The association of religious affiliation and body mass index (BMI): An analysis from the Health Survey for England

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Obesity and Health

- Rising levels of obesity (BMI>30) across the world
- UK prevalence (Health Survey for England, 2011).
  - 24% in men
  - 36% in women
- Increased risk all cause mortality, ischaemic heart disease, stroke, diabetes mellitus, COPD, cancers (The Surgeon General, 2001)
- Obesity is associated with psychological stress
  - bidirectional increased risk of depression (Luppino et al, 2010).

Religion and Health

- Systematic review evidence of observational studies (Koenig et al, 2012).
  - Religion is associated with a reduced risk of all cause mortality,
  - reduced risk of cardiovascular disease,
  - less depression and faster recovery from depression
  - Association may be mediated through lifestyle choices (e.g. those who are religious tend to smoke less and drink less alcohol).

What is the association between religion and obesity?

- Systematic review of 36 observational studies (Keonig et al, 2012)
  - 19% lower body weight amongst those who were more religious
  - 39% higher body weight
  - 6% mixed results
  - 36% no association
- Highest quality cross sectional – higher BMI
- Highest quality longitudinal – no assoc
- Unclear picture

Exploring those where religion is associated with higher BMI…

- 2 US cross-sectional studies explored the mediating effect of smoking status (Gillum, 2006; Kim et al, 2003).
- Following adjustment for smoking status no longer significant
- Perhaps the positive association can be explained by less weight suppression among the religious communities from smoking
- No data on dietary intake

What is the situation in the England?

- The Health Survey for England (HSE)
  - Cross-sectional annual survey representative of households in England
  - Commissioned by Department of Health to provide data on the population's health, personal characteristics and health behaviour.
  - In 2004 included a measure of religion and physical activity
  - N=6704

Measures of interest

- Detailed interviews by trained interviewers
- Measured height and weight (per protocol)
- 'What is your religion or church?'
  - 'none‘
  - a list of 18 religions and denominations
  - reclassified into 'religious affiliation',
    - Affiliated /not affiliated to a religion binary variable
- Detailed 24 hour recall of fruit and vegetable intake
- Physical activity was measured using adapted ‘Allied Dunbar National Fitness Survey’
- Self -reported seven day point prevalence abstinence
- Detailed questioning on frequency and quantity of alcohol consumed

Sample Characteristics

Religion		Not affiliated (n=817)		Affiliated (n=5953)	
		mean	(SD)	mean	(SD)
age (years)		40.6	(16.4)	51.3	(18.4)
BMI (kg/m^2)		26.38	(5.10)	27.24	(5.02)
Portions of fruit and vegetables		3.4	(2.6)	3.6	(2.4)
Alcohol units drunk on heaviest day, in last 7 days		6.1	(6.4)	4.6	(5.0)
Number of days consuming alcohol in last 7 days		3	(2)	2	(2)
GHQ-12 score		1.3	(2.5)	1.3	(2.5)
Smoking status:	current smoker	30.2	% frequency	20.7	% frequency
	ex-smoker	21.9		28.1	
	never-smoker	47.9		51.1	
Social status:	manual worker	64.2		59.2	
	non-manual worker	35.8		40.8	
Ethnicity:	White	96.1		91.5	
	Mixed ethnic group	0.9		0.5	
	Black or Black British	1.1		2.6	
	Asian or Asian British	1.0		4.4	
	Any other ethnic group	0.9		0.9	
Gender:	Men	51.5		40.9	
	Women	48.5		59.1	
Physical activity level:	Low	29.8		39.6	
	Medium	36.1		33.1	
	High	34.1		27.3	

Multivariate linear regression modelling

Model		Regression Coefficients	95% Confidence Interval		P value	P for R^2 change
			Lower	Upper		
1	(Constant)	26.485	26.232	26.737		
	Religious affiliation	0.727	0.446	1.007	<0.001	
2	(Constant)	25.496	24.824	26.167		<0.001
	Religious affiliation	0.336	0.048	0.623	0.022	
3	(Constant)	25.275	24.585	25.964		
	Religious affiliation	0.343	0.055	0.630	0.019	0.005
	Alcohol units heaviest day	0.038	0.011	0.064	0.005	
4	(Constant)	25.565	24.868	26.262		<0.001
	Religious affiliation	0.312	0.025	0.599	0.033	
	Days in last 7 had a drink	-0.125	-0.173	-0.077	<0.001	
5	(Constant)	25.490	24.774	26.206		0.371
	Religious affiliation	0.311	0.024	0.598	0.034	
	Portions of fruit and vegetables	0.021	-0.025	0.066	0.371	
6	(Constant)	25.301	24.572	26.031		<0.001
	religious affiliation	0.278	-0.009	0.564	0.058	
	Ex-smoker (ref category: smoker)	1.077	0.749	1.405	<0.001	
	Never-smoker	0.514	0.228	0.799	0.000	
7	(Constant)	25.751	24.985	26.517		<0.001
	Religious affiliation	0.287	0.001	0.573	0.049	
	Medium physical activity level	-0.229	-0.498	0.040	0.095	
	High physical activity level	-0.806	-1.097	-0.516	<0.001	

Separate analysis within each smoking category

		Regression Coefficients	95% Confidence Interval		
			Lower Bound	Upper bound	P value
Smokers unadjusted analysis	(Constant)	26.072	25.613	26.532	
	Religious affiliation	0.322	-0.210	0.854	0.236
Ex-smokers unadjusted analysis	(Constant)	27.684	27.165	28.203	
	Religious Affiliation	0.376	-0.188	0.940	0.192
Never-smokers unadjusted analysis	(Constant)	26.193	25.821	26.565	
	Religious Affiliation	0.922	0.511	1.332	<0.001
Never-smokers adjusted analysis*	(Constant)	25.809	24.755	26.863	
	Religious Affiliation	0.459	0.043	0.876	0.031

Summary

- 0.73kg/m2 higher BMI
- More than half (54% 0.39kg/m2) explained by demographic confounding variables.
- Little effect of alcohol, fruit and vegetables, physical activity
- Less smoking accounted for 0.06kg/m2
- However among never smokers, but not among smokers or ex-smokers, a significantly higher BMI of 0.45kg/m2 in those affiliated to a religion remained unexplained.

Strengths

- Large representative sample
- Consistent with high quality cross sectional studies in the US show religion positively associated with BMI

Limitations

- Nominal religious affiliation
  - No account of intrinsic or extrinsic religiosity
  - Higher BMI associated with religious affiliation, but a lower BMI, in women, was associated with religious importance (Kortt & Dollery, 2012)
- Health behaviour measures - self reported
- No measure of dietary energy consumption
- No temporality, dose response

Application

- Further research needed to confirm greater BMI with religion
  - Prospective studies
  - Better measures of religiosity
- Explore the role of dietary energy intake
  - Is food over celebrated in religion to compensate for less smoking and alcohol?
  - Is this something that needs to be addressed in interventions?