

Religiosity and alcohol use: Is religiosity important for abstention and consumption levels in the second half of life?

Running head: Religiosity and alcohol use.....

Abstract

Objective: The aim of this study was to investigate the relative role of religiosity for alcohol abstention and consumption levels among individuals aged 40 years or above. Method: A two-wave prospective survey was conducted among Norwegians aged 40 to 80 years ($n = 4149$ at Time 1 in 2002/2003, and $n = 2984$ at Time 2 in 2007/2008). Results: The findings showed that, while adjusting for demographics and health variables, religiosity was strongly associated with abstention and less consumption. The results also reflected that females and those with higher age had an increased probability of alcohol abstention, whereas high education was related to a lower probability of abstention. Females also reflected less alcohol consumption, while high education and good physical health was associated with more consumption. The main results were consistent across prospective and cross-sectional models. Conclusion: Religiosity seems to be important both for abstention and alcohol consumption levels in the second half of life.

Key words: instinct religiosity; alcohol use frequency; alcohol use amount; prospective; cross-sectional; Norway

1. Introduction

Religiosity (i.e. personal devotion to religion) has received increased empirical attention as a factor related to health promoting behaviour the last decades. For instance, several studies have suggested that religiosity potentially promotes mental health (e.g. Weber & Pargament, 2014), particularly among vulnerable sub-groups (Salsman et al., 2015). However, there are few studies which have focused on the relative role of religiosity for alcohol abstention and consumption among individuals in the second half of life (aged 40 years and above). More knowledge about the potential buffering effects of religiosity on alcohol consumption in this age group is important because older adults may be more likely to experience adverse health consequences of alcohol consumption (Caputo et al., 2012). Older adults also tend to have a lower tolerance for alcohol, which could lead to exaggerated responses (Plebani et al., 2013). In addition, the alcohol consumption is increasing in the older segments of the Norwegian population (Bye & Østhus, 2012). The current study will focus on prospective and cross-sectional associations between religiosity variables with alcohol abstention and consumption levels using a large population-based sample of Norwegians in the second half of life; The Norwegian Life Course, Ageing, and Generation Study (NorLAG).

1.1. Types of religiosity and alcohol consumption

It has frequently been reported in the literature that different religious traditions and faith orientations approach alcohol consumption in diverging ways (Ellison et al., 2008; Michalak et al., 2007). A general distinction is set between proscriptive traditions (i.e. religious approaches that prohibit alcohol use or actively encourage alcohol abstention among the members) vs. non-proscriptive approaches (i.e. alcohol consumption is perceived to be tolerable in moderate amounts). Therefore, a variable on religious community membership (e.g. member of a Christian or Islamic organization) was included in the current study. The distribution in this variable may be rather homogenous, however, because the Norwegian population in the second half of life reflects less religious heterogeneity than the younger segments of the population. In the latter age group, for instance, the immigration from countries with other religious traditions than Christianity is substantially higher than among individuals in the second

half of life (Statistics Norway, 2016). Norwegians in the second half of life are typically members of the Christian church and reflect less variation in religious membership compared to, for instance, elderly in the United States.

Another distinction that is often reported in the literature is between intrinsic religiosity (i.e. religious salience/perceived personal importance of religion in life) and organizational religiosity (i.e. participation in social religious activities). The current study will focus specifically on intrinsic religiosity in relation to alcohol abstention and consumption. This is because organizational religiosity may be strongly influenced by contextual variables, such as having religious institutions nearby or having relatives or friends who try to enforce the participation in social religious activities. When religiosity is merely a result of contextual factors external to the individual, the influences on alcohol consumption may be rather negligible (Moscati & Mezuk, 2014).

