

# Adolescent eating behaviors in the UAE: Time to intervene

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## ABSTRACT

**Background:** Obesity is the single most burdensome lifestyle disease, which has reached epidemic proportions. This study aimed to examine the eating behavior patterns and beliefs in a group of adolescents living in the United Arab Emirates (UAE). **Procedure:** A questionnaire was administered to adolescents (aged 11 and 18 years) attending outpatients' clinics at governmental health facilities. Informed consent was obtained, and the questionnaire was available in English or Arabic languages. **Results:** In all, 36 adolescent subjects participated in our study with 12 males and 24 females. UAE nationals constituted 72% of our participants and 28% were of other ethnic backgrounds; 75% were overweight to obese with 17% normal and 8% underweight. The majority of patients were healthy with only 6 patients suffering chronic medical diseases. We uncovered that in less than half of our cohort, the decision to eat came directly from the individuals themselves, but it was more influenced by their families. Food consumption was largely in response to physical hunger with the sensation perceived in the upper abdomen by one-third and the remainder localizing it to various other areas. Excessive caloric intake with frequent meals and snacks was also reported. Our study subjects decided what to consume mainly based on what appeared appetizing, followed by availability and cravings and to a lesser extent based on health recommendations. Excessive speed of food ingestion was self-reported in the majority of participants. Moreover, almost half of the adolescents were unable to turn down food offerings from their close family members and over one-fourth were unable to refuse food from other persons. Common symptoms reported included dysphoric mood, disordered sleep, decreased energy and concentration difficulties as well as low self-esteem. **Conclusion:** Our study uncovered certain eating behaviors in the cohort of adolescents, which may be important in promoting weight gain. These included misconceived hunger signals, excessive frequency, amount and speed of food consumption as well as more focus on food taste, inattentiveness to cravings and a strong social influence on food intake decisions. The findings of our study aim to shed some light on the eating patterns among adolescents and encourage research to investigate eating behaviors on an expanded scale evaluating ethnic, gender and age-related differences.

**Keywords:** Adolescents, eating behavior, healthful eating, obese, overweight

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## Background

Obesity has been increasing at phenomenal rates to reach epidemic proportions.<sup>[1]</sup> It is associated with the development of a myriad of systemic diseases including diabetes, hypertension, cardiovascular, respiratory, gastrointestinal, musculoskeletal and psychological ailments as well as the development of various types of cancers. More significantly, obesity has also been linked with rising healthcare expenditures, poor quality of life, low productivity and reduced life expectancy. Despite ongoing population awareness efforts and the availability of numerous diets to control obesity, the rates in adults have tripled since 1975 and continue to increase unabated with an even more pronounced escalation in adolescents and children.<sup>[1]</sup> Its prevalence among the latter age groups was 11 million in 1975 which increased by more than ten-fold in 2016, reaching a total of 124 million. In fact, according to 2016 World Health Organization (WHO) estimates, nearly 20% of adolescents were overweight and 6-8% obese, amassing to a combined worldwide total of 340 million.<sup>[1]</sup> The long-term significance of this is substantial since childhood obesity is an important indicator of adult obesity risk, premature death as well as disability.<sup>[2-4]</sup>

Though diet and exercise are able to achieve weight loss, their effects are short term and non-sustainable. Moreover, the voluminous number of published weight loss diets demonstrates their universal lack of success at achieving and maintaining weight control. It has been suggested that food-related behavioral tendencies are contributing to the obesity epidemic by sabotaging weight loss efforts.<sup>[5]</sup> Adolescence is a time when behaviors are adopted such as independence and self-assertion leading to tremendous challenges. As such, adolescents find it difficult to reconcile personal beliefs with parental teachings, societal traditions as well as mixed messages from media, healthcare professionals and peers. In the context of food intake, adolescents undoubtedly struggle with challenging forces<sup>[6]</sup> and as a result form their own maladaptive consumption patterns in pursuit of achieving their “desired” physical appearance. In fact, poor dietary intake and dissatisfaction with body weight,<sup>[7]</sup> leading to frequent dieting, have been found to be prevalent among overweight and even normal weight adolescents.<sup>[8]</sup> Studies from Brewer *et al.* have stressed the importance of positive reinforcement and reward-based eating in habit formation that propagate unhealthy consumption patterns.<sup>[5]</sup> This again underscores the importance of eating behavior on weight gain and subsequently in the development of obesity. It has been recommended that addressing such behaviors can serve as a resource upon which effective weight management interventions are built.<sup>[5,9]</sup>

