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Association between Health Behaviours and Religion in Austrian High School Pupils—A Cross-Sectional Survey

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Abstract: The prevalence of risk factors for chronic diseases such as smoking, alcohol abuse, low fruit and vegetable consumption, and lack of physical activity is high among young adults. Health behaviours are influenced by many factors and also by religious orientation, as American studies show. The aim of the present study was to explore whether a similar association with religion exists in Austria (Europe). A cross-sectional survey was carried out in seven randomly selected high schools, whereby a total of 225 11th-grade pupils (64% girls, 36% boys; average age 16.4 years) were surveyed by means of an online questionnaire. The study reveals a positive association between religion and healthy food choices as well as meal patterns. Smoking (number of cigarettes smoked daily) and alcohol consumption (getting drunk) was negatively associated with religion. These negative associations remained after adjusting for confounding factors using logistic regression analysis. Thus, the study showed that religion is associated with a reduction in these risky health behaviours in Austrian high school pupils. However, due to the limitations of the study design, causality cannot be inferred.

Keywords: health behaviours; adolescents; religion

1. Introduction

There is evidence that many chronic diseases, such as cardiovascular disease, cancer, diabetes mellitus, obesity and lung disease are largely influenced by lifestyle factors such as smoking, physical inactivity, alcohol use and an unhealthy diet (Danaei et al. 2009; Lopez 2006; Albers 2012). Ford et al. (2009) found that never smoking, having a body mass index lower than 30, performing 3.5 h or more physical activity per week and eating a healthy diet reduces the risk of developing a chronic disease by 78%. In a longitudinal study across several European countries (Belgium, Denmark, France, The Netherlands, Switzerland), Knoops (2004) showed that adherence to a Mediterranean diet and healthy lifestyle is associated with more than a 50% lower rate of all-cause and cause-specific (coronary heart disease, cardiovascular diseases, and cancer) mortality. This positive impact of a healthy lifestyle on mortality was also found by Khaw et al. (2008) in the EPIC-Norfolk prospective population study, which showed that four health behaviours combined (not smoking, being physically active, having a moderate alcohol intake and a fruit and vegetable intake of at least five servings a day) predict a 4-fold difference in total mortality, with an estimated impact equivalent to 14 years of life saved as a result of these health behaviours.

Health behaviours developed during adolescence often persist into adulthood (Wang et al. 2008; Paul et al. 2008). Furthermore, the prevalence of certain risk factors such as smoking, alcohol abuse, low fruit and vegetable consumption, and lack of physical activity is high among young people in Europe (Ramelow et al. 2011; Currie 2012). These lifestyle factors influence one another and are further affected by social and environmental factors (Ramelow et al. 2011; Ludwig Boltzmann Institut 2006). Causal pathways on health are depicted by Dahlgren and Whitehead (Whitehead and Dahlgren 1991) in their rainbow model of the main determinates of health which shows that health status results from a wide variety of factors, both directly and indirectly. These are firstly age, gender and genetic factors, secondly individual lifestyle factors such as smoking, alcohol use and diet, thirdly social and community networks such as family and friends, fourthly living and working conditions such as access to drinkable water, fast food and transport and fifthly socio-economic status, cultural and environmental factors such as climate, and political situation. Therefore, it is necessary to focus on improving health holistically and not focus simply on a single risk factor. Thus, youth care needs integrated health promotion (Mur and Leurs 2006).

Considering lifestyle as a whole also includes religious aspects. Religiosity/spirituality has been shown to be associated with an 18% reduced risk of mortality in healthy populations suggesting a protective effect of religious and spiritual involvement on longevity (Chida et al. 2009). Koenig et al. (2001, 2011) present a scientific model showing causal pathways from religion to physical health. Religion is conceptualized as individual's belief in, relationship with, and attachment to God or a higher power. Koenig illustrates that health can be directly and indirectly influenced by religious beliefs. Positive religious coping is associated with a reduction in stress and therefore with better physical and mental wellbeing. This may lead to improved health behaviours and reduced reliance on maladaptive coping strategies such as disordered eating, excessive alcohol consumption and smoking. Furthermore, low social acceptability of smoking and drinking alcohol in religious communities may result in lower prevalence of these unhealthy behaviours.