1.1.2. Empirical studies of religiosity and alcohol consumption

Several previous studies have investigated the association between religiosity and alcohol consumption. For instance, in a general population-based sample it was shown that religiosity was strongly associated with alcohol abstention, but only modestly related to consumption among those who used alcohol (Michalak et al., 2007). In accordance with this finding, several epidemiological studies in the United States concluded that religiosity was related to alcohol abstention (Amey et al., 1996; Heath et al., 1999; Midanik & Clark, 1994). Associations between not having any religious affiliation and higher levels of drinking frequency and intoxication have also been demonstrated among adolescents (Moore et al., 2013; Patock-Peckham et al., 1998; Yonker, et al., 2012). Brown et al. (2001) reported that religious salience was related both to alcohol consumption and problem drinking among white adolescents in the United States. Further, one of the few longitudinal general population studies in this vein demonstrated that a temporal change in religious status (increasing or declining religiosity over time) was positively associated with both licit and illicit substance use (Moscati & Mezuk, 2014). Given the potential protective role of religiosity this may seem counterintuitive, but as argued by the authors a change in religious status may be related to significant

life events that may lead to substance use. Generally, there are very few studies that have focused on the association between religiosity and alcohol consumption in the older segments of the population. However, Nordfjærn and Brunborg (2015) showed that human value systems, which may be associated with religiosity (i.e. conservatism), was related to less alcohol consumption in the second half of life. Further, in a small-scale study conducted among 148 older Korean immigrants (aged 60-97 years) in Canada, it was reported that low levels of religiosity were related to more alcohol consumption (Kim, 2012).

The previous studies that investigated relations between religiosity and alcohol consumption were mainly conducted in general population samples (e.g. Michalak et al., 2007; Moscati & Mezuk, 2014) or adolescent samples (e.g. Brown et al., 2001; Moore et al., 2013). The vast majority of the studies used a cross-sectional method (e.g. Michalak et al., 2007) and some studies incorporated alcohol outcome variables that did not take both consumption frequency and typical quantity into consideration (e.g. Brown et al., 2001; Moscati & Mezuk, 2014). Further, several studies statistically adjusted for demographic characteristics, but the majority did not adjust for physical and mental health variables (e.g. Brown et al., 2001; Michalak et al., 2007) which also could relate to alcohol consumption (Adrian & Barry, 2003). Finally, the majority of the previous studies were conducted in the United States. The religious contexts in Norway and the United States have important differences. For instance, Norway generally has a high number of registered church memberships, but the actual attendance to religious teaching ceremonies is generally low compared to the United States (see also Sørensen et al., 2011).

1.2. Aims of the study

This two-wave panel study aims to investigate the relative role of religiosity for alcohol abstention and consumption levels (i.e. frequency and typical quantity) in the second half of life. This will be conducted with different indicators of religiosity (religious salience/perceived importance of religion in a person's life, extent of own personal religiosity and religious community membership) using both prospective and cross-sectional models. The use of a prospective model will not enable

conclusions about causality or temporal order between religiosity and alcohol consumption.

However, a temporal separation of measuring the independent and dependent variables reduces common method bias (see also Podsakoff et al., 2003 for details). The current examination will also adjust for a number of demographics (i.e. gender, age, education and civil status) and health variables (i.e. physical and mental health) known to be associated with alcohol abstention and consumption levels. This improves the possibility to investigate whether religiosity has an independent role on alcohol use or merely serves as a proxy variable to other background variables with importance for alcohol use.

2. Methods

2.1. Procedure

The research applied data from a two-wave panel study on life course, ageing and generation (NorLAG). This study was conducted by the Norwegian Social Research (NOVA) and Statistics Norway. The research obtained ethical approval by the Norwegian Social Science Data Services. At Time 1 (T1), a total of 24 municipalities and six different districts in Oslo were chosen from four main regions in Norway based on population density, population size, standard of living, income and age distribution. This random sample was established in 2001 and included a total of 8298 individuals (age 40 to 80 years). The sample was asked to participate in a telephone interview ($n = 5559$, response rate 67%). After the interviews the respondents were invited to take part in a mailed questionnaire survey. The present study is mainly based on data from this survey. A total of 75% ($n = 4149$) who took part in the phone interviews also returned the questionnaire.

The second wave of data collection (Time 2: T2) was carried out in 2007/2008. A total of 5269 respondents from T1 were re-contacted with an invitation to participate at T2. The response rate was 79% ($n = 3774$). Among these respondents, 79% ($n = 2984$) returned the mailed questionnaire. A total of 2672 individuals responded to the telephone and postal mail enquiries at both time points (32% of the gross sample at T1). There were few significant differences between respondents and non-

respondents across the two waves. However, attrition was somewhat associated with high age, low education, low income and poor health (see Koløen et al., 2013; Norwegian Social Research, 2012 for details).

