Zhang, Q., Hugh-Jones, S. & O'Connor, D.B. (2023). Do British and Chinese adolescents snack for different reasons? A cross-country study using the Theory of Planned Behaviour and eating styles. *Appetite*, 187, 106591.

Do British and Chinese adolescents snack for different reasons? A cross-country study using the Theory of Planned Behaviour and eating style

1. Introduction

Snacking between meals is common among adolescents (Taillie, Wang, & Popkin, 2016; Tripicchio et al., 2019). Healthy snacking can help meet recommendations for intake of key food groups such as fruit, and improve overall dietary quality of adolescents (Llauradó et al., 2015; Taillie et al., 2016). However, energy-dense snack foods and sugar-sweetened beverages are commonly consumed by adolescents in snacking occasions, contributing to poor dietary intake and high prevalence of overweight / obesity (Guo et al., 2021; Liu et al., 2019; Tripicchio et al., 2019). Investigating determinants of adolescent snacking can help inform intervention development.

Eating styles play an important role in the study of obesity-related eating behaviours. The dispositional tendency to eat in response to emotional and environmental cues (i.e. emotional eating and external eating) are associated with higher intake of high-energy snacks and sugar-sweetened beverages in adolescents (Bui et al., 2021; De Cock et al., 2016; Hill et al., 2018; Lu et al., 2016). Restrained eating (i.e. inhibiting food intake repeatedly due to weight concern) is positively related with unhealthy snacking in adults (O'Connor et al., 2008; Shukri et al., 2018); although evidence in adolescents is limited and mixed, as negative (Bisset et al., 2007) or non-significant (Koch et al., 2018) associations between restrained eating and unhealthy snacking frequency have been found in this population. Mindful eating as an adaptive eating style has attracted increasing interest, as evidence for the benefits of mindfulness-based interventions in improving dietary behaviour is accumulating (Dibb-Smith, Chapman, & Brindal, 2019; Katterman et al., 2014). Mindful eating refers to the intentional, non-judging awareness of food-related experiences (Framson et al., 2009), and has been

negatively related to unhealthy food intake in adults (Beshara, Hutchinson, & Wilson, 2013; Mantzios et al., 2018). However, the role of mindful eating in adolescent snacking has not been explored.

In addition to eating styles, adolescent eating behaviours can be influenced by social cognitive factors. One commonly used framework to understand healthy behaviour from this perspective is the Theory of Planned Behaviour (TPB), which posits that human behaviours are influenced by behavioural intention affected by attitudes (i.e. evaluation of engaging in the behaviour), subjective norms (SN, i.e. perception of significant others' normative beliefs about the behaviour) and perceived behavioural control (PBC, i.e. appraisal of the extent of control one has to carry out the behaviour) (Ajzen, 1991). Riebl et al. (2015) reviewed 34 studies supporting the TPB as an effective model in understanding dietary behaviours in youth. Despite the validity of the theoretical assumptions of the TPB, suggestions have been made to include additional constructs, such as habit strength (Conner & Armitage, 1998; Tak et al., 2011). Verplanken and Orbell (2003) defined habits as learned sequences of acts which have become automatic responses to specific cues as a result of frequent performance in similar situations. They further proposed that automaticity and personal identity (i.e. how habits are part of one's daily life and thus reflect a sense of identity or personal style) are two other important dimensions of habit strength in addition to past behavioural frequency (Verplanken, 2006; Verplanken & Orbell, 2003). Frequent snacking could be in large part habitual (De Vet et al., 2015). Tak et al. (2011) found that habit strength showed to be the strongest predictor of soft drink consumption in a sample of Dutch adolescents when examined simultaneously with the TPB constructs, which also partly mediated the associations between home environment factors and soft drink intake. Habit strength has also shown to be a more important predictor of fruit and veg intake than intentions in children and adolescents (Albani et al., 2018). Overall, preliminary evidence suggests habit strength might

explain adolescent snacking over and above the TPB constructs.