As obesity rates in our region are reported to be double the world averages,<sup>[10]</sup> this underscores the importance of research in this area. The purpose of this study was to gain an understanding of basic eating beliefs and habits in adolescents focusing on aspects related to cues for initiation and cessation of food consumption, decisions influencing meal choices and the speed as well as social

influences on dietary intake. This would then serve to help uncover modifiable consumption patterns for healthy eating and sustainable weight loss.

## Procedure

The study received approval by Al Ain Medical District Ethics Committee (reference AAMDHREC Protocol #17-36 CRD507/17). Data related to the study is available upon request at Tawam research repository. This was a questionnaire-based survey administered at outpatients’ clinics of governmental health facilities. The questionnaire was available in both English and Arabic languages. Inclusion criteria included random selection of adolescents aged 11-18 years who were willing and able to complete the questionnaire. The exclusion criteria included having chronic health problem or receiving medications affecting weight or appetite and presence of cognitive disabilities or mental health challenges and failure to provide informed consent. The definition for obesity and overweight used was based on WHO classification, whereby, for children aged between 5 and 19 years, overweight was defined as body mass index (BMI) for age greater than 1 standard deviation and obesity being greater than 2 standard deviation above WHO growth reference median.<sup>[1]</sup>

## Statistical analysis

Based on the census data, it was established that the population of Al Ain is approximately 900,000, with 30% equivalent to 270,000 being children. Amongst them, the sample size was calculated (80% Confidence Level, 10% Margin of Error; 30% of children being in the age group 5-19 required for the study), to yield a sample size of 34 participants. Statistical analysis was conducted using the Statistical Package for Social Sciences (SPSS -IBM, Chicago, IL) version 22. The survey was validated using the principal component analysis and the Kaiser Mayer Olkin (KMO) value determined. Cronbach’s alpha was adopted to assess the reliability of the items in the survey. Descriptive statistics were used, and responses tabulated as mean  $\pm$  standard deviation and/or expressed as percentage responses. Pearson’s Correlation Co-efficient was used to indicate significant differences between the variables. A *P* value of  $\leq 0.05$  was considered significant.

## Results

Validity and reliability of the survey was measured using the principal component analysis, yielding a Kaiser-Meyer-Olkin value of 0.73 and achieving statistical significance. Bartlett’s test of sphericity was significant (0.000). The principal component analysis identified a component with an eigen value of 14.3, which explained 87.4% of the total variance, correlation co-efficient indicating relationship between the items is satisfactory. The overall Cronbach’s alpha was 0.74, a measure of reliability of the survey tool.

The 36 adolescent subjects aged 11-18 years participated in the study with demographics as shown in Table 1. Hunger sensation was reported in 87% of the participants with hunger perceived in various spots distributed as upper abdomen (36%), mid-lower

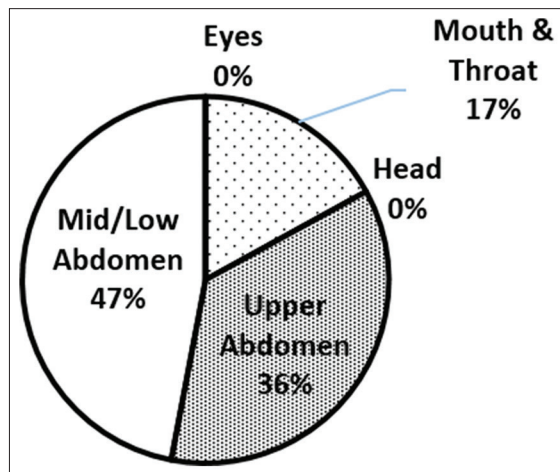
abdomen (47%) and mouth and throat (17%) [Figure 1]. Only 47% of our participants reported that the decision to eat comes directly from them, as opposed to being determined by their family members; 53% of our cohort consumed three meals per day. However, 25% had more frequent meal intake translating to the consumption of four or more meals daily. With respect to snacking, 73% consumed two or more snacks per day with 31% snacking three to four times daily. Interestingly, the motivation to eat in 50% of our adolescent cohort was physical hunger with temptation and boredom reported in 19% and 14%, respectively. In addition, only 14% reported to be eating according to pre-set mealtimes and 3% in response to stress [Figure 2].

