



Religious status and addictive behaviors: Exploring patterns of use and psychological proneness

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ABSTRACT

Background: Previous studies have emphasized the role of religiosity as both a protective factor and a factor contributing to the success of recovery in the case of addictive behaviors. However, the associations between religious status and the involvement in distinct addictive behaviors as well as the associations between religious status and psychological factors have not been comprehensively examined. Therefore, the aims of the present study were to extend the literature by examining the (i) relationship between religiosity and distinct addictive behaviors including substance use and behavioral addictions, and (ii) interactive effects of religious status and psychological factors on addictive behaviors.

Material and methods: Data from two representative samples were analyzed (National Survey on Addiction Problems in Hungary [NSAPH]: $N = 1385$; 46.8% male; mean age = 41.77 years [SD = 13.08]; and Budapest Longitudinal Study [BLS]: $N = 3890$; 48.4% male; mean age = 27.06 years [SD = 4.76]). Distinct addictive behaviors and psychological factors related to the psychological proneness to addictive behaviors (impulsivity, sensation seeking, rumination, well-being, mentalization, and worry) were comprehensively examined in relation to religious status (religious, agnostic, and non-religious). Chi-square, Kruskal-Wallis and Mann-Whitney (MW) tests and multinomial logistic regressions were performed.

Results: Religious individuals showed significantly lower involvement in addictive behaviors whereas agnostic individuals showed significantly higher involvement in addictive behaviors. With regards to psychological factors related to the proneness to addictive behaviors, agnostic individuals showed the highest level of psychological proneness. The results of multinomial regression models showed that religiosity was protective in the NSAPH sample. However, worry could overwrite the protective effect. In the BLS study, the protective role of religiosity was uncertain. It was not protective in itself, but through interaction with sensation seeking, rumination and uncertain mentalization, religiosity can also be protective.

Discussion: The findings highlight the general protective role of religiosity in addictions. However, interaction with some psychological constructs can modify the protective role of religious status. The study also highlights the need to take into account agnostic religious status of individuals in future research. Consequently, further studies are needed to explore the causality and mediating roles between these variables.

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1. Introduction

Religiosity as a multidimensional construct is organized into personal beliefs, practices, and behavioral rituals [1–3]. The construct of religiosity includes two dimensions: institutional (attitudes toward and involvement in religious organizations and/or traditions) and individual (feelings and behaviors related to a higher power) [4]. However, the individual dimension of religiosity is an affective orientation toward deity and a personal, subjective mode of religion which can be also defined as spirituality [5].

During the past few decades, several studies have demonstrated that religious beliefs and practices have a potential to influence the course of mental illness by helping to understand and to cope with the disorder and it can positively affect the perception of individuals living with psychiatric disturbances [6,7]. Furthermore, religiosity can also modulate therapeutic choices and treatment outcomes by the individual's worldview and attitude toward different therapeutic options [6,8,9]. Therefore, exploring the religious attitudes during the case management of individuals with mental health illness can help to better understand the patient's mindset and expectations and to better plan the diagnostic and treatment options. Therefore, biopsychosocial based clinical practice must consider religious references for providing holistic healthcare, which is confirmed by the fact that several guidelines emphasize the importance of knowing the patient's religious affiliation during the first psychiatric interview [8,9].

Addictive behaviors have been widely examined with regards to the potential role of religiosity [6]. Previous studies have suggested that religiosity, especially the individual dimension (i.e., spirituality), is protective and contributes to the addiction recovery process [10–13]. The literature shows that the widely used 12-step-oriented intervention programs appear to be more efficacious for rehabilitation in substance use problems compared to interventions that do not include these factors [14]. These 12-step programs aim to enhance an individual's spiritual awareness and personal orientation given that six of the 12 steps refer to a 'higher power' of the person's own understanding [13]. However, it should be noted that previous studies focusing on the associations between religious status and the involvement in distinct addictive behaviors primarily focused on substance-related addictions [15] and only a few types of behavioral addictions (e.g., gambling disorder, problematic internet use, gaming disorder [16–18]). However, less is known about the relationship between religiosity and other types of behavioral addiction (e.g. problematic social media use, work addiction, compulsive buying behavior, exercise addiction, eating disorders). Since all substance-related and behavioral addictions can be defined through six common characteristics (i.e., withdrawal, conflict, tolerance, salience, mood medication, and relapse) [19], the investigation of the relationship between religiosity and addictive behaviors can be extended to many other proposed addictive behaviors including behavioral addictions.

Furthermore, in the examination of the relationship between religiosity/spirituality and the severity of addictive behaviors, as well as the success of recovery, the mediating role of different psychological background factors should be also taken into account. Several studies have investigated the characteristics of religious individuals and associations have been reported between religiosity and (i) higher self-esteem, (ii) being less impulsive [20,21], and (iii) lower level of sensation seeking (iii) [22]. Pajević et al. [23] also found that religious beliefs provide higher levels of mental health stability among adolescents by enabling better impulse control, healthier reactions to external stimuli, and more efficient anger and aggression control. The empirical research by Joiner et al. [24] has reported that the perceived control also plays a mediating role between religiosity/spirituality and subjective well-being. In addition, individuals with a higher level of religiosity are more likely to use adaptive emotional stress-regulation strategies [25]. However, there are also contradictory results in the literature regarding the relationship between religiosity and mental stability. For example,

Sweeny et al. [26] reported greater worry during stressful periods in life among religious individuals. In addition, Saunders et al. [27] reported a negative association between religiosity in general and rumination. However, spirituality as a more personal dimension of religiosity was significantly related to rumination. Vonk and Pitzen [28] examined the relationship between mentalization and religiosity. They found that emotional intelligence was positively associated with religiosity, whereas the accuracy in mentalizing was unrelated or negatively associated with religiosity.

Overall, various results in the scientific literature have been reported regarding the role of religiosity in the development and recovery from addictive behaviors as well as the relationship between religiosity and distinct psychological factors. However, it should be noted, that some of the aforementioned psychological constructs (e.g., impulsivity, mental stability) can also contribute to the development and maintenance of addictive behaviors [29,30]. Therefore, examination of the relationship between religiosity and psychological factors that can explain the severity of addictive behaviors may have a crucial role in better understanding the role of religiosity in the development and maintenance of addictive behaviors.

