

# Religiosity and Health Risk Behaviour Among University Students in 26 Low, Middle and High Income Countries

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**Abstract** The aim of this study was to assess religiosity and health risk behaviours among university students from 26 low, middle and high income countries. Using anonymous questionnaires, data were collected from 20,222 undergraduate university students (mean age 20.8, SD = 2.8) from 27 universities in 26 countries across Asia, Africa and the Americas. Among all students, 41.1 % engaged at least once a week in organized religious activity, 35.8 % practised a non-organized religious activity daily or more than once daily, and more or less two-thirds of the students agreed to the three different statements on intrinsic of subjective religiosity. In multivariate logistic regression analysis, higher reported involvement in organized religious activity was associated with addictive, injury, sexual and oral health risk behaviour, while lower reported involvement in organized religious activity was associated with physical inactivity and oral health risk behaviour. Lower reported involvement in non-organized religious activity was associated with addictive, nutrition risk, injury, sexual and oral health risk behaviour, while higher reported involvement in non-organized religious activity was associated with physical inactivity.

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Finally, lower reported intrinsic religiosity was associated with addictive and sexual risk behaviour, while higher reported intrinsic religiosity was associated with nutrition risk behaviour, physical inactivity and oral health risk behaviour.

**Keywords** Religiosity · Health risk behaviour · University students · 26 countries

## Introduction

A number of studies have investigated the relationship between religiosity and health risk behaviour, particularly with the general adult population in high-income countries (Rew and Wong 2006). Fewer studies have investigated this relationship in young adults, including university students, in developing countries (Gomes et al. 2013). A number of studies found an inverse association between religiosity and *addictive behaviours* (alcohol, tobacco, drug use) (Bonelli and Koenig 2013; Fletcher and Kumar 2014; Gomes et al. 2013; Sinha et al. 2007; Moreira-Almeida et al., 2006; Pitel et al. 2012), *nutrition risk behaviours* such as skipping breakfast, soft drink consumption (Pitel et al. 2012), *sexual risk behaviours* such as multiple sexual partners and having had a sexually transmitted disease (Burris et al. 2009; Gold et al. 2010; Sinha et al. 2007), *injury risk behaviour* such as bullying (Pitel et al. 2012), *physical inactivity* and *oral risk behaviour* (Rew and Wong 2006).

Behavioural risk factors, including addictive behaviours, nutrition risk behaviours, sexual risk behaviours, physical inactivity and injury risk behaviours, are major determinants of youth and adult morbidity and mortality (Blum and Nelson-Mmari 2004; Gore et al. 2011; Patton et al. 2012). Cardiovascular disease and type II diabetes, for example, are largely attributable to physical inactivity, tobacco smoking and unhealthy diet (WHO 2005). Some studies (Alamian and Paradis 2012; Lawlor et al. 2005) suggest that several behavioural risk factors may co-occur among youth synergistically intensifying their risks for the development of chronic diseases.

The study aimed to assess religiosity and health risk behaviours among university students from 26 low, middle and high income countries.

## Methods

### Sample and Procedure

This cross-sectional study was carried out with a network of collaborators in participating countries (see Acknowledgments). The anonymous, self-administered questionnaire used for data collection was developed in English, translated into the languages (Arabic, Bahasa, Chinese, French, Lao, Russian, Spanish, Thai, Turkish) of the participating countries, then re-translated into English. The study was initiated through personal academic contacts of the principal investigators, who arranged for the data to be collected. The intended sample was 400 male and 400 female undergraduate university students, aged 16–30 years, in each participating country. The data were collected in 2013 by country principal investigators and their trained research assistants from 1 or 2 universities in their respective countries. The universities involved were located in the capital or other major cities in these

countries. Research assistants asked classes of undergraduate students to complete the questionnaire at the end of a teaching class, and these classes were recruited according to timetable scheduling using the stratified random sample procedure. There was no incentive for participation, nor were there any penalties for refusing to complete the survey. The students who completed the survey varied in the number of years they had attended the university and the variety of majors they were studying such as education, humanities and arts, social sciences, business and law, science, engineering, manufacturing and construction, agriculture, health and welfare and services. Written informed consent was obtained from participating students, and participation rates were in most countries over 90 %. Ethics approvals were obtained from all participating institutions in the following countries: Bangladesh ( $n = 800$ ), Barbados ( $n = 580$ ), Cameroon ( $n = 627$ ), China ( $n = 1184$ ), Colombia ( $n = 816$ ), Egypt ( $n = 831$ ), Grenada ( $n = 435$ ), India ( $n = 800$ ), Indonesia ( $n = 750$ ), Ivory Coast ( $n = 824$ ), Jamaica ( $n = 762$ ), Kyrgyzstan ( $n = 837$ ), Laos ( $n = 806$ ), Madagascar ( $n = 800$ ), Mauritius ( $n = 501$ ), Namibia ( $n = 503$ ), Nigeria ( $n = 820$ ), Pakistan ( $n = 813$ ), Philippines ( $n = 968$ ), Russia ( $n = 799$ ), Singapore ( $n = 894$ ), South Africa ( $n = 888$ ), Thailand ( $n = 860$ ), Tunisia ( $n = 960$ ), Turkey ( $n = 800$ ), Venezuela ( $n = 564$ ).