There is a growing body of evidence supporting this model (Koenig et al. 2001, 2011). Furthermore, studies that examine the relationship between religion and health behaviours during adolescence, when independent lifestyle choices are often made are increasing in recent years. Wallace and Forman (1998) investigated a sample of 5000 high school students. They found a positive association between religion (measured religious importance, attendance and denominational affiliation) and a healthy diet (how often students have breakfast, green vegetables, and fruit). Similar results have been published by Bowen-Reid and Smalls (2004) and also by Callaghan (2006). Nagel and Sgoutas-Emch (2007) identified a significant positive association between religious involvement (spiritual experience, praying and church attendance) and physical activity in adolescents as well as a negative correlation with alcohol consumption. The protective influence of religiosity on alcohol use is in line with many other studies (Porche et al. 2015; Nonnemaker et al. 2003; Dunn 2005; Brown et al. 2001b). However, there are reported differences between ethnic groups, for example religious service attendance predicts alcohol use in black adolescents, while religious fundamentalism is the most predictive factor in white adolescents (Brown et al. 2001a). No dose-response associations have been found (Steinman et al. 2008). Furthermore, Wallace and Forman (1998) as well as Dunn (Dunn 2005) show results concerning the positive impact of religion on cigarette smoking. This is in line with Brown et al. (2001b). They analysed nationally representative data collected from 22 consecutive cohorts of high school seniors from 1976 to 1997. The authors investigated the associations between risk and protective factors for substance use. They found that religion (measured by religious attendance and importance) is negatively associated with smoking. Additionally, they indicate that religion is the strongest predictor determining cigarette use.

Most of these studies in adolescents have been carried out in the United States (US). Europe is generally lacking studies on religion and health behaviours although Bosnia and Germany have

been involved in a study that investigating adolescent religiosity and psychosocial functioning (Stolz et al. 2013). However, there are significant differences in the religious characteristics of European populations compared to those in the United States (US) which warrants investigation of the associations between religion and health within Europe. The US is predominantly protestant (Bertelsmann Stiftung 2009; Wallace and Forman 1998) whereas Austria is predominantly Roman Catholic (Bertelsmann Stiftung 2009; Goujon et al. 2017). However, this landscape is changing, in 2001 3/4 of the Austrian population was Roman Catholic but in 2016, this had fallen to 2/3 with rising secularization. Seventeen percent of the Austrian population were estimated to be non-religious in 2016, compared to only 12% in 2001. Additionally, religious diversity has increased. For example, the number of Orthodox Catholics has more than doubled from 2% to 5%, and the number of Muslims has doubled from 4% to 8% between 2001 and 2016 (Goujon et al. 2017).

The aim of the present study was to explore the association between religion and health behaviours in an Austrian sample of adolescents, contributing to the lack of European studies.

2. Methods

2.1. Design and Sample

A cross-sectional survey including seven randomly sampled high schools out of 23 in the province of Carinthia in Austria was conducted. Random sampling was carried out using the Microsoft Excel for Mac 2011 RAND function. All 11th-grade classes of the chosen schools were included in the study. Thus, the sample contained 13 classes and 225 11th-grade pupils in total, who were surveyed by an online questionnaire.

The study was approved by the ethic commission of the Medical University of Graz and the school inspectors for Carinthia. Parental approval was also obtained by teachers of the classes. The pupils were provided with information about the study and written instructions. Furthermore, a declaration of consent prior to the survey was obtained. The participation was voluntary and anonymous. Parents and pupils were informed that not participating would not have disadvantages. The online questionnaire lasting 10–15 min was completed during a school lesson.

2.2. Data Collection

The online questionnaire was implemented with assistance of SoSci Survey (Leiner 2012) and comprised 60 items in total. Measures of health status, health behaviours and religiosity were collected using validated instruments where possible or questions based on well-established questionnaires within the adolescent population as described below. Permission was obtained for the use of each questionnaire. The survey was piloted on a convenience sample of eight young people (17–22 years) of one city of Carinthia and found to be easy to complete.

