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The role of religiosity types in the phenomenology of hallucinations: A large cross-sectional community-based study in a predominantly Muslim society

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ABSTRACT

Religiosity is a multidimensional construct known to influence the occurrence of hallucinations. However, it remains unknown how different religiosity types affect clinically relevant phenomenological features of hallucinations. Therefore, we wished to explore associations between intrinsic and extrinsic (non-organizational and organizational) religiosity and hallucinations severity, distress or impact on daily function in a non-clinical Muslim population. We recruited a representative sample of full-time students at Qatar's only national university via systematic random sampling and administered the Questionnaire of Psychotic Experiences online. The study design was cross-sectional. Using structural equation modeling, we estimated effects of the religiosity types on hallucinations severity, distress or impact on daily function in the past week while accounting for socio-demographic variables, anxiety, depressive symptoms, and, delusions. Extrinsic non-organizational religiosity (ENORG) was associated with experiencing reduced distress or impact on daily function from hallucinations both directly and indirectly through intrinsic religiosity. In contrast, extrinsic non-organizational religiosity (EORG) was associated with increased hallucinations distress or impact albeit only through higher intrinsic religiosity. We found no association between any religiosity types and hallucinations severity. Younger and married participants from lower socio-economic class had comparatively more severe hallucinations and more distress from them. Qatari nationality was positively associated EORG and negatively associated with hallucinations distress or impact. Evidence of differential associations between the religiosity types, socioeconomic and cultural groups, and distress or impact from past week's hallucinations supports the importance of alignment between religious, mental health, and well-being education.

1. Introduction

Religiosity comprises beliefs and behaviors from following a particular religion, religious teachings, or philosophy about the origins of life, death, and morality (Ellison and Levin, 1998; The Editors of Encyclopaedia, 2022; Hill and Pargament, 2003). Being religious can have both positive and negative influences on mental health (Koenig and Büssing, 2010) through the three main types of religiosity (Allport and Ross, 1967). Intrinsic religiosity is an internally motivating state, with faith as an end in itself (Allport and Ross, 1967). Extrinsic religiosity, on the other hand, is a state motivated by external rewards including social gains and personal growth through participation in organizational EORG (e.g. religious ceremonial events) or non-organizational religious activities (ENORG) (e.g. prayers) (Allport and Ross, 1967).

The literature is inconsistent with many studies showing paradoxical roles of the main types of religiosity on mental health. While intrinsic

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religiosity is associated with reduced distress, anxiety, depression and suicide (Aghili and Aliniya, 2012; Hettler and Cohen, 1998; Rajagopal et al., 2002), extrinsic religiosity is reportedly associated with worse mental health outcomes (Baker and Gorsuch, 1982; Lester, 2017; Muzafar and Humera, 2015).

In schizophrenia research, distinguishing intrinsic from extrinsic religiosity may be of importance to account for some of the contradictory findings on the effects of religiosity on PEs. A recent study published evidence in support of the finding that religiosity was associated with schizophrenia prevalence in 125 countries (Dutton and Madison, 2022). For instance, although World Mental Health Surveys from 25,542 adults in 18 countries failed to show significant association between reporting more psychotic experiences (PEs) in those with compared to those without religious affiliations (Kovess-Masfety et al., 2018); the study found increased odds of experiencing PEs annually among those with religious affiliations (Kovess-Masfety et al., 2018). However, there was no significant association between higher frequency of religious service attendance and increased PEs (Kovess-Masfety et al., 2018). In contrast, a recent study in France reported religious beliefs and religious observance was associated with higher prevalence of PEs in the general population (Brito et al., 2021).

While the relationship between religiosity and occurrence of PEs is widely acknowledged, little is known about how different religiosity types specifically influence hallucinations. Hallucinations are perceptions that occur in the absence of an external input. For many people, hallucinations are distressing and, if left untreated, can affect a person's ability to function in everyday life. It is thus critical to understand the role of religiosity types in modulating their debilitating effects. In particular, clinically relevant features of hallucinations such as symptom severity (duration and frequency), distress, and impact on daily function are important drivers of help-seeking behaviors for individuals at risk of psychosis in the community (van Os et al., 2009).

Few studies have reported different associations between religiosity types and hallucinations. A study from Brazil reported higher associations between engaging in EORG activities and hallucinations in ultra-high psychosis risk populations (Loch et al., 2019). Engaging in ENORG activities was associated with lower delusions (suspiciousness) and higher intrinsic religiosity (Loch et al., 2019).

A population-based study in the Netherlands reported evidence of a non-linear association between religiosity level and hearing voices in young adolescents (Steenhuis et al., 2016). Of note, in this sample, the authors found no association between religiosity types and severity of auditory vocal hallucinations (Steenhuis et al., 2016). Another study of religiosity types and mental health outcomes was conducted in acute psychiatric inpatients (Abdel Gawad et al., 2018). Here, intrinsic religiosity (but not the two extrinsic religiosity subtypes) was significantly associated with higher auditory and visual hallucinations severity. Patients who scored high on ENORG also scored significantly higher on delusions severity compared to those with low ENORG scores (Abdel Gawad et al., 2018). In this clinical sample, no significant associations were found between EORG and severity of PEs or any poor mental health outcomes including suicidality and length of stay in the hospital (Abdel Gawad et al., 2018).

1.1. Current study

We investigated the associations between three main religiosity types and hallucinations in a representative non-clinical population sample of young adults in Qatar. Qatar's population (median age 34) of predominantly Muslim Arabs is around 2.7 million with a lifetime prevalence of PEs of 27.9 % (Khaled et al., 2020). Qatar is a peninsula with culture dominated by Islamic heritage including beliefs in “Jinn”. Therefore, it is important to recognize the role of religiosity in early detection of severe mental disorders in this context.

We were interested in estimating: 1) direct effects between intrinsic and extrinsic (non-organizational and organizational) religiosity types and clinical aspects of hallucinations phenomenology (severity, distress, and impact on daily function) independent of main sociodemographic variables, delusions, depression and anxiety symptoms; and 2) indirect effects of delusions, depression and anxiety symptoms, organizational and non-organizational extrinsic religiosity on clinically relevant features of hallucination phenomenology through intrinsic religiosity.

2. Methods

2.1. Participants

Eligible adult students from Qatar University were divided into strata based on nationality (Qatari, Non-Qatari), program year (five levels), and gender and were randomly sampled to select a representative sample. All sampled students were invited via email to participate in a 25 minutes online survey. Following multiple follow-up reminders, 3193 surveys from 20,704 were completed in Arabic or English. The samples were weighted to account for the sample design, non-response, and for incorporating the known characteristics of the population into the sample.

2.2. Data collection

The Institutional Review Boards at Qatar University (QU-IRB 1021-EA/19) and the Medical Research Council at Hamad Medical Corporation (MRC-03-19-032) approved the study. The survey questionnaire was programmed and administered online (Qualtrics, 2019). Data collection was from February to June spanning academic years: 2019/2020 and 2020/2021.

2.3. Measures

Exact wording of the following measures are provided in Supplementary Table 1.

2.3.1. Questionnaire of Psychotic Experiences (QPE)

The QPE measures the lifetime occurrence and age of onset of hallucinations in different modalities including visual and auditory hallucinations and delusions. If lifetime occurrence were endorsed and symptoms occurred at least once a week, questions about duration, distress, valence, impact, insight, interaction, and commands were further assessed on a 6-point Likert scale (Rossell et al., 2019).

The QPE also included lifetime and past week delusions (paranoid, reference, guilt, control, grandeur, and somatic) with questions about their conviction, frequency, the extent of distress, and impact on daily function.

