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Trends in weight loss attempts among children in England

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ABSTRACT

Objectives To describe trends in reported weight loss attempts among school-aged children and to investigate its sociodemographic determinants.

Design We analysed data of children who participated in the Health Survey for England from 1997 to 2016 (n=34 235). This repeated cross-sectional survey reported weight loss attempts and sociodemographic characteristics. Body weight and height were measured by trained interviewers, and body mass index for age z-score was calculated. Multivariable logistic regression was used to investigate the sociodemographic determinants.

Setting England.

Participants Children (8–17 years).

Main outcome measures Weight loss attempts by year, age group, gender, BMI for age z-score, ethnicity and household income.

Results The prevalence of reported weight loss attempts increased significantly from 21.4% (1997–1998) to 26.5% (2015–2016). The increase was significant for boys, older children, Asian children, children from lower income households and in all categories of BMI for age z-score. Significant predictors of weight loss attempts included having overweight (8–12 years old, OR 4.01 (%CI 3.47 to 4.64); 13–17 years old, OR 1.96 (%CI 1.58 to 2.42)) or obesity (8–12 years old, OR 13.57 (%CI 11.94 to 15.43); 13–17 years old, OR 4.72 (%CI 3.94 to 5.66)) as well as being older, girls, from ethnic minority groups or low household income.

Conclusion The prevalence of reported weight loss attempts among children is increasing at a faster rate than the rise in excess weight and includes an increasing proportion of children with a 'healthy' weight. The increase in the prevalence of reported weight loss attempts among children is greatest among subgroups with lower baseline prevalence.

INTRODUCTION

There has been a steady rise in the prevalence of overweight and obesity in English children, and currently more than a third of UK children have overweight or obesity.¹ It is well established that excess weight in children is an important risk factor for ill-health both in childhood, especially psychological harms and in the longer term because of the increased risk of diabetes, cardiovascular disease and musculoskeletal complications.² In addition to the personal health burden, childhood obesity and its sequelae lead to increased cost to the National Health Service (NHS) and the wider economy.^{3–5}

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ There has been a steady rise in the prevalence of overweight and obesity in English children.
- ⇒ The rise is in parallel with an increased prevalence of eating disorders.
- ⇒ The were limited data on the prevalence of weight loss attempts among children.

WHAT THIS STUDY ADDS

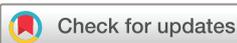
- ⇒ The prevalence in weight loss attempts among children increased significantly between 1997 and 2016.
- ⇒ The increasing trend is more pronounced among subgroups with a lower baseline prevalence.
- ⇒ Gender, ethnicity and household incomes are important sociodemographic determinants of weight loss attempts among children.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Weight management services for young people with obesity, including research into more effective interventions, needs to expand to meet the rise in weight loss attempts.
- ⇒ More research is needed to understand the drivers of weight loss attempts among young people with a healthy weight and to reduce their occurrence.
- ⇒ Policies to tackle obesity in young people need to be sensitive to reduce the risk of encouraging inappropriate weight control practices.

Childhood obesity was first named as a government priority in England in 2004, garnering attention from both health professionals and the public which continues to the present day.^{6,7} In 2006, the National Institute for Health and Care Excellence (NICE) published their first guidelines on the prevention and treatment of excess weight in children leading to a rise in the commissioning of child weight management interventions.⁶ However, little is known about the numbers or demographic characteristics of those attending these programmes or the prevalence of unsupported weight loss attempts.

There has also been a marked increase in the reported prevalence of eating disorders.⁸ Although no causal relationship has been shown, the focus on obesity in children among policy makers and public



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health campaigners, the frequency and tone of media reporting, and the rise in a social media culture which promotes the 'thin ideal', have the potential to lead to an increase in weight dissatisfaction among children and young people who are not overweight.⁹

This study aimed to analyse trends in the prevalence of weight loss attempts among children aged 8–17 years, overall and by weight status and to identify sociodemographic characteristics associated with weight loss attempts including age, gender, ethnicity and household income.