To the best of the present authors' knowledge, the associations between religious status and the involvement in distinct addictive behaviors including behavioral addictions as well as the association between religious status and psychological factors have not been previously comprehensively examined. Therefore, the aims of the present study were to extend the literature by examining the (i) relationship between religiosity and distinct addictive behaviors including substance use and behavioral addictions, and (ii) interactive effects of religious status and psychological factors on addictive behaviors across two studies conducted on large representative samples with similar methodologies.

2. Materials and methods

2.1. Participants

Data from two representative studies were included in the analyses to make the results more robust and generalizable: (i) the National Survey on Addiction Problems in Hungary (NSAPH) 2019, and (ii) the Budapest Longitudinal Study (BLS). The NSAPH 2019 is a nationally representative study of the Hungarian adult population aged between 18 and 64 years which assessed and monitored addictive problems in Hungary [31]. The data collection was carried out in the spring of 2019. The size of the final weighted sample by layer categories was 1385 participants (46.8% male [$n = 648$]; mean age = 41.77 years [$SD = 13.08$]). A total of 49.5% of participants were religious ($n = 637$), 44.1% were non-religious ($n = 567$), and 6.4% were agnostic regarding religious status ($n = 82$). In the present paper, the use of 'agnostic' refers to individuals being undecided or uncertain about their religious outlook.

The Budapest Longitudinal Study (BLS) is a representative longitudinal study assessing the process of development, maintenance, and eventual cessation of substance use and behavioral addictions among young adults (18–34 years) in Budapest. The first data collection wave was conducted with a representative young adult sample from Budapest in 2019. The final weighted sample by layer categories included 3890 participants (48.4% male [$n = 1883$]; mean age = 27.06 years [$SD = 4.76$]). A total of 38% of the BLS sample were religious ($n = 1361$), 51.7% were non-religious ($n = 1855$), and 10.3% were agnostic regarding religious status ($n = 368$). For the detailed characteristics of the NSAPH and BLS samples, see the Supplementary Materials.

2.2. Measures

The same mixed method arrangement of face-to-face and the same self-administered psychometric scales were used during the data collection and sample attrition was corrected by matrix weighting by layer categories in both NSAPH and BLS studies.

2.2.1. Religiosity

Religiosity was defined as the individual’s subjective perception of own religious status. It was measured by the following question: “Which of the following statements describes you the best?” (1 = religious, I follow the rules of church; 2 = religious, in my own way; 3 = don’t know whether I am religious; 4 = not religious; 5 = atheist). The literature exploring the relationship between religiosity and addictive behaviors mainly focuses on the individual’s own understanding of a ‘higher power’, independent of the religious practice and the type of the religion (see the 12-step-oriented interventions [13]). Therefore, for the present analyses, three groups were formed: religious; agnostic (uncertain about their religiosity), and non-religious [32]. Distinct addictive behaviors and psychological factors related to the psychological proneness to addictive behaviors were comprehensively examined along these three types of religious status.

2.2.2. Addictive behaviors

Distinct addictive behaviors were assessed using the questions of Epidemiological Model Questionnaire [33,34] as well as validated scales. The characteristics of the indicators and the internal consistencies of the scales are shown in Table 1.

2.2.3. Psychological proneness

Psychological proneness was defined as an underlying proclivity that initiates, and more importantly, perpetuates addictive behavioral patterns. The psychological factors indicating proness comprised impulsivity, sensation seeking, rumination, well-being, mentalization, and

worry. Factors related to psychological proneness to addictive behaviors were assessed using the scales shown in Table 2.

2.3. Statistical analysis

For the statistical analyses, dichotomous variables were formed based on the previously validated cut-off scores of scales and questionnaires assessing the presence of addictive behaviors. Chi-square tests were conducted to examine the differences in the proportion of participants with addictive behaviors across the three religious status groups. Adjusted standardized residuals (ASRs) were calculated to determine which groups contributed significantly to the results of chi-square tests. In further analyses, three groups were formed based on the presence or absence of addictive behaviors: (i) participants who had no addictive behavior (i.e., the value of the dichotomous variable was 0 in case of each addictive behavior); (ii) participants who had one addictive behavior (i.e., the value of the dichotomous variable was 1 in the case of one of the examined addictive behaviors); and (iii) participants who had two or more addictive behaviors (i.e., the value of the dichotomous variable was 1 in the case of two or more of the examined addictive behaviors).

Kruskal-Wallis and Mann-Whitney tests with Bonferroni correction were used to explore the factors related to psychological proneness to addictive behaviors across three religious status groups. Finally, chi-square tests and multinomial logistic regressions were applied to explore the potential contributing role of religious status, sociodemographic factors, and psychological factors as well as the interaction of

Table 1
Characteristics of the indicators and scales assessing addictive behaviors in NSAPHS and BLS samples.

Addictive behavior	Scale	References	Characteristics of the used scale	Item examples	Cronbach’s α (NSAPH sample)	Cronbach’s α (BLS sample)	Cut-off point
Past-year non-medical sedative/hypnotic use*	Epidemiological Model Questionnaire	[33,34]	–	–	–	–	–
Risky/hazardous alcohol consumption	Alcohol Use Disorders Identification Test (AUDIT)	[35,36,37,38]	10 items rated on a Likert scale ranging from 0 to 4	How often do you have a drink containing alcohol?	0.80	0.73	8
Nicotine use*	Epidemiological Model Questionnaire	[33,34]	–	–	–	–	–
Past-year illicit drug use*	Epidemiological Model Questionnaire	[33,34]	–	–	–	–	–
Moderate-risk or problem gambling	Problem Gambling Severity Index (PGSI)	[39,40,41]	9 items rated on a Likert scale ranging from 0 to 3	Within the last 12 months have you bet more than you could really afford to lose?	0.80	0.73	3
Problematic internet use	Problematic Internet Use Questionnaire (PIUQ)	[42,43,44,45,46]	9 items rated on a Likert scale ranging from 1 to 5	How often do you spend time online when you’d rather sleep?	0.94	0.93	22
Problematic social media use	Bergen Social Media Addiction Scale	[47,48,49]	6 items rated on a Likert scale ranging from 1 to 5	How often during the last year have you used social media to forget about personal problems?	0.92	0.91	24
Problematic video gaming	Ten-Item Internet Gaming Disorder Test (IGDT-10)	[50,51,52]	10 items rated on a Likert scale ranging from 0 to 2	Have you risked or lost a significant relationship because of gaming?	0.94	0.90	5
Work addiction	Bergen Work Addiction Scale (BWAS)	[53,54,55]	7 items rated on a Likert scale ranging from 0 to 4	Thought of how you could free up more time to work	0.83	0.87	16
Eating disorders	SCOFF Questionnaire	[56,57]	5 items with yes = 1/ no = 0 questions	Do you make yourself sick because you feel uncomfortably full?	0.63	0.73	2
Exercise addiction	Exercise Addiction Inventory (EAI)	[58,59,60]	6 items rated on a Likert scale ranging from 1 to 6	Exercise is the most important thing in my life	0.80	0.93	24
Compulsive buying behavior	Richmond Compulsive Buying Scale	[61,62]	6 items rated on a Likert scale ranging from 1 to 7	My spending habits are creating chaos in my life.	0.89	0.94	25

