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Ethnicity, Social Support and Oral Health Among English Individuals

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Objective: To determine whether social support explains ethnic inequalities in oral health among English individuals. ***Methods***: Data from 42704 individuals across seven ethnic groups in the Health Survey for England (1999-2002 and 2005) were analysed. Oral health was indicated by self-reports of edentulousness and toothache. Social support was indicated by marital status and a 7-item scale on perceived social support. Confounder-adjusted regression models were fitted to evaluate ethnic inequalities in measures of social support and oral health (before and after adjustment for social support). ***Results***: Overall, 10.4% of individuals were edentulous and 21.7% of dentate individuals had toothache in the past 6 months. Indian (Odd Ratio: 0.50, 95% Confidence Interval: 0.32-0.78), Pakistani (0.50, 95%CI: 0.30-0.84), Bangladeshi (0.29, 95%CI: 0.17-0.47) and Chinese (0.42, 95%CI: 0.25-0.71) individuals were less likely to be edentulous than white British individuals. Among dentate participants, Irish (1.21, 95%CI: 1.06-1.38) and black Caribbean individuals (1.37, 95%CI: 1.18-1.58) were more likely whereas Chinese individuals (0.78, 95%CI: 0.63-0.97) were less likely to experience toothache than white British individuals. These inequalities were marginally attenuated after adjustment for marital status and perceived social support. Lack of social support was associated with being edentulousness and having toothache whereas marital status was associated with edentulousness only. ***Conclusion***: The findings did not support the mediating role of social support in the association between ethnicity and oral health. However, perceived lack of social support was inversely associated with worse oral health independent of participants' sociodemographic factors.

Keywords*: Social support, oral health, health inequities, toothache, ethnicity, tooth loss*

Introduction

The prevalence of oral conditions among English adults varies across ethnic groups, although it is important to note that the oral health status of minority groups is not necessarily poorer than that of the predominantly white population (Delgado-Angulo *et al.*, 2016a;b; 2019). Despite this growing literature, more research is required to identify the underlying mechanisms to inform appropriate policy. As such inequalities are not accounted for by socioeconomic status (SES) at individual (Delgado-Angulo *et al.*, 2016a;b; Delgado-Angulo *et al.*, 2019) and area levels (Alobaidi *et al.*, 2022) suggests that other factors might explain these associations.

An important determinant of health that has been overlooked in relation to ethnic inequalities in adult oral health is social support. Social support refers to social relationships that are reciprocal, accessible and reliable (House *et al.*, 1985) and provide supportive resources and/or distraction from stressors or information (Gottlieb and Bergen, 2010; Ozbay *et al.*, 2007). Social support commonly involves receiving emotional (confidant relationship, positive affective expressions and affirmation or praise), instrumental (assistance with tangible needs such as aid in kind, money or labour), appraisal (help in decision-making, giving appropriate feedback or help deciding which course of action to take) and informational support (provision of advice or information in the service of particular needs) (Berkman and Glass, 2000; Williams *et al.*, 2004). Emotional, appraisal, and informational support are often difficult to disentangle (Berkman and Krishna, 2014). Social relationships are associated with lower risk of mental and physical illness, reduced mortality, and better quality life (Berkman and Glass, 2000; Berkman and Krishna, 2014).

Previous studies have shown that different measures of social support, such as marital status, number of close friends and perceived levels of support, are positively associated with adult oral health (Haag *et al.*, 2022; Laniado *et al.*, 2021; Sabbah *et al.*, 2011). Moreover, a recent review found greater social support to be associated with better clinical and subjective oral health among immigrants and ethnic minority groups (Dahlan *et al.*, 2019). However, social support has yet to be investigated in the context of ethnic inequalities in oral health. To fill this gap in knowledge, the aim of this study was to determine whether social support explains ethnic inequalities in oral health among English individuals. It was hypothesised that social support would explain at least partially the association between ethnicity and adult oral health.

Method

This was a secondary analysis of data from the Health Survey for England (HSE). The HSE uses a multistage stratified probability sampling to provide annual, nationally representative data for a cross-section of the

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community-dwelling population of England (Mindell *et al.*, 2012). Five HSE annual rounds (1999-2002 and 2005) were aggregated to ensure sufficient power to compare the main six ethnic minority groups in the UK, namely Irish, black Caribbean, Indian, Pakistani, Bangladeshi, and Chinese individuals as per the 2001 UK Census (Office for National Statistics, 2004), with white British individuals (reference group). The HSE recruited ethnic boost samples in 1999 and 2004. Data from the 1999 survey were included in this study, representing around 62% of the sample (Erens *et al.*, 2001). However, data from the 2004 survey were not included because the survey questionnaire did not contain any questions on oral health. The survey response rate across the five HSE years varied from 74% to 76%.