2.3.2. Religiosity

We applied the 14-item Revised Intrinsic/Extrinsic Religious Orientation Scale (I/*E*-R) by Gorsuch and McPherson (1989) based on the original scale (Allport and Ross, 1967). All items were answered on a 5-point Likert-type scale for intrinsic religiousness (religion1, religion4, religion5, religion6, religion7, religion8, religion9, religion12) and the two types of the extrinsic religiosity: extrinsic socially oriented religiousness or EORG (religion2, religion11, religion13) and extrinsic personally oriented religiousness or ENORG (religion3, religion10, religion14). More details about these measures are found in Supplementary Table 1.

2.3.3. Depressive and generalized anxiety symptoms

We used the nine-item Patient Health Questionnaire (PHQ-9) to measure depressive symptoms (American Psychiatric Association, 2013; Gelaye et al., 2014; Kroenke et al., 2010). The 2-item Generalized Anxiety Disorder (GAD-2) scale was used to measure anxiety symptoms (American Psychiatric Association, 2013; Kroenke et al., 2010).

2.3.4. Sociodemographics

Sociodemographic information included age, gender, marital status, nationality (Qatari versus non-Qatari), socioeconomic status, and parental higher education status (Supplementary Table 1).

2.3.5. Language and translation procedures

The QPE was validated in English (Rossell et al., 2019) and Dutch-speaking (Schutte et al., 2020) populations. We independently translated the QPE from English to Arabic. Two independent researchers, blind to the original English version, back-translated the two Arabic versions to English. The translation was reviewed by bilingual research team members and discrepancies in translation, resolved by consensus and adapted to the Qatari context. A clinical validation study of the Arabic version of the QPE was also carried out in Qatar with findings using the QPE, which we validated against the Positive and Negative Syndrome Scale (Yehya et al., 2022). This study showed good correlation between these scales for measures of lifetime and current visual and auditory hallucinations and delusions. The QPE subscales inversely correlated with those on the Global Assessment of Functioning. Based on these findings, we suggest that the QPE is a reliable and valid measure of psychotic symptoms for use in Arabic speaking communities.

2.4. Statistical analysis

2.4.1. Measurement model

We fitted a measurement model using confirmatory factor analysis in Mplus (version 8.0) to assess the validity of our scales in measuring the hypothesized underlying latent constructs of our main covariates (intrinsic religiosity, EORG, ENORG, delusions, depression, anxiety) and hallucinations severity and distress or impact on daily function as outcome variables. This model only included latent variables as indexed by their respective observed variables excluding sociodemographic variables.

Our first latent dependent variable was hallucinations distress or impact in the past week indexed with the QPE items for measuring: valence, distress, and impact on daily function of visual and auditory hallucinations in the past week (6-items in total). Our second latent dependent variable was hallucinations severity indexed with QPE items for measuring: duration, frequency, commands, interaction, insight or conviction of visual and auditory hallucinations in the past week (10-items in total). Latent delusions covariate was indexed with items from the QPE for measuring frequency, insight or conviction, distress, impact on daily function of delusions in the past week. All our other latent covariates were indexed with their respective items as per previously described original scales (Supplementary Table 1).

We evaluated the fit of this model by examining factor loadings, standardized residuals or modification indices and assessing overall goodness-of-fit of our model using standard minimum fit criteria for the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) $\geq$ 0.90 and Root Mean Square Error of Approximation (RMSEA) $\leq$ 0.08 (Bentler, 1990; Browne and Cudeck, 1993; Hu and Bentler, 1999). Specification of the initial measurement model was carried out on the basis of model fit diagnostic information and substantive justification, subsequently, the goodness-of-fit of the revised model was reevaluated.

Once a satisfactory measurement model was achieved, we proceeded with fitting direct and indirect structural equation models (SEM) hypothesized to explain the relationships between our indicators or observed variables and our latent dependent variables.

Because observed variables were ordinal and non-normally distributed, we used polychoric correlations and fitted measurement and structural equation models using the robust Weighted Least Squares Mean and Variance Adjusted Estimator (WLSMV) with Theta parameterization (Asparouhov and Muthén, 2010a). We used the fixed-factor method (latent factor mean of 0 and variance of 1) to scale our latent constructs (Kline, 2016).

2.4.2. Latent (structural) models

We used a systematic approach to model hypothesized direct and indirect effects between religiosity types and hallucinations-related outcomes. For direct associations, we fitted three models. The first model (Model 1), adjusted only for the associations of main covariates with latent variables. The second model (Model 2) adjusted for latent covariates and their associations with sociodemographic (observed) variables. The third model (Mode 3) adjusted for latent covariates and the associations of sociodemographic variables with covariates as well as with latent dependent variables. We compared the main findings from these three different types of models to evaluate sensitivity of our main results to the inclusion/exclusion of different variables.

For final model selection we used the fully adjusted model (Model 3), as the starting point for pruning noncontributory paths, one-path-at-a-time, starting with associations with least statistically significant p-value and re-examining the fit of the overall model after removing each path with the previous model using the DIFFTEST procedure in Mplus (Asparouhov and Muthén, 2010b). This iterative process of removing non-contributory paths and testing overall model fit before and after was carried out until the final parsimonious model (Model 4) was reached (i.e. all associations with p-value >0.40 were removed as long as their removals did not significantly alter the overall model fit as indicated by non-significant DIFFTEST results).

We also fitted five separate (one-at-a-time) bootstrapped single indirect-effects models to test the plausibility of having any one of delusions, depressive symptoms, anxiety symptoms, EORG, or ENORG indirectly influence our latent dependent variables through intrinsic religiosity. These indirect effects were estimated using the same SEM framework previously used in estimating our latent direct effects models. The significance of these indirect effects were determined using bias-corrected 90 % Confidence Intervals (CIs) (Efron, 1987) based on 5000 bootstraps samples for each indirect effect in Mplus (Cheung and Lau, 2008; Muthén, 2011) which is the preferred method (MacKinnon et al., 2004; Shrout and Bolger, 2002) and software (MacKinnon and Cox, 2012) for conducting these analyses to date. We report completely standardized and unstandardized Beta (β) coefficients for our direct and indirect effects, respectively.

3. Results

3.1. Sample characteristics

Participants were aged 23.9 (SD = 6.2) years, mostly females (80.3 %), never married (73.1 %), and of Qatari nationality (64.7 %), of middle- to high-income class with 90.5 % with stable socioeconomic status, comfortable, or wealthy and only 9.5 % of our described their socioeconomic status as challenging or poor. In relation to parental education, approximately equal proportions of our sample reported that their mothers (26.5 %) and their fathers (26.1 %) did not complete high-school education. Past week prevalence of auditory hallucinations was 4.2 % (95 % CIs: 3.5–4.9) and visual hallucinations was 2.5 % (95 % CIs: 2.0–3.1). Past week prevalence of any delusions (paranoid, reference, guilt, control, grandeur, and somatic) was 15.3 % (95 % CIs, 14.0–16.6). Item-level descriptive statistics for latent dependent and independent variables are shown in Supplementary Table 2.

Respondents differed from non-respondents on mean age (23.9 years versus 24.5 years), proportion of male gender (19.7 % versus 26.1 %), and proportion of Qatari nationality (64.7 % versus 67.3 %), respectively. Our weights accounted for these disproportionate characteristics in the respondents compared to non-respondents.

3.2. Measurement model

The initial fit of the CFA model for past week clinical phenomenology of hallucinations met all the cut-off criteria. The CFI index was 0.958, the TLI was 0.954 and the RMSEA were satisfactory 0.023 (CI 90

%:0.022–0.024). As per software suggested modification indices, we chose to implement some changes related to the three religiosity subscales – allowing some of the items from intrinsic religiosity to load onto EORG and ENORG and vice versa. The final fit of the CFA model after applying these changes showed improvement and met cut-off criteria across all indices: CFI = 0.974, TLI = 0.971, the RMSEA = 0.018 (CI 90 %: 0.017–0.019).

Item-level standardized factor loadings on the latent variables in our final measurement model with corresponding adjusted R^2 and p-values are shown in Supplementary Table 3.

