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Living longer and feeling better: healthy lifestyle, self-rated health, obesity and depression in Ireland

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Background: The combination of four protective lifestyle behaviours (being physically active, a non-smoker, a moderate alcohol consumer and having adequate fruit and vegetable intake) has been estimated to increase life expectancy by 14 years. However, the effect of adopting these lifestyle behaviours on general health, obesity and mental health is less defined. We examined the combined effect of these behaviours on self-rated health, overweight/obesity and depression. **Methods:** Using data from the Survey of Lifestyle Attitudes and Nutrition (SLÁN) 2007 (), a protective lifestyle behaviour (PLB) score was constructed for 10 364 men and women (>18 years), and representative of the Republic of Ireland adult population (response rate 62%). Respondents scored a maximum of four points, one point each for being physically active, consuming five or more fruit and vegetable servings daily, a non-smoker and a moderate drinker. **Results:** One-fifth of respondents (20%) adopted four PLBs, 35% adopted three, 29% two, 13% one and 2% adopted none. Compared to those with zero PLBs, those with four were seven times more likely to rate their general health as excellent/very good [OR 6.8 95% CI (3.64–12.82)] and four times more likely to have better mental health [OR 4.4 95% CI (2.34–8.22)]. **Conclusions:** Adoption of core protective lifestyle factors known to increase life expectancy is associated with positive self-rated health, healthier weight and better mental health. These lifestyles have the potential to add quality and quantity to life.

Keywords: lifestyle behaviours, self-rated health, obesity, depression, protective factors.

Introduction

It has been known for some time that adoption of a number of core protective/health promoting lifestyle behaviours at an individual level has a potentially large positive influence on population health. There is increasing recognition of the value of these behaviourally defined protective behaviours for health promotion and population health monitoring,^{1–8} and advice on smoking cessation, healthy diet, physical exercise and moderation in alcohol consumption has been a pillar of health education for many years. While anecdotally a perception exists that adoption of a healthy lifestyle may impair quality of life as evidenced by the admonition ‘You won’t live forever, it will just feel like it’, recent evidence suggests that quality as well as quantity can be added to life through the adoption of relatively minor lifestyle changes.⁵

Results from the Nurse’s Health Study⁹ reported the positive effects of a limited number of core protective lifestyle behaviours (PLBs) [body mass index (BMI) < 25 kg m⁻²; a diet high in cereal fibre and polyunsaturated fat and low in trans fat and glycaemic load; engagement in moderate-to-vigorous physical activity for at least half an hour per day; no current smoking and the consumption of an average of at least half a drink of an alcoholic beverage per day] in relation to the decreased risk of type 2 diabetes. This work has

been replicated in a cross-sectional study with markers of cardiovascular risk including hypertension, dyslipidaemia and insulin resistance.^{4,5,10} More recently, Khaw *et al.*,¹ in their work from the European Prospective Investigation into Cancer (EPIC) study, focused on behaviourally defined measures. They identified four lifestyle behaviours: being physically active, a non-smoker, having a moderate alcohol consumption and an adequate fruit and vegetable intake and found that the combined effect of these health behaviours predicted a 4-fold difference in total mortality in men and women,¹ equating to a 14-year difference in life expectancy between individuals practising none of these behaviours relative to those practising all four of them. In further work from the EPIC study, Myint *et al.*¹¹ concluded that behavioural factors were associated with substantial differences in age-related decline in functional health and the prevalence of those in good and poor functional health in the community.

Examining the effects of individual risk factors for chronic disease and poor physical and mental health is not a new concept; however, their combined effect on general health, obesity and mental health is less well defined. The aim of this study was to examine the combined effect of practising four non-clinically defined lifestyle behaviours (being a non-smoker, being physically active, being a moderate drinker, and consuming five portions of fruit and vegetables daily) on self-rated health, overweight/obesity and mental health.