MATERIALS AND METHODS

Study design and population

This analysis included 34 235 children aged 8–17 years who participated in the Health Survey for England (HSE) in 1997–1998 (n=6300), 2002 and 2005–2006 (n=7694), 2007–2008 (n=7745), 2009–2010 (n=4694), 2011–2012 (n=1520), 2013–2014 (n=850) and 2015–2016 (n=5432). The HSE is an annual cross-sectional population-based survey of general health that includes a nationally representative sample of the English population. Participants were selected from geographically representative households identified through multistage random probability sampling. Further information on the survey methodology can be found online and in published reports.¹⁰ Research ethics consent for each survey was obtained from the relevant Research Ethics Committee prior to each survey. No additional approval was required for this analysis.

The HSE surveys vary each year and only the 1997, 1998, 2002, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 and 2016 surveys asked participants if they were currently attempting to lose weight and were included in this analysis.

Interview responses

Informed consent for children aged 8–15 years was obtained from the parents on behalf of the children with their agreement to proceed with the survey and any measurements. Young people aged 16 and 17 years old provided their own consent. Information about children aged 8–12 years was collected from a parent in the presence of their children during the interview whenever possible. The children were also asked if they could contribute information where appropriate. Older children aged 13–17 years were interviewed directly after permission was obtained from the child's parent or guardian and the whole interview process was conducted in the presence of the child's parent or guardian.

Children reported if they were actively seeking to manage their weight by responding to the following question: 'At the present time, are you trying to lose weight, trying to gain weight, or are you not trying to change weight?'

Sociodemographic characteristics

Sociodemographic variables included self-reported age, gender, ethnicity and household income level. During data collection, age was categorised into two groups: younger children aged 8–12 years and older children aged 13–17 years. The population was divided into four major ethnicities: white, Asian, black and other/mixed. Household income level was grouped into five household equivalised income quintiles based on HSE classifications.

Anthropometric measurements

Height and weight were measured by trained nurses in a physical examination during a home visit. Height was measured

barefoot using a portable stadiometer and weight using a SECA weighing scale. Body mass index (BMI) for age z-score (BAZ) was calculated and classified based on WHO BMI for age and gender (5–19 years); thinness <-2SD, normal -2SD<=1SD, overweight >1SD<=2SD and obesity >2SD,¹¹ and we adopt these terms throughout this paper.

Statistical analyses

STATA V.15 (Stata Corp, College Station, Texas, USA) was used for all the analyses. Survey commands using weight, primary sampling unit and cluster variables were used to obtain nationally representative results, correct for non-response bias and account for clustering in the sampling. 'For those variables with children with missing data (BAZ classifications 16.8% and household income 15.6%), a missing category was included for each.' In each survey, descriptive statistics were compared for each subgroup among those trying to lose weight and the rest of the sample using Student's t-test for continuous variables and χ^2 for proportions. The prevalence of weight loss attempts for the whole sample and subgroups comprising younger/older children and BAZ classifications were calculated. Associations between sociodemographic factors and the likelihood of attempting weight loss were analysed using a multivariable logistic regression model including time (survey year), participant's BAZ classifications, age (continuous), gender, ethnicity and household income. For the logistic regression analysis, those who reported a weight loss attempt were compared with the rest, therefore, those who were 'not trying to change weight' and those who were 'trying to gain weight (n=1456; 4.2%)' were coded into one category. A p value of 0.05 was set to denote statistical significance.

RESULTS

Study population

A final sample of 34 235 children aged 8–17 who participated in the HSE from 1997 to 2016 were included in this analysis (table 1) (online supplemental table 1 for the breakdown).

Trends in prevalence of weight loss attempts

There was a significant increase over time in the proportion of children reporting weight loss attempts, from 21.4% in 1997–1998 to 26.4% in 2015–2016 (p=0.001) (online supplemental table 2). The absolute prevalence of weight loss attempts increased as BMI for age z-score increased (figure 1A), from 5.3% to 13.6% among children with a healthy weight, from 9.0% to 39.3% for children with overweight and 32.9% vs 62.6% for children with obesity, over the same time period. The most notable increase in the prevalence of weight loss attempts was in the period 2011–2012 and was apparent across all BMI for age z-scores categories. For example, from 2009–2010 to 2011–2012, prevalence of weight loss attempts increased from 13% to 48.6% among children with overweight and from 38.1% to 81% among children with obesity (figure 1A). Among older children, the frequency of weight loss attempts among children with overweight increased from 4.3% to 57.5% and among children with obesity from 31.4% to 81.7% from 2009–2010 to 2011–2012 (figure 1C). The 2011–2012 survey year was the first to find evidence of a notable proportion of children with a healthy weight reporting weight loss attempts, up from 0% in the previous year to 15.2%. Similar trends were also apparent in younger children (figure 1B).