NSAPH: National Survey on Addiction Problems in Hungary; BLS: Budapest Longitudinal Study.

* This addictive behavior was assessed by questions based on the Epidemiological Model Questionnaire of the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA).

Table 2

Characteristics of the intruments assessing psychological factors related to the proneness to addictive behaviors in NSAPH and BLS samples.

Psychological factor	Scale	References	Characteristics of the used scale	Item examples	Cronbach's α (NSAPH sample)	Cronbach's α (BLS sample)
Impulsivity	Barratt Impulsiveness Scale (BIS)	[63,64,65,66]	10 items rated on a Likert scale ranging from 1 to 4	I plan tasks carefully.	0.77	0.78
Sensation seeking	Brief Sensation Seeking Scale (BSSS)	[67]	10 items rated on a Likert scale ranging from 1 to 5	I would like to explore strange places.	0.83	0.83
Rumination	Ruminative Response Scale (RRS)	[68,69,70]	10 items rated on a Likert scale ranging from 1 to 4	Why do I have problems other people don't have?	0.92	0.91
Well-being	WHO-5 Well-Being Scale	[71,72,73]	5 items rated on a Likert scale ranging from 0 to 3	Over the past 2 weeks, I have felt calm and relaxed.	0.89	0.88
Uncertain mentalization	Reflective Functioning Questionnaire (RFQ-8)	[74]	8 items rated on a Likert scale ranging from 1 to 7	People's thoughts are a mystery to me.	0.79	0.81
Worry	Penn-State Worry Questionnaire (PSWQ)	[75,76,77]	3-item version; items rated on a Likert scale ranging from 1 to 5	Many situations make me worry.	0.91	0.94

NSAPH: National Survey on Addiction Problems in Hungary; BLS: Budapest Longitudinal Study.

religious status and psychological factors in relation to the presence of one and two or more of the examined addictive behaviors. Continuous variables were standardized before entering the regression model. Statistical significance was considered if $p < 0.05$ except in case of Mann-Whitney tests with Bonferroni correction where statistical significance was considered if $p < 0.017$. IBM SPSS 24 was used for statistical analyses [78].

3. Results

3.1. National Survey on Addiction Problems in Hungary (NSAPH) 2019

3.1.1. Addictive behaviors in relation to religious status

Table 3 shows the presence of problematic patterns of addictive behaviors including substance use disorders and behavioral addictions in the three religious status groups of the NSAPH sample. The past-year prevalence of non-medical sedative/hypnotic use was significantly different among groups with significantly lower level of religious

Table 3

The number and percentage of participants with addictive behaviors in the three religious status groups of the NSAPH sample ($N = 1385$).

Addictive behavior	Group	Yes (%)	N	ASR	χ^2 (df)	Sig. (p-value)	Cramer's V value
Past-year non-medical sedative/ hypnotic use	Religious	1.6	10	-2.7	8.928 (2)	0.012	0.084
	Agnostic	6.3	5	1.8			
	Non-religious	3.9	22	1.9			
Risky or hazardous alcohol consumption	Religious	3.5	22	-4.1	21.961 (2)	<0.001	0.132
	Agnostic	15.0	12	3.3			
	Non-religious	8.2	46	2.5			
Nicotine use	Religious	29.4	187	-5.3	28.460(2)	<0.001	0.149
	Agnostic	47.6	39	2.2			
	Non-religious	42.9	243	4.3			
Past-year illicit drug use	Religious	1.3	8	-1.8	3.997(2)	0.136	0.057
	Agnostic	4.1	3	1.3			
	Non-religious	2.6	14	1.2			
Moderate-risk or problem gambling	Religious	2.8	17	-3.4	12.473(2)	0.002	0.100
	Agnostic	8.8	7	1.6			
	Non-religious	6.8	37	2.7			
Problematic internet use	Religious	2.5	14	-4.8	26.282 (2)	<0.001	0.151
	Agnostic	14.3	10	3.0			
	Non-religious	8.5	44	3.3			
Problematic social media use	Religious	8.4	49	-3.3	15.477(2)	<0.001	0.114
	Agnostic	22.2	16	2.9			
	Non-religious	13.5	72	1.9			
Problematic video gaming	Religious	0.0	0	-1.4	-	-	-
	Agnostic	0.0	0	-0.4			
	Non-religious	0.4	2	1.6			
Work addiction	Religious	4.6	28	-0.7	3.072(2)	0.215	0.050
	Agnostic	9.2	7	1.7			
	Non-religious	4.9	27	-0.2			
Eating disorders	Religious	6.9	40	-0.4	2.161(2)	0.340	0.042
	Agnostic	11.4	9	1.5			
	Non-religious	7.0	38	-0.3			
Exercise addiction	Religious	5.0	31	-3.2	18.285(2)	<0.001	0.120
	Agnostic	17.5	14	3.6			
	Non-religious	8.6	48	1.4			
Compulsive buying behavior	Religious	0.8	5	-2.2	6.051(2)	0.049	0.069
	Agnostic	3.8	3	1.6			
	Non-religious	2.2	12	1.5			

n: sample size within groups; ASR: adjusted standardized residuals. χ^2 : Chi-square statistic; df: degree of freedom; Sig.: significance. Values in bold indicate statistically significant results. ASR significant if $> |1.96|$.

participants than expected. Here (and throughout this section), “as expected” relates to that indicated by the ASR. The occurrence of risky or hazardous alcohol consumption was also significantly different between groups with significantly less religious participants than expected, and significantly more agnostic and non-religious participants than expected.