Most research has focused on Western populations. The present study extends the existing literature by examining the role of eating styles and TPB constructs in adolescent snacking in China and England. Adolescents from developed countries such as the UK are living in the food-abundant environment, frequently exposed to food advertising and meanwhile influenced by the ideal slim body shape promoted by the media and society, which can lead to maladaptive eating styles (Cohen & Farley, 2008; Murphy et al., 2020; Rodgers & Melioli, 2016). In comparison, China as a developing country has been undergoing a rapid nutrition transition since the great economic transformations in 1980s (Huang et al., 2021). Traditional Chinese culture and medicine attach considerable importance to food and dietary practice in the context of health and well-being (Li, Yin, & Saito, 2004; Wu & Liang, 2018), which may result in a healthier relationship with food for Chinese individuals (Lim & van Dam, 2020; Wang-Chen, et al., 2022). However, the modernization and urbanization of China have greatly changed the food-related environment and residents' dietary patterns (Zhang et al., 2015). High prevalence of weight control concerns and behaviours have also been observed in Chinese adolescents (Fan et al., 2010). It remains unclear how Chinese and British adolescents might differ in eating styles.

Previous cross-country investigations have revealed variations in the relative weights of TPB constructs in predicting intentions related to health behaviour (Hosking et al., 2009; Shukri, Jones, & Conner, 2016), consumer behaviour (Morren & Grinstein, 2021) and pro-environmental behaviour (Hassan, Shiu, & Parry, 2016), and mainly interpreted such differences within the individualism-collectivism framework (Hofstede, 2011). Subjective norms have been consistently shown to exert a stronger effect in collectivistic cultures (e.g. China) on intentions, while attitudes tend to play a more significant role in individualistic cultures (e.g. UK) (Hosking et al., 2009; Morren & Grinstein, 2021; Shukri et al., 2016).

Another cultural dimension adopted to understand the cross-country applicability of the TPB is power distance (Hofstede, 2011), with a stronger subjective norm-intention relationship evident in high power distance cultures (e.g. China) where respect and formal deference for higher status people such as parents are valued (Hassan et al., 2016). Peer influence on adolescents' food choices might also be stronger in China than in Western countries due to the long school hours, the communal eating tradition and the food sharing culture in China (Veeck et al., 2014). Taken together, we expected social norms would show greater predictive power in Chinese adolescents compared to their British counterparts.

The present study aimed to: (1) explore cross-country differences in eating styles (i.e. emotional eating, external eating, restrained eating, mindful eating) and constructs of an extended TPB (i.e. attitudes, SN, PBC, habit strength) regarding snacking among Chinese and British adolescents; (2) examine predictors of unhealthy snacking (i.e. consumption frequency of unhealthy snacks and beverages) and healthy snacking (i.e. consumption frequency of fruit and vegetables) in this context; and (3) examine the moderating role of country.

2. Methods

2.1 Sample and procedure

This study was approved by the University of Leeds Research Ethics Committee (Faculty of Medicine and Health; reference number: 16-0289). Chinese adolescents were recruited from a state high school in Beijing. British adolescents were recruited from a state secondary school in the north of England city. Similar recruitment procedures were used for both samples. A psychology teacher of each school was contacted via email, which requested permission and assistance of participant recruitment in this school. The study was administered during psychology class with the help of schoolteachers after obtaining consent from the schools. Students received the informed consent form with the paper survey

questionnaire and indicated their agreement with informed consent by returning the survey. It took up to 30 minutes to complete the survey. UK adolescents were also recruited via social media. A link to the survey questionnaire on Online Surveys (https://www.onlinesurveys.ac.uk) was posted on Twitter and Facebook, inviting UK adolescents aged over 16 years to fill in the online survey.

A total of 201 Chinese adolescents and 102 British adolescents returned questionnaires (283 paper-questionnaires and 20 online). Nineteen Chinese and six British participants were excluded for analysis due to unsatisfactory quality (defined as more than 33% of the questions not completed or straight-lining responses). The final samples consisted of 182 Chinese adolescents (46.2% boys; mean age = 16.13 years, *SD* = .87; mean BMI = 21.51 kg/m^2, *SD* = 3.68) and 96 British adolescents (39.6% boys; mean age = 17.04 years, *SD* = .74; mean BMI = 23.00 kg/m^2, *SD* = 3.98). Socio-demographic characteristics of both samples are presented in supplementary files Table S1.

2.2 Measures

The survey questionnaire used in this study was firstly developed in English, and then translated into Chinese following back-translation procedures (Chapman & Carter, 1979). Internal reliabilities for each scale in both samples are shown in Table 1.

2.2.1 Eating styles

Emotional eating, *external eating* and *restrained eating* were assessed using the Dutch Eating Behaviour Questionnaire (DEBQ) (Van Strien et al., 1986). This questionnaire consists of 33 items with the response options from 1 (never) to 5 (very often), and has been frequently used in adolescents (e.g. Bui et al., 2021).