Methods

Based on the work by Khaw *et al.*,¹ we constructed a PLB score. Participants scored one point for each of the following health behaviours: being a non-smoker, being physically active (moderate/high activity score), being a moderate drinker (1–14 alcohol units per week) and consuming five or more servings

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of fruit and vegetables daily. Respondents could score from zero to four on protective health behaviours.

General study design

The study was the third national Survey of Lifestyle, Attitudes and Nutrition (SLÁN) in Ireland conducted in 2007,^{12–14} involving a nationally representative sample of 10 364 respondents (62% response rate) to whom a detailed health and lifestyle questionnaire was administered by face-to-face interview. In addition, 9223 (89%) completed a Willett Food Frequency Questionnaire (FFQ). The FFQ was an adapted version of the EPIC study,¹⁵ validated for use in the Irish population.¹⁶ Participants who did not complete a FFQ were excluded from this analysis.

Sampling

The population for the survey was defined as adults aged 18 years and over living in residential households in Ireland (residents of institutions, nursing homes, hospitals, prisons and homeless hostels were not included). Full details of the sampling frame and weighting can be found elsewhere.¹² In summary, the sampling frame used for the survey was the GeoDirectory, a list of all addresses in the Republic of Ireland, which distinguishes between residential and commercial establishments. The sample was a multi-stage probability sample, where each dwelling has a known probability of selection. The sample was weighted to closely approximate the Census 2006 figures for gender, age, marital status, education, occupation, region, household size and ethnicity.

Health and lifestyle questionnaire

A single question was included on self-rated health, respondents were asked to rate their health on a 5-point scale ranging from 'excellent' to 'poor'. Being a current smoker was defined as smoking either 'every day' or 'some days'. Non-smokers were classified as those who had never smoked; former smokers were those who had smoked 'at least 100 cigarettes in their lifetime' but do not currently smoke. For the purpose of this article, current smokers are compared with non-smokers. Average alcohol consumption was estimated as the units of alcohol consumed per week. For the purpose of this article, a moderate drinker was defined as someone who consumed between 1 and 14 units a week. A unit is defined as either 'a half pint of beer; a single measure of spirits; or as a single glass of wine, sherry or port'. Respondents were also asked if they had experienced any chronic illness from a pre-defined list in the previous 12 months.

International physical activity questionnaire (IPAQ)

Respondents were asked a series of questions relating to the time they spent being physically active. The responses were used to calculate a physical activity score (IPAQ score) for each respondent. These scores were classified as high (over 10 000 steps per day), moderate (5000–10 000 steps per day) or low (less than 5000 steps per day). For this analysis, a binary variable was created; 'low' or 'moderate/high', 'low' was defined as being physically inactive.

Composite international diagnostic interview (CIDI)

Respondents were asked a series of questions pertaining to their mental health status. The CIDI-SF (short form) Version 1.1 health interview survey, part of which was incorporated

in the main SLÁN interview, provides a probable diagnosis (CIDI-SF yields a likelihood of having a major depression rather than a full diagnosis; hence, the term 'probable Major Depressive Disorder' is used throughout this article) of major depressive disorder.¹⁷ Full details of the mental health measures have been reported elsewhere.¹⁸

Food frequency questionnaire

The dietary habits of respondents who completed a FFQ were analysed in relation to food groups. Full details of the FFQ have been documented elsewhere.¹⁹ For this analysis, fruit and vegetable intake was collapsed to a binary variable with participants categorized as consuming 'five or more servings daily' or 'less than five servings daily'.

BMI

SLÁN 2007 respondents were also asked to self-report their own height and weight. BMI was calculated based on the standard formula [height (m)/weight (kg) × weight (kg)], they were classified as overweight or obese based on a BMI score of ≥ 25 or 30 kg m^{-2} , respectively.

Statistical analysis

Data were analysed using SPSSTM (Version 15.0). Logistic regression was used to examine the relationship between PLB score, self-rated health, probable depressive disorder and obesity levels after adjusting for age, sex, education and social class. Additionally, we examined the relationship between PLB score and past diagnoses of medically diagnosed chronic illness.