In Fig. 1, we present standardized correlations (r) between latent constructs from the measurement model and their corresponding standard errors. Our dependent variables, hallucinations distress or impact and hallucinations severity, were strongly associated with each other ($r = 0.79$, $p < 0.0001$) and with delusions in the past week ($r = 0.66$, $p < 0.0001$; $r = 0.62$, $p < 0.0001$), respectively. Intrinsic religiosity was significantly associated with hallucinations distress or impact ($r = 0.30$, $p < 0.0001$) and hallucinations severity ($r = 0.23$, $p = 0.012$). ENORG religiosity was negatively and significantly associated with hallucinations distress or impact ($r = -0.19$, $p = 0.012$) and hallucinations severity ($r = -0.19$, $p = 0.019$). While, negatively correlated with our dependent variables, EORG religiosity was not significantly associated with hallucinations distress or impact ($r = -0.05$, $p = 0.547$) or hallucinations severity ($r = -0.10$, $p = 0.281$).

3.3. Latent (structural) regression

3.3.1. Direct-effects models

In Table 1, we present the main results from the SEM paths between latent and observed (sociodemographic) covariates and our two main latent dependent variables measuring past week hallucinations severity and hallucinations distress or impact. Results from models 1–3 support a positive and a significant association between intrinsic religiosity and hallucinations distress or impact. However, in the final model (Model 4 in Table 1) intrinsic religiosity was not significantly associated with hallucinations distress or impact in the past week ($\beta = 0.15$, $p = 0.076$). Instead, ENORG was negatively and significantly associated with hallucinations distress or impact ($\beta = -0.22$, $p = 0.011$).

Similarly, anxiety symptoms were significantly associated with hallucinations distress or impact in Model 4 ($\beta = 0.22$, $p = 0.029$), but not in models 1 through 3.

Delusions were positively and significantly associated with hallucinations distress or impact and hallucinations severity in all the models shown in Table 1 (Model 1 – Model 4). Older age (30+ versus 18–29 years of age) was negatively and significantly associated with hallucinations distress or impact and hallucinations severity in all the models that included age (Models 3 and Model 4).

Qatari nationality was negatively and significantly associated with hallucinations distress or impact in all the models that included the nationality variable (Model 3 and Model 4).

In Fig. 2, we present the significant SEM paths from the final model (Model 4, Table 1) including regression paths of sociodemographics on main latent covariates that were not shown in Table 1. Notably, married status was negatively associated with intrinsic religiosity ($\beta = -0.08$, $p = 0.001$). In addition, Mother's ($\beta = -0.08$, $p < 0.0001$) or father's higher education ($\beta = -0.08$, $p < 0.0001$) were also negatively associated with participant's intrinsic religiosity. Older age ($\beta = -0.06$, $p = 0.012$) and married status ($\beta = -0.10$, $p < 0.0001$) were negatively associated with EORG religiosity, while Qatari nationality was associated with higher EORG religiosity ($\beta = 0.06$, $p = 0.002$). Female gender ($\beta = -0.05$, $p = 0.042$), married status ($\beta = -0.08$, $p = 0.002$), lower socioeconomic status ($\beta = -0.06$, $p = 0.014$), and father's higher education ($\beta = -0.08$, $p = 0.002$) were all negatively associated with higher ENORG religiosity. Qatari nationality was associated with higher delusions phenomenology score in the past week ($\beta = 0.11$, $p = 0.036$), while female gender and lower socioeconomic status were associated with higher depressive (female: $\beta = 0.10$, $p < 0.0001$, lower socioeconomic status: $\beta = 0.16$, $p < 0.0001$) and anxiety symptoms (female: $\beta = 0.10$, $p < 0.0001$, lower socioeconomic status: $\beta = 0.14$, $p < 0.0001$) in the past two weeks, respectively. Married status was negatively associated with depressive ($\beta = -0.11$, $p < 0.0001$) and anxiety ($\beta = -0.12$, $p < 0.0001$) symptoms, but was positively associated with hallucinations severity ($\beta = 0.25$, $p = 0.047$). For step-by-step pruning results, please refer to Supplementary Table 4.

3.3.2. Indirect-effects models

As shown in Fig. 3, we estimated the indirect effect between delusions and hallucinations distress or impact through intrinsic religiosity (Fig. 3a), which was small (indirect effect = 0.043, 90 % CIs: −0.067, 0.129) and non-significant since the bias-corrected 90 % CIs included 0. Also as shown in Fig. 3b and c, depressive (indirect effect = 0.063, 90 % CIs: 0.015, 0.138) and anxiety symptoms (indirect effect = 0.064, 90 % CIs: 0.009, 0.138) had significant, but small indirect effects on hallucinations distress or impact through intrinsic religiosity. In contrast,

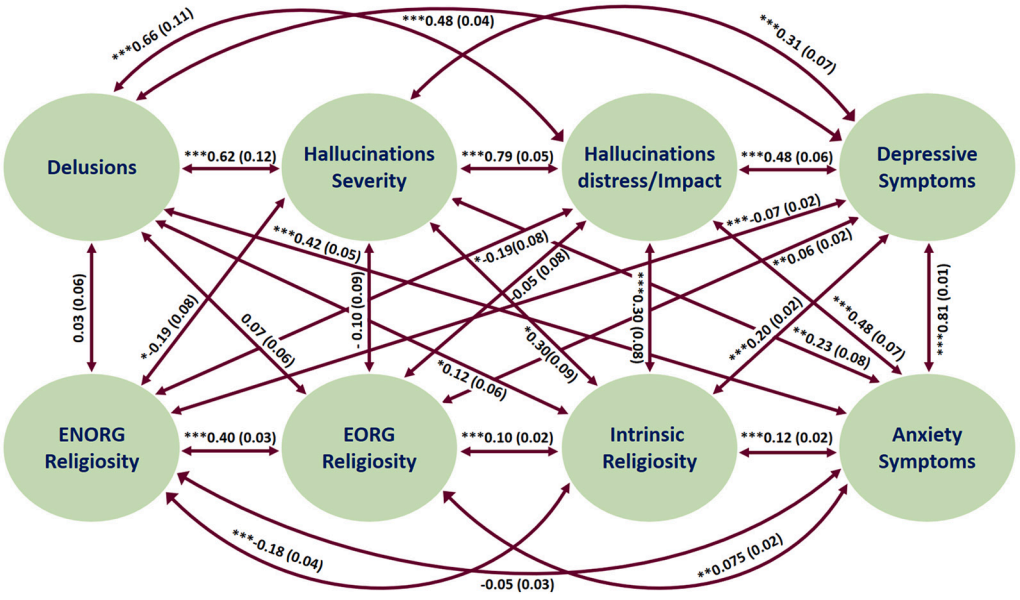

Fig. 1. Latent correlations in the confirmatory factor analysis model of past week phenomenology of hallucinations.
Note. Standardized correlations represented by double headed arrows and Standard Errors in brackets. Significance is defined as follows: *** $p < 0.0001$, ** $p < 0.001$,* $p < 0.05$. Abbreviations. EORG is Extrinsic Organizational Religiosity. ENORG is Extrinsic Non-organizational Religiosity.
Legend: All latent covariates are significantly associated with each other and with our two latent dependent variables – hallucinations severity and distress or impact - with the following exception: ENORG with delusions, ENORG with anxiety symptoms, EORG with delusions, EORG with hallucinations severity, and EORG with hallucinations distress or impact.

Table 1
Latent regression models for past week phenomenology of auditory & visual hallucinations.