## Measures

### *Religiousness*

Religiousness was assessed by the five-item Duke University Religion Index (DUREL; Koenig et al. 1997). This instrument assesses the three major dimensions of religiosity: organized religious activity, non-organized religious activity and intrinsic (or subjective) religiosity (Koenig and Bussing 2010). Cronbach alpha for the three-item intrinsic religiosity sub-scale was 0.96 in the sample.

## Health Risk Behaviour

*Addictive risk behaviour* (4 items): current tobacco use, binge drinking, past 12 months illicit drug use, gambling once a week or more (Babor et al. 2001; Lesieur and Blume 1987; WHO 1998).

*Nutrition risk behaviour* (6 items): skipping breakfast, no avoidance of dietary fat and cholesterol, no effort to eat fibre, eating fruit and vegetables less than 5 servings daily, usually adding salt to food, eating red meat at least once a day (Hall et al. 2009; Wardle and Steptoe 1991).

*Sexual risk behaviour* (4 items): two or more sexual partners in the past 12 months, ever had a sexually transmitted infection (STI), inconsistent condom use in the past 3 months, never contraceptive use in the past 12 months.

*Injury risk behaviour* (4 items): not always wearing a seat belt, drinking and driving, physical fighting in the past 12 months, carrying a weapon to the university (Wardle and Steptoe 1991).

### *Physical Inactivity*

*Physical activity* was assessed using the self-administered International Physical Activity Questionnaire (IPAQ) short version, for the last 7 days (IPAQ-S7S). We used the

instructions given in the IPAQ manual (Craig et al. 2003) and categorized physical activity (short form) according to the official IPAQ scoring protocol (International Physical Activity Questionnaire 2014) as low, moderate and high.

*Oral health risk behaviour* (2 items): brushing teeth less than twice daily, dental care visit less than once a year.

### *Socio-demographic Factors*

Questions included age, gender, place of residence and socioeconomic background which was assessed by self-ratings of their family background as wealthy (within the highest 25 % in “country”, in terms of wealth), quite well off (within the 50–75 % range for their country), not very well off (within the 25–50 % range from “country”) or quite poor (within the lowest 25 % in their country, in terms of wealth) (Wardle and Steptoe 1991). The participants were subsequently divided into poorer (not very well off and quite poor) and wealthier (wealthy, quite well off) categories.

### **Data Analysis**

Data analysis was performed using STATA software version 11.0 (Stata Corporation, College Station, Texas, USA). The prevalence of religiosity and health risk behaviours was calculated as a percentage, and the Mann–Whitney *U* test was used to assess differences of religiosity and individual health risk behaviours. Logistic regression was used to assess the association between different components of religiosity and six health risk behaviour clusters (addictive risk, nutrition risk, sexual risk, injury risk, physical inactivity and oral health risk) separately, while controlling for age, gender, family wealth and residence status. Variance inflation factor (VIF) and tolerance values for each model indicate multicollinearity was not a concern in any of the multivariate analyses. Since the study used a clustered design, country was included as a clustering variable in the regression models.

**Table 1** Religiosity in study population in per cent (N = 20222)

Attendance of religious meetings (church, temple, mosque)	More than once a week	Once a week	A few times a month	A few times a year	Once a year or less	Never
	20.8	20.3	15.8	17.0	9.4	16.7
Private religious activity	More than once a day	Daily	Two or more times a week	Once a week	A few times a month	Rarely or never
	16.1	19.7	11.5	8.5	14.8	29.2
Experience the presence of divine	Definitely true of me	Tends to be true	Unsure	Tends not to be true	Definitely not true	
	53.4	17.3	12.5	5.1	11.4	
Religious beliefs are really behind my whole approach to life	38.7	25.3	16.6	7.2	12.0	
Carry over my religion to all other dealings in my life	31.4	25.8	19.2	9.0	14.6	

