Gender differences in the relationship between religiosity and health-related behaviour among adolescents

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ABSTRACT

Background An inverse relationship between religiosity and adolescent health-related behaviour has been repeatedly documented, but evidence regarding gender is scarce. The aim of this study was to assess the association between a wide range of adolescent health-related behaviours and religiosity as well as gender differences in these associations.

Methods Data were collected in 2010 in Slovakia on 3674 adolescents, with mean age of 14.9 years (response: 79.5%). ORs for levels of religiosity, measured by religious attendance and religious salience, were calculated for 15 behaviours, such as the use of various substances, nutritional behaviour and violent behaviour. The authors then assessed the interactions of religiosity and gender on these behaviours.

Results Religiosity was inversely associated with health–risk behaviour in smoking, drunkenness, cannabis use, having breakfast, soft drinks consumption, screen-based activities and sexual intercourse among both genders and in truancy among girls only. This association was significantly stronger among girls than among boys in smoking, drunkenness and cannabis use. Religiosity was unrelated to the consumption of fruits, vegetables and sweets, physical inactivity, tooth brushing, fighting and bullying others in both genders.

Conclusions An inverse relationship between religiosity and health–risk behaviour was found in several behaviours (especially use of substances) but not in other behaviours (violent behaviours in particular). Gender seems to moderate this relationship in smoking, drunkenness and cannabis use. Further research is needed on the mechanisms leading to an association between religiosity and health behaviour and on the strength of this association in other countries and cultures.

INTRODUCTION

An inverse association between adolescent health-related behaviour (HRB) and religiosity has been found in several studies. In a meta-analysis of 40 studies dealing with the relationship between religiosity and constructive and destructive behaviours among adolescents, Cheung and Yeung[1] reported a weak overall association (Z_r=0.173), with less unhealthy and antisocial behaviour among more religious adolescents. Associations with private measures of religiosity (eg, praying or religious salience) were slightly stronger than with public measures of religiosity (eg, religious attendance).

While findings on the inverse association of religiosity with substance use and sexual behaviour are mostly consistent, those on its relationship with delinquent behaviour are more ambiguous. A meta-analysis by Baier and Wright[2] showed a small effect across 60 studies, the majority of which concerned an inverse relationship between a measure of religion and some form of unlawful behaviour. Controversy remains concerning the degree to which this relationship is causal or whether it is the result of other factors, such as personality traits leading to more religiousness and less delinquency.[3–5]

The association of religiosity with other health behaviours, such as nutritional behaviour, sedentary behaviour and physical inactivity, has been only rarely explored among adolescents. Wallace and Forman[6] found a composite measure of healthy nutritional behaviours and exercise to be positively related to religious salience and religious attendance, even after controlling for socio-demographic factors. Moreover, evidence is lacking on gender differences in the religiosity–HRB link among adolescents. Gender has been shown to be an important moderator of the associations of several other social factors with HRB, such as socioeconomic position or degree of urbanisation.[7 8] Zaleski and Schiaffino[9] assessed the effect of gender on the association between religiosity and sexual intercourse among adolescents. They found no statistically significant gender differences regarding this association. Several other studies assessed the association between religiosity and HRB for boys and girls separately but did not test the statistical significance of gender differences in this association, prohibiting further inferences.[10–12]

Finally, a vast majority of the studies dealing with the association of religiosity and HRB among adolescents were conducted in the USA. Only a few covered Western Europe, and, to our knowledge, only two took place in Central Europe. Regarding Central Europe, Piko and Fitzpatrick[13] found a negative relationship in Hungary between smoking, binge drinking and marijuana use, and several indicators of religiosity among boys. Among girls, this relationship was found only between religious attendance and marijuana use. In a subsequent similar study,[14] an association was only found between religious attendance and smoking among boys. Among girls, perceiving oneself as a 'religious person' was related to smoking, binge drinking and marijuana use, and religious attendance was related with binge drinking only.

However, these studies worked with non-nationally representative samples, focused on substance use only, and did not assess the magnitude of the gender differences specifically.

The aim of our study was to fill these gaps by assessing the relationship between HRB and religiosity, as measured by religious behaviour and beliefs, in a broad range of behaviours among a nationally representative sample of Slovak adolescents and by assessing the degree to which gender affects this association.