The absolute prevalence of reported weight loss attempts were generally higher in girls than boys (figure 2A) but the increase over time was significant only for boys (online supplemental table

Table 1 Demographic and anthropometric characteristics of children aged 8–17 years old from 1997 to 2016

	Trying to lose weight		Not trying to lose weight	
	n	Mean±SD/%	n	Mean±SD/%
Age (years)	8661	12.4±2.47	25 574	11.5±2.52*
Age group				
8–12	5330	60.5	18 371	70.7*
13–17	3331	39.5	7203	29.3*
Weight (kg)	8661	53.0±22.0	25 574	40.8±16.8*
BMI z-score	6446	2.56±1.47	23 604	1.03±1.62*
BMI category				
Thinness	6	0.1	482	2.2*
Normal	1023	17.4	11 804	51.5*
Overweight	1231	19.7	4714	19.8
Obesity	4206	62.8	6604	26.6*
Gender				
Boys	3440	40.4	13 628	53.9*
Girls	5221	59.6	11 946	46.1*
Ethnicity				
White	7053	79.1	22 074	84.8*
Asian	810	10.9	1658	7.5*
Black	394	5.2	806	3.5*
Other and mixed	404	4.9	1036	4.3
Household income level				
Q1	1875	27.5	4954	24.1*
Q2	1586	21.5	4442	20.2
Q3	1557	20.9	4677	20.9
Q4	1313	17.1	4375	19.1*
Q5	988	13.1	3540	15.6*

Estimates are mean±SD or % in which % are added up vertically; BAZ, BMI for age z-score; Q1 (<=GBP11 676.65), Q2 (>GBP11 676.65<=GBP19 117.65), Q3 (>GBP19 117.65<=GBP27 704.92), Q4 (>GBP27 704.92<=GBP47 794.12) and Q5 (>GBP47 794.12). Children 'Not-trying to lose weight' include those 'trying to gain weight (n=1,456 (4.2%))'. Missing values; BAZ classifications 16.8%, household income level 15.6%.

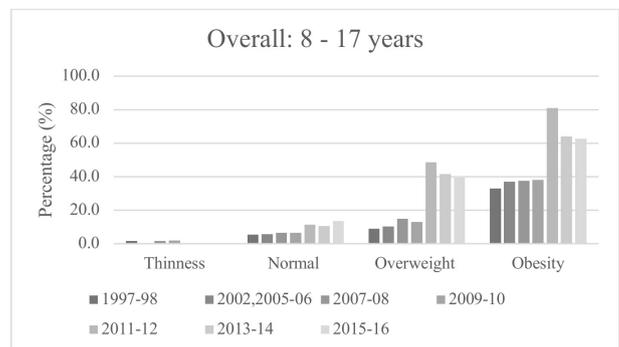
*Significant different (p<0.05) between groups (χ^2 and t-test). BAZ, body mass index for age z-score; BMI, body mass index.

2). The absolute prevalence of weight loss attempts was higher among older children than the younger children (figure 2B) and increased significantly over time among older (p=0.038), but not younger children (p=0.162) (online supplemental table 2). The prevalence of reported weight loss attempts was higher in ethnic minorities than white children in both age groups and there was a significant upward trend over time among Asian children aged 13–17 (p=0.049). The prevalence of reported weight loss attempts was higher among households with lower income with a significant upward trend among children with the lowest quartile of household income aged 8–12 and children from the Q2 of household income aged 13–17.