Mindful eating was assessed using the Mindful Eating Questionnaire (MEQ) (Framson et

al., 2009). This 28-item questionnaire consists of five dimensions, i.e. awareness, disinhibition, distraction, emotional response, external cues. In the present study, the MEQ summary scores showed poor internal reliability in both samples (Chinese sample: $\alpha = .53$; British sample: $\alpha = .58$). A think-aloud study showed that Chinese adolescents tended to misinterpret items on the *external cues* subscale of the MEQ (Zhang, Hugh-Jones, & O'Connor, 2022). In the present study, strong positive correlations between *external cues* of the MEQ and *external eating* of the DEBQ in both samples (Chinese sample: $r = .67$, $p < .001$; British sample: $r = .54$, $p < .001$) may indicate that our participants also misinterpreted some items of this subscale. Therefore, the *external cues* subscale of the MEQ was excluded for further analyses, which improved the internal consistency of the MEQ summary score in the Chinese sample ($\alpha = .63$) and the British sample ($\alpha = .62$).

2.2.2 The Theory of Planned Behaviour constructs and habit strength

The TPB constructs and habit strength related to healthy and unhealthy snacking were assessed respectively. The TPB constructs were measured using 7-point semantic differential scales in accordance with the TPB guidelines (Conner & Norman, 2015). *Attitudes* were measured using the mean of four items, with two for affective attitude (i.e. "Generally, my eating healthy snacks is unenjoyable – enjoyable / unpleasant - pleasant") and two for cognitive attitude (i.e. "Generally, my eating healthy snacks is harmful – beneficial / unimportant - important"). *Subjective norms* (SN) were measured by two items, with one for injunctive norm (i.e. norms of what others approve of; "To what extent do your family/friends/significant others think your eating healthy snacks is important? Unimportant - important") and one for descriptive norm (i.e. norms of what others actually do; "How often do you think that most of your family/friends/significant others eat healthy snacks? Never - often"). *Perceived behavioural control* (PBC) was measured using two items, with one for

the capacity aspect (i.e. “How much control do you have over whether or not you eat healthy snacks? No control – complete control”) and one for the autonomy aspect (i.e. “For me to eat healthy snacks would be very easy – very difficult”) of the PBC. *Habit strength* was assessed using the 12-item self-reported habit index (SRHI; Verplanken & Orbell, 2003), which consists of three dimensions, i.e. past frequency, automaticity, and personal identity.

2.2.3 Snacking

Snacking frequency was assessed using a modified Beverage and Snack Questionnaire (BSQ; Neuhouser et al., 2009). The questionnaire contained questions regarding the consumption frequency of snacks (8 items), beverages (9 items), fruit (1 item) and vegetables (1 item). In the present study, food brands listed as examples in each category were replaced with those commonly consumed by Chinese and British adolescents. Participants were asked to indicate their consumption frequency of each category between meals during the previous week. The same response scale was used for each item: never or less than 1 per week, 1 per week, 2-4 per week, 5-6 per week, 1 per day, 2-3 per day, more than 4 per day. Responses for foods/beverages in each item were coded continuously according to middle value of each response category. Unhealthy snack consumption was represented using the sum of self-report frequency of five out of eight snack items, including high-calorie salty and sweet snacks. Unhealthy beverage consumption was represented using the sum of five out of nine beverage items, with 100% fruit juice, flavoured water and sugar-free fizzy drinks being excluded.

2.3 Data analysis

Statistical analysis was conducted using SPSS 22.0. Exploratory analyses were conducted to examine country and gender differences in eating styles, TPB constructs and snacking

frequency using Multivariate Analysis of Variance (MANOVA). Specifically, four 2 (Chinese, British) × 2 (boys, girls) between-subjective MANOVAs were conducted to explore country and gender differences in eating styles, TPB constructs related to healthy snacking and unhealthy snacking respectively, and consumption of healthy and unhealthy snacks. Effect sizes were calculated using partial eta squares (η_p^2), with between .06 and .14 indicating a medium effect size, and larger than .14 indicating a large effect size (Cohen, 1988). Results of evaluation of assumptions of linearity and multicollinearity were satisfactory. The assumption of homogeneity of variance-covariance matrices (checked by Box's *M* test at $p > .05$) was violated in two groups of dependent variables (TPB constructs related to snacking, $p = .04$; snacking frequency, $p = .01$); therefore, following the guidance of Allen and Bennett (2008), given that group sizes in each cell were larger than 30 (n = 38 – 98) and in order to account for multiple comparisons, we adopted a stricter, more conservative significance level ($p = .01$). As highly skewed distribution was observed on the consumption of unhealthy snacks, beverages, fruit and vegetables using the Shapiro-Wilk test ($p < .001$), logarithmic transformation was applied to this group of dependent variables in further analyses. Pearson correlations were calculated to examine the associations of eating styles and TPB constructs to snacking frequencies. The predictive effects of eating styles and TPB constructs on snacking frequency and the moderating role of country were examined using hierarchical multiple regression analysis.