METHODS

Sample and procedure

Data were collected in May and June 2010 in Slovakia as a part of the Health Behaviour in School-Aged Children Research Project. Based on a list of schools from the Slovak Institute of Information and Prognosis for Education, 134 schools were chosen randomly after the selection was stratified according to region, type of school (elementary vs grammar) and size of the schools in order to create a nationally representative sample. Of the 108 schools contacted, 106 took part in the survey, representing a 98.1% school response rate. One class per grade from each school was chosen randomly and sampled. The original sample consisted of 8491 adolescents from the fifth to the ninth grade of elementary schools and corresponding grades from grammar schools across Slovakia (response: 79.5%). The most important reasons for non-response were illness (10.3%) and parental disapproval of the participation of their children (7.4%).

Our study was restricted to adolescents from the eight and ninth grades due to the higher prevalence rates in several behaviours among them. Therefore, analyses were performed on a sample consisting of 3674 adolescents (mean age ± SD =14.98±0.66 years; 48.7% boys). Questions on marijuana use and sexual intercourse were included only in the ninth grade questionnaires. Therefore, in the case of these variables, analyses were performed on a smaller sample (1784 adolescents; mean age ± SD =15.48±0.45 years; 48.0% boys).

The questionnaire was completed in the respondents' classrooms during regular class time under the guidance of trained field workers and on a voluntary and anonymous basis in the absence of teachers. Parents were informed about the study by the school administration and could opt out in case of disagreement. No explicit incentives were provided for participation.

Measures

Socio-demographic measures included gender, age and five indicators of family and social background: parental divorce, parental education, the composite score of Family Affluence Scale II,[15] the degree of urbanisation categorised according to the latest HBSC School Level Questionaire[16] and the language spoken at home as a proxy measure for ethnicity.

Religiosity was measured by two separate indicators: frequency of attending church or religious sessions (religious attendance) and self-rated importance of religious faith to one's own life (religious salience). For religious attendance, the wording of the question was 'How often do you go to church or to religious sessions?' with possible answers: several times a week/approximately once a week/approximately once a month/a few times a year/never. Those who reported attending religious sessions at least once a week were considered as attending. For religious salience, the wording of the question was 'How important would you say your religious faith is for your life?' with a scale from 1 to 7, where 1 was defined as 'not important at all', 4 as 'neither important nor unimportant' and 7 as 'absolutely important'. The remaining options of the scale (2, 3, 5 and 6) were not defined by words. Those who scored at least 5 were considered as persons with high religious salience.

Following the aforementioned cut-offs, about 40% of boys and 50% of girls were classified as religious by religious attendance and religious salience (table 1). In about 25% of all adolescents, their religiosity according to these dichotomisations was not consistent: they either attended but reported low religious salience or vice versa (data not presented). Therefore, the two measures were also combined, resulting in four groups: (1) not attending and with low religious salience (the least religious group); (2) attending but with low religious salience; (3) not attending but with high religious salience; (4) attending and with high religious salience (the most religious group).

HRB concerned unhealthy or antisocial behaviour: recent smoking and drunkenness, lifetime cannabis use, no regular breakfast, no regular consumption of fruits and vegetables, consumption of sweets and soft drinks, physical inactivity, screen-based activities, insufficient tooth brushing, sexual intercourse, truancy, fighting and bullying others. These behaviours were dichotomised according to the cut-offs in the latest Health Behaviour in School-aged Children International Report,[17] if available. In cigarette smoking and drunkenness, the indicator for unhealthy behaviour was recent use, that is, at least once during the past 30 days. In cannabis use and sexual intercourse, the indicator was having had the experience of sexual intercourse at least one time. For the remaining behaviours, cut-offs concerned regular occurrence: having breakfast less than on every school day ('no regular breakfast'), fruits consumption less than daily ('no regular fruits consumption'), vegetables consumption less than daily ('no regular vegetables consumption'), sweets consumption at least daily ('sweets consumption'), soft drinks consumption at least daily ('soft drinks consumption'), 60 min of moderate-to-vigorous physical activity less than daily during the past 7 days ('physical inactivity'), at least 6 h of screen-based activities (the sum of TV watching, electronic games and other PC activities) altogether per weekday ('screen-based activities'), tooth brushing less than twice a day ('insufficient tooth brushing'), skipping at least a whole school day at least three times in the past 12 months without a proper justification ('truancy'), at least three physical fights in the past 12 months ('fighting') and bullying others at least two or three times a month for ('bullying others').