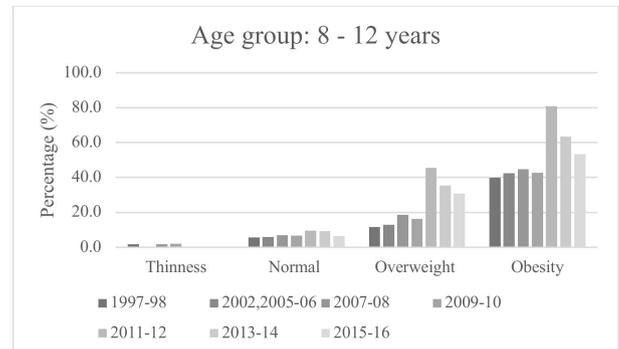
Determinants of weight loss attempts

Logistic regression analyses showed that weight status, ethnicity and household income levels were independently associated with weight loss attempts in younger children, while gender was also an independent predictor in older children (table 2). Compared with children with a healthy weight, the children with overweight and obesity were more likely to have attempted to lose weight (8–12 years old, OR 4.01, %CI 3.47 to 4.64 and OR 13.57, %CI 11.94 to 15.43; 13–17 years old, OR 1.96, %CI

A



B



C

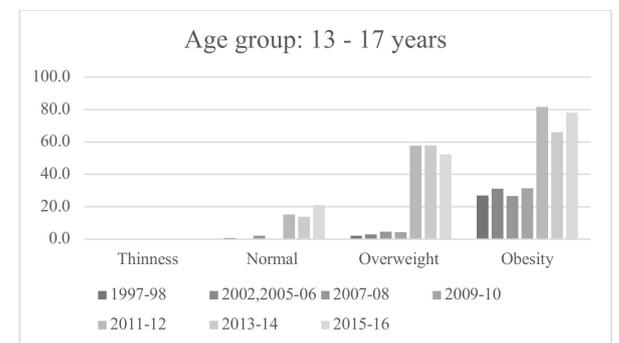


Figure 1 Prevalence of weight loss attempts by body mass index category among children. (A) Overall: 8–17 years. (B) Age group: 8–12 years. (C) Age group: 13–17 years included in Health Survey for England from 1997 to 2016.

1.58 to 2.42 and OR 4.72, %CI 3.94 to 5.66, respectively). Girls were more likely to report weight loss attempts than boys (OR 2.66, %CI 2.41 to 2.95) in older children only; Asian children (8–12 years old, OR 1.72, %CI 1.43 to 2.07; 13–17 years old, OR 1.57, %CI 1.29 to 1.93) and black children (8–12 years old, OR 1.32, %CI 1.03 to 1.68; 13–17 years old, OR 1.37, %CI 1.02 to 1.84) compared with the white children. Younger children from the lowest and second quintile of household income level were more likely to have weight loss attempts than the highest quintile (OR 1.21, %CI 1.01 to 1.44 and OR 1.20, %CI 1.01 to 1.43, respectively), while older children from the third quintile were more likely to have weight loss attempts than the highest quintile (OR 1.22, %CI 1.02 to 1.47). Univariate analysis is shown in online supplemental table 3.

DISCUSSION

In England in 2015/2016, around one in five children aged 8–12 years old and one in three children aged 13–17 years old

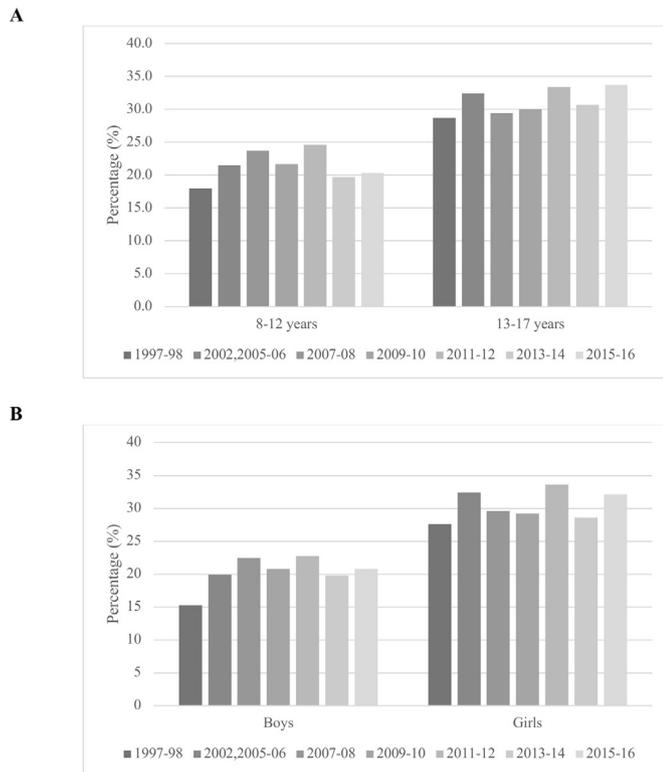


Figure 2 Prevalence of weight loss attempts in children (A) by age group and (B) by gender included in the Health Survey for England from 1997 to 2016.

