The association between markers of diet quality and wellbeing in adolescents

C.P. Perry, E. Keane, M. Molcho, C. Kelly, S. Nic Gabhainn
**Health Promotion Research Centre,
National University of Ireland Galway.**

Contact Catherine Perry for queries **catherine.perry@nuigalway.ie**
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Background

Adolescence is generally a time of good health however it is also a time of increased development both physically and mentally.

Subjective wellbeing (SWB) is a global assessment of 'how people are doing' and not the day-to-day variation in mood. It can ease the transition from adolescents to adulthood and may buffer against a variety of negative outcomes including psychological disorders.
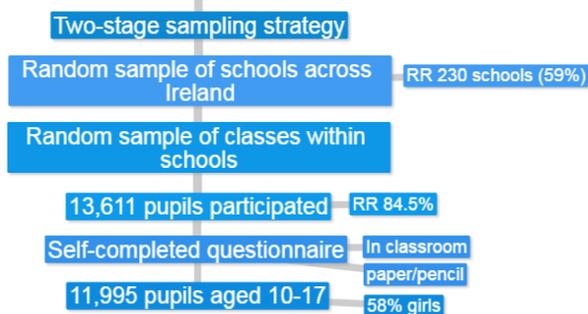
Diet has emerged as an important factor for mental ill health such as depression. However, the diet-SWB association is largely understudied in both adults and adolescents. Though, one study of Canadian children aged nine found that breakfast and junk food frequency were both correlated with increasing life satisfaction (positively and negatively respectively).

As it is important to find modifiable determinants of wellbeing which may promote the normative development of adolescents, this study aims to investigate the association between diet quality SWB in Irish adolescents aged 10-17.

Methods

Study design

Health Behaviour in School-aged Children (HBSC) Study, 2014

Two-stage sampling strategy

Random sample of schools across Ireland — RR 230 schools (59%)

Random sample of classes within schools

13,611 pupils participated — RR 84.5%

Self-completed questionnaire — In classroom paper/pencil

11,995 pupils aged 10-17 — 58% girls

Measures of subjective wellbeing

Positive SWB was measured by four questions; 'general health' (excellent, good, fair, or poor), life satisfaction (Cantril ladder, a 0-10 scale), 'happiness with life at present' and 'happy with the way you are in the last week'. These four items were z-scored and combined to create a SWB index, whereby higher scores indicated more positive SWB. PCA was used to confirm SWB items measured the same concept and Cronbach's alpha was used to test internal consistency of the SWB score

Negative wellbeing was assessed using the eight item psychosomatic symptoms checklist (headache, stomach-ache, back ache, feeling low, irritability or bad temper, feeling nervous, difficulties getting to sleep, feeling dizzy). These items were combined to create an index; higher scores indicate more frequent and severe psychosomatic symptoms.

Diet quality: Frequency of consumption of 8 food items (3 healthy and 5 unhealthy) were assessed using a 7-point response scale **(Table 1)**. A scoring method by Vereecken and colleagues, (2005) was used to create the average weekly consumption frequency **(Table 1).** Foods deemed unhealthy (high in fat, sugar and salt) were then reverse scored in order to create a diet quality score (DQS). This score was analysed as a continuous score and was also collapsed into quintiles.

Demographics: Gender (boy/girl) and age-group (10-11, 12-13, 14-15, 16-17) and highest parental occupation, recoded as high, medium, and low social-class).

Health related activities: Moderate-to-vigorous physical activity (MVPA, recoded as 7 days versus <7 days), total screen-time (watching TV and time spent on computers), dichotomised as <2hours/day versus >=2hours/day. A risk behaviour index based on 5 risk behaviours (smoking in last 30 days, cannabis use in last 12 months, drank alcohol in last 30 days, ever been drunk, and used a condom last time had sexual intercourse) recoded as no risk, some risk and high risk.

Contexts: Family, peer, school, and local area contexts were measured

Statistical analysis: Summary statistics were examined. Differences were assessed using independent samples t-test, one-way ANOVA or non-parametric alternatives when necessary. Separate simple and multiple linear regression explored the associations between measures of SWB and markers of diet quality. Analyses were performed in Stata V. 12.0

