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RESEARCH ARTICLE

Identifying Differences in Nutrition-Related Learning Interests of Adolescent Students

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ABSTRACT

BACKGROUND: In this study, we examined nutrition-related topics among adolescent students attending schools with different Indices of Community Socio-Educational Advantage (ICSEA).

METHOD: Participating students (N = 206) from 5 schools in Western Australia completed a paper-based questionnaire on nutrition-related topics. Frequencies and independent chi-square tests were used to identify differences between sexes and school ICSEA.

RESULTS: Of the participating students, 75% were interested in learning about 8 of 16 topics. We found statistically significant differences by sex ($p < .01$) for “Eating the right foods for preventing illness and disease,” “Eating the right food for being active” among girls, and “Reducing food waste” among boys. We also noted differences by school ICSEA.

CONCLUSION: Acknowledging sex and socioeducational differences in teaching and learning may help teachers to engage adolescent students in nutrition education.

Keywords: child and adolescent health; nutrition and diet; school health instruction.

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Research indicates that adolescents and young adults have the least healthy eating habits of all Australians.^{1,2} Alarming, one in 4 adolescent Australians are either overweight or obese leading to increasing rates of young adult obesity and early onset type-2 diabetes.^{3,4} Adding to this burden, research also indicates that high school nutrition educators, aiming to develop food literacy skills as a foundation for lifelong healthier food choices, face challenges when engaging students in food and nutrition education.⁵⁻⁷

In Australia, school-based nutrition education programs are guided by mandated curricula from the health and physical education learning area (HPE) and food-related contexts in the design and technologies learning area (D&T), but variation in provision is often driven by a teacher’s interpretation

of curriculum guidelines and areas of interest.⁶⁻⁸ Ultimately, Australia’s teachers select how, what, and the amount of curriculum content to enact in their pedagogic work. More specifically, such diversity does not guarantee daily, weekly, or even monthly learning in nutrition education, as a teacher may choose to deliver this content via a period of study such as over 4 weeks in a given school year.⁸ Despite variations allowing for differentiated education, teacher creativity, and a contextualized approach, research shows that the selection of curriculum topics is often driven by educators who have made assumptions about topics of interest to adolescents.⁹ Other research signifies a disconnect between teachers and adolescent beliefs, particularly with regard to what they perceive students should

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learn to have a favorable effect on their dietary behaviors.^{1,6,7}

An alternate approach focuses on student interest as opposed to what students “should” learn. Self-determination theory suggests that a focus on “interests” may lead to an increase in intrinsic motivation and engagement of students’ in the learning.^{10,11} Research in learning areas, such as mathematics and science, has shown positive relationships between student interest in these subjects and their attention to lessons, as well as self-regulation of learning, the quantity and level of learning, the selection of learning strategies and goal achievement, persistence in the learning and self-efficacy to achieve desired learning outcomes.¹²⁻¹⁹ Similar research exploring a relationship between curriculum implementation, food and nutrition education outcomes and obesity rates in Australia has not been explored. Irrespective, findings suggest that engaging students in topics that are of interest to them, can lead to engagement with specific and/or additional content.

Despite research identifying that the topic of nutrition is a health concern to adolescents, research is limited regarding specific aspects of nutrition that are of interest.²⁰⁻²² Other than food being important in the prevention of disease, what constitutes and contributes to food being classified as healthy or unhealthy, and the complexities of navigating nutritional information, information pertaining to adolescent nutrition interests is limited.^{20,22}

Two Australian studies investigating adolescent food literacy identified and prioritized aspects of nutrition education that adolescents believe are important for them to eat a healthy diet.^{7,20} These studies concluded that personal relevance was an overwhelming influence on adolescent choices. This finding is further supported in literature that is focused on pedagogy and teaching frameworks deemed critical to engaging students and sparking an interest to learn more.^{20,23-25} By way of contrast, a review of literature reveals that specific nutrition-related topics that interest adolescents have not previously been investigated, particularly in Australia. Therefore, the aim of this study was to identify the food and nutrition-related topics that interest adolescents and promote engagement and a desire for them to learn more. Specifically, we aimed to investigate differences in adolescents’ nutrition education interests by sex and socioeducational advantage. The overall purpose of the investigation was to support and strengthen health-enhancing nutrition-related actions in adolescents through informed nutrition-based educational practices. By identifying topics of nutritional interests, which adolescents identified as intrinsically motivating and contextually relevant, schools, teachers, and curriculum leaders could utilize sociocritical information to customize pedagogy and better engage young people in nutrition education.