Food selection was driven mainly by outside influences with only 22% of our participants basing their meal choices

**Table 1: Participants Demographics (n=36)**

Demographic Variable	Number of Participants (%)
Gender	
Male	12 (33%)
Female	24 (67%)
Age	
≤12 years	9 (25%)
>13 years	27 (75%)
Nationality	
United Arab Emirates nationals	26 (72%)
Expatriates	10 (28%)
Comorbidities	
None	30 (83%)
Present*	6 (17%)
Weight Category**	
Underweight	3 (8%)
Normal	6 (17%)
Overweight/obese	27 (75%)

\*1 patient with each of the following conditions: Type 1 diabetes mellitus, mild hypothyroidism, asthma, migraine and 2 patients with abnormal blood pressure. \*\*Obesity/overweight based on World Health Organization (WHO) classification: for children aged between 5 and 19 years, overweight defined as Body Mass Index (BMI) for age >1 standard deviation and obesity >2 standard deviation above WHO growth reference median



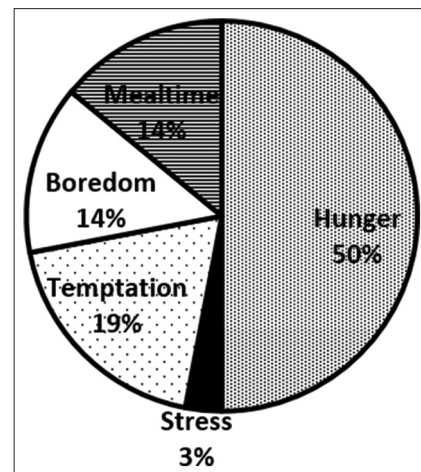
**Figure 1: Hunger Spot Localization.** The percentage of participants who perceive their hunger spot sensation in these various locations in their bodies: only 36% experiencing this sensation in the expected upper abdomen area. The remainder sensed it in their mouth/throat or mid/low abdomen

on their cravings. They often consumed what appeared appetizing (47%), what was available (22%), and to a lesser extent on health recommendations (6%) [Figure 3]. Very similar findings were identified in snack selection; being based primarily on palatability (42%) and food availability (28%), followed by cravings (25%) and marginally dependent on health recommendations (6%). The reported food items craved most were carbohydrates (69%). As for the origin of cravings, 64% of our adolescents attributed these to internal desires as opposed to social factors, such as advertisement and peers, which influenced cravings in only 28% of the cohort.

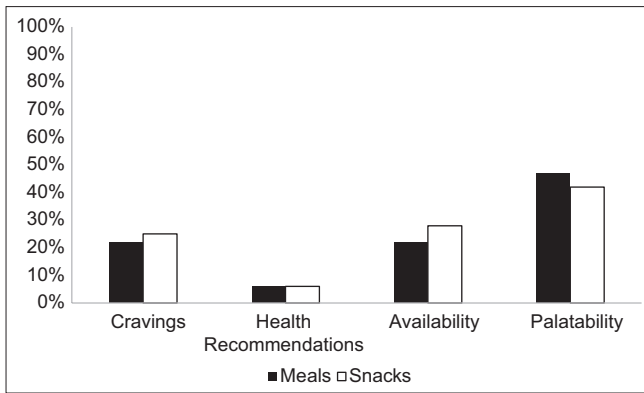
Self-reported triggers for stop eating included finishing their plate (14%) and experiencing overeating symptoms (6%) such as “could not breathe” or “get off the chair” or “had to unbuckle their belt,” whereas 81% perceived heaviness or bloating and 22% psychological post-meal symptoms; 11% of participants reported being dissatisfied with their meals, however, 36% would rarely or never incorporate meal feedback into future consumption decisions [Figure 4].