Participants' oral health was the outcome, indicated by the prevalence of self-reported edentulousness among all individuals and the prevalence of toothache among dentate individuals. Participants reported if they had some or lost all their teeth. On a follow-up question, dentate participants reported if they had had toothache in the past six months. Ethnicity was the main exposure, based on participants' family origins. Only participants who self-declared as white British, Irish, black Caribbean, Indian, Pakistani, Bangladeshi and Chinese were included. The hypothesized mediator, social support, was assessed using two measures: marital status and social support at the individual level. Participants reported their current marital status using six response options: married (including cohabitees), single and formerly married (including separated, divorced and widowed). Questions about social support at the individual level included 7 Likert-type items on general social support. Items were coded from 1 to 3 to derive a score ranging from 7 to 21, with higher scores indicating more social support. The items enquired about social support offered by 'people I know' and were designed to capture aspects of emotional support (make me feel loved, do things that make me feel happy), unspecified practical support (can be relied upon, will see I am taken care of, give support and/or encouragement) and positive evaluations of the respondent (accept me just as I am, make me feel important) (Zimet *et al.*, 1988). Scores were categorised as severe lack of support (score<18), some lack of support (score=18-20) and no lack of support (score=21) (Andrew, 2005; Fagg *et al.*, 2008).

Participants' demographic factors (sex and age), SES and HSE annual round were also included as confounders. Following our previous work with the HSE, a composite indicator of SES was derived from confirmatory factor analysis by assigning participants' education (none, basic, higher), employment status (unemployed, employed), head of household's social class (measured in six classes from I [highest] to IV [lowest]) and annual equivalized income for the household (continuous form) to a single latent variable (i.e., a one-factor model with four measures). Non-response in socioeconomic measures was dealt with using full-information maximum likelihood estimation. Estimation used the weighted least square method which can handle both categorical (education, social class and employment status) and continuous indicators (income). Strong factor loadings were observed, ranging from 0.60 to 0.76. The one-factor model had a good fit to the data (Comparative Fit Index (CFI) =0.99 and Root Mean Square Error of Approximation (RMSEA) =0.039). The factor score of the SES latent variable was finally categorized into quintiles, where Q1 was the poorest and Q5 was the wealthiest (Alobaidi *et al.*, 2022; Delgado-Angulo *et al.*, 2019; Delgado-Angulo *et al.*, 2020).

Statistical analysis was conducted in Stata 17 using survey weights to account for the unequal probability of selection and non-response. Two separate samples were analysed, depending on the outcome. The first explored ethnic inequalities in edentulousness among all individuals whereas the second explored ethnic inequalities in toothache among dentate individuals. The composition of both samples was first described. The prevalence of each outcome was compared by sociodemographic characteristics and measures of social support using the Chi-squared test.

A regression-based approach to mediation was used, which required fitting two sets of regression models for each outcome (VanderWeele, 2016). The first set tested the association between ethnicity (exposure) and each measure of social support (mediator) adjusted for confounders (sex, age groups, SES quintiles and survey year). As both measures of social support were categorical, they were modelled using multinomial logistic regression. The second set tested the association between ethnicity and each outcome in binary logistic regression. This association was presented adjusted for confounders (Models 1A-2A) and adjusted for confounders and the measures of social support (Models 1B-2B). The mediating role of social support in the association between ethnicity and oral health was quantified with the formula (%): $100 \times (\beta_{Model\ 1} - \beta_{Model\ 2})/\beta_{Model\ 1}$. Odds ratios (OR) with 95% confidence intervals (95%CI) were reported from all regression models.

Results

Table 1 shows the sociodemographic composition and measures of social support for each ethnic group. All minority ethnic groups were younger than the white British group. There were more female participants in the Irish and black African groups and fewer in the Bangladeshi, Indian and Pakistani groups than in the white British group. The Bangladeshi, black Caribbean and Pakistani ethnic groups had the largest proportion of participants living in the two poorest SES quintiles. All minority ethnic groups but the Irish group were more likely to be married and to report some or severe lack of social support than the white British group.