Eating behaviour: Firstly, using the food frequency questionnaire of the well-established World Health Organization collaborative cross-national Health Behaviour in School-aged Children Survey (WHO-HBSC-Survey) (World Health Organization 2012; Ludwig Boltzmann Institut 2006), the following questions were asked: "How many times a week do you usually drink fruit juice or eat fruit, vegetables/salad, cereal products, brown/whole-grain bread, white bread, French fries, red meat, sausages, chicken/turkey, fast-food, fish, crisps/chips/salt sticks, sweets/chocolates, sweetened soft drinks/energy drinks, ice tea and soft drinks without sugar? Answers were based on a 6-point Likert-type scale ranging from 1 = never to less than once a week, 2 = once a week, 3 = 2–4 days a week, 4 = 5–6 days a week, 5 = once a day/every day and 6 = more than once a day. For correlational analysis, a 'healthy eating' food frequency score was generated putting together positive items (fruit/vegetable/salad, brown bread/whole grain bread) and negative items (French fries, fast food, chips, soft drinks/energy drinks and ice tea) with reversed scoring (Cronbach's Alpha > 0.79). The possible range was 0 to 48. For logistic regression analyses responses were combined

into binary outcomes. High Fruit and Vegetable Consumption means consuming at least one serving of fruit or vegetables a day, while low says neither fruit nor vegetable a day.

Secondly, the frequency of eating main meals (more than only a glass of beverages, an apple, a hamburger or other snacks) was assessed with six questions based on the WHO-HBSC-Survey 2002 (Ludwig Boltzmann Institut 2006). These were: On how many weekdays (0–5) do you usually eat breakfast (question 1), dinner (question 2) supper (question 3)? And on how many weekend days (0–2) do you usually eat breakfast (question 4), dinner (question 5) supper (question 6)? A meal frequency score with a possible range from 0 to 21 was calculated, for analysis of correlations. In terms of binary outcomes for logistic regression analyses high Main Meal Frequency refers to at least two a day main meals, while low refers to less than two main meals a day.

Disordered Eating: To assess indication of an eating disorder, a German version (Hölling and Schlack 2007) of the SCOFF-Questionnaire (Luck et al. 2002; Morgan et al. 1999) was used. It is a brief tool (five items) designed to screen for eating disorders and has been shown to have excellent validity and reliability (Luck et al. 2002). Two or more positive answers to the five questions were suggestive of disordered eating.

Physical activity: Questions about physical activity were based on the well-established German Health Interview and Examination Survey for Children and Adolescents (KiGGS) (Lampert et al. 2007). Two questions were asked to gauge the extent of physical activity. These were firstly "How often are you physically active in your leisure time, so much that you get out of breath or sweat?" Responses were based on a 6-point Likert-type scale ranging from 1 = never, 2 = 1–2 times per month, 3 = 1–2 times per week, 4 = 3–5 times per week, 5 = once a day and 6 = more than once a day. The second question asked: "How many hours per week are you usually [this] physically active?"

Cigarette smoking habits: The questions about cigarette smoking habits were also based on the KiGGS Survey (Lampert and Thamm 2007). The following questions were asked: "Are you currently smoking?" (Yes/No) And: "If yes, how often do you smoke?" Response possibilities were 1 = no [I don't smoke], 2 = less than once a week, 3 = once a week, 4 = several times a week, 5 = once a day and 6 = more than once a day. An additional question was "If yes, how many cigarettes do you smoke a day, a week, a month? Answers were calculated on a fractional basis to calculate the daily number of cigarettes smoked. In terms of binary outcomes for logistic regression analyses high Number of cigarettes smoked daily refers to two or more cigarettes daily, while low refers to less than two cigarettes daily.