reported attempts to lose weight, including some children with a healthy weight. The prevalence of weight loss attempts increased during the preceding decade in all BMI for age z-score categories, especially among boys, older children, children of Asian

ethnicity or from lower income families, compared with their peers. Overall, having overweight or obesity, as well as being female, from an ethnic minority group or low-income household significantly predicted weight loss attempts in this population.

Data on weight loss attempts in children are relatively sparse. A cross-sectional study conducted among European, Israel and North American adolescents with overweight and obesity in 2001/2002 showed the prevalence of weight loss attempts ranged from 5% to 76%.¹² Data from the 2005–2014 National Health and Nutrition Examination Survey (NHANES) found that 28.2% of children aged 8–15 years old made persistent attempts to lose weight,¹³ while a more recent study in Canada showed 48% of children aged 8–10 years old reported weight loss attempts.¹⁴ Excess weight is one of the most significant determinants of weight loss attempts.^{12–15} One study reported a 5% increase in the OR of weight loss attempts per BMI unit increase.¹³

Our findings of the relationships between weight loss attempts and sociodemographic characteristics are generally consistent with those previously reported. For example, it has been reported that the prevalence of self-reported dieting is higher in older children^{14–16} and girls^{12–17–18} compared with younger children or boys. Although we found the absolute prevalence was constantly higher among girls, we found a significant increase in weight loss attempts over time among boys from both age groups but not in girls. Several other studies have reported a marked increase in weight loss attempts among boys over time.^{17–19–20} Consistent with other surveys, weight loss attempts was more commonly reported among children from ethnic minority groups than the white population.^{13–15–21} Children from the highest quintile of household income were less likely to report attempting to lose weight than those from the lower quintiles.¹³ Correspondingly, a previous study reported a large proportion of low-income African-American adolescents (43.4%) tried to lose weight.²²

Table 2 Associations between demographic characteristics or BMI category and attempts to lose weight

	8–12 years old			13–17 years old		
	OR	95% CI	P value	OR	95% CI	P value
Year of survey	1.02	1.01 to 1.03	<0.001	1.07	1.06 to 1.08	<0.001
BMI category*						
Underweight	0.18	0.08 to 0.40	<0.001	N/A	N/A	<0.001
Overweight	4.01	3.47 to 4.64	<0.001	1.96	1.58 to 2.42	<0.001
Obesity	13.57	11.94 to 15.43	<0.001	4.72	3.94 to 5.66	<0.001
Gender						
Girls	1.04	0.95 to 1.15	0.373	2.66	2.41 to 2.95	<0.001
Ethnicity						
Asian	1.72	1.43 to 2.07	<0.001	1.57	1.29 to 1.93	<0.001
Black	1.32	1.03 to 1.68	0.028	1.37	1.02 to 1.84	0.039
Other and mixed	1.19	0.94 to 1.50	0.145	1.17	0.91 to 1.50	0.224
Household income levels						
Q1	1.21	1.01 to 1.44	0.036	1.18	0.98 to 1.42	0.086
Q2	1.20	1.01 to 1.43	0.036	1.18	0.97 to 1.43	0.090
Q3	1.14	0.96 to 1.36	0.144	1.22	1.02 to 1.47	0.034
Q4	1.06	0.88 to 1.27	0.564	1.09	0.90 to 1.33	0.372

*BMI for age z-score; Q1 (\leq GBP11 676.65), Q2 ($>$ GBP11 676.65 \leq GBP19 117.65), Q3 ($>$ GBP19 117.65 \leq GBP27 704.92), Q4 ($>$ GBP27 704.92 \leq GBP47 794.12) and Q5 ($>$ GBP47 794.12). Estimates from multivariable logistic regression model. Each coefficient shows the OR of trying to lose weight compared with the reference category while adjusting for all other determinants of weight loss attempts. Reference groups for categorical variables; boys, whites, $>$ GBP47 794.12, and normal BAZ classification. Estimates for missing category (BAZ classifications and household income) are omitted. For survey year, the OR is per increasing year. There is no OR estimate for 13–17 age group because there was nobody trying to lose weight. P value $<$ 0.05 to denote statistical significance.