2.2. Measures

2.2.1. Demographics

Each respondent's gender was recorded at baseline. Age was measured by years, both at T1 and T2, and was used as a continuous variable in analyses. In addition, respondents' level of education (basic = high school or below; high = university/college) and civil status (neither married nor together with a registered partner; married or together with a registered partner) were obtained by national registers both at T1 and T2.

2.2.2. Health variables

Information about physical and mental health was recorded both at T1 and T2 by the Short-Form Health Survey (SF-12) (Ware Jr et al., 1996). The instrument contained items related both to physical health, such as whether the respondents' health situation set restrictions on vigorous activities, e.g. running and lifting heavy objects as well as moderate activities such as pushing a vacuum cleaner. The SF-12 also included items regarding mental health, such as feelings of sadness, calmness or limited social interaction the last two weeks. The instrument included a total of 12-items and norm-based standardized scores were established by the procedures described in Gandek et al. (1998). The same study reported satisfactory validity and reliability of this instrument in Norway. The measure was used as a continuous scale, with higher scores reflecting good mental and physical health.

2.2.3. Religiosity variables

Measures of religiosity have not yet been standardized to a large extent (see Moscati & Mezuk, 2014 for a discussion). The current study focused on intrinsic religiosity. At T1 religious salience was measured with one indicator: "How important is religion in your life". The response anchors were scored on a four-point Likert scale: (1) not important to (4) very important (see also Michalak et al.,

2007). The instrument was dichotomized by merging “slightly important”, “relatively important”, and “very important” vs. “not important at all”. The same item was also included at T2 and was dichotomized in the same way as at T1 . T2 also included an additional religiosity measure (i.e. own personal religiosity): “Do you consider yourself as: not religious at all; relatively religious; very religious; do not know”. This scale was dichotomized by merging “relatively religious” and “very religious” vs. “not religious at all”. “Do not know” responses were set to system missing values. As the measure of religious salience and own personal religiosity could be expected to be strongly correlated, these two variables were merged at T2.

Finally, a variable was included at T2 that asked the respondents about religious, belief or ethical communities in which they were member (coded: no membership; Christian; Islam; other religious group; other non-religious group). Because people who are baptized in Norway are automatically enrolled into the church registry this variable was not necessarily considered to be a feasible indicator of actual religiosity. Many parents choose baptism for their children for non-religious reasons and people often remain in the church registry throughout life without necessarily considering religion to be important or being active in religious activities. This was also reflected by visual inspection of frequency distributions on the religious membership variable where the vast majority of the sample (86%) reported membership in the church or another Christian organization. However, the variable could give a feasible indication of participation in religious societies (e.g. muslim organizations) where alcohol may be prohibited. The variable was therefore included in further analyses.

2.2.4. Alcohol consumption

Two items concerning alcohol consumption were applied at T2. The first item recorded respondents’ annual drinking frequency (“daily/almost daily”; “2–3 times a week”; “once a week”; “2–3 times a month”; “once a month”; “less frequent than the preceding options”; “not been drinking the last 12 months”; and “have never been drinking alcohol”). The response anchors were converted to the number of annual drinking days using the method reported by Nordfjærn and Brunborg (2015). Usual drinking quantity was measured with the second item: “if you drank alcohol during the last year, how

many “drinks” did you usually drink on each occasion (a drink is 0.5 liters of beer, one glass of wine, a small glass of fortified wine or 4 centiliters of spirits)”. An open-ended response field was applied to record the responses. The responses were in turn converted to liters of pure alcohol by multiplying each value with 0.015. The responses to the drinking frequency question were used to enter the respondents into two possible groups: (1) abstainers (who either reported that they had never been drinking alcohol or had not been drinking alcohol the last year) or (2) alcohol consumers (who reported alcohol use the last year). Several previous studies used a similar approach to operationalize alcohol abstention and consumption (e.g. Michalak et al., 2007; Nordfjærn & Brunborg, 2015). Finally, a continuous variable was created where drinking frequency was multiplied with usual quantity. This yields an estimate of annual alcohol consumption, which accounts both for drinking frequency and usual drinking quantity. The variable was log-transformed and used in further analyses.

