widely recommended to be used as proxies for socioeconomic status.³⁰ Also, a strength of this study is its contribution to a rare literature regarding adults' patterns of dental care utilization in Norway where the private dental health care system is without the responsibility to report to the authorities of health.⁷ Moreover, few studies have analysed the effect of socio-economic

	% (n)	OR (95% CI) Model 1	OR (95% CI) Model 2
Men	12.6 (139)	1	1
Women	16.4 (237)	1.3 (1.0–1.5)	1.3 (1.1–1.7)
Younger (25–29)	13.0 (237)	1	1
Older (30–35)	16.1 (231)	1.1 (1.0–1.4)	1.1 (0.9–1.4)
Early life course predisposing			
Mothers' education low	24.5 (81)	1	1
Mothers' education high	13.3 (295)	0.9 (0.6–1.2)	0.9 (0.7–1.3)
Unpleasant experience with dental care in childhood			
Never	2.8 (37)	1	1
A few times	19.1 (136)	7.1 (5.5–9.1)	6.7 (5.2–8.6)
Several	46.0 (183)	30.7 (22.5–41.8)	25.4 (18.5–35.0)
Later life course enabling			
Income gross household-NOK			
0–400,000	14.6860		1
400,001–90,000	15.5 (174)		1.5 (0.8–1.6)
>900,000	14.0 (142)		1.1 (0.8–1.5)
Own education-lower	23.4 (160)		1
Own education - higher	11.4 (207)		0.7 (0.6–0.9)
Later life course need related			
Smoking- yes	27.2 (97)		1
Smoking - no	12.7 (279)		0.7 (0.5–1.1)
Need for treatment- no	9.5 (138)		1
Need for treatment- some	19.8 (1787)		1.3 (1.1–1.7)
Need for treatment- much	34.0 (51)		3.0 (1.9–4.7)
Satisfied oral health- yes	8.6 (127)		1
Satisfied oral health - no	23.2 (249)		1.7 (1.3–2.2)
Belief in keeping teeth for life -agree	10.1 (164)		1
Belief in keeping teeth for life-disagree	22.7 (186)		0.8 (0.6–1.1)

Note: Chi square test, p value < 0.05 considered statistically significant. Multiple variable logistic regression with odds ratio, ORs and 95% confidence interval, CI.

circumstances on patterns of dental care utilization among adults within the same system of dental health care services.³¹ Previous studies have used proxy measures of dental avoidance in terms of dental attendance frequency and time since last dental visit. In contrast, this study utilized three self-reported indicators of avoidance of dental care due to fear and economic burden, including different time frames. Finally, the study population was nationally representative and covered a relatively wide age range of younger Norwegian adults. A number of potential limitations should be considered. The concepts of predisposing-, enabling-, and need-related factors suggested by Andersen's model are broadly defined, and thus an unambiguous selection of variables into the various concepts is not always possible. The retrospective measure of early unpleasant experience with dental care might

have induced biases by lack of recall. It is anticipated, however, that recall bias might be stronger regarding subjective assessments such as family well-being than for concrete events. All self-reported information might be affected by social desirability bias such as, for instance, the questions about smoking, measures of dental treatment need might suffer misclassification, and finally the low response rate is of concern. We cannot exclude the possibility of introduced selection bias. Finally, the statistically significant odds ratios in this study indicate only a relationship between exposure and outcomes – but says little about the strength of the associations.²⁸

The present prevalence of avoidance of dental visits due to economic burden exceeded the rates reported in previous Swedish and Finnish cohort studies, ranging between 5% and 25%.^{17,32} and also

TABLE 3 Cancelled dental appointment due to fear by early and later life course predisposing-, enabling-, and need-related factors.

TABLE 4 Avoided ordering of dental appointment due to fear by early and later life course predisposing-, enabling-, and need-related factors.