Results

Demography

Table 1 shows a breakdown of the relevant participant characteristics differentiated by gender. Higher proportions of women were of normal weight and consumed five or more daily servings of fruit and vegetables compared with men. Men were more likely to be smokers, to consume more alcohol and to be physically active compared with women. Women were more likely to have adopted more of the PLBs. Table 2 shows the age, gender, social demographic profile and the distribution of key outcome variables in five groups of study participants defined on the basis of number of PLBs. Clear and highly significant trends were seen for age, gender, education and social classification status. Those with three and four PLBs were more likely to be female, in the younger/middle age group to have tertiary education and to be in the 'large employers/professional/manager' socioeconomic classification group. Respondents with a lower PLB score were significantly more likely to have a depressive disorder ($P < 0.01$).

Associations between PLBs and feeling healthy

The association between PLB score, self-rated health, healthy weight and better mental health adjusted for age, sex, education and social class is shown in table 3. For self-rated health and depressive state, clear and highly significant trends in odds ratios were observed across the five groups of study participants. These trends were not as obvious for body weight. Relative to those with zero PLBs, those with four were almost seven times more likely to rate their general health as excellent/very good [OR 6.8, 95% CI (3.64–12.82)]. These trends persisted even when the model was adjusted for depressive disorders. Those with four PLBs were also four times more likely to have better mental health [OR 4.4, 95% CI (2.34–8.22)] indicating a better overall general health

Table 1 Distribution of variables for SLÁN 2007 participants included in this analysis (participants who did not complete a FFQ were excluded from the analysis)

Variable	Category	Men	Women	Total
		(N = 4511) Mean (SD)	(N = 4661) Mean (SD)	(N = 9172) N (%)
Age (years)	–	43.4 (16.9)	44.3 (17.8)	43.8 (17.4)*
BMI (kg m ⁻²)	Underweight (15–18.5)	60 (1.4)	128 (3.0)	188 (2.2)*
	Normal weight (18.5–24.9)	1745 (40.4)	2397 (55.8)	4142 (48.1)
	Overweight (25–29.9)	1831 (42.4)	1217 (28.3)	3048 (35.4)
	Obese (≥30)	684 (15.8)	557 (13.0)	1241 (14.4)
European socio-economic classification	Large employers, professional, managers	1541 (34.2)	1482 (31.8)	3023 (33.0)*
	Intermediate, lower supervisory occupations and technicians	593 (13.1)	758 (16.3)	1351 (14.7)
	Self-employed and small employers	800 (17.7)	561 (12.0)	1361 (14.8)
	Lower sales/service, lower technical and routine occupations	1379 (30.6)	1344 (28.8)	2723 (29.7)
	Unknown/unclassified	198 (4.4)	516 (11.1)	714 (7.8)
Education	Primary	1712 (38.0)	1594 (34.2)	3306 (36.6)*
	Secondary	1217 (27.0)	1289 (27.7)	2506 (27.3)
	Tertiary	1582 (35.1)	1778 (38.1)	3360 (36.6)
Smoking status	Former	1023 (22.9)	720 (15.6)	1743 (19.2)
	Never	2110 (47.2)	2672 (57.9)	4782 (52.6)
	Current ^a	1335 (29.9)	1224 (26.5)	2559 (28.2)
Physical activity	Low	913 (24.3)	1266 (32.7)	2179 (28.6)*
	Moderate/high	2844 (75.7)	2606 (67.3)	5450 (71.4)
Alcohol drinking	Above weekly recommended units	1975 (52.21)	2214 (62.2)	4189 (57.0)*
Fruit and vegetable consumption	More than five servings per day	2691 (59.6)	3318 (71.2)	6009 (65.5)*
No. of protective lifestyle behaviours	0	54 (2.4)	40 (1.6)	97 (2.0)
	1	388 (16.2)	259 (10.4)	647 (13.3)
	2	727 (30.4)	675 (27.2)	1402 (28.8)
	3	802 (33.5)	920 (37.1)	1722 (35.3)
	4	419 (17.5)	589 (23.7)	1008 (20.7)
Self-reported general health	Excellent/very good/good	3955 (87.8)	4100 (88.3)	8055 (88.0)
Probable major depressive disorder		210 (4.7)	349 (7.5)	559 (6.1)*
Any chronic illness in the previous 12 months excluding CVD events		1517 (33.7)	1832 (39.4)	3349 (36.6)*