Ethnic inequalities in edentulousness were investigated in 42704 individuals (93.6% of the full sample), aged 16 years or over. Overall, 10.4% of participants were edentulous. Large inequalities in the prevalence of edentulousness were observed by ethnicity and marital status but not by levels of perceived social support (Table 2). Edentulousness was most common among Irish individuals (11.1%) and least common among Bangladeshi individuals (1.7%). It was also the most and least common among formerly married (29.6%) and married individuals (2.4%). There were clear ethnic differences in social support (Table 3). Irish and black Caribbean individuals were more likely whereas Bangladeshi and

Table 1. Characteristics of the main ethnic groups included.

	white British (n=34423)	*Irish (n=2282)*	*black Caribbean (n=1527)*	*Indian (n=1592)*	*Pakistani (n=1236)*	*Bangladeshi (n=974)*	*Chinese (n=670)*
Sex, %							
Male	44.6	41.7	39.6	49.8	51.8	49.9	45.4
Female	55.4	58.3	60.5	50.2	48.2	50.1	54.6
Age (years) Mean (SD)	49.0 (18.0)	47.7 (17.9)	42.4 (18.7)	39.2 (16.7)	33.4 (15.0)	33.4 (17.2)	40.0 (17.2)
SES quintile, n %							
Q1 (poorest)	18.7	19.7	30.2	17.9	33.8	62.8	20.1
Q2	19.7	17.6	20.7	22.6	26.8	18.7	22.7
Q3	20.6	18.8	19.2	17.3	15.9	8.0	20.1
Q4	20.5	19.2	18.4	19.1	12.4	6.8	18.4
Q5 (wealthiest)	20.5	24.8	11.5	23.1	11.1	3.7	18.7
Marital status, n %							
Married	16.7	19.0	40.8	21.7	24.2	24.0	28.6
Single	66.3	62.7	41.5	69.1	67.3	68.1	64.1
Formerly married	17.0	18.3	17.6	9.3	8.6	7.9	7.3
Perceived social support, n %							
No lack	61.8	61.8	50.3	43.3	40.4	36.8	33.0
Some lack	26.0	26.9	31.0	28.5	32.3	29.3	32.3
Severe lack	12.2	11.2	18.6	28.2	27.3	33.9	34.8

Chinese individuals were less likely to be single or formerly married than white Britons. Indian and Pakistani individuals were also less likely to be single than white Britons. Furthermore, black Caribbean, Indian, Pakistani, Bangladeshi and Chinese, but not Irish, individuals were more likely to report some lack or severe lack of support than white British individuals.

Ethnic inequalities in edentulousness remained after adjustment for sociodemographic confounders (Table 4). Indian, Pakistani, Bangladeshi and Chinese individuals less likely to be edentulous than white British individuals after adjustment for confounders, respectively. These inequalities were attenuated by up to 5.6% after further adjustment for marital status and perceived social support. In this fully adjusted model, the two measures of social support were associated with edentulousness. Single individuals were 22% less likely, whereas formerly married individuals were 37% more likely to be edentulous than married individuals. In addition, individuals with some and severe lack of support had, respectively, 8% and 15% greater odds of being edentulous than those with no lack of support.

Ethnic inequalities in toothache were analysed in 38333 dentate individuals. In all, 21.7% of dentate participants had experienced toothache. Clear inequalities in the prevalence of toothache were observed by ethnicity and both measures of social support (Table 2). The prevalence of toothache was highest among black Caribbean individuals (29.7%) and lowest among Chinese individuals (19.6%). By marital status, the prevalence of toothache was highest among married individuals (23.4%) and lowest among formerly married individuals (20.5%). By perceived social support, the prevalence of toothache was the highest and lowest among individuals with severe (25.5%) and no lack of social support, respectively. There were clear ethnic differences in of social support among dentate individuals (Table 3). Irish and black Caribbean individuals were more likely whereas Bangladeshi and Chinese individuals were less likely to be single or formerly married than white British individuals. Indian and Pakistani individuals were also less likely to be single than white British individuals. Moreover, all ethnic groups but the Irish group were more likely to report some lack or severe lack of support than white British individuals.

Ethnic inequalities in toothache remained after adjustment for confounders (Table 4). Irish and black Caribbean individuals were, respectively, 21% and 37% more likely, whereas Chinese individuals were 22% less likely to experience toothache than white British individuals in the confounder-adjusted model. These associations were weakly attenuated after further adjustment for marital status and perceived social support. In the fully adjusted model, perceived social support but not marital status was associated with toothache. Individuals with some and severe lack of support were, respectively, 18% and 32% more likely to experience toothache than those with no lack of support.