		Hallucinations distress or impact			Hallucinations severity					Hallucinations distress or impact			Hallucinations severity		
Model	Variable added	β	SE	p	β	SE	p	Model	Variable added	β	SE	p	β	SE	p
Model 1[a]	Intrinsic religiosity	**0.197**	0.084	**0.019**	0.137	0.088	0.119	Model 3[c]	Female vs. male	−0.101	0.089	0.254	−0.110	0.099	0.264
	Extrinsic ORG	−0.072	0.097	0.457	−0.103	0.108	0.340		Married vs. single/divorced/separated	0.106	0.112	0.346	0.239	0.128	0.063
	Extrinsic NORG	−0.134	0.101	0.183	−0.143	0.107	0.178		Qatari national vs. non-Qatari	**−0.238**	0.086	**0.006**	−0.127	0.103	0.216
	Delusions	**0.566**	0.135	**<0.0001**	**0.626**	0.140	**<0.0001**		SES	−0.002	0.099	0.983	−0.086	0.115	0.452
	Depressive symptoms	−0.065	0.187	0.726	0.036	0.173	0.837		Mother highest education	0.060	0.102	0.557	0.111	0.109	0.306
	Anxiety symptoms	0.275	0.191	0.151	−0.072	0.179	0.689		Father highest education	0.018	0.108	0.866	−0.051	0.115	0.659
Model 2[b]	Intrinsic religiosity	**0.218**	0.084	**0.010**	0.159	0.089	0.075	Model 4[d]	Intrinsic religiosity	0.146	0.082	0.076	0.106	0.090	0.236
	Extrinsic ORG	−0.110	0.094	0.245	−0.116	0.110	0.291		Extrinsic ORG	–	–	–	−0.109	0.098	0.263
	Extrinsic NORG	−0.099	0.095	0.298	−0.127	0.104	0.223		Extrinsic NORG	**−0.219**	0.086	**0.011**	−0.171	0.102	0.093
	Delusions	**0.642**	0.136	**<0.0001**	**0.792**	0.140	**<0.0001**		Delusions	**0.584**	0.128	**<0.0001**	**0.606**	0.110	**<0.0001**
	Depressive symptoms	−0.132	0.195	0.497	−0.124	0.190	0.512		Depressive	–	–	–	–	–	–
	Anxiety symptoms	0.299	0.196	0.126	−0.001	0.187	0.995		Anxiety symptoms	**0.222**	0.102	**0.029**	–	–	–
Model 3[c]	Intrinsic religiosity	**0.185**	0.086	**0.032**	0.117	0.093	0.208		Age (30+ vs. 18–29)	**−0.318**	0.094	**0.001**	**−0.626**	0.084	**<0.0001**
	Extrinsic ORG	−0.072	0.101	0.479	−0.127	0.112	0.256		Female vs. male	−0.119	0.083	0.149	−0.107	0.096	0.264
	Extrinsic NORG	−0.151	0.108	0.163	−0.167	0.117	0.153		Married vs. single/divorced/separated	0.129	0.117	0.271	**0.253**	0.127	**0.047**
	Delusions	**0.608**	0.144	**<0.0001**	**0.668**	0.153	**<0.0001**		Qatari national vs. non-qatari	**−0.238**	0.083	**0.004**	−0.106	0.096	0.272
	Depressive	−0.103	0.192	0.589	0.011	0.177	0.952		SES	–	–	–	–	–	–
	Anxiety symptoms	0.290	0.194	0.136	−0.065	0.184	0.725		Mother highest education	–	–	–	–	–	–
	Age (30+ vs. 18–29)	**−0.327**	0.104	**0.002**	**−0.646**	0.098	**<0.0001**		Father highest education	–	–	–	–	–	–

Note. All SEM regression coefficients are standardized. All variables are modelled as latent constructs with exception of sociodemographics.
Model 1 –adjusting for main covariates only – religiosity (intrinsic, extrinsic organization, extrinsic non-organizational), delusions, depressive and anxiety symptoms.
Model 2 –adjusting for main covariates – religiosity (intrinsic, extrinsic organization, extrinsic non-organizational), delusions, depressive and anxiety symptoms – in addition to the effects of sociodemographics (age, gender, marital status, Qatari nationality, social economic status, mother's and father's highest education) on the main covariates. The results from the regression of sociodemographics on main latent covariates are not shown.
Model 3 – adjusting for main covariates – religiosity (intrinsic, extrinsic organization, extrinsic non-organizational), delusions, depressive and anxiety symptoms, the effects of sociodemographics on main covariates, in addition to the effects of sociodemographics on main latent dependent variables (hallucination severity and distress/impact). The results from the regression of sociodemographics on main latent covariates are not shown.
Model 4 – final model after pruning non-significant SEM regression paths from fully saturated model (Model 3) one-at-a-time in an iterative process, while ensuring the fit of the measurement model does not significantly deteriorate by comparing the fit of the overall model after removing each path with the previous model using the DIFFTEST procedure in Mplus. The results from the regression of sociodemographics on main latent covariates are not shown.

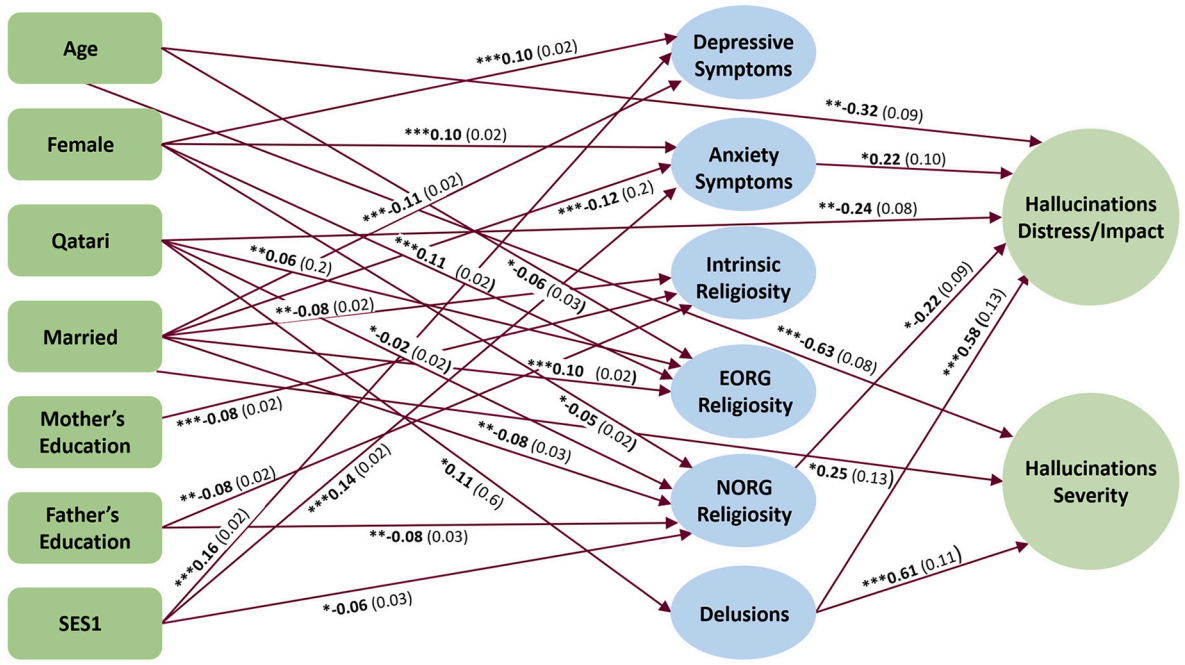

Fig. 2. Final pruned latent regression model.

Note. Structural equation modeling regression paths represented by single headed arrows with standardized Beta coefficients and corresponding Standard Errors in brackets. Significant Beta coefficients are in bold. Significance defined as follows: *** $p < 0.0001$, **$p < 0.001$,* $p < 0.05$. Abbreviations. EORG is Extrinsic Organizational Religiosity. ENORG is Extrinsic Non-organizational Religiosity.