Also, nicotine use differed significantly between groups with significantly lower number of religious and higher number of agnostic and non-religious individuals than expected. In addition, the occurrence of moderate-risk or problem gamblers was significantly different between groups with significantly fewer religious participants than expected, and with significantly more non-religious participants than expected. The frequency of problematic internet use was also significantly different in the three groups. The number of religious individuals was significantly lower than expected. However, the number of agnostic and non-religious participants was significantly higher than expected. Furthermore, problematic social media use was significantly different between groups with significantly less religious and significantly more agnostic participants than expected.

The risk of exercise addiction was significantly different across the three groups in the NSAPH sample with more agnostic individuals than expected. The number of religious individuals was significantly lower than expected. The frequency of compulsive buying behavior was significantly different between groups: the number of religious individuals was significantly lower than expected. The occurrence of past-year illicit drug use, work addiction, and eating disorders did not differ significantly between groups. Finally, the prevalence of the problematic video gaming was close to zero in each group, therefore, no statistical tests could be performed.

Table 4 shows the number and percentage of participants who had (i) one addictive behavior and (ii) two or more addictive behaviors across the three religious status groups. The presence of addictive behaviors was significantly different between groups in the NSAPH sample. The number of religious participants was significantly lower than expected in regard of having one addictive behavior and having two or more addictive behaviors. Furthermore, the number of agnostic and non-religious participants was significantly higher than expected regarding having two or more addictive behaviors.

3.1.2. Psychological proneness in relation to religious status

Table 5 shows the descriptive statistics of psychometric scales assessing distinct psychological factors across the three religious status groups of the NSAPH sample.

Compared to the religious group, the level of impulsivity was significantly higher in the agnostic group (MW: $p < 0.001$) and non-religious group (MW: $p < 0.001$). Regarding the sensation seeking, the agnostic group (MW: $p < 0.001$) and non-religious group (MW: $p < 0.001$) showed significantly higher levels compared to the religious group. However, the level of sensation seeking was significantly higher in the agnostic group compared to the non-religious group (MW: $p = 0.006$). Rumination was significantly higher in the agnostic group

compared to the religious group (MW: $p < 0.001$) and non-religious group (MW: $p < 0.001$). Compared to the religious group, mentalization was significantly more uncertain in the non-religious group (MW: $p < 0.001$) and the agnostic group (MW: $p < 0.001$). The level of well-being and worry did not differ significantly between groups.

3.1.3. The role of religious status on the number of addictive behaviors

Based on the multinomial regression models (Table 6), religious participants in the NSAPH sample had 32.3% lower risk of having one addiction and 46% lower risk of having two or more addictive behaviors (compared to non-religious participants). In regard of the main effect of the gender, male individuals in the NSAPH sample had more than twice a higher risk of having one addiction and three times higher risk of having two or more addictive behaviors. Higher age decreased the risk of having two or more addictive behaviors by 19.6% in the NSAPH sample.

Sensation seeking had a main contributing effect on having addictive behaviors in the NSAPH sample. Higher levels of sensation seeking increased the risk of having two or more addictive behaviors by 68.3%. Individuals with higher levels of rumination had 42.7% higher risk for having two or more addictive behaviors in the NSAPH sample. Higher levels of well-being reduced the risk of having two or more addictive behaviors by 31.6% in the NSAPH sample.

Uncertain mentalization also had main contributing effect on having addictive behaviors. More specifically, it increased the risk of having (i) one addictive behavior by 42.5%, and (ii) two or more addictive behaviors by 90.9% in the NSAPH sample. In interaction with religiosity, higher levels of uncertain mentalization reduced the risk of having two or more addictive behaviors by 43.6% in the NSAPH sample (compared to non-religious participants). Finally, higher levels of worry increased the risk of having two or more addictive behaviors by 55.3% in NSAPH sample. Being religious with higher levels of worry also increased the risk of having one addictive behaviors by 66.1% in the NSAPH sample.

3.2. Budapest Longitudinal Study (BLS)

3.2.1. Addictive behaviors in relation to religious status

Table 7 shows the presence of problematic patterns of addictive behaviors in the three religious status groups of the BLS sample. In regard of the presence of risky/hazardous alcohol consumption, there was significantly less religious participants than expected in the BLS sample. Furthermore, the occurrence of moderate-risk or problem gamblers was also significantly different between groups in the BLS sample with significantly fewer religious participants than expected. The frequency of problematic internet use was also significantly different. The number of religious individuals was significantly lower than expected. However, the number of agnostic and non-religious participants was significantly higher than expected. In addition, problematic social media use was also significantly different between groups with significantly less religious and significantly more agnostic and non-religious participants than expected.

The frequency of work-addicted participants was significantly

Table 4

The number and percentage of participants involved in one and two or more of the examined addictive behaviors across the three religious status groups of the NSAPH sample ($N = 1385$).

	Group	Yes (%)	n	ASR	χ^2 (df)	Sig. (p-value)	Cramer's V value
One addictive behavior	Religious	31.2	199	-2.2	70.395(4)	<0.001	0.165
	Agnostic	37.8	31	0.7			
	Non-religious	37.0	210	1.9			
Two or more addictive behaviors	Religious	12.9	82	-6.1			
	Agnostic	39.0	32	4.6			
	Non-religious	24.5	139	3.9			

n: sample size within groups; ASR: adjusted standardized residuals.

χ^2 : Chi-square statistic; df: degree of freedom; Sig.: significance.

Values in bold indicate statistically significant results.

ASR significant if $> |1.96|$.

Table 5
Descriptive statistics, mean ranks and Kruskal-Wallis test of scales assessing psychological factors in the three religious status groups of the NSAPH sample (N = 1385).