Statistical analyses

We first computed prevalence rates for the 15 behaviours, overall and by category of religiosity. As we intended to explore gender differences in the relationship between HRB and religiosity, we also computed these prevalence rates for boys and girls separately. Next, we computed age-adjusted ORs and 95% CIs for religiosity groups, using the least religious group—'not attending and with low religious salience'—as reference group for each gender. In order to control for the effects of potential confounders, we repeated the analyses while adjusting for age and also for parental divorce, parental education, family affluence, degree of urbanisation and ethnicity. In these analyses, we used the composite categorical measure of religiosity. In addition, we repeated this with the inclusion of the two non-dichotomised measures of religiosity to assess whether findings were similar for continuous-level measures of religiosity. Finally, we analysed the interactions of the effects of gender and religiosity on HBR for the four levels of religiosity using a logistic

Table 1 Frequencies and percentages for both measures of religiosity and the combined groups, and for health-related behaviour, for both genders separately

	Boys (n)	Valid %	Girls (n)	Valid %	p Values
Religious attendance					<0.001
Not attending (less than once a week or never)	1012	58.7	942	51.1	
Attending (at least once a week)	713	41.3	902	48.9	
Missing	65	—	40	—	
Religious salience (scale 1–7)					<0.001
Low religious salience (score 1–4)	1032	60.3	948	51.6	
High religious salience (score 5–7)	679	39.7	890	48.4	
Missing	79	—	46	—	
Attendance and salience combined					<0.001
Not attending + low religious salience	819	48.0	707	38.5	
Attending + low religious salience	210	12.3	239	13.0	
Not attending + high religious salience	188	11.0	231	12.6	
Attending + high religious salience	491	28.7	658	35.9	
Missing	82	—	49	—	
Health-related behaviour					
Recent smoking	540/1783	30.3	501/1881	26.6	0.024
Recent drunkenness	362/1782	20.3	305/1877	16.2	0.006
Lifetime cannabis use (ninth grade only)	189/909	20.8	124/968	12.8	<0.001
No regular breakfast	851/1761	48.3	1084/1865	58.1	<0.001
No regular fruits consumption	1300/1761	73.8	1280/1868	68.5	<0.001
No regular vegetables consumption	1362/1747	78.0	1386/1859	74.6	0.015
Sweets consumption	713/1753	40.7	862/1864	46.2	0.001
Soft drinks consumption	745/1760	42.3	681/1865	36.5	<0.001
Physical inactivity	1284/1761	72.9	1639/1866	87.8	<0.001
Screen-based activities	1005/1638	61.4	874/1793	48.7	<0.001
Insufficient tooth brushing	916/1784	51.3	560/1882	29.8	<0.001
Sexual intercourse (ninth grade only)	135/881	15.3	100/966	10.4	0.004
Truancy	122/1781	6.9	101/1882	5.4	<0.001
Fighting	354/1752	20.2	113/1863	6.1	0.122
Bullying others	334/1760	19.0	201/1875	10.7	<0.001
Total counts	1790	—	1884	—	

regression model, also adjusted for age. Statistical analyses were performed using SPSS V.16.0.

RESULTS

Frequencies and percentages for measures and the combined groups, for both genders separately, are presented in table 1. The prevalence rates for the behaviours varied widely: from 5.4% for truancy (among girls) to 87.8% for physical inactivity (also among girls).

The results of further analyses are presented in table 2. In most behaviours, the prevalence rates in the most religious group were considerably lower than those in the least religious group and the prevalence rates in the partly religious groups were mostly similar to those in the least religious group.

The differences concerned recent smoking, recent drunkenness, lifetime cannabis use, no regular breakfast, soft drinks consumption, screen-based activities, sexual intercourse and truancy. The biggest relative differences were found for sexual intercourse (OR 0.29). Lifetime cannabis use and sweets consumption were the only behaviours where the OR was significantly higher in one of the more religious groups compared with the least religious group. The overall logistic model was not statistically significant in sweets consumption.