Table 1: Scoring method for diet quality score

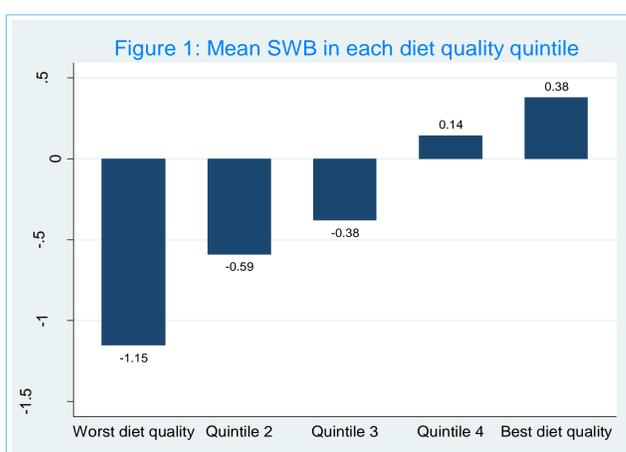| Response	Never	< 1/ week	1/ week	2-4 days/ week	5-6 days/ week	Every day/ Every day > once
Healthy	0	0.25	1	3	5.5	7
Items	Fruit		Vegetables			Fish
Unhealthy	7	5.5	3	1	0.25	0
Items	Sweets, Soft drinks, Diet soft drinks, Crisps, Chips					

Results

The SWB score was negatively skewed with a median and IQR of 0.12 (4.46). The psychosomatic symptoms score positively skewed; median and IQR 6.00 (9.00). The DQS was normally distributed with mean and SD of 26.30 (9.42).

There was a significant difference between DQS quintile and SWB (p=0.0001), and there was a significant positive trend (p_{trend}=0.001). There was no significant difference between mean SWB score of quintile 4 and quintile 5 DQS.

Figure 1 displays the mean SWB score in each of the diet quality quintiles. As diet quality quntile increases towards the best diet quality SWB score also increases

Figure 1: Mean SWB in each diet quality quintile

Worst diet quality	-1.15
Quintile 2	-0.59
Quintile 3	-0.38
Quintile 4	0.14
Best diet quality	0.38

Key findings
Adolescents with a higher diet quality have more positive subjective wellbeing and lower frequency and severity of psychosomatic symptoms

Table 2: Unadjusted and adjusted associations of diet quality and wellbeing

	Subjective Wellbeing score		Psychosomatic score	
	Model 1a	**Model 1b**	**Model 2a**	**Model 2b**
	β (95% CI)			
Poorest diet quality	Ref	Ref	Ref	Ref
Quintile 2	0.56 (0.36 0.76)	0.01 (-0.18 0.20)	-1.42 (-1.86 -0.98)	-0.35 (-0.80 0.10)
Quintile 3	0.77 (0.57 0.97)	0.15 (-0.04 0.34)	-1.95 (-2.39 -1.51)	-0.52 (-0.96 -0.07)
Quintile 4	1.30 (1.10 1.49)	0.30 (0.11 0.49)	-2.86 (-3.30 -2.43)	-0.95 (-1.39 -0.51)
Best diet quality	1.53 (1.33 1.73)	0.39 (0.20 0.59)	-3.00 (-3.43 -2.55)	-1.05 (-1.50 -0.59)
Adjusted R^2	0.03	0.49	0.03	0.42

- Model1a Diet quality and SWB unadjusted
- Model1b Diet quality and SWB fully adjusted
- Model2a Diet quality and Psychosomatic symptoms score unadjusted
- Model2b Diet quality and Psychosomatic symptoms score fully adjusted

Adjusted for age, gender, parental social-class, physical activity, total screen time, risk behaviour index, (Family context) family structure, ease of talking to mother or father, family support, (Peer context) peer support, quantity of friends, being bullied, (School context) liking school, pressured by school work, teacher support, (Local area context) perception of local area.
Reference categories: Quintile 1, poorest diet quality

Results continued

Table 2 displays the unadjusted and fully adjusted association between diet and SWB and separately for diet and psychosomatic symptoms. Diet was a significant factor in both wellbeing measures. After controlling for multiple confounders the effect of diet on SWB was still significant in quintile 4 and quintile 5 relative to the poorest diet quality.

Table 2: the final adjusted model explained 49% of the variation in SWB. Other health related lifestyle activities of MVPA, hours of screen time, and engaging in risk behaviours (smoking tobacco or cannabis, alcohol, sexual intercourse) were also significantly associated with SWB.

Discussion/conclusion

The results suggest that eating a good quality diet may promote positive subjective wellbeing.

As this study is cross-sectional the relationship between diet quality and SWB may plausibly be **bi-directional**. However longitudinal studies with similar population characteristics have found that the consumption of fruit or vegetables/healthy diets preceded the positive affect on SWB. Similarly much research focusing on food and mood investigates the short-term effect food can have on mood, such as eating 'comfort foods' when stressed.

Adolescence is a time of greater food independence and opting for more ultra-processed foods, low in nutritional value. The impact of poor diet quality on wellbeing should be emphasised.

Creating environments that support healthier dietary choices is key to enable good general health and wellbeing during adolescence and tracking to adulthood.

Health Behaviour in School-aged Children: A World Health Organization (WHO) Collaborative Cross-national Study.
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