

Reinhard Heun<sup>1\*</sup>

## A systematic review on the effect of Ramadan on mental health: minor effects and no harm in general, but increased risk of relapse in schizophrenia and bipolar disorder

<sup>1</sup>University of Bonn, Germany

\*email: globalpsychiatry@gmx.com

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### Abstract

**Objectives:** Globally, Moslems are the second largest religious group. During the month of Ramadan from dawn to sundown, healthy Moslems are required to refrain from eating, drinking, smoking, sexual activity and harmful behaviour towards others and themselves. Thus Ramadan may change individual physical states and social interactions. Both might affect mental health within society. Consequently, this systematic review looks at the various effects of Ramadan on mental health.

**Methods:** A literature search on Ramadan and mental health initially identified 294 papers. We finally selected all 22 relevant papers covering Ramadan and mental health from which study data were extracted.

**Results:** Relevant papers focussed on the general population and healthy volunteers, on subjects practising sports, on subjects with severe physical disorders, on subjects at risk of eating disorders and on subjects with mental health disorders. The effects of Ramadan on mental well-being were mixed. Positive and negative effects were usually minor, except in subjects with schizophrenia and metabolic syndrome, and in subjects with bipolar disorder who suffered a substantial increase of relapses.

**Conclusion:** Ramadan fasting is safe in most conditions and disorders, but caution is required in subjects with schizophrenia and bipolar disorder. The research on mental health and Ramadan would profit from larger studies with more representative samples to help understand the intra-individual and social factors that affect the mental health and well-being in patients and in society. The scientific potential of such studies may have been overlooked in the psychiatric community.

### Keywords

Systematic review, Ramadan, fasting, mental health, depression, anxiety, schizophrenia, bipolar disorder

## INTRODUCTION

### Relevance of Ramadan

Ramadan is the ninth month of the Islamic lunar calendar, referred to as the Holy Month. Fasting during Ramadan is one of the five religious duties of adult Moslems. Moslems who participate will abstain from eating, drinking and smoking during the day from sunrise to sundown. During Ramadan, all wrongdoings including self-destructive behaviour and anger towards others are prohibited. Moslems with severe diseases can refrain from fasting during Ramadan. However, it may not be clear to doctors who is fit or unfit for fasting in different diseases.

After sundown and during the night, Moslems can eat and drink as much as they need, thus compensating for the lack

of fluid and calorie intake during abstinence. Late eating and drinking either alone or in social gatherings will reduce the time available for night time sleep. Thus, the body metabolism and the diurnal sleep cycle are likely to be affected by Ramadan (Brahmam 2006).

There are 1.6 billion Moslems in the world living in many different countries and environments. Ramadan thus affects a large proportion of the global population. The social, religious and mental activities and effects of Ramadan may vary by country (Waterhouse et al. 2008).

### Ramadan, sleep, fasting and mental health

Ramadan may affect sexual function in men (Talib et al. 2015). Ramadan can affect the chronobiology of the body temperature and energy expenditure (Bahammam et al.

2010). The effect of Ramadan fasting on sleep and daytime fatigue may depend on the season of the year, the latitude of the place, and thus the length of day and night. It may also depend on social factors such as working hours, shop opening times, meal and prayer times (Bahammam 2006).

Sleep has been shown to be affected in many psychiatric disorders: Patients with depression often suffer interrupted sleep and sleep-onset rapid eye movement periods. Poor sleep may be an early sign or a trigger of depression and manic episodes in bipolar disorder. Sleep deprivation has been used as a therapy for severe depressive disorders. During manic episodes, the need for sleep is known to be reduced. Temporary sleep changes have been observed during Ramadan (Leiper et al 2008). Most of the effects of Ramadan fasting on sleep can be reproduced by experimental fasting outside Ramadan (BaHamam et al. 2014).

Change of appetite is a main feature of different eating disorders and depression. Excessive fasting is the characteristic of anorexia nervosa. Fasting has been assumed to improve the mood, in general, but has only rarely been used to improve the mood in depression. Such interventions have not become general practice for practical reasons, but the long-term effects of fasting on mood are also not yet clear (Fond et al. 2012).

The present systematic review will focus on mental health and assess how much it is affected by Ramadan. It investigates if Ramadan and the induced fasting have positive or negative effects on mental health in the general population, in special subgroups of the populations and in different patient groups.