Almost all these associations persisted in the most religious group after additional adjustment for parental divorce, parental education, family affluence, degree of urbanisation and ethnicity, without important changes in estimates of the strength of the association. Associations concerned drunkenness (OR 0.74, 95% CI 0.52 to 1.06), cannabis use (OR 0.56, 95% CI 0.39 to 1.10), soft drinks consumption (OR 0.83, 95% CI 0.63 to 1.10) and sexual intercourse (OR 0.59, 95% CI 0.31 to 1.11), all of them only among boys. When the two non-dichotomised measures of religiosity were used, the associations between HRB and religiosity were mostly similar to those in the original analyses with the combined categorised measure (data not shown). The only exception concerned substance use among boys: the examined association was only found if both measures of religiosity were included, indicating a possible interaction between them. After controlling for possible mediators and confounders, the changes in the association between religiosity and HRB were marginal (data not shown).

The ORs of the interaction of gender and religiosity on HRB were only statistically significant in recent smoking, recent drunkenness, lifetime cannabis use and in truancy, where the overall interaction model was not statistically significant (table 3). In all these behaviours, the association between HRB and religiosity was stronger among girls than among boys.

DISCUSSION

The aim of this study was to assess the relationship between HRB and religiosity, as well as gender differences in this relationship. In most behaviours, the most religious group of adolescents behaved less riskily and less unhealthily than the least religious group. However, the groups of adolescents who were either attending or with high religious salience (but not both) did not differ from the least religious group in most behaviours. Moreover, some behaviours were unrelated to religiosity. Regarding the strength and gender pattern of the

Table 2 Prevalence rates for several types of health-related behaviour by religiosity, overall and by gender, associated age-adjusted ORs and 95% CIs and interaction of gender and religiosity regarding the association with health-related behaviour