Alcohol drinking behaviour: Based on the WHO-HBSC-Survey 2002 (Ludwig Boltzmann Institut 2006). The questions were: "Have you ever had so much alcohol that you were really drunk?" Response options were: No, once, 2–3 times, 4–10 times, 11–20 times, more than 20 times. A previous study has suggested that the frequency of drunkenness has a better prediction power of problematic behaviour than the frequency of alcohol consumption per se (Ludwig Boltzmann Institut 2006). In terms of binary outcomes for logistic regression analyses high Drunkenness Frequency refer to being drunk more than once in their lifetime, while low refers to no drunken episodes.

Religiosity: Religiosity was assessed using the Centrality of Religiosity Scale (CRS) which consists of 10 items (CRS-10) (Huber and Huber 2012; Huber 2004). It measures five dimensions of religion: public practice, private practice, religious experience, ideology and intellectual interest (two questions for each). Therefore, the CRS measures intrinsic religiosity as well as extrinsic religious involvement and is suitable for interreligious studies (Huber and Huber 2012). Answers are scored from 1 to 5 based on perceived level or importance and frequency of engagement. In the calculation of the CRS-Score, the total score is divided by the number of items resulting in a range of the CRS-Score between 1.0 and 5.0. (Huber and Huber 2012). The total score (CRS-Score) was used for correlation and regression analysis, additionally scores of each dimension were used for correlation analysis.

Other variables: A stress-score was used as a confounding variable. This stress-score included two questions assessing perceived stress frequency, "How often do you feel stress?" with eight response

options, and perceived stress intensity, "How intensely do you feel this pressure?" with response options from 0 to 10.

Demographic questions included gender, age (years), and religious affiliation (10 options: Roman Catholic; Lutheran; old Catholic; Evangelical Free Churches; Jewish; Jehovah witness; Seventh-day Adventist; Islam; other denomination and no denomination).

2.3. Statistical Analyses

Descriptive statistics were conducted to present sample characteristics. Gender differences between health behaviours for dichotomous categories were estimated with Chi-squared (presented with *p* values).

Associations between health behaviours and religiosity were calculated using Spearman correlations with scores and Likert-type scales as described above. Multiple logistic (due to lack of linearity and data not being normal distributed) regression models were used to determine the magnitude of association between religiosity and health behaviours. For each of these analyses responses regarding each health behaviour were combined into binary outcomes. Four separate models with binary/dichotomous health behaviour variables (High/Low Fruit and Vegetable Consumption, High/Low Main Meal Frequency, High/Low Drunkenness Frequency and High/Low Cigarette Smoking Number as described above) as the outcome variable and the CRS-Score as the independent variable were performed. These were adjusted for gender and stress. In a further step, all health behaviour variables that were correlated with the outcome variable were entered into the model. Significance for regression models were set at 0.01 level according to Bonferroni correction ($\alpha = 0.05/4$). Statistical analyses were conducted using SPSS 20.

The sample size has been calculated a priori using G*Power (Faul et al. 2011) which showed that 55 individuals were needed to achieve 80% power to significantly identify an effect size of 0.35, using an α error probability of 0.01 and 4 predictor variables in the regression analyses.

3. Results

3.1. Sample Characteristics

From the 225 pupils recruited, 5 (2.2%) dropped out or did not complete the questionnaire seriously. As this drop-out rate was low, analysis was conducted on the 220 pupils who completed the questionnaire appropriately. The mean age of these pupils was 16, most were female and affiliated to the Roman Catholic denomination (Table 1).

Table 1. Sample characteristics (gender, religion, mean age with standard deviation) by schools.

School	Total		Gender		Religion						Age	
			Female	Male	rk	lu	efc	is	or	no	Years	
	n	%	*n*				*n*				m	SD
1	26	11.8	21	5	20	1	1	0	0	4	16.2	0.43
2	38	17.3	29	9	23	2	1	0	2	10	16.6	0.64
3	18	8.2	18	0	16	1	0	0	0	1	16.5	0.62
4	61	27.7	35	26	43	9	2	3	1	3	16.3	0.55
5	35	15.9	16	19	26	4	1	0	3	1	16.4	0.60
6	18	8.2	6	12	11	6	0	0	0	1	17.4	0.50
7	24	10.9	15	9	19	0	0	0	1	4	16.2	0.51
total	220		140	80	158	23	5	3	7	24	16.4	0.64

rk = Roman Catholic; lu = Lutherian; efc = Evangelical Free Church; is = Islam; or = Other religion (Greek orthodox, Buddhism); no = No religion.