Discussion

This study found that social support explained little variation in ethnic inequalities in oral health among individuals in England. The Asian advantage in edentulousness increased slightly once both measures of social support were accounted for. As for toothache, the Chinese advantage increased modestly, whereas the disadvantage experienced by the Irish and black Caribbean ethnic groups attenuated slightly once social support was accounted for.

Table 2. Oral health by sociodemographic factors and social support.

	All sample (n=42704)	*Edentulousness*		*Dentate with Toothache (n=38333)*	
	%	*%*	*[95% CI]*	*%*	*[95% CI]*
Ethnicity					
white British	84.3	11.1	[10.7-11.6]	21.0	[20.4-21.5]
Irish	4.9	11.4	[9.8-13.1]	25.1	[22.8-27.6]
black Caribbean	2.8	10.3	[8.7-12.2]	29.7	[27.0-32.6]
Indian	3.0	2.7	[1.9-3.9]	24.4	[21.9-27.1]
Pakistani	1.6	1.7	[1.1-2.7]	26.9	[24.1-29.8]
Bangladeshi	2.2	2.3	[1.5-3.4]	23.9	[20.6-27.5]
Chinese	1.1	2.8	[1.7-4.5]	19.6	[16.6-23.0]
P value[a]		<0.001		<0.001	
Sex					
Male	44.7	9.4	[8.9-10.0]	20.6	[19.9-21.4]
Female	55.3	11.3	[10.8-11.8]	22.6	[21.9-23.3]
P value		<0.001		<0.001	
Age group					
16-24 years	10.8	0.3	[0.2-0.5]	24.5	[23.5-25.6]
25-34 years	16.4	0.2	[0.2-0.4]	24.5	[23.2-25.8]
35-44 years	20.3	0.6	[0.5-0.9]	23.0	[21.8-24.2]
45-54 years	16.6	3.4	[2.9-3.9]	21.7	[20.5-23.0]
55-64 years	14.2	12.7	[11.6-13.8]	20.0	[18.6-21.4]
65-74 years	12.4	27.5	[26.0-29.1]	17.8	[16.3-19.4]
75+ years	9.3	47.8	[45.8-49.9]	12.3	[10.7-14.2]
P value		<0.001		<0.001	
SES quintile					
Q1 (poorest)	20.1	28.8	[27.7-30.1]	23.8	[22.6-25.1]
Q2	19.9	13.4	[12.5-14.3]	21.7	[20.6-22.9]
Q3	20.0	5.9	[5.3-6.6]	21.7	[20.6-22.8]
Q4	19.9	2.8	[2.3-3.3]	21.3	[20.2-22.4]
Q5 (wealthiest)	20.0	1.1	[0.8-1.4]	20.6	[19.4-21.7]
P value		<0.001		0.004	
Marital status					
Married	65.6	2.7	[2.3-3.1]	23.4	[22.3-24.5]
Single	18.0	8.4	[8.0-8.9]	21.5	[20.8-22.1]
Formerly married	16.4	26.9	[25.6-28.3]	20.5	[19.1-21.9]
P value		<0.001		0.003	
Perceived social support					
No lack	59.7	10.2	[9.8-10.7]	20.2	[19.5-20.9]
Some lack	26.6	10.4	[9.7-11.1]	23.2	[22.2-24.2]
Severe lack	13.7	11.4	[10.4-12.4]	25.5	[24.1-27.0]
P value		0.134		<0.001	

[a] Chi-squared test for comparisons

There were ethnic differences in social support, with three clear patterns noted after accounting for sociodemographic differences between ethnic groups. Firstly, all four Asian groups were more likely to be cohabiting (married or living with a partner) and to report some or severe lack of support than the white British group, suggesting that other sources of support, beyond marriage, are not available to these ethnic groups. Secondly, black Caribbean individuals were more likely to be living alone (single or formerly married) and report some or severe lack of support than white British individuals, suggesting that this group is at a particular disadvantage (i.e., social isolation). Thirdly, Irish individuals were more likely to be living alone but reported similar levels of social support than white British individuals, suggesting that for them social support could mainly come from sources outside marriage.

Table 3. Social support among ethnic groups.