**Table 2** Individual risk behaviours in relation to religiosity components

	%	Organized religious activity M <sup>a</sup> (M <sup>b</sup> ) z-score	Non-organized religious activity M <sup>a</sup> (M <sup>b</sup> ) z-score	Intrinsic religiosity M <sup>a</sup> (M <sup>b</sup> ) z-score
<i>Addictive risk behaviour</i>				
Current tobacco use	12.8	3.3 (3.8) -12.13***	2.7 (3.3) -15.47***	10.8 (11.2) -6.62***
Binge drinking (past month)	11.8	3.4 (3.8) -12.76***	2.5 (3.4) -21.67***	10.2 (11.3) -17.95***
Illicit drug use (past 12 months)	19.1	3.9 (3.7) -9.18***	3.4 (3.2) -6.95***	11.5 (11.3) -1.30
Gambling once a week or more	8.2	3.7 (3.8) -2.02*	3.1 (3.3) -4.65***	10.8 (11.2) -4.94***
<i>Nutrition risk behaviour</i>				
Skipping breakfast	46.2	3.8 (3.7) -3.15**	3.2 (3.3) -1.13	11.2 (11.2) -0.03
No avoidance of dietary fat and cholesterol	61.0	3.7 (3.8) -4.07***	3.2 (3.4) -8.66***	11.1 (11.3) -2.74**
No effort to eat fibre	60.2	3.6 (3.9) -12.38***	3.1 (3.5) -15.76***	11.1 (11.4) -6.49***
Eating fruit and vegetables less than 5 servings daily	82.8	3.7 (3.9) -6.13***	3.2 (3.4) -7.42***	11.1 (11.5) -6.06***
Usually adding salt to food	39.6	3.9 (3.7) -9.72***	3.5 (3.1) -12.09***	11.8 (10.8) -19.32***
Eating red meat at least once a day	45.6	3.6 (3.9) -13.99***	3.0 (3.5) -15.46***	10.8 (11.5) -10.73***
<i>Sexual risk behaviour (of sexually active)</i>				
Two or more sexual partners in the past 12 months	19.1	3.8 (3.7) -3.66***	3.1 (3.2) -1.44	11.7 (11.0) -11.54***
Ever had sexually transmitted infection (STI)	5.7	4.5 (3.7) -16.51***	4.2 (3.1) -16.78***	11.5 (11.0) -1.92
Inconsistent condom use	72.2	3.8 (3.6) -6.00***	3.4 (2.8) -13.14***	11.4 (10.8) -7.31***
Never contraceptive use	42.6	4.0 (3.7) -8.11***	3.3 (2.9) -8.54***	11.4 (10.8) -6.84***
<i>Injury risk behaviour</i>				
Not always wearing a seat belt	54.7	3.9 (3.6) -8.90***	3.4 (3.2) -6.07***	11.5 (10.9) -11.40***
Drinking and driving (car or motorcycle)	27.1	3.2 (3.7) -15.70***	2.5 (3.3) -19.71***	9.3 (11.2) -23.90***
Physical fighting	13.1	4.0 (3.7) -6.18***	3.2 (3.2) -0.33	11.5 (11.0) -6.19***
Carrying a weapon	6.4	3.8 (3.7) -1.22	3.4 (3.2) -3.92***	11.4 (11.1) -3.13**
Physical inactivity	47.5	3.8 (3.7) -4.03***	3.4 (3.2) -9.47***	11.6 (10.9) -14.55***
<i>Oral health risk behaviour</i>				
Brushing teeth less than twice or more daily	32.9	3.9 (3.7) -6.17***	3.3 (3.2) -4.01***	11.6 (11.0) -12.46***
Dental care visit, less than once a year or never	58.3	3.9 (3.6) -12.23***	3.3 (3.2) -6.57***	11.4 (10.9) -11.08***

\*  $P < .05$ ; \*\*  $P < .01$ ; \*\*\*  $P < .001$

<sup>a</sup> Mean value of those with risk behaviour; <sup>b</sup> mean value for whole population