Psychological factor	Group	Mean	SD	Mean rank	H-value	Sig. (p-value)	Cohen's d effect size
Impulsivity	Religious	17.42	4.53	559.92	72.446	<0.001	0.464
	Agnostic	19.74	4.37	745.35			
	Non-religious	19.56	5.13	735.20			
Sensation seeking	Religious	15.10	5.57	572.13	58.307	<0.001	0.412
	Agnostic	19.60	6.70	817.99			
	Non-religious	17.49	6.38	706.17			
Rumination	Religious	14.99	5.31	633.84	20.400	<0.001	0.232
	Agnostic	17.76	5.83	813.63			
	Non-religious	14.99	5.78	626.09			
Well-being	Religious	9.16	3.22	669.88	2.726	0.256	0.046
	Agnostic	9.47	2.62	718.13			
	Non-religious	9.14	2.90	650.16			
Uncertain mentalization	Religious	1.33	2.17	579.44	21.070	<0.001	0.237
	Agnostic	2.13	2.49	749.32			
	Non-religious	1.66	2.29	674.57			
Worry	Religious	5.48	2.94	656.94	1.789	0.409	0.025
	Agnostic	5.67	2.77	688.40			
	Non-religious	5.31	2.90	638.54			

SD: standard deviance; Sig.: significance.
Values in bold indicate statistically significant results of Kruskal-Wallis tests.

different between groups in the BLS sample. The number of religious individuals was significantly lower than expected, while the number of agnostic participants was significantly higher than expected. The risk of exercise addiction differed significantly between the three groups with more agnostic individuals than expected. The frequency of compulsive buying behavior was significantly different between groups in the BLS sample: the number of agnostic participants was significantly higher than expected.

The prevalence of past-year non-medical sedative/hypnotic use, nicotine use, past-year illicit drug use, and eating disorders did not differ significantly between groups, while the prevalence of the problematic video gaming was also close to zero in each group of the BLS study. Therefore, statistical tests could not be performed.

Table 8 shows the number and percentage of participants who had (i) one addictive behavior and (ii) two or more addictive behaviors across the three religious status groups of the BLS sample. The presence of addictive behaviors was significantly different between groups. In the BLS sample, the number of agnostic individuals was significantly higher than expected in regard to having two or more addictive behaviors.

3.2.2. Psychological proneness in relation to religious status

Table 9 shows the descriptive statistics of psychometric scales assessing distinct psychological factors across the three religious status groups of the BLS sample. Compared to the religious individuals, the level of impulsivity was also significantly higher in the agnostic group of the BLS sample (MW: $p < 0.001$) and non-religious group (MW: $p < 0.001$). Furthermore, the non-religious group showed a higher level of impulsivity compared to the agnostic group (MW: $p = 0.002$). As for the sensation seeking, the agnostic group (MW: $p < 0.001$) and non-religious group (MW: $p < 0.001$) showed significantly higher levels compared to the religious group. The level of sensation seeking was also significantly higher in the agnostic group compared to the non-religious group (MW: $p < 0.001$). As well as in the NSAPH sample, rumination was significantly higher in the agnostic group compared to the religious group (MW: $p = 0.008$) and non-religious group (MW: $p < 0.001$). In the BLS sample, the well-being of the agnostic group was significantly higher compared to both the religious group (MW: $p < 0.001$) and the non-religious group (MW: $p < 0.001$). Compared to the religious group, mentalization was also significantly more uncertain in the non-religious group (MW: $p < 0.001$) and the agnostic group (MW: $p < 0.001$). Finally, in the BLS sample, the level of worry was significantly higher in the religious group (MW: $p = 0.001$) and the non-religious group (MW: $p < 0.001$), compared to the agnostic group.

3.2.3. The role of religious status on the number of addictive behaviors

Based on the multinomial regression models built on the BLS sample (Table 10), religious participants had 34.4% higher risk of having one addictive behavior and 47.4% higher risk of having two or more addictive behaviors (compared to non-religious participants). Male individuals of the BLS sample had 85.3% higher risk of having one addiction and 78% higher risk of having two or more addictive behaviors. Higher age increased the the risk of having one addictive behavior by 13.8% in the BLS sample.

With regard to the role of psychological factors, impulsivity had a significant main effect in the BLS sample, with a unit increase in impulsivity resulting in 24.6% lower risk for having two or more addictive behaviors. However, in interaction with the religious status, impulsivity increased the presence of addictive behaviors as follows: religious individuals with a higher level of impulsivity had 63.9% higher risk for having one addictive behavior and 83.2% higher risk for having two or more addictive behaviors (compared to non-religious individuals). Furthermore, agnostic individuals with a higher level of impulsivity had 47.7% higher risk for having one addictive behavior and more than three times higher risk of having two or more addictive behaviors (compared to non-religious participants).

Sensation seeking also had a main contributing effect on having addictive behaviors in the BLS sample. Participants with higher levels of sensation seeking had 23.9% higher risk for having one addictive behavior and almost two times higher risk for having two or more addictive behaviors. However, in the BLS sample, religious participants with higher levels of sensation seeking had 47% lower risk for having two or more addictive behaviors (compared to non-religious participants). Individuals with higher levels of rumination had 57.9% higher risk of having one addictive behavior and 2.5 times higher risk for having two or more addictive behaviors in the BLS sample. However, religious participants in the BLS sample with higher levels of rumination had lower risk for having (i) one addictive behavior (by 23.5%) and (ii) two or more addictive behaviors (by 24.5%) (compared to non-religious individuals). Higher levels of well-being reduced the risk of having two or more addictive behaviors by 45% in the BLS sample.

Uncertain mentalization also had main contributing effect on having addictive behaviors in the BLS sample. It increased the risk of having (i) one addictive behavior (by 31.1%), and (ii) two or more addictive behaviors (by 74.9%). In interaction with religiosity, higher levels of uncertain mentalization reduced the risk of having two or more addictive behaviors (by 35.8%) in the BLS sample (compared to non-religious participants). In addition, higher levels of worry increased the risk of having two or more addictive behaviors (by 37.3%) in the BLS sample.

Table 6

Multinomial regression models: the role of religious status, sociodemographic factors, and psychological factors in interaction with psychological factors in the presence of one or two or more of the examined addictive behaviors in the NSAPH sample (N = 1385).