Legend: Final model based on pruning non-significant ($p > 0.400$) progression paths from fully adjusted or saturated model one-at-a-time in an iterative process, while ensuring the original measurement model fit does not significantly deteriorate. For brevity and clarity purposes, only the significant ($p < 0.05$ or less) SEM regression paths are shown here, while non-significant regression paths are not shown. Correlations between the two latent dependent variables, between the latent independent variables as well as between the observed sociodemographic variables are not shown, though are accounted for in the final model.

EORG and ENORG had some of the largest significant indirect effects on hallucinations through intrinsic religiosity, though in opposite directions: EORG had an overall positive indirect effect of 0.11 (90 % CIs: 0.044, 0.264), while ENORG had an overall negative indirect effect of −0.18 (90 % CIs: −0.473, − 0.033) on hallucinations distress or impact through intrinsic religiosity.

4. Discussion

Data on how religiosity may affect phenomenological features of PEs of potential clinical significance and relevance to service planning are important as PEs can be precursors to more serious mental illness (van Os and Reininghaus, 2016; Yung and Lin, 2016). In addition, the type of religiosity endorsed by an individual may influence the trajectory of their illness (Mohr et al., 2006; Rosmarin et al., 2013; Siddle et al., 2002).

We found that extrinsic non-organizational religiosity or ENORG was negatively associated with past week's hallucinations distress and impaired daily function. However, intrinsic religiosity was positively associated with higher levels of distress and impaired daily function. This association was due to hallucinations in the past week in most of our models, though it was not statistically significant in our final parsimonious model (Model 4 in Table 1).

Similar to ENORG, extrinsic organizational (EORG) religiosity was negatively associated with distress and impaired daily function due to hallucinations in the past week (Model1 and Model 3 in Table 1) but its effect on hallucinations did not hold independently of other factors in our final model (Model 4 in Table 1).

We found no association between any religiosity types and reported hallucination severity. It is possible that perceived distress from hallucinations and their impact on daily function acts through psychological (like coping through prayers) or social routes (like comfort through communion) but not symptom severity. Perception of distress varies considerably. Such a conclusion would be consistent with a study from the Netherlands (Steenhuis et al., 2016). This finding may also relate to stigma and the reluctance to report severity of symptoms perceived as indicative of a mental illness (Peters et al., 2016; Peters et al., 2017).

Both generalized anxiety and delusions were positively and independently associated with distress or impaired daily function from hallucinations in the past week. Generalized anxiety is likely both to predispose to these negative responses to hallucinations as well as being consequent to them. However, only delusions were positively and significantly associated with both hallucinations distress or impact and hallucinations severity in all our models as shown in Table 1.

We have previously reported, in a non-clinical sample, that distress was increased when delusions and hallucinations co-occur (Khaled et al., 2020). In the current study, although participants were not defined as 'ill' some had significant symptoms that were distressing. Delusions were positively and significantly associated with hallucination severity and the hallucination distress or impact in all our models (Table 1). This strong association between hallucinations and delusions, consistent with our previous findings (Khaled et al., 2020), is suggestive that participants experienced a high level of distress. Of relevance here is the observation that a number of factors, including reluctance to seek help, sometimes prevent people from seeking clinical help when needed (Peters et al., 2016; Peters et al., 2017). Whether hallucinations co-occurred with religious or non-religious delusions, our data indicates that their co-occurrence should alert people to the possible need for early intervention to prevent clinical psychosis.

In our study, we did not assess religious delusions. However, the prevalence of other types of delusions in our sample was high (approximately 15 %). Given the religious context of our setting, one might expect to have high rates of delusions of religious nature in Middle East samples. However, the available literature supports evidence to the

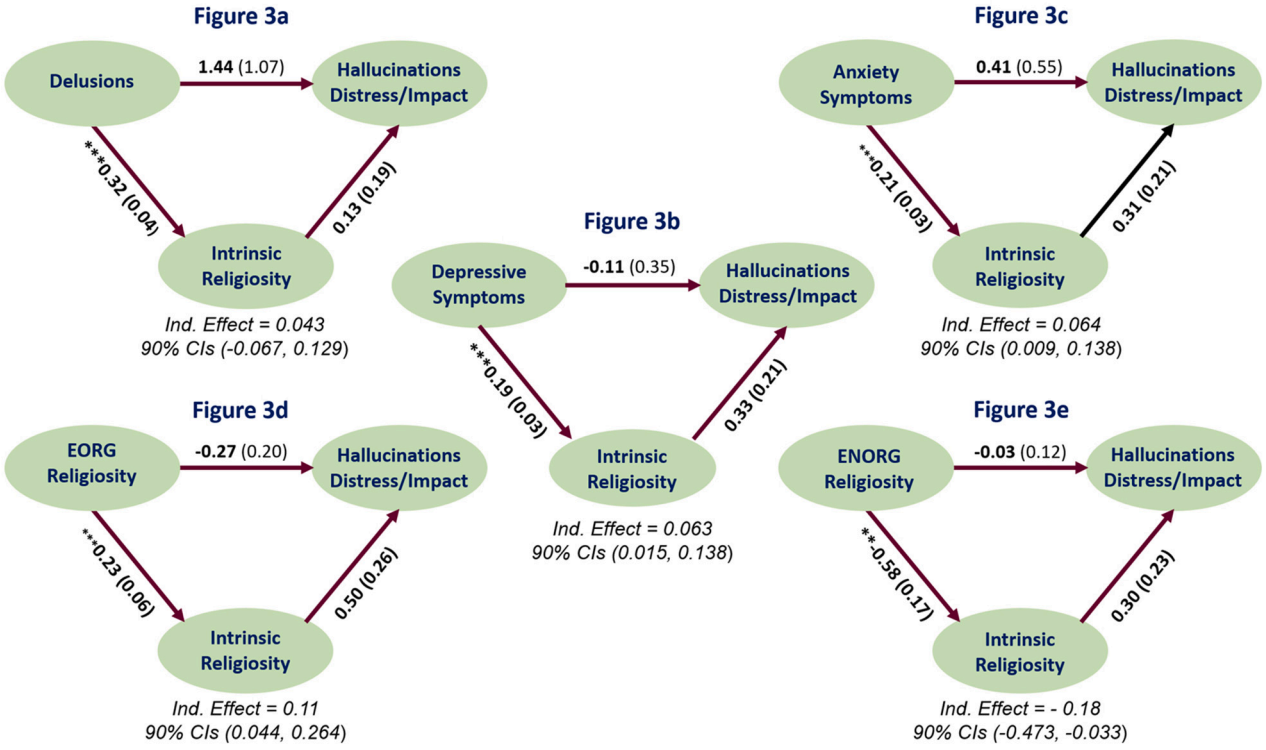

Fig. 3. Hypothesized indirect effects on hallucinations distress or impact through intrinsic religiosity.

Note. Structural equation modeling of indirect-effect paths to latent dependent variable measuring hallucinations distress or impact. Only latent variables are shown. The indirect-effect paths are represented by single headed arrows to (a) and from (b) intrinsic religiosity with unstandardized Beta coefficients and corresponding Standard Errors in brackets. Significant Beta coefficients are in bold. Significance defined as follows: *** $p < 0.0001$, **$p < 0.001$,* $p < 0.05$. Abbreviations. CIs: confidence intervals. EORG: Extrinsic Organizational Religiosity. ENORG: Extrinsic Non-organizational Religiosity.

Legend: Indirect-effects are the product of indirect paths a*b and statistical significance is determined by bias corrected confidence intervals, which are derived from 5000 bootstrap samples for each indirect-effect estimate. panel a shows that the indirect-effect of delusions on hallucinations distress or impact through intrinsic religiosity is not significant as the bias corrected 90 % CIs of the estimate crosses the null (0). Panels b–e show small indirect-effect estimates for depressive or anxiety symptoms to medium-sized indirect-effects for EORG religiosity and ENORG religiosity on the latent dependent variable hallucinations distress or impact through intrinsic religiosity. Indirect-effect of ENORG on hallucinations distress or impact was negative indicating reduced hallucinations distress or impact through intrinsic religiosity.

contrary. Specifically, previous studies support lower prevalence of religious delusions in Middle East populations compared to European or North American populations (Stompe et al., 2006).