2.3. Statistical procedures

Descriptive statistics as well as proportion tests and independent-samples t-tests were used to describe the sample and to test univariate differences between alcohol consumers and abstainers on the study variables. To test prospective and cross-sectional associations between demographics, health variables and religiosity variables with alcohol abstention (no, yes) two multivariate logistic block regression analyses (enter method) were performed. The first block contained the demographic characteristics (i.e. gender, age, education and civil status) and health variables (i.e. mental and physical health). The religiosity variables were entered in the second block in order to investigate whether they contributed significantly to the model above and beyond the demographic characteristics and health variables. The NorLAG recorded information about one religiosity variable at T1 (religious salience/perceived importance of religion in life) and this variable was used as the independent variable in the prospective analysis. Since NorLAG included two religiosity indicators, which were strongly correlated at T2 ($r = 0.68, p < .001$), the two items were combined at T2 to avoid multicollinearity in the regression analyses. This combined variable was created on the basis of the religious salience and level of own personal religiosity. In addition, the cross-sectional analysis included the religious membership variable.

To test prospective and cross-sectional associations between religiosity and level of alcohol consumption, two multivariate linear regression analyses were performed. The analyses used the same independent variables and block sequence as the logistic regression analyses. The dependent variable (level of alcohol consumption) was log-transformed in order to avoid violation of the homoscedasticity assumption in regression analysis. This approach also effectively excluded the alcohol abstainers ($n = 218$) from this analysis, because it is not possible to log-transform a value of zero. This was desirable as alcohol consumption levels mainly are interesting to study among those who actually consume alcohol. Gender at T1 was used in all analyses. All prospective analyses used demographics and health variables obtained at T1, while the cross-sectional analyses used T2 measures for dynamic demographics (age, education and civil status) and health variables (mental health and physical health). All analyses used a conventional significance level of $p < .05$ and were performed in IBM® SPSS® Statistics version 23.

3. Results

Table 1 displays baseline demographics as well as scores on the health variables, religiosity variables and alcohol consumption at T1 and T2. The results are shown for the complete sample and split by alcohol abstention (yes, no). As shown, alcohol consumers were more likely to be male and to have a high education. These individuals also reported better physical health than abstainers, both at T1 and T2. Individuals who abstained from alcohol were older and substantially more likely to perceive a relative or strong religious salience (T1 and T2). Abstainers were also more likely to report relative or strong levels of personal religiosity (T2) and were also more likely to report a strong salience and/or personal religiosity at the combined variable at T2.

Table 1 about here

The next step was to investigate the relative role of religiosity for alcohol abstention in one prospective (T1 to T2) and one cross-sectional model (T2). As shown in Table 2, the prospective

model reflected that the block containing the religiosity variable at T1 (religious salience) was significantly associated with alcohol abstention at T2, above and beyond the demographics and health variables. When adjusting for all independent variables in the model, religious salience was associated with a nearly fourfold higher probability of alcohol abstention. In addition, female gender and higher age was related to an increased probability of abstaining, whereas high education and good physical health was related to a reduced probability of alcohol abstention.

As displayed in Table 2, the results of the prospective and cross-sectional analyses were rather consistent. The explained variance was also similar across the two models. The block containing the religiosity variables also contributed significantly to the cross-sectional model and a higher score on the combined religion variable at T2 was associated with a fourfold probability of abstention. With the exception of the combined religiosity variable, which was only available at T2 and physical health which was solely significant at T1, the same independent variables reached significance in the prospective and cross-sectional models.

Table 2 about here

The final step was to examine the prospective and cross-sectional associations between religiosity and higher alcohol consumption levels among those who used alcohol. As displayed in Table 3, the prospective model showed that the block with religiosity variables exerted a significant contribution to the model above and beyond demographics and health variables. The results showed that while all independent variables in the model were adjusted for, a relative or strong religious salience at T1 was associated with less alcohol consumption at T2. Further, female gender and, to a lesser extent, higher age and being married or with a registered partner were associated with less alcohol consumption, while high education was associated with higher consumption levels.

As reported in Table 3, although the religiosity block had a weaker contribution to the cross-sectional model, the strengths of the relations between the independent variables and outcome variables were

relatively similar (Standardized adjusted beta = -.13 and -.10 in the prospective and cross-sectional models, respectively). A strong salience and/or strong personal religiosity at T2 was associated with less alcohol consumption at the same measurement wave. Female gender and, to a lesser extent, good mental health and being married or together with a registered partner were associated with less alcohol consumption. High education and good physical health were the most important factors for higher alcohol consumption in the cross-sectional model.