Main effects and the role of religious status in interaction with psychological factors	The presence of one addictive behavior		The presence of two or more addictive behaviors	
	OR (95% CI)	Sig. (p-value)	OR (95% CI)	Sig. (p-value)
Religious status				
Religious	0.677 (0.499–0.919)	0.012	0.540 (0.356–0.819)	0.004
Agnostic	1.946 (0.848–4.465)	0.116	2.024 (0.745–5.503)	0.167
Non-religious	Ref.			
Gender				
Male	2.312 (1.746–3.062)	<0.001	3.005 (2.053–4.400)	<0.001
Female	Ref.			
Age	0.920 (0.789–1.073)	0.289	0.804 (0.655–0.987)	0.037
Impulsivity	0.880 (0.699–1.108)	0.278	0.793 (0.585–1.075)	0.135
Impulsivity x religious	1.043 (0.748–1.455)	0.802	1.068 (0.678–1.681)	0.778
Impulsivity x agnostic	1.377 (0.472–4.024)	0.558	2.970 (0.955–9.241)	0.060
Impulsivity x non-religious	Ref.			
Sensation seeking	1.180 (0.915–1.525)	0.201	1.683 (1.246–2.275)	0.001
Sensation seeking x religious	1.143 (0.809–1.615)	0.448	1.086 (0.700–1.686)	0.713
Sensation seeking x agnostic	2.000 (0.870–4.597)	0.103	1.303 (0.519–3.275)	0.573
Sensation seeking x non-religious	Ref.			
Rumination	1.287 (0.959–1.729)	0.093	1.427 (1.021–1.993)	0.037
Rumination x religious	0.782 (0.530–1.156)	0.218	0.926 (0.577–1.486)	0.751
Rumination x agnostic	0.752 (0.320–1.767)	0.513	1.027 (0.422–2.499)	0.952
Rumination x non-religious	Ref.			
Well-being	0.891 (0.686–1.158)	0.389	0.684 (0.498–0.941)	0.020
Well-being x religious	0.982 (0.698–1.379)	0.914	1.101 (0.707–1.715)	0.670
Well-being x agnostic	0.401 (0.126–1.273)	0.121	1.279 (0.387–4.229)	0.687
Well-being x non-religious	Ref.			
Uncertain Mentalization	1.425 (1.057–1.921)	0.020	1.909 (1.382–2.638)	<0.001
Uncertain mentalization x religious	0.747 (0.515–1.085)	0.125	0.564 (0.366–0.868)	0.009
Uncertain mentalization x agnostic	0.723 (0.271–1.928)	0.517	0.732 (0.274–1.955)	0.534
Uncertain mentalization x non-religious	Ref.			
Worry	0.824 (0.620–1.095)	0.183	1.553 (1.148–2.100)	0.004
Worry x religious	1.661 (1.140–2.418)	0.008	0.992 (0.633–1.555)	0.972
Worry x agnostic	1.091 (0.370–3.214)	0.875	1.319 (0.432–4.027)	0.626
Worry x non-religious	Ref.			

Ref: reference groups; OR: odds ratio; CI: confidence interval. Values in bold indicate statistically significant results.

4. Discussion

The present study comprehensively examined (i) the relationship between religious status and problematic patterns of distinct addictive behaviors including substance use disorders and behavioral addictions, and (ii) the relationships between religious status and psychological factors related to the proneness to addictive behaviors. The first set of findings extended the scientific literature by showing that regarding most of the examined addictive behaviors (including both substance use disorders and behavioral addictions), the religious group showed significantly lower level of problematic patterns of addictive behavior compared to agnostic and/or non-religious individuals. These results highlight and suggest the protective role of religiosity in addictions more generally. It should be also noted that the lower prevalence of non-medical use of sedatives/hypnotics suggests that religiosity also has implications regarding healthcare compliance and adherence.

As aforementioned, the role of religiosity/spirituality in the development and recovery from addictions is well-known [10–14]. However, little is known about how agnostic religious status is related to the development and maintenance of addictive behaviors. In most cases, as shown in the present study, problematic patterns of use were the most frequent in the agnostic group. In regard to the psychological factors concerning the proneness to addictive behaviors, the results pointed in the same direction (i.e., those with agnostic religious beliefs had the highest level of traits associated with psychological proneness toward addiction). In general, based on the results here, agnostic religious status is associated with higher level of both problematic patterns of addictive behaviors and psychological factors related to the proneness toward addictive behaviors. Therefore, higher levels of these psychological factors among the agnostic religious group may render these individuals more vulnerable, which is a risk factor for higher involvement in addictive behaviors. Various studies have reported that psychological constructs examined in the present study contribute to addictive behaviors [79–88].

However, it should also be noted that these psychological constructs are also highly related to mental stability and previous studies have found that individuals with intrinsic religiosity are committed to (and less likely to have personal struggles with) their religion, which may explain their mental stability [89]. Moreover, studies also suggest that religious identity commitment correlates with higher level of satisfaction and coherence in life, since religious belief may contribute to ideological confidence in a coherent worldview, while doubting that an individual's worldview may be related to higher level of distress [90–92]. However, Galen and Kloet [90] reported that individuals who have higher belief certainty, not only religious, but non-religious, have greater mental stability compared to those with low certainty, due to their confident worldview. In fact, Maliňáková et al. [93] found that agnostic individuals are more likely to experience attachment anxiety compared with stable non-religious individuals. Therefore, poorer mental health and stability may contribute to higher levels of problematic pattern of addictive behaviors among agnostic individuals.

The findings were also supplemented with multinomial regression models to provide a more accurate picture about the role of religiosity and psychological factors among those with addictive behaviors. In general, it was found that in the national representative adult population (NSAPH) study, religiosity was basically a protective factor. However, if worry is a pronounced characteristic of the personality, it seems that this trait increases the risk of having one addictive behavior among religious individuals. Therefore, in these cases, the protective role of religiosity appears to be overwritten by worry. This finding is consistent with the findings of Sweeny et al. [26]. In the young adult (BLS) study, and based on the logistic regression models, the protective role of religiosity became uncertain. It does not appear to be protective in itself. However, among individuals who are more prone to addictions (those with higher levels of sensation seeking and rumination; uncertain mentalization), when interacting with these psychological constructs, religiosity also

Table 7

The number and percentage of participants with addictive behaviors in the three religious status groups of the BLS sample (N = 3890).