	All adults (n=42704)		*Dentate adults (n=38333)*	
	Single vs married	*Formerly married vs married*	*Single vs married*	*Formerly married vs married*
	OR [95% CI]	*OR [95% CI]*	*OR [95% CI]*	*OR [95% CI]*
white British	1.00 [Reference]	1.00 [Reference]	1.00 [Reference]	1.00 [Reference]
Irish	1.52 [1.27-1.82]*	1.25 [1.06-1.48]*	1.56 [1.30-1.89]*	1.38 [1.16-1.61]*
black Caribbean	4.77 [4.00-5.70]*	1.87 [1.55-2.26]*	5.03 [4.19-6.06]*	1.98 [1.61-2.44]*
Indian	0.73 [0.61-0.88]*	0.86 [0.67-1.10]	0.73 [0.61-0.88]*	0.88 [0.68-1.13]
Pakistani	0.34 [0.28-0.42]*	0.92 [0.72-1.19]	0.34 [0.28-0.42]*	0.95 [0.74-1.24]
Bangladeshi	0.25 [0.20-0.32]*	0.64 [0.47-0.88]*	0.25 [0.20-0.32]*	0.65 [0.47-0.91]*
Chinese	1.52 [1.22-1.90]*	0.61 [0.45-0.84]*	1.56 [1.24-1.96]*	0.65 [0.47-0.90]*
	Some vs no lack of support	*Severe vs no lack of support*	*Some vs no lack of support*	*Severe vs no lack of support*
	OR [95% CI]	*OR [95% CI]*	*OR [95% CI]*	*OR [95% CI]*
white British	1.00 [Reference]	1.00 [Reference]	1.00 [Reference]	1.00 [Reference]
Irish	1.03 [0.91-1.18]	0.93 [0.78-1.12]	1.02 [0.88-1.16]	0.93 [0.77-1.14]
black Caribbean	1.33 [1.15-1.54]*	1.63 [1.35-1.96]*	1.40 [1.20-1.64]*	1.67 [1.37-2.04]*
Indian	1.49 [1.27-1.75]*	3.17 [2.70-3.73]*	1.46 [1.24-1.71]*	3.12 [2.64-3.68]*
Pakistani	1.59 [1.34-1.89]*	2.61 [2.17-3.13]*	1.56 [1.31-1.86]*	2.56 [2.13-3.09]*
Bangladeshi	1.45 [1.19-1.78]*	2.92 [2.34-3.65]*	1.41 [1.15-1.74]*	2.85 [2.27-3.59]*
Chinese	2.15 [1.73-2.66]*	4.99 [4.03-6.19]*	2.11 [1.70-2.62]*	4.86 [3.90-6.05]*

Marital status (married, never married and formerly married) and perceived social support (no lack, some lack and severe lack) were modelled using multinomial logistic regression, from which odds ratios (OR) were reported. Models were adjusted for confounders (sex, age groups, SES quintile and survey year).

Table 4. Binary logistic regression models for predictors of oral health.

	Edentulousness (n=42704 adults)			*Toothache (n=3833 dentate adults)*		
	Model 1A	*Model 1B*	*Attenuation %*	*Model 2A*	*Model 2B*	*Attenuation %*
	OR [95% CI]	*OR [95% CI]*		*OR [95% CI]*	*OR [95% CI]*	
Ethnicity						
white British	1.00 [Reference]	1.00 [Reference]		1.00 [Reference]	1.00 [Reference]	
Irish	1.18 [0.97-1.44]	1.19 [0.97-1.45]	-1.6	1.21 [1.06-1.38]*	1.21 [1.06-1.39]*	-2.2
black Caribbean	1.15 [0.89-1.49]	1.14 [0.89-1.48]	5.6	1.37 [1.18-1.58]*	1.36 [1.17-1.58]*	1.9
Indian	0.50 [0.32-0.78]*	0.49 [0.31-0.76]*	-1.6	1.08 [0.93-1.25]	1.03 [0.88-1.19]	63.1
Pakistani	0.50 [0.30-0.84]*	0.49 [0.29-0.82]*	-3.3	1.12 [0.95-1.31]	1.06 [0.90-1.25]	43.7
Bangladeshi	0.29 [0.17-0.47]*	0.28 [0.17-0.47]*	-0.7	0.89 [0.73-1.09]	0.85 [0.69-1.04]	-48.4
Chinese	0.42 [0.25-0.71]*	0.41 [0.24-0.69]*	-3.2	0.78 [0.63-0.97]*	0.73 [0.59-0.91]*	-25.9
Marital status						
Married		1.00 [Reference]			1.00 [Reference]	
Single		0.78 [0.63-0.96]*			0.93 [0.84-1.03]	
Formerly married		1.37 [1.23-1.53]*			1.00 [0.91-1.11]	
Perceived social support						
No lack		1.00 [Reference]			1.00 [Reference]	
Some lack		1.08 [0.96-1.21]			1.18 [1.10-1.27]*	
Severe lack		1.15 [1.00-1.33]*			1.32 [1.21-1.44]*	