Table 3 about here

4. Discussion

This panel study is one of the first to investigate the relative role of religiosity for alcohol abstinence and consumption levels in a large population-based sample of individuals in the second half of life. The results showed that while a wide-range of demographics and health variables were adjusted for, religiosity was associated with abstinence and also lower consumption levels among those who consumed alcohol. Moreover, the results showed that female gender and higher age were independently associated with an increased probability of alcohol abstinence, while high education and good physical health was associated with a reduced probability of abstinence. Female gender was also the variable with the strongest association with less alcohol consumption, whereas high education was related to higher consumption. These findings were rather consistent across the prospective and cross-sectional models. Overall, this expands findings from previous research in younger population segments in the United States (e.g. Brown et al., 2001; Michalak et al., 2007; Moore et al., 2003) to individuals in the second half of life in the relatively secular Norwegian setting.

Although strong conclusions cannot be drawn about the causes for why religiosity was strongly associated with alcohol abstinence, both physical and mental health were controlled for in the analysis. Both of these factors may be important underlying factors for why elderly choose to abstain from alcohol. Since religiosity still had a significant relation to abstinence it is possible that religious norms

contributed to abstinence among those who reported a strong religious salience and personal religiosity. Modern Christian practice is not necessarily promoting abstinence, but the practice was stricter in Norway some decades back and it was more common for Christians to abstain from alcohol. Parts of the cohort that were exposed to stricter practices are currently in the older age segments of the population.

It could be questioned whether abstinence actually is a health promoting behavior among aging adults. For instance, it has been argued that individuals who abstain from alcohol tend to have poorer mental and physical health than those who consume moderate amounts of alcohol (e.g. El-Guebaly, 2007; Lang et al., 2007). This may be due to potential third variables associated with abstinence, such as social exclusion. Nevertheless, those who abstain from alcohol are protected against the adverse physical and psychological impacts of heavy drinking (Michalak et al., 2007). Further, the current study did not suggest that those who abstained from alcohol had poorer mental health than those who consumed alcohol. The physical health was, however, found to be poorer among abstainers, which is likely due to the fact that these individuals were older. This explanation was further substantiated by the fact that physical health was not very strongly associated with abstinence when all factors were adjusted for in the multivariate model. As such, the abstinence associated with religiosity in the current study may have beneficial health effects in the second half of life.

On the basis of previous general population studies it has been concluded that religiosity is more strongly associated with alcohol abstinence, while religiosity may be secondary to demographics in terms of alcohol consumption levels (e.g. Michalak et al., 2007). Intriguingly, this was not replicated in the current study conducted among individuals in the second half of life as religiosity had one of the strongest associations with alcohol consumption levels, both in the prospective and cross-sectional models. Hence, religiosity does not seem to solely be related to abstinence in the second half of life, but may also be associated with moderation in consumption among those who consume alcohol. This implies that successful implementation of the norm activation systems, which may underly these

psychological processes, in public health campaigns may not merely promote alcohol abstinence, but also less alcohol consumption among those in the target groups who continue to drink alcohol.

The fact that religiosity had a demonstrable contribution to the explanatory models beyond the more typical research variables (e.g. gender, age, education as well as mental and physical health) suggests that researchers should give increased empirical attention to religiosity when studying substance use and other health-relevant behaviours. In spite of its potential importance, the domain examining alcohol consumption and religiosity in concert is relatively novel. This may be due to that science has strived to be a domain that is distinct from religion (see also Moscati & Mezuk, 2014). However, there is no contradiction between science as a distinct discipline from religion and a science that incorporates religion as a concept to be investigated by the scientific method.

Of note, religious membership did not reach significance neither in the analysis of alcohol abstinence nor alcohol consumption levels. It is likely that this could have been due to the lack of variance in this variable, as 86% of the current cohort reported membership in a Christian organization. Since most Norwegians who undergo baptism are entered into the Church registers, this variable is probably not a feasible indicator of actual religiosity in this context. This finding should be investigated further in countries with more religious heterogeneity in the elderly population than in Norway. Replication could also be interesting when the current young and middle-aged Norwegian individuals have reached the second half of life. These age cohorts would likely reflect more variation in religious membership variables than the present cohort, as immigration from other countries and cultures has increased the last decades.