	Total sample			Boys			Girls			Interaction gender
	N	%	OR (95% CI)	n	%	OR (95% CI)	n	%	OR (95% CI)	× religiosity
Recent smoking										
Not attending + low religious salience	504/1523	33.1	**1*** **	251/817	30.7	**1***	253/706	35.8	**1*** **	***
Attending + low religious salience	141/448	31.5	0.95 (0.76 to 1.19)	72/210	34.3	1.19 (0.86 to 1.64)	69/238	29.0	0.75 (0.55 to 1.04)	
Not attending + high religious salience	116/418	27.8	**0.77 (0.60 to 0.97)***	60/187	32.1	1.06 (0.75 to 1.50)	56/231	24.2	**0.56 (0.40 to 0.79)****	
Attending + high religious salience	230/1145	20.1	**0.51 (0.42 to 0.61)*****	119/488	24.4	**0.73 (0.56 to 0.94)***	111/657	16.9	**0.36 (0.28 to 0.46)*****	
Recent drunkenness										
Not attending + low religious salience	315/1521	20.7	**1*** **	164/815	20.1	**1****	151/706	21.4	**1*** **	**
Attending + low religious salience	100/448	22.3	1.12 (0.87 to 1.45)	53/210	25.2	1.35 (0.94 to 1.94)	47/238	19.7	0.93 (0.65 to 1.35)	
Not attending + high religious salience	81/417	19.4	0.90 (0.68 to 1.19)	48/188	25.5	1.33 (0.92 to 1.94)	33/229	14.4	**0.60 (0.39 to 0.90)****	
Attending + high religious salience	141/1145	12.3	**0.53 (0.43 to 0.66)*****	75/489	15.3	**0.71 (0.53 to 0.96)***	66/656	10.1	**0.41 (0.30 to 0.56)*****	
Lifetime cannabis use (ninth grade only)										
Not attending + low religious salience	157/788	19.9	**1*** **	88/413	21.3	**1****	69/375	18.4	**1*** **	**
Attending + low religious salience	40/209	19.1	0.95 (0.64 to 1.40)	26/100	26.0	1.27 (0.76 to 2.13)	14/109	12.8	0.66 (0.36 to 1.24)	
Not attending + high religious salience	46/220	20.9	1.07 (0.74 to 1.54)	33/102	32.4	**1.78 (1.10 to 2.87)***	13/118	11.0	0.55 (0.29 to 1.04)	
Attending + high religious salience	58/595	9.7	**0.44 (0.32 to 0.60)*****	33/248	13.3	**0.57 (0.37 to 0.88)***	25/347	7.2	**0.34 (0.21 to 0.56)*****	
No regular breakfast										
Not attending + low religious salience	886/1505	58.9	**1*** **	434/805	53.9	**1*** **	452/700	64.6	**1*** **	NS
Attending + low religious salience	227/442	51.4	**0.73 (0.59 to 0.91)****	90/206	43.7	**0.66 (0.48 to 0.90)****	137/236	58.1	0.76 (0.56 to 1.02)	
Not attending + high religious salience	220/412	53.4	**0.79 (0.64 to 0.99)***	85/184	46.2	**0.71 (0.51 to 0.98)***	135/228	59.2	0.80 (0.59 to 1.09)	
Attending + high religious salience	543/1141	47.6	**0.63 (0.54 to 0.73)*****	206/487	42.3	**0.62 (0.50 to 0.78)*****	337/654	51.5	**0.58 (0.46 to 0.72)*****	
No regular fruits consumption										
Not attending + low religious salience	1063/1513	70.3	1	590/811	72.7	1	473/702	67.4	1	NS
Attending + low religious salience	319/444	71.8	1.09 (0.86 to 1.38)	151/206	73.3	1.04 (0.73 to 1.46)	168/238	70.6	1.18 (0.85 to 1.62)	
Not attending + high religious salience	292/412	70.9	1.04 (0.82 to 1.32)	135/183	73.8	1.08 (0.75 to 1.57)	157/229	68.6	1.05 (0.76 to 1.45)	
Attending + high religious salience	814/1134	71.8	1.09 (0.92 to 1.29)	364/482	75.5	1.18 (0.91 to 1.53)	450/652	69.0	1.08 (0.86 to 1.36)	
No regular vegetables consumption										
Not attending + low religious salience	1171/1505	77.8	1	640/804	79.6	1	531/701	75.7	1	NS
Attending + low religious salience	332/436	76.1	0.91 (0.71 to 1.17)	157/201	78.1	0.92 (0.63 to 1.34)	175/235	74.5	0.93 (0.66 to 1.31)	
Not attending + high religious salience	308/411	74.9	0.84 (0.65 to 1.09)	140/183	76.5	0.81 (0.55 to 1.19)	168/228	73.7	0.90 (0.64 to 1.26)	
Attending + high religious salience	850/1133	75.0	0.87 (0.72 to 1.04)	367/483	76.0	0.83 (0.63 to 1.08)	483/650	74.3	0.94 (0.73 to 1.20)	
Sweets consumption										
Not attending + low religious salience	633/1506	42.0	1	311/806	38.6	1	322/700	46.0	1	NS
Attending + low religious salience	211/442	47.7	**1.26 (1.02 to 1.56)***	91/206	44.2	1.28 (0.94 to 1.75)	120/236	50.8	1.20 (0.89 to 1.61)	
Not attending + high religious salience	184/411	44.8	1.13 (0.91 to 1.41)	78/182	42.9	1.23 (0.88 to 1.70)	106/229	46.3	1.00 (0.74 to 1.36)	
Attending + high religious salience	485/1135	42.7	1.02 (0.88 to 1.20)	197/483	40.8	1.10 (0.88 to 1.39)	288/652	44.2	0.92 (0.74 to 1.14)	
Soft drinks consumption										
Not attending + low religious salience	648/1515	42.8	**1*** **	366/812	45.1	1	282/703	40.1	**1****	NS
Attending + low religious salience	180/441	40.8	0.92 (0.74 to 1.14)	83/204	40.7	0.83 (0.60 to 1.13)	97/237	40.9	1.04 (0.77 to 1.40)	
Not attending + high religious salience	157/412	38.1	0.81 (0.65 to 1.01)	75/183	41.0	0.83 (0.60 to 1.15)	82/229	35.8	0.82 (0.60 to 1.12)	
Attending + high religious salience	385/1131	34.0	**0.69 (0.58 to 0.81)*****	180/482	37.3	**0.73 (0.58 to 0.92)****	205/649	31.6	**0.68 (0.54 to 0.85)****	