Succumbing to social pressures was clearly evident, with 78% of our participants eating to please their close family members and 48% to appease others; 44% of adolescents were unable to turn down food offerings from their close family members and 28% from other persons [Figure 4]. Interestingly, 53% of adolescents reported themselves as the primary factor responsible for eating. Moreover, 50% of the participants stated that they would be interested in engaging in a sustainable weight intervention for mastering their nutrition.

Excessive speed of food ingestion was uncovered in our adolescents with 75% reporting taking less than 20 minutes to complete their meals. This was even more accelerated in 19% whereby meal consumption took less than 10 minutes. Overall,



**Figure 2: Eating Triggers.** The percentage of participants whose triggers for eating are based on hunger, mealtimes, temptations, stress or boredom: 50% of our cohort eat based on hunger whereas eating according to mealtimes is responsible in 14%. The remainder reported eating based on boredom, temptation or stress



**Figure 3:** Basis for Meals and Snacks Decisions. Percentage of participants who base their meals and snacks consumption decisions on cravings vs other factors such as food palatability, availability or health recommendations; 22% of meals and 25% of snacks decisions were based on cravings with the remaining majority basing these decisions on health recommendations, food availability or palatability

83% of participants consumed more quickly the foods they enjoyed the most. The main triggers for speed feeding were being very hungry (42%), being rushed (25%) and eating in groups (17%). Other factors, such as foods enjoyed most (11%) and stress (6%), had minor contributions [Figure 5].

The main symptoms our adolescent cohorts often or always experienced were namely dysphoric mood (14%), disordered sleep (28%), decreased energy and concentrating difficulties (16%) and low self-esteem (14%). Additionally, our cohorts had some prevalent belief patterns. Specifically, 53% believed that “Breakfast is the most important meal of the day.” and 31% thought that “Food should not be consumed after 6 pm.” There did not appear to be a consensus on the optimal number of meals per day. Regarding food choices, 81% identified fruits and vegetables as healthy, 44% meat and fish and 22% nuts among healthy food choices. Additionally, 75% identified sweets and 17% chips as being unhealthy.

## Discussion

Obesity is a worsening health problem worldwide and the Middle East, in particular, has recently witnessed a dramatic rise in obesity and its associated diseases.<sup>[2]</sup> This can be attributed to numerous adopted lifestyle changes, however, also significantly related to, acquired maladaptive eating behaviors. This has been reported in our previous study where such patterns were uncovered in a cohort of UAE adult participants<sup>[11]</sup>; with this study serving as a sequel to explore consumption behaviors in an adolescent cohort. Interesting prevalent beliefs and behaviors were uncovered as will be discussed according to the subheadings highlighting our major findings. Patient demographics are shown in Table 1.

### Social influences to eat

The decision to eat in less than half of our cohort originates from the subjects themselves, rather than being significantly influenced by others. More importantly, a majority of our adolescents ate to



**Figure 4:** Post-Meal feedback and Meal Satisfaction. Shown in the left-hand columns in black are percentages of participants with a low likelihood of turning down food offerings by their family (44%) or others (28%) and taking into account their previous meal experience (36%) into future consumption decisions. Conversely, shown in right-hand columns in white are the percentages of participants with a high likelihood of eating to please their family (78%) or others (48%)

please their family more than others. Furthermore, over one-third of the adolescents had an inability to refuse food offerings from their family members and other persons [Figure 4]. It is likely that the hospitality culture in this region encourages such behavior. In addition, this is further promoted by the susceptibility of eating behavior in adolescents to external forces. Story<sup>[6]</sup> eloquently described this in her conceptual model, highlighting family and peer effects among the main areas of influence. This has potential applicability in promoting healthful consumption as children have also been shown to model their eating on parents<sup>[12]</sup> and peers.<sup>[13]</sup> Furthermore, conformity with the former is a better predictor of adolescents’ eating scores.<sup>[14]</sup> This, however, may have negative connotations when parents and peers themselves have unfavorable eating habits that can promote excess weight gain; perhaps to some extent explaining the marked rise in childhood and adolescent obesity in our region<sup>[15]</sup> and worldwide.