Addictive behavior	Group	Yes (%)	N	ASR	χ^2 (df)	Sig. (p-value)	Cramer's V value
Past-year non-medical sedative/ hypnotic use	Religious	1.7	23	-1.0	5.210 (2)	0.074	0.038
	Agnostic	3.5	13	2.2			
	Non-religious	1.9	35	-0.4			
Risky or hazardous alcohol consumption	Religious	4.0	54	-2.6	7.214 (2)	0.027	0.054
	Agnostic	6.5	24	1.2			
	Non-religious	5.9	109	1.9			
Nicotine use	Religious	36.6	495	1.2	1.747(2)	0.418	0.022
	Agnostic	36.0	132	0.3			
	Non-religious	34.3	635	-1.3			
Past-year illicit drug use	Religious	5.5	77	0.3	0.252(2)	0.881	0.009
	Agnostic	4.9	14	-0.5			
	Non-religious	5.4	94	0.0			
Moderate-risk or problem gambling	Religious	0.9	12	-2.5	6.410(2)	0.041	0.043
	Agnostic	1.9	7	0.9			
	Non-religious	1.1	21	1.9			
Problematic internet use	Religious	3.5	45	-5.4	31.326(2)	<0.001	0.096
	Agnostic	9.9	34	2.7			
	Non-religious	7.9	141	3.6			
Problematic social media use	Religious	10.6	137	-2.9	11.718(2)	0.003	0.059
	Agnostic	17.1	57	2.5			
	Non-religious	13.4	241	2.3			
Problematic video gaming	Religious	0.0	0	-	-	-	-
	Agnostic	0.0	0	-			
	Non-religious	0.0	0	-			
Work addiction	Religious	3.0	40	-2.6	8.776(2)	0.012	0.050
	Agnostic	6.1	22	2.1			
	Non-religious	4.5	82	1.2			
Eating disorders	Religious	8.6	113	0.9	3.506(2)	0.173	0.032
	Agnostic	10.0	36	1.4			
	Non-religious	7.4	133	-1.7			
Exercise addiction	Religious	7.2	96	-0.3	12.228(2)	0.002	0.059
	Agnostic	11.7	43	3.4			
	Non-religious	6.5	120	-1.8			
Compulsive buying behavior	Religious	3.4	45	-1.4	9.576(2)	0.008	0.052
	Agnostic	6.9	25	3.0			
	Non-religious	3.8	70	-0.5			

n: sample size within groups; ASR: adjusted standardized residuals.

χ^2 : Chi-square statistic; df: degree of freedom; Sig.: significance.

Values in bold indicate statistically significant results.

ASR significant if $> |1.96|$.

Table 8

The number and percentage of participants involved in one and two or more of the examined addictive behaviors across the three religious status groups of the BLS sample (N = 3890).

	Group	Yes (%)	n	ASR	χ^2 (df)	Sig. (p-value)	Cramer's V value
One addictive behavior	Religious	35.3	481	1.7	11.091(4)	0.026	0.039
	Agnostic	33.1	122	-0.2			
	Non-religious	32.4	601	-1.6			
Two or more addictive behaviors	Religious	18.4	250	-1.9			
	Agnostic	25.2	93	2.7			
	Non-religious	20.1	373	0.2			

n: sample size within groups; ASR: adjusted standardized residuals.

χ^2 : Chi-square statistic; df: degree of freedom; Sig.: significance.

Values in bold indicate statistically significant results.

ASR significant if $> |1.96|$.

appears to be protective. Furthermore, these results raise the possibility of religion as the object of addiction among these individuals. Taylor [94] described a number of characteristics of "religious addiction" similar to both behavioral and substance addictions. Therefore, if the main object of the addiction is the religion itself, this may give the impression that religiosity is protective against further addictions. In addition, after controlling for other psychological variables, and somewhat counterintuitively, impulsivity appeared to be a protective factor in the BLS study. There is no obvious reason why this would be the case. This perhaps could have occurred as a result of controlling other variables in the model but further research is clearly needed to explore this unexpected finding. However, in interaction with religiosity and

agnostic religious status, this effect was reversed. For possible explanations of these results, further studies are required.

Overall, the results supported the impact of religiosity and its interactions with personality features in addictive behaviors. Due to the modulating effect of religiosity on therapeutic choices and treatment outcomes [6,8,9], professionals working in the field of addictions should pay more attention to individuals' religious beliefs (alongside psychological factors). There is no treatment method suitable for everyone due to the heterogeneity of patients with addictive behaviors. The comprehensive nature of the present study examined the interactions of religiosity with personality factors. Therefore, the findings help in developing individual treatment plans and can also help in the

Table 9Descriptive statistics, mean ranks and Kruskal-Wallis test of scales assessing psychological factors in the three religious status groups of the BLS sample ($N = 3890$).

Psychological factor	Group	Mean	SD	Mean rank	H-value	Sig. (p-value)	Cohen's d effect size
Impulsivity	Religious	18.86	5.01	1485.01	182.513	<0.001	0.441
	Agnostic	20.69	4.29	1804.13			
	Non-religious	21.31	4.64	1981.38			
Sensation seeking	Religious	16.64	5.65	1646.17	55.988	<0.001	0.237
	Agnostic	18.94	5.77	2068.63			
	Non-religious	17.67	6.17	1830.42			
Rumination	Religious	14.33	4.85	1797.17	17.772	<0.001	0.128
	Agnostic	15.70	6.00	1946.51			
	Non-religious	14.39	5.24	1715.48			
Well-being	Religious	9.72	2.84	1756.09	14.047	0.001	0.112
	Agnostic	10.06	3.75	1968.95			
	Non-religious	9.71	2.85	1764.88			
Uncertain mentalization	Religious	0.21	0.27	1661.11	27.937	<0.001	0.164
	Agnostic	0.26	0.29	1864.69			
	Non-religious	0.24	0.26	1834.05			
Worry	Religious	4.75	2.63	1790.44	21.982	<0.001	0.144
	Agnostic	5.42	2.94	1981.74			
	Non-religious	4.63	2.54	1730.69			

SD: standard deviance; Sig.: significance.

Values in bold indicate statistically significant results of Kruskal-Wallis tests.

development of more complex and integrative prevention programs.

Some strengths and limitations of the study should be noted. A key strength of the study was that most of the examined addictive behaviors appear in the scientific literature and are treated in clinical practice. Therefore, it is important to comprehensively examine these behaviors in the context of religiosity. In addition, religiosity was not defined and examined as a two-dimensional construct. Studies in the scientific literature investigating the role of religious status in the development, maintenance, and recovery from addictions mainly focus on the role of religiosity and spirituality. However, less attention has been given to the effects of being agnostic toward religiosity. The present study draws attention to the need of taking into account agnostic religious status in future research. Furthermore, another strength was that the data came from two relatively large and representative samples as well as sheer number of variables that were analyzed. The results of these comprehensive studies point in the same direction increasing the robustness, generalizability, and validity of the present study's findings. Nevertheless, further studies are needed to also explore the causality and mediating roles between these phenomena.