Findings from our indirect-effects models supported positive associations between intrinsic religiosity and increased distress or impaired daily function from past weeks' hallucinations through depression (Fig. 3b), anxiety (Fig. 3c), and through EORG (Fig. 3d). There were negative associations with hallucinations distress or impact through ENORG (Fig. 3e). The largest of these indirect-effects were through EORG and ENORG. A possible explanation is that intrinsic religiosity has two opposing effects on hallucinations' distress or impact. Intrinsic religiosity could ameliorate distress and reduce impact on daily function from hallucinations when accompanied by non-organizational religiosity, but worsen hallucinations' distress or impact on daily function when accompanied by organizational religiosity. The emergence of these two plausible, but different mechanisms involving intrinsic religiosity may explain the contradictory findings about the role of religiosity in the literature (Aghili and Aliniya, 2012; Baker and Gorsuch, 1982; Borras et al., 2007; Hettler and Cohen, 1998; Lester, 2017; Mohr et al., 2006; Muzafar and Humera, 2015; Rajagopal et al., 2002) as most of these studies either treat religiosity as unidimensional construct or focus on one type of religiosity without accounting for other types.

In countries with high levels of stigma of mental illness like Qatar (Kehyayan et al., 2021), organized religious activities may lead to more self-stigma and self-directed guilt about hallucinatory experiences. A common belief among most members of the community is seeing mental illness as punishment from God (Zolezzi et al., 2017), which can potentially exacerbate distress among those who experience mental symptoms and who also engage in communal religious activities. Increased distress among those with PEs in the community may also arise from delay in help seeking (van Os et al., 2008). In contrast, engaging in non-organized religious activities like prayers for self-reflection and divine guidance maybe more soothing and less self-stigmatizing such that the distress or impact from hallucinations is lessened. Our findings support the potential benefits of alignment between religious education and mental health, which will also reduce stigma against mental illness in organized religious settings such as mosques, majilis, and "thikar" gatherings. This is especially of relevance in a setting like Qatar where religion plays an important role in the milieu of public life (Zinke et al., 1999; Zolezzi et al., 2017).

4.1. Sociodemographic variables and hallucinations

Younger participants had more severe hallucinations and more distress than older participants, consistent with the age of highest risk of psychosis (van Os et al., 2008). This observation supports the potential clinical importance of PEs in young people (Armando et al., 2010; Nuevo et al., 2012) shown in follow-up studies (Bak et al., 2003; Poulton et al., 2000).

Qatari nationality was significantly and negatively associated with hallucinations distress or impact. This may be due to lack of knowledge of what these symptoms are or perhaps attribution of these symptoms to supernatural causes such as 'evil eye', 'black magic', and 'Jinn' rather than interpreting them as early signs of mental illness (Khalifa et al.,

2011). If so, this population group may benefit from supportive psychoeducation.

4.2. Strengths and limitations

To our knowledge, this is the first study to examine the impact of religiosity on hallucinations in a predominantly Muslim country in the Middle-East, where PEs are also prevalent (Khaled et al., 2020).

Non-clinical and clinical populations who experience PEs share certain demographic variables such as younger age, being single, and unemployed (Agerbo et al., 2004; Driessen et al., 1998; McGrath et al., 2004; Verdoux et al., 1998). We chose a healthy student population within the age range commonly associated with early onset psychosis (Driessen et al., 1998;van Os and Reininghaus, 2016). Our sample was relatively young and representative of the predominately Muslim adult university population in Qatar.

Here, we developed and tested models linking: three main religiosity types, sociodemographic variables, delusions, anxiety, depressive symptoms, to past week hallucinations' severity as well as distress and impact on daily function. In the process of developing these models, we applied a SEM framework with a latent variable approach as it explicitly models measurement error, allowing us to test hypotheses using the latent constructs rather than imperfectly measured variables (Muthén, 1992). This approach makes the estimates more accurate than traditional regression approaches that are susceptible to under-estimation or over-estimation (Kenny et al., 1998).

Although we applied weights to account for disproportionate characteristics in the respondents compared to non-respondents, the magnitude of the reported estimates here would have been weaker if non-respondents (older Qatari males) were more religious and less likely to experience distress or impact due to hallucinations compared to the ones in our sample. Some participants may have been reluctant to report symptoms or religiosity due to sensitivity. Only 5.8 % of sample had experienced auditory or visual hallucinations in the past week. Hence, the power to detect associations for hallucinations may be less than that detect associations with delusions in the past week, as delusions were more prevalent (15.3 %). Generalizability is limited to those who regularly experienced auditory or visual hallucinations in the past week.

The cross-sectional design of our study limits causal interpretation including inference about mediation. Although we chose to model the indirect effects of delusions, depressive symptoms, anxiety symptoms, EORG, and ENORG on hallucinations severity and distress or impact through intrinsic religiosity first, it is equally plausible that intrinsic religiosity exert its indirect effects on hallucinations distress or impact through some or all of these variables. Additionally, it may be that these constructs are mutually reinforcing (bi-directional) or spuriously correlated due to unmeasured common factors such as upbringing and early religious instruction. These are all reasonable alternative theories that cannot be distinguished based on the present data. Future studies should replicate these findings through longitudinal design, which is best suited for testing mediational causal paths.

4.3. Conclusion

In a sample of relatively young, non-help seeking, adults representative of the predominately Muslim university population in Qatar who regularly experienced auditory or visual hallucinations in the past week, religiosity types were differentially associated with distress or impact on daily function, but none of the types were significantly associated with hallucinations severity. These findings raise the possibility that ideas of a punishing God combined with stigma against mental illness could cause increased distress or impact on daily function from hallucinations possibly due to hesitancy in seeking help, particularly in those high on extrinsic organizational religiosity and intrinsic religiosity, but not those high on extrinsic non-organizational religiosity. It is important to align religious education and mental health education in contexts where religiosity plays an important role in public life.

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CRediT authorship contribution statement

Authors SK, PW, MA & IS designed the study and wrote the protocol. Authors SK and MA collected the data. SK conducted the statistical analysis. SK, PW, IS, & SGB participated in writing and editing the manuscript. All authors have read and approved the final manuscript.

Declaration of competing interest

The authors have declared that there are no conflicts of interest in relation to the subject of this study.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.schres.2022.11.003.

References

Abdel Gawad, N., Desai, P., Ali, T., Lewis, K.K., Polo, R., Engstrom, A., Allen, M., Pigott, T., 2018. Religious activity, psychotic features, and suicidality in 688 acute psychiatric inpatients. J. Psychiatr. Pract. 24, 253–260. https://doi.org/10.1097/PRA.0000000000000311.

Agerbo, E., Byrne, M., Eaton, W.W., Mortensen, P.B., 2004. Marital and labor market status in the long run in schizophrenia. Arch. Gen. Psychiatry 61, 28. https://doi.org/10.1001/archpsyc.61.1.28.

Aghili, M., Aliniya, R., 2012. In: The Investigation of the Relationship between Religious Orientation and Suicide Thought Among Students, 2, pp. 2956–2961.

Allport, G.W., Ross, J.M., 1967. Personal religious orientation and prejudice. J. Pers. Soc. Psychol. 5, 432–443. https://doi.org/10.1037/h0021212.

American Psychiatric Association, 2013. Diagnostic and Statistical Manual of Mental Disorders, Fifth edition. American Psychiatric Association. https://doi.org/10.1176/appi.books.9780890425596.