BAZ, body mass index for age z-score; BMI, body mass index.

Findings from the HSE on weight loss attempts in adults over a similar time period also showed a significant increase in the proportion of people trying to lose weight, from 39% in 1997 to 50% in 2015 with the biggest determinants of weight loss attempts having overweight/obesity and being female.²³ However, we observed a marked increase in reported weight loss attempts from 2011 to 12 onwards which was not apparent in the data for adults including among children with a healthy weight. Although this observational analysis cannot establish the cause, this date marked the start of individual feedback on weight status to parents or carers as part of the National Child Measurement Programme (NCMP).²⁴ The NCMP was established as a screening programme in 2006 to measure the height and weight of children at reception (aged 4–5 years) and year 6 (aged 10–11 years) at school by trained staff.²⁵ However, individual level feedback from the NCMP was not provided until 2010–2011 and sparked considerable media attention in relation to childhood obesity. Parents were provided written weight feedback with information about their child's BMI category, defined using centiles of the UK 1990 growth curves; clinical cut-offs at the 2nd, 91st and 98th BMI centiles defined underweight, healthy weight, overweight and obese (described to parents as 'very overweight').²⁶ In addition, information about the health risks, associated with their child's weight status, healthy lifestyles from the government healthy lifestyle campaign and local health and leisure services are also provided.²⁷ A previous survey found that the provision of NCMP weight feedback increased recognition of childhood overweight and encouraged some parents to seek help, but it is also plausible that this prompted greater self-management.²⁴

The rise in efforts to lose weight loss among children who were overweight or obese may imply some success in communicating the importance of weight control to this group, although this inference is tempered by the absence of information on the nature of these weight loss attempts. It is of concern that the increase has not been matched by an increase in the provision of weight management services in England, creating a risk of unsupervised and potentially inappropriate weight control behaviours. Meanwhile, the rise in weight loss attempts among children with a healthy weight raises concerns and suggests greater attention is needed to target weight control messages appropriately.

This study, using multiple HSE surveys, reports the recent trends in weight loss attempts among children in England. A key strength of the present study is that the findings are nationally representative. Anthropometric measurements were taken by trained nurses at the home visits using calibrated machines and standardised protocol, minimising any risk of measurement error or misreporting. However, the overall sample size means that some subgroup comparisons such as household income levels and BAZ were limited by small numbers. Parents were responsible for answering interview questions on behalf of the younger children, whereas the older children aged 13–17 years answered the survey by themselves. These discrepancies in the interview process between young and older children may lead to bias and under-reporting, based on parental perceptions of weight control attempts, hence dividing them into two separate age groups for analysis. The accuracy of reported weight loss attempts is dependent on the perceptions of a weight loss attempt and the understanding of weight loss practices among parents and children and may not reflect professional perspectives of a weight loss attempt, nor is there information on the strategies employed in weight loss attempts. A further limitation is that the questions about weight loss attempts were not asked

every year limiting our ability to look for recent changes. Weight loss attempt was asked based on only a single question, further information such as the methods used to lose weight and how much weight was lost were not available.

CONCLUSION

The rise in childhood obesity in recent years has coincided with an increase in self-reported weight loss attempts, particularly among population subgroups with lower baseline prevalence of weight loss attempts. However, this includes an increase among children with a healthy weight, suggesting a parallel increase in inappropriate weight concern.

Contributors AA conceptualised and designed the study, carried out the analyses, drafted the manuscript, and reviewed and revised the manuscript. ML drafted, reviewed and revised the manuscript. CP conceptualised and designed the study, supervised the analyses, reviewed and revised the manuscript and was the guarantor of the study. SJ conceptualised and designed the study, supervised the whole study and critically reviewed the manuscript for important intellectual content. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Ethics approval Not applicable.

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