3. Results

3.1 Descriptive statistics and cultural differences

Descriptive statistics by country and gender for eating styles, TPB constructs and snacking frequency are presented in Table 1. The results of MANOVAs are also shown in Table 1. Total *N* of 278 reduced to 274 – 277 as a result of missing data on relevant scales.

There was a significant main effect of country on the eating style variables ($F(4, 267) = 6.27$, $p < .001$, $\eta_p^2 = .086$), TPB constructs related to unhealthy snacking ($F(4, 270) = 5.40$, $p < .001$, $\eta_p^2 = .074$), and to healthy snacking frequency ($F(4, 269) = 5.92$, $p < .001$, $\eta_p^2 = .081$). As shown in Table 1, compared to British adolescents, Chinese adolescents showed significant lower external eating ($p = .004$), higher restrained eating ($p = .009$), less positive attitudes ($p < .001$,) and subjective norms ($p = .007$) and lower levels of habit strength ($p = .005$) regarding unhealthy snacking. Significant interactions between country and gender were found for mindful eating ($p = .003$) and attitudes ($p = .009$) regarding healthy snacking, and consumption frequency of unhealthy beverages ($p = .009$).

3.2 Predicting unhealthy snacking frequency and the moderating role of country

Correlations of eating styles and TPB constructs to consumption frequency of unhealthy snack and beverages are shown in Table S2. Four hierarchical regression analyses were conducted, as shown in Table 2. In each regression, country and gender were entered as covariates at step 1. Eating styles or TPB constructs were entered at step 2, then the relevant multiplicative interaction terms were entered at step 3 to examine the moderating effects of country.

Eating styles accounted for 12.4% ($p < .001$) of the variance in unhealthy snack consumption and 9.2% ($p < .001$) in unhealthy beverage consumption after controlling for country and gender. External eating ($\beta = .21$, $p = .002$) and mindful eating ($\beta = -.17$, $p = .008$) were shown to significantly predict unhealthy snack consumption. Mindful eating significantly predicted unhealthy beverage consumption ($\beta = -.22$, $p = .001$), and external eating showed a predictive effect approaching significance ($\beta = .12$, $p = .074$). Emotional eating, although significantly correlated to unhealthy snack consumption ($r = .21$, $p < .001$), did not show unique predictive effects ($p = .272$). Country × eating style interactions did not

emerge as a significant predictor of unhealthy snack (p = .880) or beverage (p = .907) consumption.

The TPB constructs accounted for 13.7% (p < .001) of the variance in unhealthy snack consumption and 8.4% (p < .001) in unhealthy beverage consumption after controlling for country and gender. Unhealthy snack consumption was predicted by SN (β = .20, p = .001) and habit strength (β = .30, p < .001). Attitudes and PBC, although significantly correlated with unhealthy snack consumption (Attitudes: r = .24, p < .001; PBC: r = -.15, p = .011), did not emerge as predictors (Attitudes: p = .705; PBC: p = .703). Unhealthy beverage consumption was predicted by habit strength (β = .19, p = .009). SN and PBC also showed a predictive effect approaching significance (SN: β = .11, p = .053; PBC: β = -.15, p = .014). The country × TPB variables interaction emerged as a significant predictor in unhealthy beverage consumption (ΔR^2 = .042, p = .008), suggesting country moderated the relationship between TPB constructs and consumption frequency of beverages. Specifically, the country × habit strength interaction showed to be significant (β = .25, p < .001). Further simple slope analyses showed that unhealthy beverage consumption was predicted by habit strength (β = .46, p < .001) only in British adolescents but not in Chinese adolescents. The effects of country × PBC interaction also showed a predictive effect on unhealthy beverage consumption approaching significance (β = .14, p = .023). For unhealthy snack consumption, the country × TPB variables interaction (ΔR^2 = .031, p = .029) and specifically the country × habit strength interaction (β = .15, p = .014) showed predictive effects approaching significance.