**Table 3** Associations between religiosity and risk behaviour types

	AOR (95 % CI) Addictive risk behaviour (1–4 vs 0)	AOR (95 % CI) Nutrition risk behaviour (4–6 vs 0–3)	AOR (95 % CI) Sexual risk behaviour (1–4 vs 0)
<i>Organized religious activity</i>			
Low (1–2)	1.00	1.00	1.00
Medium (3–4)	1.55 (1.42–1.70)***	0.80 (0.74–0.87)***	1.42 (1.29–1.57)***
High (5–6)	1.39 (1.26–1.53)***	0.85 (0.74–0.87)***	1.30 (1.17–1.45)***
<i>Non-organized religious activity</i>			
Low (1)	1.00	1.00	1.00
Medium (2–4)	1.00 (0.92–1.10)	0.74 (0.68–0.81)***	1.05 (0.95–1.15)
High (5–6)	0.82 (0.74–0.91)***	0.62 (0.56–0.68)***	0.74 (0.67–0.83)***
<i>Intrinsic religiosity</i>			
Low (3–10)	1.00	1.00	1.00
Medium (11–13)	0.90 (0.83–0.98)*	1.16 (1.07–1.26)***	1.18 (1.08–1.28)***
High (14–15)	0.74 (0.67–0.81)***	1.21 (1.11–1.33)***	0.88 (0.80–0.97)*
	Injury risk behaviour (1–4 vs 0)	Physical inactivity	Oral health risk behaviour (2 vs.0–1)
<i>Organized religious activity</i>			
Low (1–2)	1.00	1.00	1.00
Medium (3–4)	1.16 (1.07–1.26)***	1.03 (0.95–1.11)	1.16 (1.05–1.28)**
High (5–6)	1.13 (1.03–1.24)**	0.91 (0.84–0.99)*	1.35 (1.21–1.50)***
<i>Non-organized religious activity</i>			
Low (1)	1.00	1.00	1.00
Medium (2–4)	0.96 (0.88–1.04)	1.15 (1.06–1.25)***	0.92 (0.83–1.02)
High (5–6)	0.76 (0.70–0.84)***	1.24 (1.13–1.36)***	0.85 (0.76–0.95)**
<i>Intrinsic religiosity</i>			
Low (3–10)	1.00	1.00	1.00
Medium (11–13)	0.71 (0.66–0.76)***	1.19 (1.10–1.28)***	1.13 (1.03–1.24)**
High (14–15)	0.68 (0.63–0.74)***	1.52 (1.40–1.66)***	1.56 (1.41–1.72)***

All models adjusted for age, gender, family wealth status and residence

AOR adjusted odds ratio, CI confidence interval

\*  $P < .05$ ; \*\*  $P < .01$ ; \*\*\*  $P < .001$

## Results

### Religiosity Practices and Beliefs

The total sample included 20,222 undergraduate university students, 41.5 % males and 58.5 % females, (mean age 20.8, SD = 2.8) from 26 countries. From all students, 41.1 %

engaged at least once a week in organized religious activity, 35.8 % practised a non-organized religious activity daily or more than once daily, and more or less two-thirds of the students agreed to the three different statements on intrinsic of subjective religiosity (see Table 1).

### **Health Risk Behaviours and Religiosity Components**

Students with less organized, non-organized and intrinsic religiosity engaged more often in addictive risk behaviours: tobacco use, binge drinking and gambling, compared with students with more organized, non-organized and intrinsic religiosity. However, with illicit drug use, the opposite trend seems to be true for organized and non-organized religious activity. In the case of nutrition risk behaviours, students with less organized, non-organized and intrinsic religiosity engaged more often in four high-risk behaviours: (no avoidance of dietary fat and cholesterol, no effort to eat fibre, eating less than five servings of fruit and vegetables a day and eating red meat at least once a day). Paradoxically, students with higher scores on the religiosity measures usually added salt to food more than those with lower scores. Similarly, in terms of sexual risk behaviours, students with higher religiosity scores on all measures also engaged more often in all four sexual risk behaviours (had an STI, multiple sexual partners, inconsistent condom use and no contraceptive use). Likewise, students with higher religiosity scores on all measures engaged in less physical activity and more oral health risk behaviour (see Table 2).

### **Associations with Health Risk Behaviour Clusters**

In multivariate logistic regression analysis, more organized religious activity and less non-organized religious activity as well as less intrinsic religiosity were associated with addictive risk behaviour. In the case of nutrition risk behaviour, less organized religious activity, less non-organized religious activity and more intrinsic religiosity were found to have stronger associations, while more organized religious activity, less non-organized religious activity and medium intrinsic religiosity were found to be associated with sexual risk behaviour. Further, more organized religious activity, less non-organized religious activity and less intrinsic religiosity were associated with injury risk behaviour. Finally, less organized religious activity, more non-organized religious activity and more intrinsic religiosity were associated with physical inactivity, while more organized religious activity, less non-organized religious activity and more intrinsic religiosity were associated with oral risk behaviour (see Table 3).