METHODS

Design

The current study stems from a secondary analysis of descriptive cross-sectional data identifying student-learning interest in nutrition-related topics, gathered from adolescents in 5 Western Australia (WA) schools as part of the Nutrition Transformational Games (NTG) project during 2017-2018. In the final phase of the NTG project, a prototype nutrition education game was pilot-tested with the students to assess suitability and acceptability of the game, as well as its effect on motivation and learning in nutrition education. Following game play, students completed a short paper-based questionnaire to record their impressions and acceptability toward the game, engagement in learning about food and nutrition, and motivation to take action about specific nutrition issues. In addition, part of the questionnaire included dichotomous questions that asked students to indicate their level of interest in 16 nutrition-related topics for further learning or study. Our study examines the responses from students to the 16 nutrition-related topics, to identify topics of interest as well as differences in their interests based on sex or school Index of Community Socio-Educational Advantage (ICSEA). The ICSEA scale is used to indicate the socioeducational background of students, allowing comparison between schools of similar socioeducational make-up.²⁶ ICSEA is not influenced by school facilities, resourcing or staffing.

Participants

We used stratified nonrandom sampling to recruit students for the NTG project prototype trial. Sampling and recruitment aimed to acquire an equal proportion of boys and girls between years 7 and 10 and across the scale of ICSEA school values in the metropolitan area of Perth, WA. We selected schools were using an online directory of school ICSEA values, and categorized as low, medium and high tertiles according to ICSEA value.²⁷ School inclusion in the study was limited to those schools with over 300 students to reduce recruitment burden.

Initially, schools were randomly selected from each ICSEA tertile with an invitation to participate sent directly to the Principal or indirectly via a staff contact known to the researchers.²⁸ Due to an initial low recruitment rate set within the timeframe for the study, we recruited other schools through advertisements placed in a newsletter emailed to registered users of the resource, Refresh.ED, a WA online learning platform that provides resources to support schools and teachers with food and nutrition education.²⁸ Recruited schools self-selected the classes of students that would participate in the study; students in these classes were invited

Table 1. Demographic Characteristics of Student Participants

		Boys	Girls	Total
ICSEA	Year level	N	N	N
Low	7-8	44	39	83
	9-10	13	14	27
	Total	57	53	110
High	7-8	28	59	87
	9-10	6	3	9
	Total	34	62	96
Total	7-8	72	98	170
	9-10	19	17	36
	Total	91	115	206

via an information package supplied to parents and/or guardians. Table 1 shows the demographic characteristics of study participants.

Instrumentation

A list of 16 nutrition-related topics was generated from a review of literature of adolescent nutrition interests and concerns, topics included in the Refresh.ED K-10 food and nutrition teaching resources (aligned to Australian Curriculum), and data collected from focus groups held with 44 boys and 24 girls and as part of the early stages of the NTG project. These participants were selected from varied ICSEA schools and youth groups. When introduced to the topics, we asked them to indicate their level of interest in learning more about each topic via a response of Yes or No.

The generated list of topics (Tables 2 and 3) was included in the post-game questionnaire administered to years 7-10 high school students participating in the current study—the prototype game trial pilot-tested for the NTG project. The topics concerning digestion and vegetarian diets were not included in questionnaires administered at the first school but following feedback from students at that school, were added to the instrument. This addition led to the smaller sample size for these items.

Validity and reliability of the research instrument were established in several ways during the larger NTG project. First, the instrument was closely examined by the research team to ensure alignment to formative research, curriculum text, clarity and ease of language for the age group and the functioning and facilities within the instrument such as response mechanisms. Then, the instrument was tested for construct validity of the topics included (interpretation) with 2 focus groups, who matched photos and text descriptions. As a test of criterion validity, questionnaire responses based on the text descriptions alone or in combination with trigger photos were compared in a pilot-test aligned with the larger NTG project. We made revisions to discordant items. For this study, self-report by these students was considered adequate face validity for assessing “interest in learning.” We

did not perform test-retest reliability for questionnaire items.

Data Analysis

Statistical analysis was conducted using SPSS v25.²⁹ Frequencies of affirmative responses to the statement: “I’m interested in learning more about this topic” were determined for all 16 topics. School ICSEA was re-classified as “low” or “high” based on values closest to the mid-point of sample distribution—low <1028 High >1084. Comparative analyses of the differences between sex within ICSEA (low/high), and ICSEA within sex were conducted using the Pearson chi-squared test.

Statistically significant differences were defined by $p < .01$, conservatively allowing for increased chance of significant differences resulting from consideration of multiple variables. Marginal differences were defined by $p < .05$. A minimum sample size of 130 was required to detect a medium difference in the primary outcome learning interests (Cramer’s $V = 0.3$),³⁰ using a Pearson chi-square test at 80% power (G*Power). Due to the sample size of years 9-10 students ($N = 36$), all year levels were combined for analysis by sex and ICSEA.