3.3 Predicting healthy snacking frequency and the moderating role of country

Correlations of eating styles and TPB variables to consumption frequency of fruit and vegetable are shown in Table S3. Four hierarchical regression analyses were conducted, as

shown in Table 3. Eating styles accounted for 7.5% ($p < .001$) of the variance in fruit consumption and 5.9% ($p = .002$) in vegetable consumption after controlling for country and gender. Restrained eating significantly predicted consumption of fruit ($\beta = .28$, $p < .001$) and vegetables ($\beta = .25$, $p < .001$). Country × eating style interactions did not emerge as a significant predictor of fruit ($p = .369$) or vegetable ($p = .664$) consumption.

The TPB constructs accounted for 6.2% ($p = .002$) of the variance in fruit consumption and 3.2% ($p = .069$) in vegetable consumption after controlling for country and gender. Habit strength predicted fruit consumption of fruit ($\beta = .19$, $p = .008$) and also showed an effect on vegetable consumption which approached significance ($\beta = .15$, $p = .037$). Attitudes wwere s correlated with fruit consumption ($r = .20$, $p = .001$), but did not emerge as a significant predictor ($p = .072$). The country × TPB variables interaction emerged as a significant predictor in fruit consumption ($\Delta R^2 = .11$, $p < .001$), suggesting country moderated the relationship between TPB constructs and consumption frequency of fruit. Specifically, the country × PBC ($\beta = .21$, $p < .001$) and country × habit strength ($\beta = .27$, $p < .001$) interactions showed to be significant. Further simple slope analyses showed that fruit consumption was predicted by PBC ($\beta = .27$, $p = .001$) and habit strength ($\beta = .51$, $p < .001$) only in British adolescents, while none of the TPB constructs emerged as significant predictors of fruit consumption in Chinese adolescents ($p \geq .27$). In addition, the country × TPB variables interaction also showed a predictive effect on vegetable consumption approaching significance ($\Delta R^2 = .04$, $p = .015$), with the country × habit strength interaction being significant ($\beta = .21$; $p < .001$).

4. Discussion

We examined predictors of adolescent snacking in the context of dispositional eating styles and the TPB in a cross-country study. Both eating styles and TPB constructs significantly predicted unhealthy snacking. Country did not moderate the prediction of eating styles on

unhealthy snacking frequency, but showed a moderating effect on the relationship between TPB constructs and unhealthy snack consumption that approached significance. Country differences were found in external eating and restrained eating but not in emotional eating, suggesting emotional eating might be more stable across country. However, when examined simultaneously, emotional eating did not show unique predictive effects on unhealthy snacking. In comparison, mindful eating emerged as a significant predictor of both unhealthy snack and beverage consumption regardless of country, extending previous evidence for the negative association between mindful eating and unhealthy food intakes in Western adult populations (Beshara et al., 2013; Mantzios et al., 2018). External eating also showed predictive effects on unhealthy snacking in both samples. Interventions targeting unhealthy snacking of adolescents predominantly with normal weight might benefit from incorporating specific mindful eating strategies to reduce external eating.

Chinese adolescents showed lower levels of positive attitudes, subjective norms (SN) and habit strength of unhealthy snacking than their British peers. This could be due to the relatively short-term nutrition transition in China, as snacking has become prevalent in China only in the last two decades (Huang et al., 2021; Wang et al., 2014). SN significantly predicted adolescent unhealthy snack consumption regardless of country. This is in line with previous studies suggesting that social norms, particularly peer social norms, could play an important role in shaping young people's food intake (Stock et al., 2014; Stok et al., 2016). It should be noted that in the present study, general but not specific (e.g., parents, peers) SN were measured. Further studies can explore potential country differences in the effects of specific SN on adolescent unhealthy snacking. In addition, British adolescent consumptions of unhealthy snacks and beverages were predicted by habit strength. This finding is in line with previous studies in adolescents from Western cultures suggesting that unhealthy snacking could be primarily habitual (De Vet et al., 2015; Tak et al., 2011). Taken together,

these findings warrant further country-specific research on social cognitive determinants and intervention strategies of adolescent unhealthy snacking and beverage consumption.