3.2. Health Related Variables and Religiosity Scores of the Total Sample and by Gender

The sample had a mean CRS-Score of 1.41 (possible range 1–5) which was significantly lower in males than females with a mean difference and 95% CI of 0.26 [0.04–0.48]. While the stress score and also the healthy eating score were significantly higher in females than in males, the main meal frequency score was significantly lower in this subgroup.

A higher proportion of the total sample fell into the higher risk categories for episodes of drunkenness and levels of physical activity. Responses differed significantly by gender, proportionally more males were drunk more often and proportionally more females had lower levels of physical activity. For fruit and vegetable consumption, meal frequency, smoking status, and disordered eating the majority of the sample fell into the lower risk categories. While proportionally more males eating meals more often and exhibiting less disordered eating than females, proportionally more females ate greater amounts of fruit and vegetables than males (Table 2).

Table 2. Percentage frequency of transposed dichotomous health related variables of total sample and by gender.

	Total sample N = 220	**Females N = 140**	**Males N = 80**	**Difference between Males and Females**
	***n* (%)**	***n* (%)**	***n* (%)**	***p* Value ****
Fruit and Vegetable Consumption				
0 (High) = at least once a day	113 (51.4)	83 (59.3)	30 (37.5)	0.002
1 (Low) = none a day	107 (48.6)	57 (40.7)	50 (62.5)	
Main Meal Frequency				
0 = (High) at least 2 a day	154 (70)	91 (65.0)	63 (78.8)	0.032
1 = (Low) less than 2 a day	66 (30)	49 (35.0)	17 (21.2)	
Eating Disorder (Scoff-Score)				
0 = not suggestive of Eating disorder	165 (75)	93 (66.4)	72 (90.0)	<0.001
1 = suggestive of Eating disorder	55 (25)	47 (33.6)	8 (3.6)	
Cigarette Smoker				
0 = non-smoker	153 (69.5)	97 (69.3)	56 (70.0)	>0.5
1 = smoker	67 (30.5)	43 (30.7)	24 (30.0)	
Number of cigarettes smoked daily *				
0 = (Low) less than 2 Cigarettes daily	30 (44.8)	23 (53.5)	7 (29.2)	0.55
1 = (High) 2 or more Cigarettes daily	37 (55.2)	20 (46.5)	17 (70.8)	
Drunkenness Frequency				
0 = (Low) never or only once in lifetime	88 (40)	65 (46.4)	23 (28.8)	0.01
1 = (High) more than once in lifetime	132 (60)	75 (33.6)	57 (71.3)	
Physical Activity Frequency				
0 = at least 3 times a week	101 (45.9)	55 (39.3)	46 (57.5)	0.009
1 = less than 3 times a week	119 (54.1)	85 (60.7)	34 (42.5)	

* n = 67 only smokers (female n = 43, male n= 24); ** p-values calculated with Chi-square, tested 2-tailed.

3.3. Association between Health, Health Behaviours and Religion

There were significant weakly positive correlations between CRS-Score and Healthy Eating Score as well as Main Meal Frequency Score. There were significant weak to moderate negative correlations between CRS-Score and the Cigarette Smoking Number and Drunkenness Frequency (Table 3). Thus, for these behaviours a logistic (data not normally distributed) regression model was performed following the transformation into binary outcomes (Table 2).

Table 3. Spearman Correlation Coefficients for health behaviours and domains of religiosity.