RESULTS

A total of 206 students completed the survey and their responses were included in our analysis. Of the total sample, 55.8% were girls and 44.2% were boys. Overall, 53.4% of participants came from low ICSEA schools and 46.6% from high ICSEA schools. The school year ranged from years 7 to 10 and grouped into 2 categories—years 7-8, and years 9-10.

Tables 2 and 3 show the percentage of participants interested in each topic. Half (8 out of 16) of the topics were of interest to at least 75% of the participants. The topics with the highest level of interest related to food and health or performance: “eating the right foods for preventing illness and disease” (88.3%), “keeping a healthy weight and preventing disease” (86.9%), “eating the right foods for keeping a healthy weight” (84.9%), and “eating the right foods for being active” (79.1%). There was also increased interest in “knowing how to keep food safe to eat” (82.0%) and “how to prepare healthy food” (75.2%).

Humanitarian concerns were also evident with high interest in learning more about “providing food for needy people” (79.6%), “preventing world hunger” (76.7%), and “reducing food waste” (66.3%). There was less interest in topics such as “natural foods” (64.6%), “vitamin supplements” (62.0%), “vegetarian diets” (29.4%), and “influences on food choice” (58.3%), including “advertising” (44.2%).

Table 2 shows the percentages of boys and girls overall, and specifically from low and high ICSEA

Table 2. Percentage of students who responded yes to “I’m interested in learning more about this topic”. Percentage of gender within High and Low and total ICSEA¹ schools for each topic.

Topic	% Affirmative Response								
	Low ICSEA ¹ (%)			High ICSEA (%)			Total (%)		
	Male (n=57)	Female (n=53)	Total (n=110)	Male (n=34)	Female (n=62)	Total (n=96)	Male (n=91)	Female (n=115)	Total (n=206)
Eating the right foods for preventing illness & disease	86.0	94.3	90.0	73.5 ^a	93.5 ^a	86.5	81.3 ^b	93.9 ^b	88.3
Keeping a healthy weight and preventing disease	82.5	84.9	83.6	85.3	93.5	90.6	83.5	89.6	86.9
Eating the right foods for keeping a healthy weight*	76.8	83.0	79.8	85.3	93.5	90.6	80.0	88.7	84.9
Keeping food safe to eat	86.0	79.2	82.7	82.4	80.6	81.3	84.6	80.0	82.0
Providing food for needy people	64.9 ^c	84.9 ^c	74.5	73.5 ^d	91.9 ^d	85.4	68.1 ^b	88.7 ^b	79.6
Eating the right food for being active	73.7	69.8	71.8	76.5 ^d	93.5 ^d	87.5	74.7	82.6	79.1
Preventing world hunger	59.6 ^c	77.4 ^c	68.2	79.4	90.3	86.5	67.0 ^b	84.3 ^b	76.7
Knowing how to prepare healthy food	73.7	71.7	72.7	73.5	80.6	78.1	73.6	76.5	75.2
Reducing food waste*	50.9	63.5	56.9	79.4	75.8	77.1	61.5	70.2	66.3
Choosing natural foods over processed foods	56.1	62.3	59.1	64.7	74.2	70.8	59.3	68.7	64.6
Choosing real food over vitamin supplements*	64.9	51.9	58.7	61.8	67.7	65.7	63.7	60.5	62.0
How food is digested and its effects in our body**	52.8	55.0	53.8	50.0	50.0	50.0	51.7	53.0	52.3
Knowing what influences what you eat	50.9	49.1	50.0	61.8	71.0	67.7	54.9	60.9	58.3
Choosing locally grown over imported*	45.6	48.1	46.8	50.0	53.2	52.1	47.3	50.9	49.3
The influence of advertising on food choice	49.1	45.3	47.3	44.1	38.7	40.6	47.3	41.7	44.2
Following a vegetarian diet**	26.4	40.0	32.3	20.6	30.8	25.0	24.1	36.4	29.4

* Total participant responses, n = 205.

** Total participant responses, n = 153; (Low ICSEA, n=93 (53M, 40F)) (High ICSEA, n=60(34M, 26F)).

^a Females from High ICSEA schools significantly greater than males from High ICSEA schools ($P < 0.01$).

^b Females significantly greater than males ($P < 0.01$).

^c Females from Low ICSEA schools marginally greater than males from Low ICSEA schools ($P < 0.05$).