## **METHODS**

### **Systematic review of the literature**

We performed a literature search on Pubmed and Medline in September 2017 using the following search terms: Ramadan and mental health or depression or anxiety or schizophrenia or bipolar disorder.

The search identified a total of 294 papers. We then reviewed their titles and abstracts.

One paper in French was excluded.

Ninety-nine papers were falsely identified because one of the authors had the name Ramadan, but were then excluded as

these papers did not relate to the holy month of Ramadan, or mental health and Ramadan.

Of the remaining 194 papers of which the abstracts were screened, 162 papers did not focus on mental health issues according to the abstracts.

Thirty-two full papers were reviewed and assessed, and one additional paper was identified via the reference list.

Two review papers and one editorial did not contain any data. Eight other papers did not focus on mental health or provide any data on mental health in Ramadan.

The data from 22 studies were extracted and summarised in a table.

### **Extraction of information**

The data extraction focused on study question, study design, subject characteristics, assessment instruments, outcome, study results, conclusions and possible bias. The foci of individual studies and their designs showed considerable variety. However, we did not apply any further selection of papers concerning study type, quality and outcome, as this would reduce the number of papers considerably and would, therefore, have restricted the current already limited overview on the effects of Ramadan on mental health.

## **RESULTS**

Table 1 gives the results of paper selection and data extraction. The literature in relation to the effects of Ramadan on mental health is limited to a few areas: that is, effects in the general population and healthy volunteers (7 papers), in sports (3 papers), on eating and eating disorders (3 papers), on severe physical disorders (3 papers) and on mental disorders including bipolar disorder and schizophrenia (6 papers).

### **Effect in general population and healthy subjects**

The studies on the effects of Ramadan on mood and mental health in the general population and healthy volunteers provide contradicting evidence. Three studies reported positive effects: Depression and stress levels, were significantly reduced in Iranian nurses after in comparison with before the holy month of Ramadan; the effects on anxiety levels were lower and statistically non-significant (Koushali et al. 2013). Mood and the processing of emotional stimuli in volunteers

Table 1.

Authors (year)	Country	study focus	study type	Subjects	gender	age (mean)	assessment	outcome	study result	conclusion	limitations	possible bias
Akgul, Derman, Kanbur 2014	Turkey	new eating disorders in adolescents	case series	6 patients admitted to hospital	5 females	14 - 17 years	case history	hospital admission	increase in admission to hospital for eating disorder during or shortly after Ramadan	Ramadan may trigger eating disorders in those with a predisposition	small sample	selection and awareness bias
Al-Ozairi, Al Kandari, AlHaqqan, AlHarbi, Masters, Syed 2015	Kuwait	wellbeing of subjects with sleeve gastrectomy during Ramadan	within-subject design, telephone survey on fasting and non-fasting day	207 participants who had had sleeve gastrectomy	166 females	35.2 years	Patient Health Questionnaire (PHQ-9) depression scores	slightly higher depression scores during versus after fasting.	fasting did not cause clinically significant depression	Fasting was well tolerated in subjects with sleeve gastrectomy	selected sample, difficult to generalise	recall and response bias
Al-Sinawi, Al-Adawi, Al-Guenedi 2008	Oman	Ramadan as trigger of alcohol withdrawal	case report	one alcoholic	male	48 years	patient history	symptom description	koro-like symptoms (delusion that penis was amputated)	Ramadan may trigger alcohol withdrawal	extraordinary case	awareness bias
Aloui, Briki, Baklouti, Chtourou, Driss, Chaouachi, Chamari, Souissi 2015	Tunisia	effects of music on sports performance during Ramadan	with-in subject design in 4 sports sessions	nine physical education students	male	21 y	self-rated enjoyment and anxiety	enjoyment and anxiety during sports performance	reduced enjoyment during versus before Ramadan in the music condition, less anxiety in the music condition	listening to music may be beneficial during sports warming up during Ramadan	low number of subjects	selection bias, non blinding
Altuntas, Gezen, Sahoniz, Kement, Aydin, Sahin, Okkabaz, Oncel 2013	Turkey	quality of life during fasting in subjects with a cancer-related stoma	cross sectional case control with follow-up in fasting subjects	14 fasting, 42 non-fasting subjects	23 females, 7 fasting, 16 non-fasting	53.9 years in fasting, 56.5 years in non-fasting subjects	disease specific quality of life scales	no effect on emotional, role, cognitive and social functioning	Ramadan fasting had almost no influence on quality of life.	Stoma patients should be allowed to decide on fasting.	minor sample differences, no randomisation, very special sample	selection and recall bias
Chennaoui, Desgorges, Drogou, Boudjema, Tomaszewski, Deplesse, Burnat, Chalabi, Gomez-Merino 2009	France	effects of Ramadan fasting on sports performance and mood	pre-post within-subject assessments	8 middle distance athletes	male	25 years	Profile of Mood State Questionnaire	depression subscore	No change of depression scores between days 0, 21, 31	The subjective mood is unchanged by Ramadan fasting	lack of control group	selection bias, limited generalisability