	% (n)	OR (95% CI) Model 1	OR (95% CI) Model 2
Men	27.2 (301)	1	1
Women	33.0 (477)	1.3 (0.9–1.6)	1.4 (1.1–1.8)
Younger (25–29)	27.8 (310)	1	1
Older (30–35)	32.6 (468)	1.1 (0.8–1.4)	1.1 (0.8–1.5)
Early life course			
Mothers' education low	38.7 (128)	1	1
Mothers' education high	29.3 (650)	0.6 (0.4–0.9)	0.7 (0.5–1.0)
Unpleasant experience with dental care in childhood			
Never	9.7 (128)	1	1
A few times	42.8 (305)	8.4 (5.7–12.5)	7.7 (5.2–11.5)
Several	76.1 (303)	27.9 (18.7–41.7)	21.7 (14.3–32.8)
Later life course			
Household gross income NOK			
0–400,000	32.0 (131)		1
400,001–900,000	31.1 (350)		1.4 (0.9–2.0)
>900,000	29.2 (297)		1.4 (0.8–2.0)
Own education-lower	38.5 (263)		1
Own education - higher	27.2 (492)		0.5 (0.3–0.6)
Smoking- yes	43.3 (154)		1
Smoking - no	28.4 (624)		0.6 (0.4–0.9)
Need for treatment- no	22.2 (324)		1
Need for treatment- some	38.8 (366)		1.4 (1.1–1.8)
Need for treatment- much	58.7 (88)		2.4 (1.5–3.9)
Satisfied oral health- yes	22.0 (326)		1
Satisfied oral health - no	42.2 (452)		1.9 (1.4–2.5)
Belief in keeping teeth for life -agree	24.1 (39)		1
Belief in keeping teeth for life-disagree	41.9 (344)		0.8 (0.6–1.2)

Note: Chi square test with statistical significance $p < 0.05$. Multiple variable logistic regression with odds ratio, OR and 95% confidence interval, CI.

that observed in a national sample of Swedish adults.³³ In accordance with the present findings, international studies have identified economic burden as one of the main reasons for refraining from seeking dental care in spite of confirmed treatment needs.^{16,34} This supports evidence from economic theory regarding an inverse relationship between dental attendance rate and cost of dental treatment for the patient.³¹ Care should be taken when directly comparing prevalence rates of dental avoidance behaviour since studies emanate from different countries with different dental health care systems and since the time frames measuring avoidance behaviour vary across studies. Nevertheless, problems with accessibility, in terms of financial constraints, seem to be important reasons for avoiding dental visits among 25–35-year-olds in Norway, where dental care is less generously subsidized than medical care. Notably, this study does not discriminate between direct financial constraints in terms of being

unable to manage payment for dental care and indirect financial constraints in terms of for instance long travelling distance to clinics and loss of working time.

Avoidance of dental care due to economic burden was less likely among participants with low socio-economic loads in terms of higher education and household income. This suggests that lower educated- and lower-income groups of younger adults are not adequately protected against high-cost dental care, implicating a substantial financial burden. Several studies have confirmed that socially vulnerable or disadvantaged groups are less likely to utilize dental health care services.^{3,18,22,35} In this study, avoidance of dental care due to economic burden increased linearly with amount of dental care needed and was more prevalent among adults who expressed dissatisfaction with oral health. Poor oral health and high treatment load has been identified as risk factors for avoidance of dental care due to any reason among

	% (n)	OR (95% CI)	
		Model 1	Model 2
Men	34.7 (383)	1	1
Women	40.0 (579)**	1.2 (1.0–1.4)	1.3 (1.1–1.6)
Younger (25–29)	42.0 (469)	1	1
Older (30–35)	34.4 (493)**	0.7 (0.5–0.8)	0.7 (0.5–0.8)
Early life course			
Mothers' education - low	43.2 (143)	1	1
Mothers' education-high	36.9 (919)**	0.7 (0.6–0.9)	0.9 (0.7–1.2)
Unpleasant experience with dental care in childhood			
Never	33.0 (436)	1	1
A few times	39.8 (276)	1.3 (1.0–1.5)	1.0 (0.8–1.3)
Several	53.8 (214)**	2.5 (1.9–3.2)	1.6 (1.2–2.1)
Later life course			
Household gross income			
0–400,000	53.2 (218)		1
400,001–900,000	41.5 (466)		0.6 (0.5–0.8)
>900,000	27.3 (278)**		0.4 (0.3–0.5)
Own education-lower	49.9 (341)		1
Own education - higher	32.8 (594)**		0.6 (0.5–0.7)
Smoking- yes	53.4 (190)		1
Smoking - no	35.2 (772)**		0.7 (0.5–0.9)
Need for treatment- no	29.2 (425)		1
Need for treatment- some	47.2 (446)		1.6 (1.3–1.9)
Need for treatment- much	60.7 (91)**		1.8 (1.2–2.7)
Satisfied oral health- yes	27.3 (404)		1
Satisfied oral health - no	52.1 (558)**		1.9 (1.6–2.4)
Belief in keeping teeth for life -disagree	54.2 (445)		1
Belief in keeping teeth for life-agree	29.6 (481)**		0.5 (0.4–0.7)

Note: Chi square statistics with significance levels $p < 0.05$. Multiple variable logistic regression with odds ratios, OR and 95% confidence intervals, CI.