^d Females from High ICSEA schools marginally greater than males from High ICSEA schools ($P < 0.05$).

schools who indicated interest in learning more about certain topics. Considering all participants, significantly more girls than boys were interested in learning about food for health, “eating the right foods for preventing illness and diseases” (93.9% vs 81.3%, $p < .01$), addressing humanitarian issues such as “providing food for needy people” (88.7% vs 68.1%, $p < .001$), and “preventing world hunger” (84.3% vs 67.0%, $p < .01$). In high ICSEA schools, these statistically significant sex differences also were evident in that girls more than boys were interested in learning about “eating the right foods for preventing illness and diseases” (93.5% vs 73.5%, $p < .01$) and “providing food for needy people” (91.9% vs 73.5%, $p < .05$). Similarly, in ICSEA schools of greater disadvantage, a larger proportion of girls were interested in “providing food for needy people” (84.9% vs 64.9%, $p < .001$) and “preventing world hunger” (77.4% vs 59.6%, $p < .05$).

Table 3 shows for each topic the percentages of students from low and high ICSEA schools who indicated interest in learning more about the topic. Overall, significantly more students from high ICSEA schools were interested in learning about “eating the right foods for keeping a healthy weight” (90.6% vs 79.8%, $p < .05$), “eating the right foods for being active” (87.5% vs 71.8%, $p < .01$), “preventing world hunger” (86.5% vs 68.2%, $p < .01$), “reducing food

waste” (77.1% vs 50.0%, $p < .01$), and “knowing what influences what we eat” (77.1% vs 50.0%, $p < .01$). Among girls, significant ICSEA school differences (high greater than low) were found for “eating the right foods for being active” (93.5% vs 69.8%, $p < .001$) and “knowing what influences what we eat” (71.0% vs 49.1%, $p < .01$). Among boys, a significantly greater proportion of students at high ICSEA schools were interested in learning about “reducing food waste” (79.4% vs 50.9%, $p < .01$).

DISCUSSION

Engaging and supporting students in developing an interest in learning about food and nutrition is a challenge for nutrition educators in high schools, especially as the complex landscape of contemporary food and nutrition choice and subsequent issues is continuously changing.^{5,31-33} To support intrinsic motivation, engagement, and self-regulated learning, the evidence suggests that educators must understand and consider the personal interests of adolescents when developing health education programs.^{10,11,13,14} This is to ensure that the learning has potential to influence adult health habits and remain of interest, thereby supporting future career outcomes. The current analysis of cross-sectional data collected from a sample of year 7-10 adolescent students derived

Table 3. Percentage of students who responded yes to “I’m interested in learning more about this topic”. Percentage of ICSEA within gender and total for each topic

Topic	% Affirmative Response								
	Male (%)			Female (%)			Total (%)		
	Low (n=57)	High (n=34)	Total (n=91)	Low (n=53)	High (n=62)	Total (n=115)	Low (n=110)	High (n=96)	Total (n=206)
Eating the right foods for preventing illness & disease	86.0	73.5	81.3	94.3	93.5	93.9	90.0	86.5	88.3
Keeping a healthy weight and preventing disease	82.5	85.3	83.5	84.9	93.5	89.6	83.6	90.6	86.9
Eating the right foods for keeping a healthy weight*	76.8	85.3	80.0	83.0	93.5	88.7	79.8 ^b	90.6 ^b	84.9
Keeping food safe to eat	86.0	82.4	84.6	79.2	80.6	80.0	82.7	81.3	82.0
Providing food for needy people	64.9	73.5	68.1	84.9	91.9	88.7	74.5	85.4	79.6
Eating the right food for being active	73.7	76.5	74.7	69.8 ^a	93.5 ^a	82.6	71.8 ^b	87.5 ^b	79.1
Preventing world hunger	59.6	79.4	67.0	77.4	90.3	84.3	68.2 ^b	86.5 ^b	76.7
Knowing how to prepare healthy food	73.7	73.5	73.6	71.7	80.6	76.5	72.7	78.1	75.2
Reducing food waste*	50.9 ^c	79.4 ^c	61.5	63.5	75.8	70.2	56.9 ^b	77.1 ^b	66.3
Choosing natural foods over processed foods	56.1	64.7	59.3	62.3	74.2	68.7	59.1	70.8	64.6
Choosing real food over vitamin supplements*	64.9	61.8	63.7	51.9	67.7	60.5	58.7	65.6	62.0
How food is digested and its effects on our body**	52.8	50.0	51.7	55.0	50.0	53.0	53.8	50.0	52.3
Knowing what influences what you eat	50.9	61.8	54.9	49.1 ^d	71.0 ^d	60.9	50.0 ^b	67.7 ^b	58.3
Choosing locally grown over imported*	45.6	50.0	47.3	48.1	53.2	50.9	46.8	52.1	49.3
The influence of advertising on food choice	49.1	44.1	47.3	45.3	38.7	41.7	47.3	40.6	44.2
Following a vegetarian diet**	26.4	20.6	24.1	40.0	30.8	36.4	32.3	25.0	29.4

* Total participant responses, n = 205.