4.1. Strengths and limitations of the study

The present study featured a large randomly obtained cohort of individuals in the second half of life. There are also very few studies on this topic to date that have measured the independent variables and outcome variables at different points in time. This may reduce the impact of common method variance on the results (e.g. respondents may complete the measures under different conditions and also reduces

the probability that previous responses influence memory etc.). The study should be replicated in cohorts that reflect stronger religious heterogeneity and with improved indicators of religious membership. This would allow researchers to investigate the relations between different religious traditions and approaches with alcohol consumption. It would also have been an advantage to include a measure that taps attendance to a place of worship. This would partly allow disentangling whether it is being spiritual per se, or the belonging to a certain group with certain social norms, that has an influence on alcohol consumption. Also, religiosity is likely to be rather stable during a six-year period in the second half of life. There is a need for longitudinal studies starting in relatively young age when religiosity is usually shaped and with multiple follow-up waves throughout the second half of life. This would allow for temporal investigations of whether changes in religious status are systematically associated with alcohol consumption over time. Future studies should also include measures of potential reasons for why religion is related to less alcohol consumption, for instance by including religious norms as mediators in the analyses.

4.2. Conclusion

The results from the current study of adults in the second half of life suggest that religiosity is important both for alcohol abstinence and for consumption levels among those who drink alcohol. Religiosity added substantially to the explanatory models both prospectively and cross-sectionally. The consumption of alcohol is increasing among aging Norwegians. It would therefore be important to disentangle the potential norms that promote healthy alcohol behaviours among religious individuals in the second half of life. These norms (or factors that promote the norms) could be incorporated in public health programmes independently of religiosity in the target groups.

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Table 1. Demographics, health variables, religiosity and alcohol consumption in the sample

Indicator	Total	Abstainers (T2)		p-value
	(n = 7052)	Yes (n = 218)	No (n = 3732)	
<i>Baseline demographic variables</i>				
Male % (n)	48 (3412)	27 (58)	48 (1784)	.000
Age M (SD)	57 (11.11)	63 (10.83)	56 (9.91)	.000
High education % (n)	26 (1429)	17 (27)	34 (944)	.000
Married or registered partner % (n)	64 (3560)	66 (103)	68 (1900)	.294
<i>Health variables (T1 and T2)</i>				
Physical health M (SD)				
T1	47 (11.42)	45 (11.64)	49 (10.25)	.000
T2	48 (10.61)	45.2 (11.26)	48.5 (10.22)	.000
Mental health M (SD)				
T1	54.6(8.40)	55.1 (8.22)	55.4 (7.40)	.648
T2	55.1 (7.64)	55.3 (8.01)	55.4 (7.26)	.901
<i>Religiosity variables (T1 and T2)</i>				
Relative or strong religious salience % (n)				
T1	64 (2617)	89 (125)	59 (1464)	.000
T2	58 (2220)	85 (161)	57 (2017)	.000
Relatively or very strong personal religiosity % (n)				
T2	60 (1730)	88 (157)	58 (1539)	.000
Strong salience and/or strong personal religiosity % (n)				
T2	63 (2489)	89 (189)	61 (2251)	.000
Religious membership (T2)				
No membership	8 (413)	4 (7)	8 (304)	
Christian	86 (4258)	90 (174)	86 (3083)	
Islam	0.6 (32)	2 (3)	0.2 (7)	
Other religious groups	0.8 (42)	3 (6)	0.7 (24)	
Other non-religious groups	4 (217)	2 (3)	5 (183)	
<i>Alcohol consumption (T1 and T2)</i>				
Last year drinking frequency ¹				
Mdn (interquartile range)				
T1	3 (2)	-	-	
T2	4 (2)	-	-	
Last year usual drinking quantity ²				
Mdn (interquartile range)				
T1	1 (1)	-	-	
T2	1 (1)	-	-	
Logged alcohol consumption				
Product Mdn (interquartile range)				
T1	1.6 (1.2)	-	-	
T2	1.6 (0.9)	-	-	

¹ Number of drinking days

² Liters of pure alcohol

Group differences between alcohol abstainers and consumers were examined with proportion tests and t-tests
Significant differences in bold