Similar patterns were observed in healthy snacking. Country did not moderate the prediction of eating styles on fruit or vegetable consumption, but moderated the effects of TPB constructs on fruit consumption, and showed a moderating effect on the relationship between TPB constructs and vegetable consumption that approached significance. For eating styles, restrained eating emerged as a unique predictor of both fruit and vegetable (FV) consumption, indicating that restrained eaters among the adolescents restricted their dietary intake by eating more typical healthy foods. This is in line with recent studies showing positive associations between dietary restraint and FV intake (Wood et al., 2021; Yong et al., 2021). In the present study, restrained eating predicted higher consumption of FV but not lower unhealthy snack or beverage consumption, indicating that restrained eating might not lead to an overall healthier snacking pattern. For TPB constructs, habit strength emerged as a strong predictor of FV consumption in British adolescents, which is consistent with previous studies suggesting habit strength as a more important predictor than intention of FV intake (Albani et al., 2018). However, none of the TPB constructs emerged as significant predictors of FV consumption of Chinese adolescents. Further studies are needed to investigate determinants on healthy snacking of Chinese adolescents that can help inform intervention development (e.g. Conner & Norman, 2015; O'Connor, Armitage & Ferguson, 2015).

Findings should be considered alongside the study's methodological limitations. First, the cross-sectional design limits the possibility of identifying causal relationships. Second, the self-report measures are subject to potential response bias. Specifically, adolescents who completed the survey during class with the presence of researchers and schoolteachers might be more greatly influenced by demand characteristics compared to those via an online questionnaire. In addition, snacking frequency was measured without identifying portion size

for each eating occasion, and therefore could not provide precise information of actual food intake. The questionnaire used to assess snacking frequency was developed in Western culture, and therefore might underestimate Chinese adolescents' snack intake. The Mindful Eating Questionnaire showed relatively low internal reliability in both samples and may have inadequate psychometric properties (Zhang et al., 2022); alternative measures such as the Four Facet Mindful Eating Scale (FFaMES; Carrière et al., 2022) are recommended for future studies. Fourth, the generalisation of study findings was limited by the homogeneous study samples and the relatively small size of the British sample. Finally, this study did not provide information about the predictive power of the full TPB as the role of *intention* was not examined. Despite these limitations, this study advanced understanding of adolescent snacking and potential determinants by taking into account the cultural context. To our knowledge, this is the first study comparing the application of the TPB in explaining adolescent snacking in Western and Eastern countries. In addition, this study adds to the limited knowledge of determinants on snacking of Chinese adolescents.

In conclusion, this study highlighted the role of mindful eating in adolescent unhealthy snacking regardless of country, supporting the utilisation of mindful eating strategies in adolescent snacking interventions. TPB-based interventions for adolescent snacking should carefully consider the cultural context. Snacking interventions that help to break and form habits could be particularly beneficial for British adolescents. For Chinese adolescents, interventions aimed at reducing unhealthy snacking ought to consider incorporating norm- and PBC-related components. Further research is needed to test the effectiveness of adolescent snacking interventions in British and Chinese populations.

Declarations:

Author contributions All authors contributed to the study conception and design. Material preparation, participant recruitment, data collection and analysis were mainly conducted by

QZ under the supervision of DO and SH. The first draft of the manuscript was written by QZ and all authors contributed to previous versions of the manuscript. All authors checked the final manuscript and are happy to be accountable for this paper.

Funding This study was conducted as part of a PhD programme. Funding was allocated by the University of Leeds as a part of this degree.

Availability of data and materials The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of Interest None

Table 1 Descriptive statistics and multivariate analysis of variance examining gender and cultural differences in eating styles, TPB variables, and snacking frequency