** Total participant responses, n = 153; (Male, n=87 (53L, 34H)) (Female, n=66 (40L, 26H)).

^a Females from higher ICSEA schools significantly greater than females from Low ICSEA schools ($P < 0.01$).

^b High ICSEA significantly higher than Low ICSEA ($P < 0.01$).

^c Males, High ICSEA schools significantly greater than males, Low ICSEA schools ($P < 0.01$).

^d Females, High ICSEA schools marginally greater than females, Low ICSEA schools ($P < 0.05$).

from 5 metropolitan schools in WA identified food- and nutrition-related learning interests to support lifelong healthier food choices. In addition, the analysis identified the differences in learning interests related to sex and school ICSEA value. We specifically identified the learning interests from the perspectives of the students rather than the educators/teachers, a limitation the literature describes of previous studies.^{34,35}

Overall, most adolescents were interested in learning about more than half of the 16 topics listed. Notably, the 3 topics with the highest percentage of interest related to diet and health included, “eating the right foods for preventing illness and disease,” “keeping a healthy weight and preventing disease,” and “eating the right foods for keeping a healthy weight.” This finding is supported by other studies suggesting that adolescents are concerned about food issues relating to their weight, and overall health and wellbeing.^{20,36-38} In the context of this WA-based study, knowing about the Australian “dietary guidelines” and knowing “which food is healthy or unhealthy and the reasons why” was recognized as important.^{7,20} Although of interest and specifically featured in health education curricula mandated in WA, these topics further suggest that knowledge does not always translate to optimal health behaviors, especially during these formative years.³⁹ This is the

reason that national statistics in Australia record low levels of vegetable intake in this age group, with a high proportion of energy being consumed from discretionary foods.⁴⁰

Additional topics of interest to the student participants included issues relevant to food literacy skills such as “knowing how to prepare healthy food,” and “keeping food safe to eat;” however, other research has indicated variance with regard to the perceived importance of these topics.^{7,20} Notably, both topics were considered important as aspects of food and nutrition education and literacy but were ranked low as a priority for learning. Low prioritization could suggest that students have learned the topics from parents or other caregivers, or because they are not yet relevant to them in supporting their dietary needs.^{7,20}

These emerging results indicate that adolescents are interested in humanitarian issues related to food—specifically, assisting food insecure people and in preventing world hunger. Furthermore, to support understanding of or solutions to these complex sociological and environmental problems, there was evidence of interest from more than half of the students in learning about reducing food waste. This area of interest has become more topical due to current national and global statistics on food waste, political imperative for action, and the transferability of learning tasks through local strategies such as

breakfast programs in classrooms to reduce food waste as seen in the United States.⁴¹⁻⁴⁴ Conversely, there was low interest in learning about other topics linked to environmental concerns such as “choosing locally grown food over imported” and “following a vegetarian diet.” This latter finding may suggest that such nutrition-related food sustainability topics are not supported in schools, as noted in other research.⁴¹ Nevertheless, knowing about “animal welfare” was among the top 6 items adolescents identified as food literacy influences on their dietary behavior.^{6,7}

In contrast to the highest ranked group of topics, the lowest ranked topics were all concerned with “food choice.” These topics related to dichotomies of choice such as natural versus processed foods, vitamins supplements versus whole foods, locally grown over imported, and how marketing influences food choice. Research in this area shows that food choice during childhood and early adolescent years is determined by cognitive appraisal where a major determinant is the taste of food and family norms, including the type of food provided at home.⁴⁵ Therefore, this inherent decision-making process, plus low perceived relevance, could be attributed to general low involvement of Australian adolescents in family food selection.⁷ This could partly explain the low interest among the students in this study with regard to topics pertaining to food choice. Therefore, further research needs to be conducted to understand how interest in these topics could be improved, because the lack of understanding of drivers of food choice by adolescents could impact current food choices away from home and future choices leading into adult years.

Limitations

This study’s sample size of over 200 students with stratification by sex and socioeducational status helped to identify potential differences of nutritional interests between the schools studied in WA according to socio-educational advantage. However, the number of schools at each ICSEA level (low = 3 and high = 2) is limited, given the challenge in recruiting schools. Therefore, generalizability of data to other states and territories in Australia must be done with caution.

The inclusion of topics generated from outside of this research and the omission of opportunity for students to contribute their own topics of interest, limited the questionnaire. The ability to capture additional topics is recommended in future research by including an additional open-ended question.