Table 2. Religiosity variables with prospective and cross-sectional associations with alcohol abstention (no, yes)

Indicator	Prospective model (T1 → T2)		Cross-sectional model (T2)	
	AOR (95% CI)	Wald	AOR (95% CI)	Wald
	DV: Alcohol abstention T2 (0 = no, n = 2444, 1 = yes, n = 139)		DV: Alcohol abstention T2 (0 = no, n = 2618, 1 = yes, n = 131)	
Block 1. Demographics and health variables				
Gender (female)	1.97 (1.33; 2.92)	11.34****	2.60 (1.72; 3.95)	20.18****
Age	1.06 (1.04; 1.08)	37.52****	1.06 (1.04; 1.09)	28.26****
Education (high)	0.54 (0.34; 0.85)	7.02**	0.52 (0.32; 0.82)	7.71***
Civil status (married or registered partner)	1.06 (0.72; 1.56)	0.10	1.17 (0.78; 1.75)	0.57
Mental health	1.00 (0.98; 1.02)	0.11	0.99 (0.97; 1.02)	0.29
Physical health	0.98 (0.97; 1.00)	4.30*	1.00 (0.98; 1.01)	0.39
Block 2. Religiosity				
Religious salience (relatively/strong)	3.78 (2.21; 6.47)	23.50****		
Membership				
No membership (ref)	-	-	-	-
Christian membership	-	-	1.38 (0.42; 4.54)	0.27
Islam membership	-	-	7.71 (0.48; 117.23)	0.13
Other religious group	-	-	5.31 (0.76; 37.22)	2.83
Other non-religious group	-	-	1.00 (0.16; 6.25)	0.00
Strong salience and/or strong personal religiosity ¹	-	-	4.24 (2.27; 7.89)	20.66****

****p < .001, *** p < .005, ** p < .01, * p < .05

Both blocks were significant in both models (p < .001)

Nagelkerke R² prospective model = 0.15

Nagelkerke R² cross-sectional model = 0.14

AOR = adjusted odds ratio

CI = confidence interval

¹ Merged variable of religious salience and level of own personal religiosity at T2

Table 3. Religiosity variables with prospective and cross-sectional associations with alcohol consumption level

Indicator	Prospective model (T1 → T2) (n = 1453)			Cross-sectional model (T2) (n = 1630)		
	Standardized adjusted beta (95% CI)	t-value	F-change	Standardized adjusted beta (95% CI)	t-value	F-change
Block 1. Demographics and health variables			12.01			14.94
Gender (female)	-0.12 (-0.29; -0.12)	-4.65***		-0.13 (-0.30; -0.14)	-5.25***	
Age	-2.03 (-0.01; 0.00)	-2.03*		-0.03 (-0.01; 0.00)	-1.06	
Education (high)	0.15 (0.16; 0.34)	5.62***		0.11 (0.11; 0.28)	4.43***	
Civil status (married or registered partner)	-0.06 (-0.20; -0.02)	-2.40*		-0.06 (-0.19; -0.02)	-2.40*	
Mental health	-0.04 (-0.01; 0.00)	-1.41		-0.08 (-0.02; -0.01)	-3.19***	
Physical health	0.02 (-0.01; 0.01)	0.75		0.07 (0.00; 0.01)	2.65**	
Block 2. Religiosity			25.05			7.45
Religious salience	-0.13 (-0.30; -0.13)	-5.00***		-		
Membership						
No membership (ref)	-	-		-	-	
Christian membership	-	-		0.15 (-0.02; 0.69)	1.85	
Islam membership	-	-		-0.01 (-1.84; -1.37)	-0.29	
Other religious group	-	-		-0.03 (-1.10; 0.37)	-0.97	
Other non-religious group	-	-		0.03 (-0.12; 0.32)	0.90	
Strong salience and/or strong personal religiosity ¹	-	-		-0.10 (-0.24; -0.08)	-3.76***	

***p < .001, ** p < .01, * p < .05

Significant F-changes (p < .001) in bold

Adjusted R² prospective model = 0.06

Adjusted R² cross-sectional model = 0.07

¹ Merged variable of religious salience and level of own personal religiosity at T2

² Higher scores reflect more consumption