	CRS-Score	Intellect	Ideology	Private	Experience	Public
Healthy Eating-Score	**0.141** *	0.08	0.03	0.179 **	0.02	0.138 *
Main Meal Frequency-Score	**0.135** *	0.140 *	0.08	0.07	0.135 *	0.09
Scoff-Score	0.12	0.01	0.55	0.203 **	0.06	0.12
Cigarette Smoking Frequency	−0.12	−0.03	−0.09	−0.13	−0.11	−0.08
Cigarette Smoking Number	**−0.480** **	−0.13	−0.298 *	−0.459 **	−0.403 **	−0.461 **
Drunkenness Frequency	**−0.285** **	−0.10	−0.195 **	−0.296 **	−0.231 **	−0.195 **
Physical Activity Frequency	0.03	0.03	−0.02	−0.03	0.09	0.05
Physical Activity Duration	0.04	0.03	−0.04	0.02	0.07	0.12

Note: Bold numbers show significant correlations between the total Centrality of Religiosity Scale-Score (CRS-Score) and health behaviour (* $p < 0.05$; ** $p < 0.01$.).

3.4. Strength of Association between Health, Health Behaviour and Religiosity

The results of the adjusted binary logistic regression analyses indicate that the CRS-Score was significantly associated with cigarette smoking and frequency of drunkenness. For every unit increase in religiosity (meaning having a higher religiosity by one point on the CRS-Score), the likelihood of getting drunk (never or only once in life compared to more than once) was reduced by 5% (Table 4). For every unit increase in religiosity, the likelihood of smoking two or more cigarettes daily is reduced by 10% (Table 4).

Table 4. Logistic regression models for the association between religiosity and health behaviours.

		OR	95% CI		Sig
Drunkenness (High/Low)	CRS-Score (adjusted for gender and stress)	0.95	0.92	0.99	0.006
	CRS-Score (adjusted for gender, stress and other health behaviours)	0.95	0.91	0.99	0.010
Fruit and Vegetable Consumption (High/Low)	CRS-Score (adjusted for gender and stress)	1.00	0.97	1.04	n.s.
Main meal frequency (High/Low)	CRS-Score (adjusted for gender and stress)	0.97	0.94	1.01	n.s.
Number of Cigarettes smoked * (High/Low)	CRS-Score (adjusted for gender and stress)	0.89	0.82	0.96	0.002
	CRS-Score (adjusted for gender, stress and other health behaviours)	0.90	0.83	0.97	0.005

Note: CRS-Score = Centrality of Religiosity Scale-Score; * in smokers only $n = 67$.

Furthermore, the results of the binary logistic regression models show that fruit and vegetable consumption and main meal frequency is not significantly associated with the CRS-Score (Table 4).

4. Discussion

4.1. Main Findings

The aim of this study was to evaluate associations between health and risk behaviours with religion in adolescents in Carinthia, an Austrian province. Logistic regression analyses in our study confirmed that religiosity (CRS-Score) was significantly associated with the number of cigarettes smoked daily and of problem drinking (drunkenness). After controlling for gender, stress perception (stress-score) and other related health behaviours, this relationship remained significant. After adjustment of confounders, we found no significant association between religiosity and eating behaviours, neither for healthy eating nor for frequency of main meal consumption. This suggests that the association we found between eating behaviours and religiosity was explained by our confounding variables of gender, stress.

4.2. Consistency of Findings

We found that among smokers, those with higher CRS-Score smoked less cigarettes daily. However, frequency of smoking in our study was not associated with religiosity. Nagel and Sgoutas-Emch (2007) and Marsiglia et al. (2011) did not find any association with smoking amongst pupils from a Roman-Catholic background and suggested this could be due to the low prevalence of smokers in this population in general. Dunn (2005) found those who considered religion as important were significantly less likely to be a current smoker (OR = 1.47; 1.40). This was in an American 86.9% white population with data from the Monitoring the Future survey, a continuing study of American youth. Brown et al. (2001b) also found that religion (measured by religious attendance and importance) is negatively associated with smoking and the strongest predictor determining cigarette use. Nonnemaker et al. (2003) indicate that both public and private religiosity are protective factors against cigarettes and alcohol use. Concerning alcohol use, this is in line with Nagel and Sgoutas-Emch (2007). They found a lower prevalence in those who felt religion was important. The authors investigated the association with frequency of alcohol use. Our result showed no reduction of frequency of alcohol use with religiosity, however, there were fewer episodes of drunkenness in those with higher religiosity scores.