	Gender	M ± *SD* / Cronbach's α		*F*, *p*, η_p^2		
		Chinese	British	Country	Gender	Country × Gender
Eating styles						
External eating (1-5)	boys	3.02 (.80)	3.43 (.77)	*F* = 8.58; ***p* = .004***;	*F* = 13.92; ***p* < .001****;	*F* = .35; *p* = .56;
	girls	2.79 (.52)	3.09 (.68)			
	α	.89	.93	η_p^2 = .031	η_p^2 = .049	η_p^2 = .001
Emotional eating (1-5)	boys	1.88 (.81)	1.65 (.67)	*F* = 1.09; *p* = .298;	*F* = 26.74; ***p* < .001****;	*F* = .91; *p* = .341;
	girls	2.36 (1.03)	2.35 (.82)			
	α	.93	.93	η_p^2 = .004	η_p^2 = .090	η_p^2 = .003
Restraint eating (1-5)	boys	2.27 (.74)	1.90 (.74)	*F* = 6.97; ***p* = .009***;	*F* = 11.70; ***p* = .001***;	*F* = .50; *p* = .478;
	girls	2.57 (.80)	2.36 (1.02)			
	α	.86	.79	η_p^2 = .025	η_p^2 = .042	η_p^2 = .002
Mindful eating (1-4)	boys	2.82 (.32)	2.90 (.26)	*F* = 1.08; *p* = .299;	*F* = 1.03; *p* = .311;	*F* = 8.92; ***p* = .003***;
	girls	2.91 (.33)	2.74 (.35)			
	α	.63	.62	η_p^2 = .004	η_p^2 = .004	η_p^2 = .032
TPB – healthy snacking (1-7)						
Attitudes	boys	5.11 (1.37)	5.41 (1.13)	*F* = .53; *p* = .47;	*F* = 2.43; *p* = .12;	*F* = 6.83; ***p* = .009***;
	girls	5.77 (1.37)	5.25 (1.21)			
	α	.85	.80	η_p^2 = .002	η_p^2 = .009	η_p^2 = .025
SN	boys	4.54 (1.62)	5.00 (1.36)	*F* = .00; *p* = .96;	*F* = .02; *p* = .90;	*F* = 5.42; *p* = .021[a];
	girls	5.01 (1.52)	4.57 (1.41)			
	α	.75	.76	η_p^2 = .00	η_p^2 = .00	η_p^2 = .020
PBC	boys	3.99 (1.07)	3.88 (.90)	*F* = .50; *p* = .48;	*F* = 1.39; *p* = .24;	*F* = 2.45; *p* = .12;
	girls	3.94 (.86)	4.23 (1.11)			
	α	.95	.67	η_p^2 = .002	η_p^2 = .005	η_p^2 = .009
Habit strength	boys	3.73 (1.67)	3.60 (1.41)	*F* = 3.57; *p* = .06;	*F* = .29; *p* = .59;	*F* = 1.53; *p* = .22;
	girls	4.06 (1.37)	3.47 (1.34)			
	α	.94	.95	η_p^2 = .013	η_p^2 = .001	η_p^2 = .006
TPB – unhealthy snacking (1-7)						

Attitudes	boys	3.65 (1.43)	4.50 (.78)	$F = 14.93$;	$F = 1.80$;	$F = 1.41$;
	girls	4.07 (1.42)	4.53 (1.23)	$\mathbf{p < .001}^{**}$;	$p = .18$;	$p = .24$;
	α	.82	.69	$\eta_p^2 = .052$	$\eta_p^2 = .007$	$\eta_p^2 = .005$
SN	boys	3.30 (1.66)	3.99 (1.27)	$F = 7.36$;	$F = .03$;	$F = 1.48$;
	girls	3.48 (1.36)	3.74 (.87)	$\mathbf{p = .007}^{*}$;	$p = .86$;	$p = .22$;
	α	.65	.62	$\eta_p^2 = .026$	$\eta_p^2 = .00$	$\eta_p^2 = .005$
PBC	boys	4.22 (1.33)	4.21 (.98)	$F = .09$;	$F = 3.05$;	$F = .14$;
	girls	3.90 (1.23)	4.00 (1.03)	$p = .93$;	$p = .082^{a}$;	$p = .71$;
	α	.68	.63	$\eta_p^2 = .00$	$\eta_p^2 = .011$	$\eta_p^2 = .00$
Habit strength	boys	3.07 (1.63)	3.52 (1.35)	$F = 8.11$;	$F = 2.83$;	$F = .31$;
	girls	3.29 (1.57)	3.97 (1.50)	$\mathbf{p = .005}^{*}$;	$p = .094^{a}$;	$p = .58$;
	α	.96	.94	$\eta_p^2 = .029$	$\eta_p^2 = .010$	$\eta_p^2 = .001$
Snacking frequency (times / week)						
Unhealthy snacks	boys	12.45 (18.36)	15.79 (17.38)	$F = 18.27$;	$F = 2.31$;	$F = .24$;
	girls	10.67 (10.77)	20.12 (22.09)	$\mathbf{p < .001}^{**}$;	$p = .13$;	$p = .62$;
				$\eta_p^2 = .063$	$\eta_p^2 = .008$	$\eta_p^2 = .001$
Unhealthy beverages	boys	14.62 (20.08)	17.04 (28.26)	$F = 1.68$;	$F = 14.37$;	$F = 6.98$;
	girls	5.49 (9.36)	12.12 (19.11)	$p = .20$;	$\mathbf{p < .001}^{**}$;	$\mathbf{p = .009}^{*}$;
				$\eta_p^2 = .006$	$\eta_p^2 = .050$	$\eta_p^2 = .025$
Fruit	boys	10.28 (12.29)	7.99 (9.25)	$F = 2.16$;	$F = 1.80$;	$F = .02$;
	girls	10.39 (10.87)	10.42 (12.06)	$p = .14$;	$p = .181$;	$p = .96$;
				$\eta_p^2 = .008$	$\eta_p^2 = .007$	$\eta_p^2 = .00$
Vegetables	boys	8.72 (13.03)	6.71 (7.32)	$F = 1.51$;	$F = 1.56$;	$F = .02$;
	girls	9.87 (13.24)	9.87 (11.21)	$p = .28$;	$p = .21$;	$p = .89$;
				$\eta_p^2 = .004$	$\eta_p^2 = .006$	$\eta_p^2 = .00$

SN: Subjective norms; PBC: perceived behavioural control

* = $p < .01$; ** = $p < .001$; a = $p < .05$.

