## SUPPORTING INFORMATION

Supplementary Table 1. Detail of each construct, its operationalisation, measures including response options and scoring.

Variable	Measure	Reference	No item/ dental examination	Response set	Scoring/interpretation	Cronbach's alpha
POPULATION CHARACTERISTICS						
Predisposing /social structures	Education	-	1	*'What is the highest level of school you have completed?'* Primary/middle school = 1, High school = 2, University = 3	Higher scores more pre-disposing	-
	Annual household income	-	1	'≤300,000NOK' =1, '>300,000-450,000NOK' = 2, '>450,000- 900,000NOK' = 3, '900,000+ NOK' = 4.	Higher scores more pre-disposing	-
	Urbanization	-	1	'Rural/municipalities with widespread settlement' = 1, 'Suburban/municipalities with smaller towns' = 2, 'Urban/municipalities with larger towns' = 3.	Higher scores more pre-disposing	-
Predisposing /salutogenic resources	Sense of coherence	Antonovsky 1993 Eide 1991	13	*An example of item: 'Do you have the feeling that you don't really care about what goes on around you?'* 7 point Likert scale ranging from 1 to 7. The sum scores from 13–91.	Higher scores indicate stronger SOC = more pre-disposing	0.84
Enabling recourses	Declined treatment due to costs	-	1	*'Have you during the last two years refrained from dental services because you did not have enough money?'* 'Yes'= 1 and 'No' = 2.	Higher scores more resources	-
	Difficulty attending dental health care services	Marshman et al. 2012	1	*'Is it difficult for you to get routine (e.g. check-up and fillings) dental health care?'* 'Yes/don't know'' = 1,'No' = 2	Higher scores more resources	-

	Dental anxiety (DAS)	Corah's 1969, Kvale et al. 1997	4	5-point Likert scale yield sum scores from 4 to 20.	Scores reversed: Higher scores indicate less dental anxiety = more resources	0.92
Needs	Respondents perceived treatment need	Marshman et al. 2012	1	*'If you saw a dentist tomorrow, do you think you would need treatment?'* 'I would not need treatment' = 1, 'Don't know' =2, and 'I would need treatment'= 3.	Higher scores more needs	-
ORAL HEALTH BEHAVIORS						
Personal health practices	Toothbrushing frequency	-	1	*'How often do you brush your teeth?'* 'Twice a day' = 3, 'once a day' = 2, and 'not daily' = 1	Higher scores more frequent brushing	-
	Smoking status	-	1	Smoking status was categorized in three groups based on number of pack years: 'Non-smoker' = 1, 'Light smoker' = 2, 'Heavy smoker' = 3.	Higher scores more smoking	-
Use of dental services	Frequency of dental attendance	Marshman et al. 2012	1	*'How often do you attend dental services?'* 'Only when having problems' = 1, 'Longer intervals than 2 years' = 2, 'Every second year'= 3, 'Every year" = 4.	Higher scores more frequent use	-
	Attendance orientation	Marshman et al. 2012	1	*'When do you use dental services?* 'Seldom/never attend DHCS' = 1, 'Only when having problems (pain, lost fillings)' = 2, 'Having routine recall/check-up' = 3.	Higher scores more frequent use	-
ORAL HEALTH OUTCOMES						
Clinical outcomes	Periodontitis	Eke et al. 2015	Dental examination	Periodontitis was categorized in three groups: 'Healthy' = 1, 'non-severe' = 2, 'severe' = 3.	Higher scores more periodontitis.	-

| Person-reported oral health outcome | Oral Health impact profile (OHIP-14) | Slade 1997, Dahl 2011 | 14 | 5-point Likert scale coded as never (1), hardly ever (2), occasionally (3), fairly often (4), and very often (5). The sum scores from 14-70. | Responses to item 1-5, and 10 represent physical function; item 6-9 psychological function; items 11-14 represents social function. The higher the score the greater oral health impacts were experienced. | 0.89 |