Armando, M., Nelson, B., Yung, A.R., Ross, M., Birchwood, M., Girardi, P., Nastro, P.F., 2010. Psychotic-like experiences and correlation with distress and depressive symptoms in a community sample of adolescents and young adults. Schizophr. Res. 119, 258–265. https://doi.org/10.1016/j.schres.2010.03.001.

Asparouhov, T., Muthén, B., 2010. Simple Second Order Chi-Square Correction.

Asparouhov, T., Muthén, B., 2010. Bayesian Analysis Using Mplus: Technical Implementation.

Bak, M., Myin-Germeys, I., Hanssen, M., Bijl, R., Vollebergh, W., Delespaul, P., van Os, J., 2003. When does experience of psychosis result in a need for care? A prospective general population study. Schizophr. Bull. 29, 349–358. https://doi.org/10.1093/oxfordjournals.schbul.a007010.

Baker, M., Gorsuch, R., 1982. Trait anxiety and intrinsic-extrinsic religiousness. J. Sci. Study Relig. 21, 119. https://doi.org/10.2307/1385497.

Bentler, P.M., 1990. Comparative fit indexes in structural models. Psychol. Bull. 107, 238–246. https://doi.org/10.1037/0033-2909.107.2.238.

Borras, L., Mohr, S., Brandt, P.-Y., Gillieron, C., Eytan, A., Huguelet, P., 2007. Religious beliefs in schizophrenia: their relevance for adherence to treatment. Schizophr. Bull. 33, 1238–1246. https://doi.org/10.1093/schbul/sbl070.

Brito, M.A., Amad, A., Rolland, B., Geoffroy, P.A., Peyre, H., Roelandt, J.-L., Benradia, I., Thomas, P., Vaiva, G., Schürhoff, F., Pignon, B., 2021. Religiosity and prevalence of suicide, psychiatric disorders and psychotic symptoms in the french general population. Eur. Arch. Psychiatry Clin. Neurosci. 271, 1547–1557. https://doi.org/10.1007/s00406-021-01233-3.

Browne, M., Cudeck, R., 1993. Alternative ways of assessing model fit. In: Bollen, K.A., Long, J.S. (Eds.), Testing Structural Equation Models, pp. 136–162.

Cheung, G.W., Lau, R.S., 2008. Testing mediation and suppression effects of latent variables: bootstrapping with structural equation models. Organ. Res. Methods 11, 296–325. https://doi.org/10.1177/1094428107300343.

Driessen, G., Gunther, N., Bak, M., van Sambeek, M., van Os, J., 1998. Characteristics of early- and late-diagnosed schizophrenia: implications for first-episode studies. Schizophr. Res. 33, 27–34. https://doi.org/10.1016/S0920-9964(98)00059-0.

Dutton, E., Madison, G., 2022. "Blessed are the nations with high levels of Schizophrenia": National Level Schizophrenia Prevalence and its relationship with National Levels of religiosity. J. Relig. Health 61, 6–22. https://doi.org/10.1007/s10943-021-01353-z.

Efron, B., 1987. Better bootstrap confidence intervals. J. Am. Stat. Assoc. 82, 171–185. https://doi.org/10.1080/01621459.1987.10478410.

Ellison, C.G., Levin, J.S., 1998. The religion-health connection: evidence, theory, and future directions. Health Educ. Behav. 25, 700–720. https://doi.org/10.1177/109019819802500603.

Gelaye, B., Tadesse, M.G., Williams, M.A., Fann, J.R., Vander Stoep, A., Andrew Zhou, X.-H., 2014. Assessing validity of a depression screening instrument in the absence of a gold standard. Ann. Epidemiol. 24, 527–531. https://doi.org/10.1016/j.annepidem.2014.04.009.

Gorsuch, R.L., McPherson, S.E., 1989. Intrinsic/Extrinsic measurement: I/E-revised and single-item scales. J. Sci. Study Relig. 28, 348. https://doi.org/10.2307/1386745.

Hettler, T.R., Cohen, L.H., 1998. Intrinsic religiousness as a stress-moderator for adult Protestant churchgoers. J. Community Psychol. 26, 597–609. https://doi.org/10.1002/(SICI)1520-6629(199811)26:6<597::AID-JCOP6>3.0.CO;2-M.

Hill, P.C., Pargament, K.I., 2003. Advances in the conceptualization and measurement of religion and spirituality: implications for physical and mental health research. Am. Psychol. 58, 64–74. https://doi.org/10.1037/0003-066X.58.1.64.

Hu, L., Bentler, P.M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Struct. Equ. Model. Multidiscip. J. 6, 1–55. https://doi.org/10.1080/10705519909540118.

Kehyayan, V., Mahfoud, Z., Ghuloum, S., Marji, T., Al-Amin, H., 2021. Internalized stigma in persons with mental illness in Qatar: a cross-sectional study. Front. Public Health 9, 685003. https://doi.org/10.3389/fpubh.2021.685003.

Kenny, D.A., Kashy, D.A., Bolger, N., 1998. Data analysis in social psychology. In: Gilbert, D.T., Fiske, S.T., Lindzey, G. (Eds.), Handbook of Social Psychology, pp. 233–265.

Khaled, S.M., Wilkins, S.S., Woodruff, P., 2020. Lifetime prevalence and potential determinants of psychotic experiences in the general population of Qatar. Psychol. Med. 50, 1110–1120. https://doi.org/10.1017/S0033291719000977.

Khalifa, N., Hardie, T., Latif, S., Jamil, I., Walker, D.-M., 2011. Beliefs about jinn, black magic and the evil eye among muslims: age, gender and first language influences. Int. J. Cult. Ment. Health 4, 68–77. https://doi.org/10.1080/17542863.2010.503051.

Kline, R.B., 2016. Principles and practice of structural equation modeling. In: Methodology in the Social Sciences, Fourth edition. The Guilford Press, New York.

Koenig, H.G., Büssing, A., 2010. The Duke University religion index (DUREL): a five-item measure for use in epidemological studies. Religions 1, 78–85. https://doi.org/10.3390/rel1010078.

Kovess-Masfety, V., Saha, S., Lim, C.C.W., Aguilar-Gaxiola, S., Al-Hamzawi, A., Alonso, J., Borges, G., de Girolamo, G., de Jonge, P., Demyttenaere, K., Florescu, S., Haro, J.M., Hu, C., Karam, E.G., Kawakami, N., Lee, S., Lepine, J.P., Navarro-Mateu, F., Stagnaro, J.C., ten Have, M., Viana, M.C., Kessler, R.C., McGrath, J.J., the WHO World Mental Health Survey Collaborators, 2018. Psychotic experiences and religiosity: data from the WHO World Mental Health Surveys. Acta Psychiatr. Scand. 137, 306–315. https://doi.org/10.1111/acps.12859.

Kroenke, K., Spitzer, R.L., Williams, J.B.W., Löwe, B., 2010. The patient health questionnaire somatic, anxiety, and depressive symptom scales: a systematic review. Gen. Hosp. Psychiatry 32, 345–359. https://doi.org/10.1016/j.genhosppsych.2010.03.006.

Lester, D., 2017. Does religiosity predict suicidal behavior? Religions 8, 238. https://doi.org/10.3390/rel8110238.

Loch, A.A., Freitas, E.L., Hortêncio, L., Chianca, C., Alves, T.M., Serpa, M.H., Andrade, J. C., van de Bilt, M.T., Gattaz, W.F., Rössler, W., 2019. Hearing spirits? Religiosity in individuals at risk for psychosis—results from the Brazilian SSAPP cohort. Schizophr. Res. 204, 353–359. https://doi.org/10.1016/j.schres.2018.09.020.

MacKinnon, D.P., Cox, M.G., 2012. Commentary on "Mediation analysis and categorical variables: the final frontier" by Dawn iacobucci. J. Consum. Psychol. 22, 600–602. https://doi.org/10.1016/j.jcps.2012.03.009.