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Chtourou, Hammoud, Souissi, Chamari, Chaouachi, Souissi 2011	Tunisia	effects of Ramadan on mood states	pre-post intervention	20 soccer players	male	17.6 years	Profile of Mood State Questionnaire	depression subscores	No change of depression scores between week before, week one and week four of Ramadan	The subjective mood is unchanged by Ramadan fasting	lack of control group	selection bias, limited generalisability
Daradkeh 1992	Jordan	effects of Ramadan on parasuicide	naturalistic time-series analysis 1986-1991	population of Jordan	both	not provided	reports of parasuicide who sought medical aid	numbers of events in months before, during, after Ramadan	less parasuicides reported during Ramadan	Ramadan has a short term effect on reported parasuicides during but not after Ramadan	reporting bias, difficult to generalise to other countries	possible awareness bias, low number of reported versus expected parasuicides
Eddahby, Kadri, Moussaoui 2014	Morocco	relapse rates in bipolar disorders during Ramadan	prospective cohort study	170 patients with stabilized bipolar disorder	87 females	36.2 years	Hamilton Depression Rating Scale, Bech-Rafaelsen Scale, for anxietyamilton Anxiety Rating Scale	37 out of 111 fasters, 9/59 non-fasters relapsed	Fasting during the Ramadan month increased the risk of relapse among bipolar patients by 2.77 fold in comparison to nonfasters	Fasting during Ramadan may have negative impacts on bipolar disorder.	selected hospital sample in psychiatric care	selection bias
Erol, Baylan, Yazici 2012	Turkey	effect of Ramadan on eating behaviour	pre-post follow up	79 young volunteers who consistently fasted during Ramadan	63 females	16.3 years in both gender groups	Eating Attitude Test and Bulimic Investigatory Test, Edinburgh	no change in score before to after Ramadan	no change in self-reported eating behaviour	Ramadan does not affect eating behaviour	low sample of males	selection bias
Etemadifar Sayahi, Alroughani, ToghianiFar, Akbari, Nasr 2016	Iran	effects of Ramadan on quality of life in Multiple Sclerosis	pre post follow up	218 Multiple sclerosis patients selected via MS society	150 females	33.6 years	Multiple Sclerosis Quality of Life-54 (MSQOL-54) questionnaires	higher MSQOL-54 after fasting	The mean mental health composites of quality of life increased significantly after fasting	increased mental health relate d quality of life of MS patients after versus before Ramadan	selected sample, difficult to generalise, short study duration	selection bias