Conclusion

Our findings are of importance because they identify the type of food and nutrition topics adolescents in high schools in WA are interested in learning about, and that there are differences in the learning interests

between boys and girls in different socioeducational contexts. A greater understanding of the learning interests of adolescent students, especially in the changing landscape of food and nutrition, is integral for educators to engage students with food and nutrition education, possibly leading to better learning outcomes, greater food literacy, and sustainable skills for adulthood. The strengths of this study are the specificity of knowledge relating to the curriculum and possibilities for content inclusions in the teaching and learning of HPE and other learning areas in WA. In addition, as noted earlier, the exploration of student interest in this context has not been explored in previous studies.

IMPLICATIONS FOR SCHOOL HEALTH

Our findings and those from other studies suggest that the topics that motivate student learning in nutrition education need to be contextualized to the specific cohort and are dependent on past learning as well as perceived need. This is particularly relevant to the level of socioeducational advantage and/or disadvantage of the school and the students’ home environment.⁴⁵ Therefore, assessment of prior learning to establish relevance, interest, and need is paramount for student engagement in nutrition education, health promotion activities, and interventions that occur in schools outside of the curriculum itself. For example, this information could be shared with committees, working groups, and parent/caregiver bodies operating in schools and school communities to extend the impact beyond curriculum reform.

We made 2 general observations with regard to student sex and level of school disadvantage. First, for the 4 topics for which we found statistically significant sex differences, girls showed greater learning interest than boys regardless of school ICSEA level. Whereas this difference may not be important in more advantaged schools where approximately 75% or more of both boys and girls were interested in learning about these topics, in those schools with greater disadvantage, interest among boys was below 65% for topics related to “providing food for needy people” and “preventing world hunger.” Given that interest is an important trigger for learning, sex-sensitive approaches may be needed in lower ICSEA schools to engage both boys and girls in learning about these particular topics.

Second, for the 5 topics for which we found statistically significant differences for ICSEA status, youth from high ICSEA schools showed greater learning interest than students from Low ICSEA schools, independent of sex. Based on less than 50% interest and the logic used for sex differences above, “reducing food waste” and “knowing what influences what you eat” may be 2 topics requiring contextualization for

differences in levels of disadvantage to achieve student engagement. Furthermore, these topics are not specified in curriculum text.

The easiest and most cost-effective way for schools, teachers, and curriculum leaders to promote student engagement in nutrition education and support healthier food choices in the adolescent age group may be to survey student interest on food and nutrition topics prior to learning. Doing so may help to counteract the sociocritical differences in ICSEA values between schools and promote culturally and contextually relevant nutrition education.

Human Subjects Approval Statement

Ethics approval for the NTG project and secondary analysis was obtained from the Edith Cowan University Human Research Ethics Committee (#16604). Additional approvals were obtained from the State government and Catholic education authorities for the research design, instruments, collection and management of data in relevant schools. Informed consent was also obtained from school principals, teachers, students, and parents of students involved.

Conflict of Interest

M.F., J.B., and M.M. have no conflicts of interest to declare. M.M. is the Chief Investigator of the Nutrition Transformational Games project. D.B. is a Curriculum Advisory Committee member for the Year 7-10 Health and Physical Education panel of the School Curriculum and Standards Authority (SCSA), WA. S.S. is a Curriculum Advisory Committee member for the Year 7-10 Technologies panel of the SCSA, WA.

REFERENCES

1. Australian Bureau of Statistics (ABS). *Soft Drink, Burgers and Chips: The Diet of Our Young Males*. Canberra, ACT (Australia): ABS; 2014. Available at: [https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4364.0.55.007~2011-12~Media%20Release~Soft%20drink,%20burgers%20and%20chips%20-%20the%20diet%20of%20our%20young%20males%20\(Media%20Release\)~1#:~:text=Soft%20drink%2C%20burgers%20and%20chips%20%2D%20the%20diet%20of%20our%20youth,Bureau%20of%20Statistics%20\(ABS\)](https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4364.0.55.007~2011-12~Media%20Release~Soft%20drink,%20burgers%20and%20chips%20-%20the%20diet%20of%20our%20young%20males%20(Media%20Release)~1#:~:text=Soft%20drink%2C%20burgers%20and%20chips%20%2D%20the%20diet%20of%20our%20youth,Bureau%20of%20Statistics%20(ABS).). Accessed June 14, 2020.
2. Australian Institute of Health and Welfare (AIHW). *Nutrition across the Life Stage*. Canberra, ACT (Australia): AIHW; 2018. Available at: <https://www.aihw.gov.au/getmedia/fc5ad42e-08f5-4f9a-9ca4-723caca510d/aihw-phe-227.pdf.aspx?inline=true>. Accessed June 14, 2020.
3. Non-Communicable Diseases Risk Factor Collaboration (NCD-Risc). Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. *Lancet*. 2017;390(10113):2627-2642.
4. Wilmot E, Idris I. Early onset type 2 diabetes: risk factors, clinical impact and management. *Ther Adv Chronic Dis*. 2014;5(6): 234-244.