MacKinnon, D.P., Lockwood, C.M., Williams, J., 2004. Confidence limits for the indirect effect: distribution of the product and resampling methods. Multivar. Behav. Res. 39, 99–128. https://doi.org/10.1207/s15327906mbr3901_4.

McGrath, J., Saha, S., Welham, J., El Saadi, O., MacCauley, C., Chant, D., 2004. A systematic review of the incidence of schizophrenia: the distribution of rates and the influence of sex, urbanicity, migrant status and methodology. BMC Med. 2, 13. https://doi.org/10.1186/1741-7015-2-13.

Mohr, S., Brandt, P.-Y., Borras, L., Gilliéron, C., Huguelet, P., 2006. Toward an integration of spirituality and religiousness into the psychosocial dimension of schizophrenia. AJP 163, 1952–1959. https://doi.org/10.1176/ajp.2006.163.11.1952.

Muthén, B.O., 1992. Latent variable modeling. Latent variable modeling. Alcohol Health Res. World 60, 286–292.

Muthén, B., 2011. Applications of Causally Defined Direct and Indirect Effects in Mediation Analysis using SEM in Mplus.

Muzafar, H.K., Humera, S., 2015. Religious orientation and psychological distress among parents of mentally retarded children. Int. J. Indian Psychol. 2 https://doi.org/10.25215/0202.042.

Nuevo, R., Chatterji, S., Verdes, E., Naidoo, N., Arango, C., Ayuso-Mateos, J.L., 2012. The continuum of psychotic symptoms in the general population: a cross-national study. Schizophr. Bull. 38, 475–485. https://doi.org/10.1093/schbul/sbq099.

Peters, E., Ward, T., Jackson, M., Morgan, C., Caralambides, M., Woodruff, P., Jacobsen, P., Chadwick, P., Garety, P.A., McGuire, P., 2016. Clinical, socio-demographic and psychological characteristics in individuals with persistent psychotic experiences with and without a "need for care". World Psychiatry 15 (1), 41–52. https://doi.org/10.1002/wps.20301. Feb.

Peters, E., Ward, T., Jackson, M., Woodruff, P., Morgan, C., McGuire, P., Garety, P.A., 2017. Clinical relevance of appraisals of persistent psychotic experiences in people with and without a need for care: an experimental study. Lancet Psychiatry 4 (12), 927–936.

Poulton, R., Caspi, A., Moffitt, T.E., Cannon, M., Murray, R., Harrington, H., 2000. Children's self-reported psychotic symptoms and adult schizophreniform disorder: a 15-year longitudinal study. Arch. Gen. Psychiatry 57, 1053. https://doi.org/10.1001/archpsyc.57.11.1053.

Qualtrics, 2019. Qualtrics. Provo, Utah, USA.

Rajagopal, D., Mackenzie, E., Bailey, C., Lavizzo-Mourey, R., 2002. The effectiveness of a spiritually-based intervention to alleviate subsyndromal anxiety and minor depression among older adults. J. Relig. Health 41, 153–166. https://doi.org/10.1023/A:1015854226937.

Rosmarin, D.H., Bigda-Peyton, J.S., Öngur, D., Pargament, K.I., Björgvinsson, T., 2013. Religious coping among psychotic patients: relevance to suicidality and treatment outcomes. Psychiatry Res. 210, 182–187. https://doi.org/10.1016/j.psychres.2013.03.023.

Rossell, S.L., Schutte, M.J.L., Toh, W.L., Thomas, N., Strauss, C., Linszen, M.M.J., van Dellen, E., Heringa, S.M., Teunisse, R., Slotema, C.W., Sommer, I.E.C., 2019. The questionnaire for psychotic experiences: an examination of the validity and reliability. Schizophr. Bull. 45, S78–S87. https://doi.org/10.1093/schbul/sby148.

Schutte, M.J.L., Linszen, M.M.J., Marschall, T.M., Ffytche, D.H., Koops, S., van Dellen, E., Heringa, S.M., Slooter, A.J.C., Teunisse, R., van den Heuvel, O.A., Lemstra, A.W., Foncke, E.M.J., Slotema, C.W., de Jong, J., Rossell, S.L., Sommer, I.E.C., 2020. Hallucinations and other psychotic experiences across diagnoses: a comparison of phenomenological features. Psychiatry Res. 292, 113314 https://doi.org/10.1016/j.psychres.2020.113314.

Shrout, P.E., Bolger, N., 2002. Mediation in experimental and nonexperimental studies: new procedures and recommendations. Psychol. Methods 7, 422–445. https://doi.org/10.1037/1082-989X.7.4.422.

Siddle, R., Haddock, G., Tarrier, N., Faragher, E.B., 2002. Religious delusions in patients admitted to hospital with schizophrenia. Soc. Psychiatry Psychiatr. Epidemiol. 37, 130–138. https://doi.org/10.1007/s001270200005.

Steenhuis, L.A., Bartels-Velthuis, A.A., Jenner, J.A., Aleman, A., Bruggeman, R., Nauta, M.H., Pijnenborg, G.H.M., 2016. Religiosity in young adolescents with auditory vocal hallucinations. Psychiatry Res. 236, 158–164. https://doi.org/10.1016/j.psychres.2015.12.014.

Stompe, T., Bauer, S., Ortwein-Swoboda, G., Schanda, H., Karakula, H., Rudalevicienne, P., Chaudhry, H.R., Idemudia, E.S., Gschaider, S., 2006. Delusions of guilt: the attitude of Christian and Muslim schizophrenic patients toward good and evil and the responsibility of men. J. Muslim Ment. Health 1, 43–56. https://doi.org/10.1080/15564900600654294.

The Editors of Encyclopaedia, 2022. Definition, Types, List of Religions, Symbols, Examples, & Facts. Encyclopedia Britannica, Religion. Feb.

van Os, J., Reininghaus, U., 2016. Psychosis as a transdiagnostic and extended phenotype in the general population. World Psychiatry 15, 118–124. https://doi.org/10.1002/wps.20310.

van Os, J., Verkooyen, R., Hendriks, M., Henquet, C., Bak, M., Marcelis, M., Delespaul, P., Krabbendam, L., Myin-Germeys, I., 2008. A psychosis proneness-persistence-impairment model of psychotic disorders. Tijdschr. Psychiatr. 50, 77–83.

van Os, J., Linscott, R.J., Myin-Germeys, I., 2009. A systematic review and meta-analysis of the psychosis continuum: evidence for a psychosis proneness-persistence-impairment model of psychotic disorder. Psychol. Med. 39, 179–195.

Verdoux, H., Bergey, C., Assens, F., Abalan, F., Gonzales, B., Pauillac, P., Fournet, O., Liraud, F., Beaussier, J., Gaussares, C., Etchegaray, B., Bourgeois, M., van Os, J., 1998. Prediction of duration of psychosis before first admission. Eur. psychiatr. 13, 346–352. https://doi.org/10.1016/S0924-9338(99)80701-9.

Yehya, A., Khaled, S., Sommer, I., Elhag, S., Hassan, M., Woodruff, P., Alabdalla, M., 2022. The arabic questionnaire for psychotic experiences in patients with psychotic disorders: a clinical validation. Asian J. Psychiatry (March, Under Review).

Yung, A.R., Lin, A., 2016. Psychotic experiences and their significance. World Psychiatry 15, 130–131. https://doi.org/10.1002/wps.20328.

Zinke, R.C., Watson, J., Kramnick, I., Moore, R.L., Burgard, S., Carter, S.L., Murray, N., 1999. The role of religion in public life. Public Adm. Rev. 59, 170. https://doi.org/10.2307/977637.

Zolezzi, M., Bensmail, N., Zahrah, F., Khaled, S., El-Gaili, T., 2017. Stigma associated with mental illness: perspectives of university students in Qatar. Neuropsychiatr. Dis. Treat. 13, 1221–1233. https://doi.org/10.2147/NDT.S132075.