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Farooq, Nazar, Akhtar, Irfan, Subhan, Ahmed, Khan, Naeem 2010	Pakistan	Effect of fasting during Ramadan on mental state in bipolar affective disorder	pre-post follow up	62 bipolar patients	9 females	31.5 years	Hamilton Depression Rating Scale (HDRS) and Young Mania Rating Scale (YMRS)	significantly reduced HDRS and YMRS scores during and after Ramadan	Ramadan lead to reduced psychopathology in bipolar patients during and after	Ramadan fasting has no adverse effects on mental state of bipolar patients	selection into tertiary treatment centre	selection and attrition bias
Fawzi, Fawzi, Said, Fawzi, Fouad, Abdel-Moety 2015	Egypt	effects of fasting on biological parameters and mental health in schizophrenia	pre-post follow up	100 randomly selected outpatients with schizophrenia (31 with, 69 without metabolic syndrome)	all male	39.6 years in subjects with, 37.9 years in those without metabolic syndrome	Positive and Negative Syndrome Scale (PANSS)	31 patients with metabolic syndrome showed increased PANSS scores	Ramadan fasting increased psychopathology in patients with high body mass index	more nutrition education may be needed for schizophrenic patients during Ramadan	selected patient group, males only	selection bias, poor generalisability
Harder-Lauridsen, Rosenberg, Benatti, Damm, Thomsen, Mortensen, Pedersen, Krogh-Madsen 2016	Denmark	effect of Ramadan-type of intermittent fasting on cognitive function and mood	intra-individual comparisons under different conditions	10 healthy lean volunteers	male	25.2 years	Likert-type scale of specific mood-related feelings	reduced positive feelings in the afternoons during fasting	no effect of Ramadan type-fasting on cognition	Ramadan-type fasting does not affect cognition in healthy volunteer, but reduces mood	selection of 10 healthy volunteers	selection bias
Kadri, Mouchtaq, Hakkou, Moussaoui 2000	Morocco	relapse in bipolar disorder during Ramadan	intraindividual comparisons during follow-up	20 clinically stable bipolar patients	11 females	32.1 year	Hamilton Depression and Bech-Rafaelsen scales	relapse	45% of the patients relapsed during Ramadan	Ramadan impacts on the stability of bipolar patients	low number of subjects	selection and attrition bias
Kadri, Tilane, El Batal, Taltit, Tahiri, Moussaoui 2000	Marocco	irritability and anxiety before, during and after Ramadan	intra-individual pre-post follow up	100 volunteers	male	32 years	severity of irritability with visual analogue scale	continuous increase in irritability during the month	anxiety and irritability were increased during Ramadan	the effect is stronger in smokers	self-selection of volunteers	selection bias
Koushali, Hajiamini, Ebadi, Bayat, Khamseh 2013	Iran	Effect of Ramadan on emotional reactions of nurses	pre-post follow up	313 nurses	137 females	37.8 years	Depression, Anxiety and Stress Scales (DASS)	reduction of DASS scores in nurses	depression and stress levels were significantly reduced after in comparison with before the holy month	Fasting has been effective in diminishing stress and depression levels among nurses.	pre-post comparison, no data during Ramadan	selected sample

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Authors (year)	Country	study focus	study type	Subjects	gender	age (mean)	assessment	outcome	study result	conclusion	limitations	possible bias
Molavi, Yunus, Utama 2016	Malaysia	effect of Ramadan fasting on spatial attention through emotional stimuli	pre post follow up. Intraindividual comparisons	40 volunteers	20 females	26.3 years	questionnaire	happiness and pleasantness added up to mood levels	fasting improved the mood of participants, i.e happiness and pleasantness	Ramadan changes the processing of emotional stimuli	poor assessment of mood	selection bias
Nugraha B, Ghashang SK, Hamdan I, Gutenbrunner C 2017.	Germany	effects on mood and quality of life	propective case-control follow up	50 young healthy subjects	male	26.2 years	Hospital Depression and Anxiety Score, and Beck's Depression Index-II	scores in depression and anxiety slightly improved during Ramadan	Ramadan fasting had a positive effect on anxiety and depression	Ramadan fasting has no negative effects on mood and quality of life	depression results varied by scale used	selection bias, poor generalisability
Roky, Chapotot, Benchebkroun, Benaji, Hakkou, Elkhalfi, Buguet 2003	Morocco	daytime sleepiness, EEG and mood	intraindividual follow-up	eight volunteers	male	20-28 years	mood including happiness, sadness, calmness and tension assessed by visual analogue scale	global mood scores decreased during Ramadan intermittent fasting, especially in the afternoon	mood and subjective alertness were reduced during the day, more pronounced in the afternoon.	Ramadan reduces daytime mood	only male volunteers, poor generalisability	selection bias
Roky, Iraki, Hajkhlifa, Lakhdar Ghazal, Hakkou 2000	Morocco	diurnal variation of mood during Ramadan	time series analyses, intraindividual	10 healthy subjects	male	20-28 years	mood including happiness, sadness, calmness and tension assessed by visual analogue scale	global mood scores decreased during Ramadan intermittent fasting	Ramadan reduces morning and afternoon mood	Ramadan fasting reduced the mood during the day	selected sample of male volunteers, not representative for females	selection bias
Savas, Ozturk, Tanriverdi, Kepekci 2014	Turkey	Effects of Ramadan fasting restrictionson eating behaviours in obese women	pre-post comparison	34 obese women	female	40.7 years	Eating Attitude Test (EAT) and Bulimic Investigatory Test, Edinburgh (BITE)	no changes in EAT, BITE scores and Body Mass index	No changes in eating behaviour before to after Ramadan in obese women	Ramadan does not affect attitudes towards eating in obese women.	selected sample	selection bias