Regarding the limitations of the study, self-administered questionnaires were used, therefore, social desirability bias should be taken into account. Furthermore, since religiosity is a multidimensional construct, different definitions and measures of religiosity can be found in the scientific literature. Moreover, the present study relied on the individuals' subjective perception of their religiosity, independent of the religious practice and the type of the religion. However, this conceptualization is reductionist, and no further information was collected concerning individuals' beliefs, attitudes, and feelings regarding religion. In relation to the assessment of addictive behaviors, using dichotomous variables (presence vs. absence of an addictive behavior), may have caused a loss of information. On the other hand, some of the examined addictive behaviors may overlap (e.g., problematic internet use, problematic gaming, problematic social media use), which may increase the prevalence of two or more addictive behaviors. Finally, regarding eating disorders, the internal consistency of the SCOFF Questionnaire was slightly lower than optimal in the NSAPH sample, which should be taken into account during the interpretation of results in this sample. In addition, current addiction models primarily consider binge eating as the most similar to addictions, but the SCOFF Questionnaire does not assess this construct. In future studies, further psychological factors (such as extraversion, emotion regulation, resilience), other addictive behaviors (such as problematic smartphone use, sex/pornography addictions), and specific aspects of religious beliefs should be also included in analyses. Furthermore, since the present study was cross-sectional,

other research designs such as longitudinal investigations are needed to explore the causal relationship between the examined constructs. In addition, the inclusion of other age groups (e.g. teenagers, because adolescence is a critical period in terms of the development of addictions) would be advantageous and increase the generalizability of the present study's results.

5. Conclusion

The present study's findings highlight the general protective effect of religiosity in substance-related and behavioral addictions. However, interactions with some psychological/personality constructs can modify this protective role. The results draw attention to the need to take into account patients' religious status in both prevention and clinical practice, as well as agnostic religious status, in future research.

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Declaration of Competing Interest

ELTE Eötvös Loránd University receives funding from the Szerencsejáték Ltd. to maintain a telephone helpline service for problematic gambling. The University of Gibraltar receives funding from the Gibraltar Gambling Care Foundation, an independent charity. Mark D. Griffiths' university has received research funding from *Norsk Tipping* (the gambling operator owned by the Norwegian Government). Griffiths has also received funding for a number of research projects in the area of gambling education for young people, social responsibility in gambling and gambling treatment from *Gamble Aware* (formerly the *Responsible Gambling Trust*), a charitable body which funds its research program based on donations from the gambling industry. Griffiths also regularly undertakes consultancy for various gaming companies in the area of player protection and social responsibility in gambling. However, these funding sources are not related to this paper and the funding institution had no role in the study design or the collection, analysis, and interpretation of the data, writing the manuscript, or the decision to submit the paper for publication. All other authors declare that they have no conflicts of interest.

Table 10

Multinomial regression models: the role of religious status, sociodemographic factors, and psychological factors in interaction with psychological factors in the presence of one or two or more of the examined addictive behaviors in the BLS sample (N = 3890).

Main effects and the role of religious status in interaction with psychological factors	The presence of one addictive behavior		The presence of two or more addictive behaviors	
	OR (95% CI)	Sig. (p-value)	OR (95% CI)	Sig. (p-value)
Religious status				
Religious	1.344 (1.118–1.615)	0.002	1.474 (1.135–1.914)	0.004
Agnostic	1.217 (0.899–1.648)	0.203	0.831 (0.496–1.392)	0.483
Non-religious	Ref.			
Gender				
Male	1.853 (1.573–2.182)	<0.001	1.780 (1.418–2.234)	<0.001
Female	Ref.			
Age	1.138 (1.050–1.234)	0.002	1.088 (0.973–1.216)	0.140
Impulsivity	0.942 (0.827–1.074)	0.373	0.754 (0.626–0.908)	0.003
Impulsivity x religious	1.639 (1.348–1.995)	<0.001	1.832 (1.391–2.413)	<0.001
Impulsivity x agnostic	1.477 (1.001–2.179)	0.049	3.211 (1.835–5.620)	<0.001
Impulsivity x non-religious	Ref.			
Sensation seeking	1.239 (1.091–1.407)	0.001	2.433 (2.056–2.881)	<0.001
Sensation seeking x religious	0.917 (0.750–1.121)	0.399	0.530 (0.410–0.686)	<0.001
Sensation seeking x agnostic	0.792 (0.564–1.110)	0.176	0.842 (0.546–1.299)	0.437
Sensation seeking x non-religious	Ref.			
Rumination	1.579 (1.374–1.815)	<0.001	2.510 (2.122–2.968)	<0.001
Rumination X religious	0.765 (0.611–0.958)	0.020	0.755 (0.577–0.987)	0.040
Rumination X agnostic	0.973 (0.689–1.374)	0.875	0.927 (0.619–1.386)	0.711
Rumination X non-religious	Ref.			
Well-being	0.903 (0.793–1.029)	0.125	0.550 (0.464–0.653)	<0.001
Well-being x religious	0.947 (0.778–1.153)	0.588	1.164 (0.909–1.491)	0.228
Well-being x agnostic	0.951 (0.702–1.289)	0.746	1.120 (0.772–1.624)	0.552
Well-being x non-religious	Ref.			
Uncertain Mentalization	1.311 (1.143–1.503)	<0.001	1.749 (1.467–2.086)	<0.001
Uncertain mentalization x religious	0.892 (0.730–1.090)	0.264	0.742 (0.577–0.955)	0.020
Uncertain mentalization x agnostic	0.869 (0.604–1.249)	0.447	0.719 (0.459–1.124)	0.148
Uncertain mentalization x non-religious	Ref.			
Worry	1.052 (0.917–1.207)	0.468	1.373 (1.161–1.625)	<0.001
Worry x religious	1.033 (0.837–1.275)	0.762	1.151 (0.900–1.472)	0.263
Worry x agnostic	1.276 (0.909–1.791)	0.158	1.393 (0.943–2.056)	0.095
Worry x non-religious	Ref.			

Ref: reference groups; OR: odds ratio; CI: confidence interval. Values in bold indicate statistically significant results.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.comppsy.2023.152418>.

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