5. Casazza K, Ciccazzo M. The method of delivery of nutrition and physical activity information may play a role in eliciting behavior changes in adolescents. *Eat Behav*. 2007;8(1):73-82.
6. Ronto R, Ball L, Pendergast D, Harris N. The role of home economics teachers in enhancing adolescents' food literacy to develop healthy dietary behaviours. *J Home Econ Instit Australia*. 2016;23(1):11-19.
7. Ronto R, Ball L, Pendergast D, Harris N. Adolescents' perspectives on food literacy and its impact on their dietary behaviours. *Appetite*. 2016;107:549-557.
8. Barwood D, Cunningham C, Penney D. What we know, what we do and what we could do: creating an understanding of the delivery of health education in lower secondary government schools in Western Australia. *Aust J Teach Educ*. 2017;41(11):15-30.
9. Sobal J. Health concerns of young adolescents. *Adolescence*. 1987;22(87):739-750.
10. Deci EL, Vallerand RJ, Pelletier LG, Ryan RM. Motivation and education: the self determination perspective. *Educ Psychol*. 1991;26(3 & 4):325-346.
11. Ryan R, Deci E. Intrinsic and extrinsic motivations: classic definition and new directions. *Contemp Educ Psychol*. 2000;25(1):54-67.
12. Allmendinger P. The post-positivist landscape of planning theory. In: Allmendinger PA, Tewdwr-Jones M, eds. *Planning Futures: New Directions for Planning Theory*. New York, NY: Routledge; 2002:3-18.
13. Sansone C, Thoman DB. Interest as the missing motivator in self-regulation. *Eur Psychol*. 2005;10(3):175-186.
14. Hidi S, Ainley M. Interest and self regulation: relationships between the two variables that influence learning. In: Schunk DH, Zimmerman BJ, eds. *Motivation and Self-Regulated Learning: Theory, Research, and Applications*. New York, NY: Routledge; 2007:77-110.
15. Ainley M, Corrigan M, Richardson N. Students, tasks and emotions: identifying the contribution of emotions to students' reading of popular culture and popular science texts. *Learn Instr*. 2005;15(5):433-447.
16. Hidi S, Renninger KA. The four-phase model of interest development. *Educ Psychol*. 2006;41(2):111-127.
17. Zimmerman BJ, Kitsantas A. Developmental phases in self-regulation: shifting from process goals to outcome goals. *J Educ Psychol*. 1997;89(1):29-36.
18. Zimmerman BJ, Kitsantas A. Acquiring writing revision skill: shifting from process to outcome self-regulatory goals. *J Educ Psychol*. 1999;91(2):241-250.
19. Ainley M, Hidi S, Berndorff D. Interest, learning, and the psychological processes that mediate their relationship. *J Educ Psychol*. 2002;94(3):545-561.
20. Baker S, Devine A, Miller M, Dare J. A multiliteracies approach to adolescent nutrition education. *Asia Pac Food Nutr Collab Behav Nutr Newsletter*. 2017;4:1-2. Available at: <https://pdfs.semanticscholar.org/d300/023c2c2e1fcddbe399c493e0b1e9a44d84a3c.pdf?ga=2.24468538.1272409850.1592102008-1416600046.1592102008>. Accessed June 14, 2020.
21. Esau D, Ho PT, Blair GK, et al. Engaging youth in rural Uganda in articulating health priorities through photovoice. *Glob Health Promot*. 2017;24(3):56-67.
22. Subratty A, Imrit S, Jowaheer V. A web-based survey on adolescents' perceptions of food. *Nutr Food Sci*. 2002;32(6): 210-213.
23. Roberson R. Helping students find relevance: teaching the relevance of course content can help students develop into engaged, motivated and self-regulated learners. *Psychol Teach Netw*. 2013;23(2):18-20. Available at: <https://www.apa.org/ed/precollege/ptn/2013/09/students-relevance>. Accessed, June 14, 2020.
24. Kolis M. *Student Relevance Matters: Why Do I Have to Know this Stuff?* Lanham, MD: Rowman & Littlefield Education; 2011.