a: Smoker was classified as someone who smokes either everyday or some days

*Significant gender difference $P < 0.01$; ***Significant gender difference $P < 0.05$

Table 2 Demographic breakdown by number of protective lifestyle behaviours practised

		Number of protective behaviours					P-value trend
		0	1	2	3	4	
		N = 153 % (N)	N = 919 % (N)	N = 1954 % (N)	N = 2159 % (N)	N = 1008 % (N)	
Gender	Male	85 (55.9)	566 (61.6)	1063 (54.4)	1025 (47.5)	419 (41.6)	0.000
	Female	67 (44.1)	353 (38.4)	891 (45.6)	1134 (52.5)	589 (58.4)	
Age group	18–29	35 (23.2)	242 (26.3)	574 (29.4)	598 (27.7)	324 (32.1)	0.000
	30–44	46 (30.5)	307 (33.4)	661 (33.8)	733 (33.9)	321 (31.8)	
	45–64	38 (25.2)	271 (29.5)	554 (28.3)	644 (29.8)	287 (28.5)	
	>65	32 (21.2)	100 (10.9)	166 (8.5)	185 (8.6)	76 (7.5)	
Education	Primary	84 (54.9)	349 (38.0)	624 (31.9)	543 (25.2)	193 (19.1)	0.000
	Secondary	36 (23.5)	265 (28.8)	580 (29.7)	628 (29.1)	277 (27.5)	
	Tertiary	33 (21.6)	305 (33.2)	751 (38.4)	988 (45.8)	538 (53.4)	
European socio-economic classification	Large employers, professional, managers	37 (24.2)	280 (30.4)	694 (35.5)	863 (40.0)	438 (43.5)	0.000
	Intermediate, lower supervisory occupations and technicians	23 (15.0)	143 (15.5)	299 (15.3)	356 (16.5)	149 (14.8)	
	Self employed and small employers	22 (14.4)	153 (16.6)	279 (14.3)	270 (12.5)	138 (13.7)	
	Lower sales/service, lower technical and routine occupations	59 (38.6)	298 (32.4)	600 (30.7)	556 (25.7)	221 (21.9)	
	Unknown/unclassified	12 (7.8)	46 (5.0)	83 (4.2)	115 (5.3)	62 (6.2)	
Self-rated health	Excellent/very good/good	122 (79.7)	796 (86.9)	1780 (91.0)	2112 (93.3)	971 (96.7)	0.000
	Fair/poor	31 (20.3)	120 (13.1)	175 (9.0)	144 (6.7)	33 (3.3)	
BMI	≥25 kg m ⁻²	86 (61.9)	484 (55.2)	952 (51.5)	983 (47.9)	411 (42.7)	0.000
Probable major depressive disorder		19 (12.5)	66 (7.2)	116 (6.0)	117 (5.4)	47 (4.7)	0.001
Any chronic illness in the previous 12 months		74 (48.7)	366 (39.9)	685 (35.1)	694 (32.2)	310 (30.8)	0.000

and well-being. While similar trends were not as obvious in relation to BMI status, those with four PLBs had an elevated likelihood of being normal weight (BMI < 25 kg m⁻²) than overweight/obese (BMI > 25 kg m⁻²) compared with those with fewer PLBs.