### **Discussion**

This study examined the relationship between religiosity and health risk behaviours among university students in 26 countries. On the whole, the study found that those who endorsed more religiosity (organized religious activity and intrinsic religiosity) were associated with risky addictive, injury and oral health behaviour. This finding is confirmed in the previous studies, which found an inverse association between religiosity and addictive behaviours (Bonelli and Koenig 2013; Fletcher and Kumar 2014; Gomes et al. 2013; Sinha et al., 2007; Moreira-Almeida et al. 2006; Pitel et al. 2012), injury risk behaviour (Pitel et al. 2012) and oral risk behaviour (Rew and Wong 2006). It is possible that among the various

religious denominations such as Muslims in the study sample abstinence is promoted from addictive behaviours. Additional research may be needed at the micro-level within religious groups on possible socialization and conformity influences on addictive risk behaviours (Garcia et al. 2013). Further, this study, however, found mixed results across measures of religiosity. Thus, a lot of students in non-organized religious activity are also less likely to engage in certain risky behaviours (sexual and injury). It may just be that organized religious activity may give people a false sense of partner safety, which non-organized activity (private prayers, individual Bible reading, meditation) does not. Further, it may be possible that religiousness was trying to compensate for sexual risk behaviours practised, and low rates of sexual risk behaviour in the present sample may have also contributed to this finding.

A distinction may need to be drawn between organized religious activity and the other two indices: unorganized religious activity and intrinsic religiosity. When treated together, there was no clear pattern of association between religiosity and risk behaviour. There was, however, a consistent inverse pattern of association between non-organized religious activity and every risk behaviour, with physical inactivity being the exception. It is noteworthy that intrinsic religiosity conforms to this pattern of association in addictive risk behaviour, sexual risk behaviour and injury risk behaviour. It also conforms to the association that is established with non-organized religious activity and physical activity. These data do suggest that if one is personally religious, as opposed to attending religious activities, one is more likely to make some healthier choices, especially those with moral implications. Consequently, the finding that a more organized religious activity and less non-organized religious activity and less intrinsic religiosity were associated with addictive risk behaviour is consistent with other reported patterns of associations between religiosity and high-risk sexual behaviour (Penhollow et al. 2005). A more organized religious activity can very easily coexist with less non-organized activity and less intrinsic religiosity, if the attachment is to the religious organizations or activities and not necessarily to one's personal precept of the Divine. The study found that the three distinct measures of religiousness (organized and non-organized religious activity and intrinsic religiosity) interacted differently with the assessed health risk behaviours, as also found in the previous studies (e.g. Sinha et al. 2007). This was mainly evident between organized religious activity and non-organized religious activity and/or intrinsic religiosity. The former clearly involves largely social group behaviour, while the latter emphasizes more on the perceived importance of religiousness and religious values (Sinha et al. 2007). Thus, it may be plausible that greater importance of religiousness rather than just social religious activity has a greater impact on positive health behaviours, as found in addictive and injury risk behaviours in this study. It seems more research is needed to assess the differential influence of religiousness in terms of organized activity (influence of peers) and personal health behaviours influenced by intrinsic religion (Regnerus 2003; Sinha et al. 2007).

Despite some mixed results, the study results provide from the outset some useful directions to public health professionals. In the first instance, the finding that fully 41 per cent of this international population of young adults reported being engaged in organized religious activity at least once a week signals that religious gatherings are an underutilized opportunity for health education and behaviour change trials. It has been recognized for some time that schools, worksites and clinical and community settings, the more traditional public health intervention sites, must be supplemented with innovative locations in order to increase and diversify access. Organized religious activities recruit and access potential participants for tailored interventions situated in settings with which they are familiar and



comfortable and to which they attach spiritual significances that can possibly be utilized for health promotion.

## Study Limitations

This study had several limitations. The study was cross-sectional, so causal conclusions cannot be drawn. The investigation was carried out with students from one or two universities in each country, and the inclusion of other centres could have resulted in different results. Moreover, national and regional sample size imbalances may have caused some skewed response patterns. University students, in general, are not representative of all young adults, and the religiosity variables and health risk behaviours may be different in other sectors of the young adult population. Further, in this study two components of religiousness (organized and non-organized religious activity) were assessed with single-item measures, thus limiting evidence for reliability and validity of these assessment instruments (Rew and Wong 2006).

## Conclusion

The study found among a large sample of university students from 26 countries across Africa, Asia and Americas that many practised organized and non-organized religious activity. Several associations between religiosity and health risk behaviour which can help guide public health intervention among university students.

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## Compliance with Ethical Standards

**Conflict of interest** The authors declare that they have no competing interests.

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