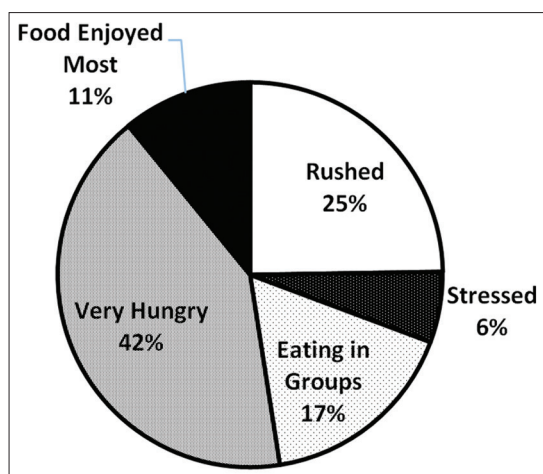
### Misconceived hunger cues

A majority of our adolescents recognize the feeling of hunger sensation with only one-third perceiving it in the upper abdomen; the typical spot identified with hunger pangs.<sup>[16]</sup> On the other hand, a majority experienced hunger in atypical areas as shown in Figure 1. This might possibly encourage meal consumption when the body is not truly in need for fuel thus leading to extra calories and excess weight. Moreover, unclear identification with and recognition of the body’s call for food may lead to confusing hunger with thirst, boredom or stress resulting in excess caloric consumption.

### Speed feeding

Our adolescents seemed to manifest an excessive speed of food ingestion that was related to a variety of triggers, as shown in Figure 5. The most notable of which being hunger. Speed feeding may lead to missing the satiety awareness sensation, which in turn can result in overconsumption. Complex feeding inhibitory signals interact to indicate fullness and provide the cue





**Figure 5:** Speed Feeding Triggers. Percentage of participants reporting the main trigger for their speed feeding as being rushed (25%), stressed (6%), very hungry (42%), eating in groups (17%), or consuming foods enjoyed most (11%)

to cease food intake,<sup>[17]</sup> which typically takes 20 minutes. With an accelerated eating pace, this feedback pathway is missed. An association has been reported between eating speed and high risk for central obesity, metabolic syndrome and its disease components.<sup>[18]</sup> Expectedly, the majority of foods consumed quickly were those enjoyed the most, perhaps suggesting excitement as a potential speed feeding trigger.

### Overeating

Our participants described their cue to meal cessation being the perception of overeating symptoms. Finishing their plate was also an important stop feeding trigger perhaps related to cultural upbringing to minimize food wasting. Nevertheless, these habits, by encouraging overconsumption, are key players in promoting weight gain. This may explain the wide prevalence of frequent bingeing, dieting and feeling obese in adolescents despite serious concerns surrounding body image and their weight.<sup>[8]</sup> We also uncovered symptoms commonly experienced by our adolescent cohort consisting of mood, sleep and concentrating disturbances as well as low self-esteem. Though these may not be entirely diet-related, concerns over food intake and weight certainly do not help.

Our cohort exhibited significant physical, and to a lesser extent, psychological symptoms, after meal consumption. The latter was specifically a feeling of guilt frequently experienced post meals in nearly one-fifth of our participants. Similar findings were uncovered by Ackard<sup>[19]</sup> which revealed overeating in 17% of girls and nearly 8% of boys and was associated with obesity, psychological challenges, depressive mood and low self-esteem. There are additional reports that many adolescents, in fact, exhibited subclinical bingeing<sup>[20]</sup>, perhaps, explaining some of the symptoms described by our cohort. Interestingly, a significant proportion of our cohort appeared to pay little attention to this post-meal feedback, rarely or never taking it into consideration for future meal decisions [Figure 4]. Since few of our adolescents

reported meal dissatisfaction, this may suggest that such symptoms may not be perceived as meal-related.

### Inattentiveness to cravings

Cravings accounted for one-fifth of meal and snack choices with the decision primarily being based on food palatability and availability as shown in Figure 3. It has been reported that cravings in adolescents are more common and prominent determinants of food intake as compared with adults.<sup>[21]</sup> However, in keeping with our findings, others have shown that taste, in fact, is one of the most important influences on food choices<sup>[22]</sup> along with cost and convenience likely determining availability.<sup>[6]</sup> This perhaps explains why flavor enhancement is a common tool utilized by food manufacturers to promote product consumption in this age group. Lack of attention to internal cravings could also play an integral role in overeating. Put together, these may potentially leave adolescents defenseless in the face of temptations and marketing schemes. Nevertheless, the origin of cravings in our cohort was mainly internal desires, and unexpectedly, social factors such as advertisement and peers, accounted for a lesser proportion of cravings. The majority of our participants reported carbohydrates as their most craved food item.