Continued

Table 2 Continued

	Total sample			Boys			Girls			Interaction gender × religiosity
	N	%	OR (95% CI)	n	%	OR (95% CI)	n	%	OR (95% CI)	
Physical inactivity										
Not attending + low religious salience	1206/1507	80.0	1	589/807	73.0	1	617/700	88.1	1	NS
Attending + low religious salience	368/445	82.7	1.20 (0.91 to 1.58)	150/207	72.5	0.98 (0.70 to 1.39)	218/238	91.6	1.47 (0.88 to 2.46)	
Not attending + high religious salience	327/413	79.2	0.94 (0.72 to 1.23)	131/184	71.2	0.89 (0.62 to 1.27)	196/229	85.6	0.80 (0.52 to 1.23)	
Attending + high religious salience	927/1137	81.5	1.12 (0.92 to 1.36)	358/486	73.7	1.06 (0.82 to 1.36)	569/651	87.4	0.94 (0.68 to 1.31)	
Screen-based activities										
Not attending + low religious salience	892/1457	61.2	**1*** **	514/772	66.6	**1*** **	378/685	55.2	**1*** **	NS
Attending + low religious salience	238/429	55.5	**0.78 (0.63 to 0.98)***	126/197	64.0	0.88 (0.63 to 1.22)	112/232	48.3	0.76 (0.56 to 1.02)	
Not attending + high religious salience	219/411	53.3	**0.73 (0.59 to 0.91)****	106/183	57.9	**0.71 (0.51 to 0.99)***	113/228	49.6	0.81 (0.60 to 1.09)	
Attending + high religious salience	516/1106	46.7	**0.55 (0.47 to 0.65)*****	249/468	53.2	**0.57 (0.45 to 0.72)*****	267/638	41.8	**0.59 (0.47 to 0.73)*****	
Insufficient tooth brushing										
Not attending + low religious salience	624/1524	40.9	1	428/818	52.3	1	196/706	27.8	1	NS
Attending + low religious salience	181/448	40.4	0.97 (0.78 to 1.21)	109/210	51.9	0.97 (0.72 to 1.32)	72/238	30.3	1.12 (0.81 to 1.55)	
Not attending + high religious salience	166/418	39.7	0.95 (0.76 to 1.18)	91/187	48.7	0.87 (0.63 to 1.19)	75/231	32.5	1.25 (0.91 to 1.73)	
Attending + high religious salience	442/1149	38.5	0.91 (0.78 to 1.06)	239/491	48.7	0.87 (0.69 to 1.08)	203/658	30.9	1.17 (0.92 to 1.47)	
Sexual intercourse (ninth grade only)										
Not attending + low religious salience	136/782	17.4	**1*** **	72/406	17.7	**1****	64/376	17.0	**1*** **	NS
Attending + low religious salience	21/205	10.2	**0.57 (0.35 to 0.94)***	13/96	13.5	0.76 (0.40 to 1.45)	8/109	7.3	**0.41 (0.19 to 0.89)***	
Not attending + high religious salience	32/214	15.0	0.81 (0.53 to 1.24)	19/97	19.6	1.11 (0.63 to 1.96)	13/117	11.1	0.58 (0.30 to 1.12)	
Attending + high religious salience	33/587	5.6	**0.29 (0.19 to 0.43)*****	19/242	7.9	**0.41 (0.24 to 0.70)****	14/345	4.1	**0.19 (0.11 to 0.36)*****	
Truancy										
Not attending + low religious salience	115/1522	7.6	**1*** **	62/816	7.6	1	53/706	7.5	**1*** **	NS†
Attending + low religious salience	32/447	7.2	1.01 (0.67 to 1.52)	15/208	7.2	1.00 (0.56 to 1.80)	17/239	7.1	1.02 (0.57 to 1.80)	
Not attending + high religious salience	25/418	6.0	0.75 (0.48 to 1.17)	13/187	7.0	0.85 (0.46 to 1.60)	12/231	5.2	0.67 (0.35 to 1.29)	
Attending + high religious salience	40/1147	3.5	**0.45 (0.31 to 0.65)*****	26/490	5.3	0.70 (0.44 to 1.12)	14/657	2.1	**0.26 (0.14 to 0.48)*****	
Fighting										
Not attending + low religious salience	210/1517	13.8	1	161/814	19.8	1	49/703	7.0	1	NS
Attending + low religious salience	63/444	14.2	1.02 (0.75 to 1.38)	48/207	23.2	1.20 (0.83 to 1.74)	15/237	6.3	0.90 (0.50 to 1.64)	
Not attending + high religious salience	46/412	11.2	0.77 (0.55 to 1.09)	32/185	17.3	0.84 (0.55 to 1.29)	14/227	6.2	0.88 (0.48 to 1.62)	
Attending + high religious salience	134/1132	11.8	0.84 (0.66 to 1.06)	101/483	20.9	1.07 (0.81 to 1.42)	33/649	5.1	0.72 (0.46 to 1.13)	
Bullying others										
Not attending + low religious salience	239/1516	15.8	1	158/810	19.5	1	81/706	11.5	1	NS
Attending + low religious salience	64/441	14.5	0.89 (0.66 to 1.20)	41/205	20.0	1.01 (0.69 to 1.48)	23/236	9.7	0.82 (0.50 to 1.34)	
Not attending + high religious salience	67/418	16.0	1.02 (0.76 to 1.37)	38/188	20.2	1.05 (0.70 to 1.57)	29/230	12.6	1.12 (0.71 to 1.76)	
Attending + high religious salience	148/1139	13.0	**0.80 (0.64 to 1.00)***	87/485	17.9	0.90 (0.67 to 1.20)	61/654	9.3	0.80 (0.56 to 1.13)	