was improved during Ramadan (Molawi et al. 2016). Officially reported para-suicides in Jordan were reduced during, but not after Ramadan (Daradkeh 1992).

In contrast, five studies reported negative effects: Ramadan fasting increased fatigue in nurses (Ovuyolu et al. 2016). Irritability and anxiety were increased in healthy male volunteers during Ramadan, with the effects being more pronounced in smokers (Kadri, Tilane et al. 2000). Roky et al. (2000, 2003) reported reduced subjective alertness and mood scores in 10 and 8 volunteers during the day throughout Ramadan. Harder-Lauridsen et al. (2016) also reported reduced mood levels in volunteers in the afternoon during Ramadan.

The contradiction in the outcomes of the studies cannot be neglected or easily explained by study type. These differences will make it necessary to properly assess under which circumstances positive or negative effects of Ramadan on mental health can be observed.

### Effects on mood in sports

The effects of Ramadan on mental well-being in sports and physical activity were mostly positive, at least not negative: Sports performance and fatigue, but not mood, were reduced during compared to before Ramadan (Chennaoui et al. 2009, Chtourou et al. 2011). Aloui et al. (2015) saw increased sports performance in physical education students with music during Ramadan, but the different effects on enjoyment and anxiety were inconsistent with a motivational enhancement by music.

These positive outcomes may be related to the fact that the observed samples consist of young physically active subjects. In general, Aloui et al. (2016) recommend that judokas only try to lose weight before or after Ramadan.

### Effects in different physical disorders

The effects of fasting on the mental health in people with some severe physical disorders were quite positive: Ramadan-related religious fasting did not cause depression or low mood in subjects with cancer-related stoma (Altuntas et al. 2013) and gastric sleeve surgery (Al-Ozairi et al. 2015). Mental health-related quality of life was even better after versus before Ramadan in patients with multiple sclerosis (Etemafidar et al. 2017).

In summary, there is some, even though limited, evidence that fasting can be performed well by subjects with some severe physical disorders.

### Effects on normal eating and eating disorders

The publications on eating and eating disorders are positive in the way that eating disorders only seem to be triggered in a small subgroup of subjects with enhanced vulnerability to eating disorders: Akgul et al. (2014) observed an increase in hospital admissions during and shortly after Ramadan in a case series that may be caused by fasting induced triggering of eating problems in vulnerable adolescents. But Ramadan fasting did not affect attitudes towards eating in young volunteers (Erol et al. 2012) and obese women (Savas et al. 2014).

Thus, Ramadan fasting does not seem to change eating behaviour in general, but it may affect eating behaviour in few subjects vulnerable to eating disorders

### Effects in different mental health disorders

There is limited evidence that the effects of Ramadan fasting on mental disorders is more harmful than beneficial: Ramadan-induced alcohol restriction may lead to acute alcohol withdrawal and finally acute paranoid symptoms (Al-Sinawi et al. 2008). There was no effect of Ramadan on mental health in patients with schizophrenia without metabolic syndrome; however, positive and negative symptoms of schizophrenia deteriorated in those with a metabolic syndrome (Fawzi et al. 2015). Disease-related psychopathology, that is, depression and manic symptoms, improved in patients with bipolar disorder during and after Ramadan (Farooq et al. 2010). However, Kadri, Mouchtaq et al. (2000) observed an increase of relapses during Ramadan. According to Eddahby et al. (2014), fasting during the Ramadan month increased the risk of relapse amongst patients with bipolar disorder by 2.77 fold in comparison to non-fasters.

Consequently, even though the psychopathology may reduce in bipolar disorder, there is a considerable excess risk of relapse during Ramadan. It may thus be advisable to recommend Ramadan fasting in subjects at risk of alcohol withdrawal, in patients with schizophrenia and metabolic syndrome and in patients with known bipolar disorder.