Over half of our cohort was consuming three meals per day, with one-fourth having more frequent meal intake. Though this increases the risk of overconsumption, Cusatis<sup>[14]</sup> found a positive relationship between meal number and dietary diversity of healthful foods reflecting more variety available at mealtimes. In our cohort, the motivation for food ingestions according to pre-set mealtimes was reported in only a small percentage with half basing their intake on physical hunger [Figure 2]. This finding is consistent with the observations by Neumark-Sztainer<sup>[22]</sup> whereby adolescents ate a particular food primarily because of being hungry or in response to cravings. With respect to snacking, the majority consumed two or more snacks per day with nearly one-third snacking more often. This is not surprising since snacking is a well-described phenomenon in eating patterns of adolescence reaching on average four per day.<sup>[23]</sup>

In contrast to the findings by Turconi,<sup>[24]</sup> there appears to be reasonable knowledge in our cohort about healthful food qualities. A significant proportion identified fruits, vegetables, meat and fish among healthy food choices while considering sweets as unhealthy. Whether this awareness is translated into actual practice is difficult to discern from our data. This is important as adolescents have been frequently found to have diets of poor quality or in need of improvement<sup>[25]</sup>, however, female sex and younger age adolescents have been noted to engage in more healthful eating.<sup>[6]</sup> The small sample size of our cohort limited such subgroup comparisons in our study.

There were additional interesting prevalent belief patterns among our adolescents specifically related to the importance of breakfast consumption. It is unclear whether these reflect parental teaching, or if in fact, our cohort acted upon them. According to Videon,<sup>[26]</sup>

nearly 20% of the adolescents reported breakfast skipping but parental presence at the evening meal appeared to lower this likelihood. Breakfast skipping is associated with changes in cognitive abilities and increased BMI in university adolescent girls.<sup>[27]</sup> In addition, mothers appear to have a significant impact on adolescents' food intake.<sup>[28]</sup> In UAE culture, with strong family ties, it is anticipated that meal skipping might be much lower, but this was not ascertained in our study. Finally, an unexpected yet encouraging observation was that many of our adolescents consider themselves as being the factor most responsible for their weight gain; and express interest in a sustainable weight intervention and permanently mastering their nutrition.

Limitations of our study include the small sample size, which restricted our ability to perform subgroup analysis for assessing the significance of age, gender and ethnic background on eating behavior. Moreover, our findings are limited to our specific population, and thus, may not be generalizable to other cultures.

## Conclusion

Our study uncovered certain eating behavioral patterns in a cohort of adolescents in the UAE, which may be important in promoting weight gain. These include misconceived hunger signals, excessive meal and snack consumption and focus on food palatability with inattentiveness to cravings. Post-meal physical and psychological symptoms were generally disregarded in future meal decisions. Promisingly, many of our adolescents considered themselves the factor most responsible for their weight gain and expressed interest in permanently mastering their nutrition, however, they appeared to succumb to influences from others for food ingestion and exhibited accelerated consumption speed. These eating habits may be treated through behavior modification. Larger studies are needed to confirm our findings and evaluate cultural, gender and age-related differences.

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**Declaration:** This is to confirm that the material is original research and has not been previously published elsewhere and all authors have approved the manuscript for submission. The study was approved by Al Ain Medical District Ethics Committee and its implementation was in compliance with all the requirements including informed consent, anonymity of patient information and data protection. The raw datasets have been deposited at our Institutional Archive Center and will be made available upon request.

**Competing Interests Statement:** Dr Samra Abouchacra and Dr Oudi Abouchacra are co-authors of a book called Eatology.

However, there is no form of financial support received by or contributed to the current study and there was no other form of funding for this study.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

## List of Abbreviations

UAE - United Arab Emirates  
WHO - World Health Organization  
BMI - Body Mass Index

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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