Differences and overall models which are statistically significant ($p<0.05$) are in bold.
*$p<0.05$, **$p<0.01$, ***$p<0.001$, NS= not statistically significant at level $p<0.05$.
†Statistically significant interaction in the most religious group only ($p<0.001$).

Table 3 The association of gender, religiosity and the interaction of gender and religiosity with HRB among adolescents, adjusted for age: ORs and 95% CIs in parentheses (selected behaviours)

	Recent smoking	Recent drunkenness	Lifetime cannabis use (ninth grade only)	Truancy
Age	**1.29 (1.15–1.45)*** **	**1.50 (1.31–1.71)*** **	**1.17 (0.88–1.56)**	**1.96 (1.59–2.42)*** **
Gender				
Male	1	1	1	1
Female	**1.28 (1.03–1.58)***	1.11 (0.87–1.43)	0.84 (0.59–1.20)	1.03 (0.70–1.51)
Religiosity				
Not attending + low religious salience	**1***	**1****	**1****	1
Attending + low religious salience	1.20 (0.87–1.66)	1.35 (0.94–1.93)	1.28 (0.77–2.15)	1.01 (0.56–1.83)
Not attending + high religious salience	1.05 (0.75–1.48)	1.33 (0.92–1.94)	**1.77 (1.10–2.86)***	0.83 (0.44–1.56)
Attending + high religious salience	**0.73 (0.57–0.94)***	**0.71 (0.53–0.96)***	**0.57 (0.37–0.89)***	0.70 (0.44–1.13)
Female gender by religiosity				
Not attending + low religious salience	**1*****	**1****	**1****	1
Attending + low religious salience	**0.62 (0.40–0.98)***	0.69 (0.41–1.16)	0.51 (0.23–1.14)	0.99 (0.44–2.25)
Not attending + high religious salience	**0.53 (0.33–0.87)****	**0.45 (0.26–0.78)****	**0.31 (0.14–0.69)****	0.81 (0.33–1.99)
Attending + high religious salience	**0.49 (0.34–0.71)*****	**0.57 (0.37–0.89)****	0.60 (0.31–1.15)	**0.38 (0.18–0.81)***

Differences and overall models which are statistically significant ($p<0.05$) are in bold.
*$p<0.05$, **$p<0.01$, ***$p<0.001$.

association with religiosity, three distinct groups of behaviours can be identified, which are as follows:

1. Behaviours associated with religiosity in both genders, but stronger among girls: smoking, drunkenness, cannabis use, sexual intercourse and truancy (though not statistically significant among boys). In these behaviours, the difference between the non-religious and the most religious group is clearly visible in the total sample. In smoking, drunkenness and cannabis use, these differences are bigger among girls. In cannabis use, the interaction OR is statistically significant in the group 'not attending but with high religious salience'. In sexual intercourse, the interaction ORs are even lower than in smoking and drunkenness but not statistically significant. This may be due to the smaller sample size because these items were included in the questionnaires for the ninth school grade only and to the low prevalence rates.
2. Behaviours relatively weakly albeit significantly associated with religiosity: no regular breakfast, soft drinks consumption and screen-based activities. In these behaviours, the association was found in both genders equally. However, among boys, the association became non-significant in soft drinks after controlling for family and social indicators.
3. Behaviours not associated with religiosity: no regular fruits consumption, physical inactivity, insufficient tooth brushing and fighting. Vegetables consumption, sweets consumption and bullying others might be included in this group as well because their association with religiosity was only very weak, and the overall model was not statistically significant. The interaction of gender and religiosity on these seven behaviours was not statistically significant either.