25. Government of South Australia. *South Australian Teaching for Effective Learning Detailed Framework*. Adelaide, SA (Australia): Department for Education and Child Development; 2019. Available at: https://www.education.sa.gov.au/sites/default/files/tfel_framework_appendix_a_unleashing_learning_potential.pdf?acsf_files_redirect. Accessed June 14, 2020.
26. Australian Curriculum, Assessment and Reporting Authority (ACARA). *What Does the ICSEA Value Mean?* Sydney, NSW (Australia): ACARA; 2014. Available at: https://docs.acara.edu.au/resources/20160418_ACARA_ICSEA.pdf. Accessed June 14, 2020.
27. Australian Curriculum, Assessment and Reporting Authority (ACARA). *Find a School*. Sydney, NSW (Australia): ACARA; 2019. Available at: <https://www.myschool.edu.au/>. Accessed June 1, 2019.
28. Refresh ED. *Refresh. ED Food and Nutrition Teaching Resources*. Perth, Western Australia: Refresh.ED; 2014. Available at: <https://www.refreshedschools.health.wa.gov.au/>. Accessed June 14, 2020.
29. IBM Corp. *IBM SPSS Statistics for Windows, Version 25.0*. Armonk, NY: IBM Corp; 2017.
30. Cohen J. *Statistical Power Analysis for the Behavioural Sciences*. 2nd ed. Hillsdale, NJ: Lawrence Erlbaum Associates; 1988.
31. Hoelscher DM, Evans A, Parcel G, Kelder S. Designing effective nutrition interventions for adolescents. *J Am Diet Assoc*. 2002;102(3):S52-S63.
32. Willett W, Rockström J, Loken B, et al. Food in the Anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food systems. *Lancet*. 2019;393(10170):447-492.
33. Swinburn BA, Kraak VI, Allender S, et al. The global syndemic of obesity, undernutrition, and climate change: the Lancet Commission report. *Lancet*. 2019;393(10173):791-846.
34. Klingman A. Psychological education: studying adolescents' interests from their own perspective. *Adolescence*. 1998;33(130):435-446.
35. Waters E, Wake M, Toumbourou J, Wright M, Slmon L. Prevalence of emotional and physical health concerns amongst young people in Victoria. *J Paediatr Child Health*. 2002;35(1):28-33.
36. Baheiraei A, Khoori E, Weiler R, Ahmadi F, Foroshani AR, Ghofranipour F. Health concerns of adolescents in Tehran, Iran. *Int J Adolesc Med Health*. 2016;28(4):389-395.
37. Kelly C, Fitzgerald A, Sentenac M, Gakewski J, Molcho M, Gabhainn SN. Weight concerns among adolescent males. *Public Health Nutr*. 2016;19(3):456-462.
38. Som N, Mukhopadhyay S. Body weight and body shape concerns and related behaviours among Indian urban adolescent females. *Public Health Nutr*. 2015;18(6):1075-1083.
39. School Curriculum and Standards Authority (SCSA), Western Australia. *WA P-10 Syllabus for Health and Physical Education*. Perth, WA (Australia): SCSA; 2015. Available at: <https://k10outline.scsa.wa.edu.au/home/teaching/curriculum-browser/health-and-physical-education>. Accessed June 14, 2020.
40. Australian Institute of Health and Welfare (AIHW). *Australia's Health 2018*. Canberra, ACT (Australia): AIHW; 2018. Available at: <https://www.aihw.gov.au/getmedia/7c42913d-295f-4bc9-9c24-4e44eff4a04a/aihw-aus-221.pdf>. Accessed June 14, 2020.
41. Sambell R, Miller M, Devine A. Food waste: is it a sign of affluence or simply a gradual 'deprioritisation' of food? *Victorian J Home Econ*. 2017;2:2-10.
42. Marslen T. *Policy Briefing Paper: Australian Food Systems*. Perth, WA (Australia): Future Directions International; 2015. Available at: http://futuredirections.org.au/wp-content/uploads/2015/02/FDI_Strategic_Analysis_Paper_-_Australian_Food_Systems.pdf. Accessed June 14, 2020.
43. Global Panel on Agriculture and Food Systems for Nutrition. *Improving Nutrition through Enhanced Food Environments*. London, UK: Global Panel on Agriculture and Food Systems for Nutrition; 2017. Available at: <https://www.glopan.org/wp-content/uploads/2019/06/FoodEnvironmentsBrief.pdf>. Accessed June 14, 2020.
44. Farris AR, Roy M, Serrano EL, Misyak S. Impact of breakfast in the classroom on participation and food waste. *J Nutr Educ Behav*. 2019;51(7):893-898.
45. Nguyen S, Girgis H, Robinson J. Predictors of children's food selection: the role of children's perceptions of the health and taste of foods. *Food Qual Prefer*. 2015;40(Part A):106-109.