After adjusting for confounding variables, we found no association between religiosity and eating behaviours. Wallace and Forman (1998) found a positive association between religion and a healthy diet (how often students have breakfast, green vegetables, and fruit). Methodically, there are several similarities in comparison with our study, for example the use of self-administered questionnaires during a normal class period and the measure of religion by means of a multidimensional construct. However, there are several differences. Wallace and Forman use a less diverse measure (religious importance one question: How important is religion in your life?), attendance (one question: How often do you attend religious services?), and denominational affiliation (questions about religious preference). In contrast, our measure of religion included 5 dimension within the CRS-Score. Furthermore, our sample of 220 11th-grade pupils may not have been large enough to detect subtle associations. In contrast, Wallace and Forman's study was conducted in a national representative sample of 5000 high school students. Additionally, we may not have had a sufficient spread of religiosity within our sample to detect differences. In Wallace and Forman's study, religion was unimportant for 14.4% of their sample, but 37% of our sample were not religious, 32.1% considered religion very important in their study but in our study only 6 pupils (2.7%) have described themselves as "highly-religious". It might be that in our study, the association of religion and eating behaviour could not be found due to the small number of highly religious participants.

In this regard, it is important to discuss the religious demographics in Austria. We assumed differences in religiosity between Austria and the US. The US population is characterized by more protestant Christians and higher levels of religiosity (Huber and Huber 2012; Bertelsmann Stiftung 2009; Wallace and Forman 1998). However, we did not expect such a low religiosity score. Namely, 37% of the Carinthia 11th-grade high school pupils described themselves as not-religious according categorization of the CRS-Score (Huber and Huber 2012). This implies a mean CRS-Score of 1.41 in our sample. In contrast, the validation study of the CRS-Score in Austria shows a mean score of 2.93 (Huber and Huber 2012). The validation study scores were derived from the Religion Monitor Project in 2008, which compared religiosity across 21 countries (Bertelsmann Stiftung 2009). In that investigation, a representative sample of Austrian population were surveyed. However, our sample was less diverse than the wider Austrian population and its homogeneity in terms of age, school attendance and religion. This fact may have been the reason for the low religiosity we found. Adolescents in particular are less religious than the rest of the population. The Religion Monitor Project describes 20% of the overall population of Austria as highly religious and 52% as somewhat religious, while the corresponding figures for young adults are only 5% and 53% respectively. Thirty-nine percent of young people are nonreligious, compared with only 25% of the whole population. These results are in line with an Austrian-wide

youth survey (14 to 29 year old sample) conducted in 2011 (Heinzlmaier and Ikrath 2012). Where, questions on religiosity were based on a scale with 10 categories ranging from not religious to very religious. The results show that 72% of the young people scored themselves as low on religiosity (scale range between 1–5) and 28% as more religious (scale range between 6–10). Taking a closer look at the extreme values, 22% of these young people stated that they are not-religious and similar to our findings only 3% identified themselves as very religious.

Another fact that should be considered is the low effects of significant association we found. This might be because of the multi-factorial determinants of health behaviour of which religiosity is only one. We did not consider many other psychosocial determinants of health in our study. In Austria, a positive family situation (with a loving and affirming atmosphere), and a positive school environment (school satisfaction, good relationships with others, low levels of school pressure and high school performance) is positively associated with health in general, healthier eating behaviours and less substance use (Ramelow et al. 2011). Callaghan (2006) also investigated factors influencing adolescent's healthy behaviours. For example, he found significant relationships between the quality of social relationships, income of parents, religious involvement and healthy behaviours.