** $p < 0.001$.

adolescents in Norway and Sweden.^{3,23,26} Consistent with findings among adolescents, this study suggests that avoidance of dental care due to economic burden is less common among non-smokers, thus reflecting evidence of co-existence of negative oral health-related behaviours. For review see²⁶ A trustful dentist-patient relationship is recognized to be a key component in dental health care encounters.³⁶ Participants confirming belief in keeping teeth for life were less likely to avoid dental care due to economic burden. The impact of factors in the dental situation that promote positive feelings towards oral health and dental health care might be essential in reducing dental avoidance among younger Norwegian adults.

Dental fear has been defined as a universal factor influencing dental avoidance across age groups.^{5,6,26,21} Compared to the prevalence rates of younger adults with one or more missed/cancelled dental appointments, a much higher prevalence rate of 47% was

TABLE 5 Avoided dental visits due to economic cost by early and later life course predisposing-, enabling-, and need-related factors.

previously identified among Norwegian adolescents.⁴ This discrepancy may probably be attributed to different contexts of the dental care services provided to those two age groups in Norway. Young adults are themselves responsible for making dental appointments, while the public dental health services for adolescence is an out-reach offer.

Contrasting the findings regarding dental avoidance due to economic burden, the prevalence of participants who confirmed avoidance of dental appointments due to fear was largest among the most frequent dental visitors (attending more than several times a year). This accords with the 'vicious circle' of dental fear, whereby dental fear and avoidance of care lead to poor oral health and again to repeated emergency dental visits.^{3,25} Even when the patients seek dental care due to urgent need of dental treatment, they cancel or miss out on dental appointments due to dental fear and anxiety.

Dental treatment need and own education were in this study significantly associated in the expected direction with both cancelled and avoided ordering of dental appointments due to fear, whereas household income seemed to be of less importance. A notion that treatment need in terms of clinically assessed- and self-reported poor oral health are considered risk factors for dental avoidance was supported by the present findings.

Importantly, early unpleasant experience with dental care remained an independent, significant predisposing factor across the three indicators of dental avoidance but was by far most strongly associated with cancelled - and avoided ordering of dental appointments due to fear. The magnitude of the effect was such that participants being exposed to some and several unpleasant experiences in early life were several times more likely to report cancelled appointments due to fear than those with no unpleasant exposures. This supports studies suggesting that adverse early circumstances have an enduring impact on health and disease at subsequent life stages^{15,29} and underlines that care should be taken to avoid early negative experiences during dental treatment.

5 | CONCLUSION

A total of 14.7%, 30.5%, and 37.7% confirmed ever cancelled appointments due to fear ever avoided ordering appointments due to fear and avoided visiting dentist due to cost. Avoiding dental care due to fear and economic burden was more and less common among participants with frequent and seldom use of dental care. Dental avoidance behaviours were highest among socially disadvantaged groups, indicating a hole in the welfare state model that needs political consideration. Early unpleasant experience with dental care a few and several times was an important covariate of both avoidance of dental care due to dental fear and economic burden. To avoid problems escalating into adulthood, preventive strategies for oral health and fear reduction should have the highest priority in public dental health care services for children and adolescents.

6 | CLINICAL RELEVANCE

6.1 | Scientific rationale for study

Epidemiological studies considering dental avoidance behaviour among young adults are rare. To facilitate continuation of regular visits to dentists and dental hygienists and maintain good oral health into middle- and older ages, it is important to address avoidance of dental care due to fear and economic burden among younger adults.

6.2 | Principle findings

Up to one-third of younger Norwegian adults avoided dental visit due to economic burden and avoided- and cancelled dental

appointments due to dental fear. Early unpleasant experience with dental care was an important influence of avoidance behaviour due to fear and economic burden.

6.3 | Practical implications

Care should be taken to avoid early negative experiences during dental care visits. Preventive strategies and fear reduction should have the highest priority in dental care of children and adolescents.

AUTHOR CONTRIBUTIONS

ANÅ conceived and designed the study, analysed and interpreted data, drafted the work, and approved a final version. MLA revised the work critically for important intellectual content. GS revisited the work critically for important intellectual content and contributed to the final approval of the version to be published.

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CONFLICT OF INTEREST

The authors declare that they have no competing financial interest that could have influenced this paper.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available by request to the main author.

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