Supplementary Figure 1. Full structural model with all direct hypothesised pathways.
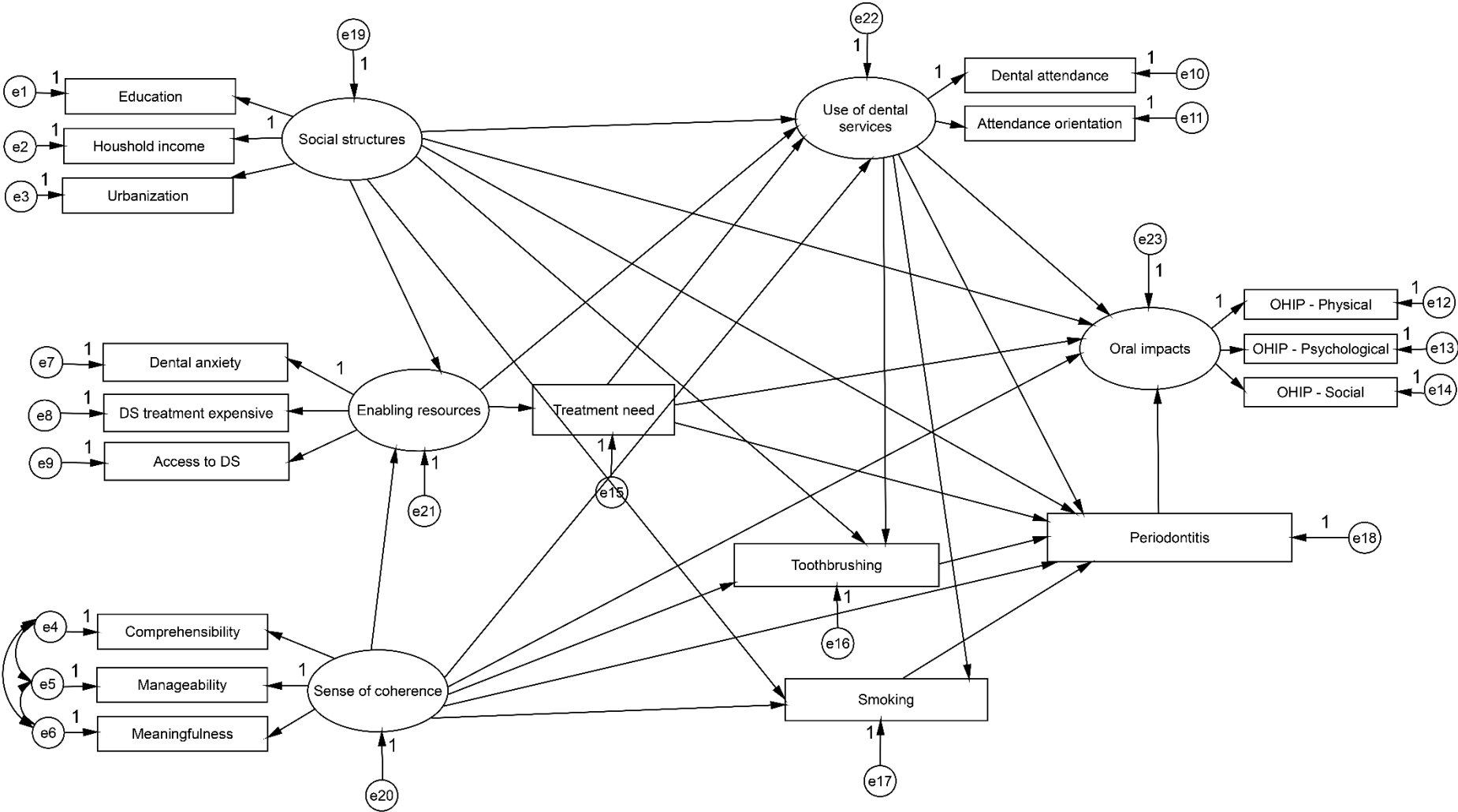
DS = Dental services

1) Population characteristics: social structures (i.e. high education, high income, living in a larger town with high availability to dental services) and SOC (higher scores) would predict more enabling resources (i.e. no difficulty in accessing dental services, no decline of treatment due to costs, and no dental anxiety).

2) Enabling recourses would in turn predict patients' perceived treatment need. More enabling resources would relate to less perceived treatment need.

3) Social structure, SOC, enabling and treatment need would predict use of dental services, where more social structure, greater SOC, more enabling resources and less treatment need would relate to more use of dental services.

4) Social structures, SOC, enabling resources, treatment need and use of dental services would predict periodontal health, which in turn would predict oral impacts, with more severe periodontitis relating to more oral impacts.

5) Additionally, social structure and SOC would directly predict use of dental services, personal oral health practices (toothbrushing and smoking), periodontitis, and oral impacts. Use of dental services would predict personal oral health practices and oral impacts. Finally, personal oral health practices would predict periodontitis