4.3. Strengths and Limitations

This study contained a representative sample of Austrian high school adolescents from the province of Carinthia. Random sampling of the high schools was performed to reduce the risk of a regional selection bias. Self-selection bias was also low with only five of the selected pupils (2.2%) not completing the questionnaire. The high response rate may be explained by the time set aside within school lessons to complete the questionnaire. Attention was given to clear and easily understandable written information for teachers and students to reduce the risk of information bias. However, it has to be mentioned due to the fact that we focused only on 11th grade high school pupils, the student population was quite homogenous in terms of the education as well as religious affiliation with a high percentage of pupils belonging to the Roman-Catholic church. Therefore, it cannot be generalised to those belonging to other religious groups. Nor can the findings be generalised to those adolescents who are not engaged with or attending high school. Kuntz and Lampert (2011) show that health behaviours (smoking, inactivity, alcohol consumption, excessive electronic media usage, and fruit and vegetable consumption) are associated with educational level, therefore it is unsurprising that in our well-educated sample, there was also lower smoking rates than in their large Austrian HBSC study which contained a more representative sample of all adolescents of Austria (n = 6496). This more representative sample included a variety of school types as well as those who had dropped out of school. However, in terms of alcohol consumption, physical activity and disordered eating, we did not find healthier behaviours in our high school pupils. Instead we found the prevalence of health and risk factors in our study comparable to others. Our results regarding excessive alcohol use are in line with results of the Carinthia survey, namely more young men had been drunk four times or more in their lives than young women (14%). Our results for physical activity are similar in both frequency and duration to the German survey (Lampert et al. 2007) which found in the 11 to 17-year-old sample 64.7% of boys and 43.7% of girls who are physically active three times or more often weekly. In the 14 to 17-year-old adolescents group, physical activity was for a duration of 7.8 h per week in males and 4.2 h in females. Rates of physical activity declined with age in both our study and this German survey. We found 25% of young people showed signs of disordered eating (33.6% in girls and 10.0% in boys). These findings are comparable to 30.1% girls and 12.8% boys (n = 6634) in the German survey which also used the SCOFF-Questionnaire that we used (Hölling and Schlack 2007).

This study was limited by our self-reported questionnaires which may have been influenced by social desirability bias. This may be particularly more evident in a school situation where students are usually required in their school work to choose the 'correct answer'. Whether this was more likely for those who were more religious or not is unknown—if it is more likely through a desire to please for those who are more religious, then this could have explained our findings. However, if it is less likely

and those who are more religious are more reflective of their honesty, then our effect size might have been underestimated.

Additionally, we were unable to measure and adjust for all potential confounding factors, as described above, for example psychosocial factors, social-economic status, home and school environment, and peer or social support. If those who were more religious were also of higher social-economic status then this may have explained the relationship. Or such confounders may have mediated the relationship we found, for example, social support from a religious community could explain why more religious adolescents also have healthier behaviours.

Our study is also limited by its cross-sectional design. A lack of temporality means that we cannot prove causality, as we cannot determine the direction of this association. We do not know whether becoming more religious leads to healthier behaviours or whether those who already have healthier behaviours seek out spiritual health through religious engagement, for example.

A larger study would increase the confidence in our results as our study was limited by a relatively small sample size. The a priori power calculation was based on conducting linear regression analysis assuming a normal distribution of variables. However, not all variables were normally distributed therefore we finally conducted a logistic regression analysis. So, our study may have been underpowered to detect small effect sizes. Nonetheless the narrow confidence intervals of our results suggest these are reasonably precise.

5. Conclusions

There is growing evidence for an interaction between religion and health behaviour. Many studies show positive associations with health, health behaviour and even reduced mortality, if a religious lifestyle is practiced in "healthy years" before a disease is developed.

However, there are few studies in adolescents which investigated the associated between religion and health behaviour in Europe. Our study showed that religiosity was associated with less smoking and drunkenness, however it is limited by its cross-sectional design and unmeasured confounding variables. It provides evidence that the relationship between religiosity and health behaviours among adolescents should be explored further. To this end it would be prudent for national surveys, for example the WHO-HBSC-Survey, to include questions on religion and spirituality.

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