Regarding the use of substances, the results of our study are in accordance with previous studies: the association with religiosity is relatively stronger than for most other behaviours.[6 18] The inverse association with sexual behaviour is also in accordance with most previous studies.[18–20] However, unlike Zaleski and Schiaffino,[9] we found an inverse association of religiosity with sexual intercourse that was stronger among girls than among boys. The overall strong inverse association of religiosity with drunkenness and cannabis use among girls in our study is in line with the results of Kovacs *et al*.[14] However, our findings contradict their hypothesis that gender differences in the association between religiosity and HRB may be due to the religiosity of girls being more church-oriented. In our study, the inverse association between religiosity and smoking, drunkenness and cannabis use is substantially stronger among girls than among boys also in the group of adolescents who have high religious salience but who do not attend regularly.

The inconsistency of the association with religiosity in nutritional behaviours is surprising. No regular fruits and vegetables consumption and sweets consumption failed to show an inverse association with religion, unlike soft drinks consumptions and regular breakfast. Similarly, the association of religiosity with physical inactivity differs according to our findings from the association with screen-based activities (as an indicator of sedentary behaviour). Nutritional behaviours and sedentary behaviour are known to stem from childhood[21] and to be influenced heavily by parents and family background.[21–24] However, the adjustment for family and social background indicators had mostly only little impact on the associations of having breakfast, soft drinks consumption and screen-based activities with religiosity. This suggests that the association between religiosity and nutritional and sedentary behaviour is independent of other factors associated with these behaviours. This hypothesis needs further confirmation and testing regarding intrapersonal factors, such as values, attitudes on leisure time use, adherence to daily rituals, and so on.

It may appear surprising that religiosity, a phenomenon strongly connected with value systems and rules prescribing proper interpersonal conduct, proved to be unrelated or only weakly related to interpersonal violence. These results provide partial support for the hypothesis of Cochran *et al*[3] that among adolescents, religiosity reduces 'ascetic' behaviours such as substance use but has little impact on delinquent behaviours. However, this does not hold for truancy among girls.

In general, the results of our study confirm that certain HRBs are indeed inversely associated with religiosity, especially when it is public (attendance) and internalised (religious salience) at the same time. However, this association does not hold for all HRBs in general. The association is significantly stronger among girls than among boys in smoking, drunkenness, cannabis use and truancy. Although we are not able to explain the reason for these gender differences, it is worth noting that they only occur in behaviours that are illegal or are considered inappropriate in adolescence, while they are absent in behaviours that are unhealthy but usually more tolerated among adolescents by their adult supervisors.

What is already known on this subject

- Religiosity is related to healthier and less risky behaviour in substance use and sexual behaviour among adolescents, while the findings on its association with violent behaviour are ambiguous.

What this study adds

- Religiosity is associated with healthier and less risky behaviour in substance use and sexual behaviour and also in truancy, screen-based activities and some nutritional behaviours.
- In substance use, this relationship is substantially stronger among girls than among boys.
- No association between religiosity and interpersonal violence was found.

Strengths and limitations

This nationally representative study with a high response rate, covering a broad range of behaviours, presents a unique contribution to the research of religiosity and HRB. Most of the previous research among adolescents in this topic explores only a limited number of particular behaviours.[1] A limitation of our study is that its design is only cross-sectional, which limits the potential for making causal inferences.

Implications

The results of our study indicate that high religiosity is indeed connected to less unhealthy behaviour, especially in substance use and less premature sexual activity and is especially so among girls. The reasons for these gender differences deserve further study. Moreover, further research is needed on the potential causal mechanisms in this relationship, such as social support within religious groups, structured activities, adult supervision, sense of purpose, the system of external rules, prayer as coping mechanism and others. It would also be interesting to replicate this study in other countries and with additional information on the particular religious affiliation of the subjects.

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