### DISCUSSION

As expected, the majority of studies with relevance to mental health and Ramadan were performed in countries with a Moslem majority, such as Turkey, Morocco, Tunisia, Iran, Pakistan, Kuwait, Oman, Saudi Arabia and Malaysia. Only three studies were conducted in European countries, i.e. Denmark, France and Germany.



The samples examined were the general population and healthy volunteers, subjects active in sports, subjects with severe physical disorders, subjects at risk of eating problems and patients with different mental health disorders.

The effects of Ramadan on the mood in healthy volunteers were positive in some studies but were negative in a few more others. Usually, the sample sizes were low, between 8 and 40 subjects, and mostly consisted of male volunteers.

The effects of Ramadan were positive in a larger sample of nurses, even though the fatigue levels were higher during Ramadan. The most positive and thus most relevant finding was the reduced number of para suicides during Ramadan in Jordan. This observation would need replication in other countries and samples to exclude a reporting and awareness bias during Ramadan. As self-harming behaviour is forbidden during Ramadan, there might be a specific risk of underreporting during this time.

In volunteers doing sports and physical activities, the effects of Ramadan are limited but were usually positive. Losing weight during Ramadan might be an increased challenge.

Ramadan did not reduce the mental well-being of subjects with cancer, gastric sleeve surgery and multiple sclerosis. Thus there should be no major medical objection concerning mental health if patients chose to fast during Ramadan.

Ramadan fasting did not have a major impact on the mental health in eating behaviour and eating disorders, even though there might be some triggering effects in vulnerable subjects.

Even though there is only rare evidence by a case report, it might be understandable that acute alcohol delirium and withdrawal may be a consequence of acute stopping of alcohol consumption. Ramadan fasting may not be recommended in subjects with schizophrenia and metabolic syndrome and in subjects with bipolar disorder because of a relevantly increased risk in relapse.

In summary, there is no major reason to recommend against fasting during Ramadan except in subjects with major psychiatric disorders. Even though some studies show some mood reduction and increased fatigue and anxiety, there is no study indicating that Ramadan fasting triggers new mental health problems or disorders.

Interestingly, there was no study that focussed on the effects of Ramadan fasting on subjects with or at risk of depression.

Future studies on the mental health during Ramadan should assess the effects in larger samples and in different countries. It might be relevant to assess the different social and environmental practices of fasting relating these to possible differences of outcome. It might be less interesting to assess the effects of Ramadan fasting on minute mood variations in small and highly selected samples of healthy male volunteers. These samples may have a high resilience to stress and may thus be less prone to changes in mood and mental well-being. It might be of more interest to identify the specific aspects of Ramadan, that is, fasting, fluid restriction, sleep delay and social gathering that may affect well-being in beneficial or harmful ways.

## LIMITATIONS

This systematic review only included studies that relate to mental health, mental disorders and Ramadan. We did not focus on sleep, the effects of fasting on metabolism or the whole variety of physical disorders. As the studies available were quite variable in design and structure with low numbers of subjects, we were unable to provide substantial undisputable conclusions. The samples used made the individual studies prone to selection bias and thus reduce the generalisability of the studies.

## CONCLUSIONS

The literature on mental health and Ramadan is mixed and patchy. Ramadan has a large influence on sleep, eating behaviour and social and religious interactions. These issues are all of great relevance to mental disorders. Some Moslems fast and some don't. However, it seems that the scientific potential of this large religiously motivated major social intervention has not been harvested neither for the understanding of mental disorders nor for the development of treatment. The possible results would not only be of relevance for the support of Moslems with mental health problems, but may also help increase the understanding of major social changes on mental health and relevant interventions on the well-being of the population.

An example may be smoking cessation interventions: Aveyard et al. (2011) recommend and discuss promoting smoking cessation through smoking reduction during Ramadan. However, there is no study that have used Ramadan fasting to initiate and assess smoking cessation outcomes.



Thus, the interaction of mental health and Ramadan needs further research with larger samples, different populations from different environments and social backgrounds and with more appropriate diagnostic instruments measuring mental state and change. There could be a deepened focus on the immense opportunities provided by this major social intervention for the understanding of sleep, fasting, social interactions, religion and, finally, mental health for the benefit of Moslem and non-Moslem patients with or at risk of mental health problems.

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