1A and 2A were adjusted for confounders (sex, age groups, SES quintiles and survey year). Models 1B and 2B were further adjusted for the two measures of social support reported in the table.
Attenuation was calculated as: 100 x ($\beta_{Model\ 1} - \beta_{Model\ 2}$)/$\beta_{Model\ 1}$. Positive values indicate attenuation.
* $p<0.05$

Perceived social support was independently associated with adult oral health. The magnitude of this effect was such that individuals with severe lack of support were 15% and 32% more likely to be edentulous and to have toothache, after accounting for demographic factors and SES. These findings support the main effects theory, which posits that high levels of social support bring positive experience as well as resources that are positively associated with overall well-being irrespective of the presence of stress (Berkman and Glass, 2000; House *et al.*, 1985). Our measure of social support captured perceived rather than received (actual or enacted) support. There is evidence that a strong sense of support seems to give people the confidence to cope without needing to marshal their network's resources (Gottlieb and Bergen, 2010). Social support can influence health through physiological processes related to stress and immune responses (biological pathway) (Uchino *et al.*, 2018; Vila, 2021), cognitive and emotional states such as self-esteem, social competence, self-efficacy and affect (psychosocial pathway) (Gable and Bedrov, 2022; Uchino *et al.*, 2012), and health-related behaviours such as being physically active and enjoying a healthier diet (behavioural pathway) (Lindsay Smith *et al.*, 2017; Powell *et al.*, 2015). In relation to tooth loss and toothache, social support can influence the perception of illness and social networks can provide access to information and resources (such as financial aid to buy medication and pay for dental care, assistance finding a trusted dentist and booking appointments, and help with childcare during episodes of pain and to attend appointments) that can influence when and why individuals seek dental care.

Findings were inconsistent for the other measure of social support, marital status, which was associated with edentulousness but not with toothache. Marital status is a common proxy of structural rather than functional support. As such, it does not capture marital quality. Conversely, perceived social support captures the functional aspect of people's relationships, and their beliefs about the availability of varied types of support from their close networks (Gottlieb and Bergen, 2010). The observation that Asian ethnic groups, particularly Chinese individuals, had better oral health despite reporting lack less support (and being married) than white Britons underscores the importance of a relationship with the spouse or partner among these groups. There is evidence that participation in family activities, such as home cooking and regular family/shared meals, are more common among Asian groups (Leung and Stanner, 2011). Asian individuals also have lower rates of smoking (Anthony *et al.*, 2012). A diet high in free sugars and tobacco smoking are two important behavioural determinants of oral health.

These findings have some implications. They reinforce an extensive body of research documenting the important relationship between social support and health. Consistent with the main effects theory (Berkman and Glass, 2000; Berkman and Krishna, 2014), our findings indicate that social support might be a valuable psychosocial resource for adult oral health cutting across various ethnic groups. Future studies should use longitudinal designs with comprehensive measures that capture the different domains of social support (emotional, instrumental, informational and appraisal) and alternative oral health outcomes. Qualitative research with individuals from specific ethnic groups might also shed some light on the mechanisms underlying the role of social support on oral health.

This study has limitations. First, the cross-sectional design precludes any causal interpretation. Second, the data were relatively old. However, the HSE 1999-2005 is the most recent English survey including both an ethnic boost sample and oral health data, thus giving the opportunity to test our hypotheses with national data. Although it is unlikely that ethnic and socioeconomic inequalities in oral health have changed in such a short time, we could not include participants from growing ethnic minority groups (i.e., black African and white Eastern Europeans). Third, our sample included 93% of eligible participants. As we found demographic differences between participants with and without missing data (data not shown), the present findings are not fully generalisable. Fourth, participants' oral health was measured through self-reports, which are prone to measurement bias. However, the rates of edentulousness and toothache in the sample resembled those in the latest national oral health survey in the country. In addition, edentulousness is a complex oral health outcome that results from cumulative experience of oral diseases and access to dental care services. This makes findings on edentulousness difficult to interpret in isolation.

In conclusion, although measures of social support were associated with both ethnicity and oral health, they explained very little of the observed ethnic inequalities in oral health among individuals in England. The findings support the main effects theory for the role of social support, by which perceived lack of social support is negatively associated with adult oral health over and above the effects of sociodemographic factors.

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