Discussion

We know from longitudinal studies that PLBs increase longevity¹; this article shows that they are also associated with better self-rated health, better mental health and healthier

Table 3 Respondent's likelihood of self-rated general health being excellent/very good/good; likelihood of BMI <25 kg m⁻² and the likelihood of not having depressive disorder compared with having depressive disorder by number of protective lifestyle behaviours adjusted for age, gender, education and social class

	Excellent/very good/good self-rated health vs. fair/poor			BMI <25 kg m ⁻² vs. BMI >25 kg m ⁻²			Not having depressive disorder vs. depressive disorder		
	Odds ratio	95% CI	P*	Odds ratio	95% CI	P*	Odds ratio	95% CI	P*
0	1	–	–	1	–	–	1	–	–
1	1.7	0.95–2.95	0.07	0.85	0.52–1.38	0.52	2.0	1.12–3.77	0.02
2	2.8	1.60–4.82	0.00	0.95	0.59–1.51	0.83	3.2	1.75–5.69	0.00
3	3.3	1.89–5.70	0.00	1.07	0.68–1.69	0.77	3.6	1.98–6.40	0.00
4	6.8	3.64–12.82	0.00	1.18	0.74–1.89	0.49	4.4	2.34–8.22	0.00

*For trend significant $P < 0.01$

body weight; conversely, those who had fewer PLBs were 'not only' leading unhealthier lifestyles, but they also perceived their overall health to be poorer, had a higher likelihood of having depression and were heavier than those with higher numbers of PLBs. Higher scores were also less likely to be associated with being diagnosed with a cardiovascular event and being diagnosed with any illness by a doctor in the last 12 months. While our results are congruent with the work by Khaw *et al.*¹ and Myint *et al.*¹¹ who examined the relationship between PLBs and mortality¹ and PLBs and functional health,¹¹ this is one of the first studies to look at self-rated health, depression and overweight/obesity in relation to PLBs.

Limitations of the study include the cross-sectional design, and the relatively low response rate (62%). However, this is similar to response rates seen in other major National Health and Lifestyle Surveys.^{13,14} It is increasingly difficult to get high response rates from national general population surveys due to the sociodemographic trends in the modern society including longer working days and the phenomenon of gated communities, particularly in urban areas. Unfortunately, data on non-participation are not available. However, sample weights were used derived from the most recent Census.²⁰ Interpretation of the data must be cautious; since exposure and outcome were measured at the same time, it is not possible to ascertain which is the cause and which is the effect. It can be argued that persons with better than average self-rated health and better mental health are more likely to engage in health seeking behaviour. The issue of reverse causation cannot be resolved in this study; however, it is likely that the causal effects of these health seeking behaviours flow in both directions are mutually beneficial: better mental health and better self-rated health leading to increased health seeking behaviours and vice versa. What is clear is that there is no evidence to suggest that the presence of health seeking behaviours is associated with poorer mental health and well-being.

Our findings add to the evidence that we can achieve progress to address the 'causes of the causes' of all-cause mortality, mental ill health and cardiovascular disease through small achievable lifestyle behaviour modifications. A key challenge for future research is to better understand the individual and societal determinants of health-seeking behaviour. For instance, there is emerging data highlighting the importance of adverse childhood experiences as a determinant of health-related behaviour in adult life.²¹ Data from the USA^{22–24} show that children with low rates of childhood adversity not only have better mental health in adult life but better physical health with lower rates of high-risk behaviours and conditions e.g. obesity.

Conclusion

Given the association between self-rated health, better mental health and higher numbers of PLBs, we propose that the four lifestyle behaviours detailed in this article be used as outcome measures from which effectiveness of public health policy can be gauged.

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Conflicts of interest: None declared.

Key points

- Being a non-smoker, being physically active, having a moderate alcohol intake and consuming five portions of fruit and vegetables daily are associated with better self-rated health, better mental health and a healthier weight.
- We would propose that the four lifestyle behaviours detailed in this article be used as outcome measures from which effectiveness of public policy can be gauged.

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