Table 2 Hierarchical regression analysis predicting unhealthy snack and beverage consumption

		Unhealthy snack intake			Unhealthy beverage intake		
Step	Predictors	Step	Step 2	Step 3	Step 1	Step 2	Step 3
		1					
Model 1: Eating styles							
1	Country	.265**	.280**	.273**	.095	.100	.103
	Gender	.076	.019	.010	-.281**	-.325**	-.331**
2	External eating		.208*	.204*		.124	.129
	Emotional eating		.075	.073		.039	.052
	Restrained eating		-.079	-.074		.013	.010
	Mindful eating		-.166*	-.170*		-.217*	-.211**
3	Country × External eating			-.009			.011
	Country × Emotional eating			-.031			.053
	Country × Restrained eating			-.015			-.023
	Country × Mindful eating			-.064			-.003
	R^2	.079	.203	.206	.084	.176	.179
	ΔR^2	.079**	.124**	.004	.084**	.092**	.003
	F_{change}	11.53	10.28	.30	12.29	7.41	.25
Model 2: TPB constructs							
1	Country	.262**	.190*	.175*	.101	.072	.067
	Gender	.102	.072	.059	-.280**	-.309***	-.334**
2	Attitudes (uh)		-.025	.035		-.073	-.064
	SN (uh)		.195**	.162*		.112a	.092
	PBC (uh)		-.017	.016		-.151a	-.116
	Habit strength (uh)		.304**	.316**		.192*	.200*
3	Country × Attitudes (uh)			.37			-.114
	Country × SN (uh)			-.100			-.058
	Country × PBC (uh)			.108			.135a
	Country × Habit strength (uh)			.154a			.249**
	R^2	.083	.220	.251	.085	.171	.213
	ΔR^2	.083**	.137**	.031a	.085**	.086**	.042*
	F_{change}	12.21	11.76	2.73	12.55	6.92	3.54

SN: Subjective norms; PBC: perceived behavioural control; (un): unhealthy snacking

* = $p < .01$; ** = $p < .001$; a = $p < .05$.

Table 3 Hierarchical regression analysis predicting fruit and vegetable consumption

		Fruit intake			Vegetable intake		
Step	Predictors	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
Model 1: Eating styles							
1	Country	-.089	-.036	-.059	.057	.116	.090
	Gender	.093	.032	.034	.083	.016	.083
2	External eating		.033	.005		.094	.063
	Emotional eating		-.009	-.023		-.023	-.009
	Restrained eating		.279**	.289**		.251**	.240**
	Mindful eating		.084	.005		.074	.064
3	Country × External eating			-.083			-.114
	Country × Emotional eating			-.079			.054
	Country × Restrained eating			-.011			-.010
	Country × Mindful eating			-.045			-.052
	R^2	.015	.090	.105	.011	.070	.079
	ΔR^2	.015	.075**	.015	.011	.059*	.008
	F_{change}	2.09	5.43	1.08	1.47	4.23	.60
Model 2: TPB constructs							
1	Country	-.083	-.057	-.039	.066	.088	.101
	Gender	.74	.045	.046	.083	.071	.087
2	Attitudes (h)		.125	.104		.062	.042
	SN (h)		-.071	-.013		-.083	-.046
	PBC (h)		.068	.068		-.036	-.028
	Habit strength (h)		.189*	.216*		.151a	.173a
3	Country × Attitudes (h)			.044			.018
	Country × SN (h)			-.048			-.012
	Country × PBC (h)			.21**			.015
	Country × Habit strength (h)			.27**			.212*
	R^2	.012	.073	.179	.012	.044	.088
	ΔR^2	.012	.062*	.106**	.012	.032	.044a
	F_{change}	1.59	4.41	8.41	1.63	2.20	3.16

SN: Subjective norms; PBC: perceived behavioural control; (h): healthy snacking

* = $p < .01$; ** = $p < .001$; a = $p < .05$.

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