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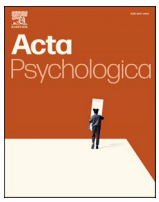

Association of religiosity on anxiety and depressive symptoms in the Brazilian population: A cross-sectional study

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ABSTRACT

Objective: Our aim is to examine the association of religiosity on anxiety and depression symptoms in a convenience sample of female and male Brazilians older than 18 years, and to analyze whether there are sex differences.
Methods: Study cross-sectional involved 1017 participants (669 women). Religiosity was assessed using the Duke University Religion Index, evaluating the dimensions of Organizational Religiosity (OR), Non-Organizational Religiosity (NOR), and Intrinsic Religiosity (IR). Anxiety and depression were self-reported on a Likert scale of 1 to 5. Generalized Linear Models with a robust estimator, Poisson distribution, and Prevalence Ratio (PR) estimates with their respective 95 % confidence intervals (CI95%) were used to estimate the PR of depression and anxiety symptoms in the total sample and according to sex.
Results: We found that Organizational Religiosity (OR: PR = 1.19; 95 % CI: 1.03–1.39) and Non-Organizational Religiosity (NOR: PR = 1.19; 95 % CI: 1.04–1.36) were associated with depressive symptoms in our sample. However, only Intrinsic Religiosity (IR: PR = 1.60; 95 % CI: 1.30–1.96) was associated with anxiety symptoms. When analyzing differences by sex, we observed that OR (PR = 1.47; 95 % CI: 1.06–2.04) and NOR (PR = 1.48; 95 % CI: 1.13–1.94) were associated with depressive symptoms in male participants. In contrast, for female participants, only IR (PR = 1.03; 95 % CI: 1.01–1.05) was associated with anxiety symptoms.
Conclusion: The relationship between religiosity, anxiety, and depression appears to be more influential in shaping the perception of depression among men and the perception of anxiety among women. Therefore, the practice of religiosity should not be discouraged and has the potential to be a complementary therapeutic intervention strategy.

1. Introduction

Currently, the concept of health is broad and emphasizes comprehensive care, encompassing physical, psychological, social, and spiritual aspects (Boutros et al., 2024; de Diego-Cordero et al., 2022; Kruk & Aboul-Enein, 2024). From a historical perspective, religious practices and their potential associations with health and illness processes have consistently sparked scientific interest (Alvarenga et al., 2024; Du, 2024; Dubey et al., 2024; Koenig, 2024; Mosqueiro et al., 2024; Rajan et al., 2024; Shuler Ivey, 2024; Wüthrich-Grossenbacher et al., 2023; Xiong

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et al., 2024).

It has been reported that approximately 90 % of the global population reports adhering to some form of religious belief (Borges et al., 2021; Pérez & Rohde, 2022). However, a scientific consensus on the definitions of religiosity and spirituality remains elusive. Various studies underscore the distinctions between these terms, proposing that religious practice represents one of the expressions of the spiritual dimension (de Brito Sena et al., 2021; Fidelis et al., 2024; Gschwandtner, 2021).

Research undertaken in a variety of countries as in Brazil (De Lira et al., 2020) has highlighted the biopsychosocial correlates of positive religious coping with indicators of positive functioning, such as feelings of post-traumatic growth and well-being (De Lira et al., 2020; Du, 2024; Moons et al., 2019). Conversely, negative religious coping has been associated with psychological distress indicators, including anxiety and depression (Almaraz et al., 2022; Du, 2024; Voytenko et al., 2023).

The growing scientific interest in the beneficial associations between religiosity and health—particularly mental health, psychological distress, and related disorders—has underscored essential opportunities for integrating holistic care approaches. These approaches take into account the multidimensional nature of the human being and emphasize the importance of valuing individuals' active participation throughout the care process (Aggarwal et al., 2023; Brečka et al., 2024; Dubey et al., 2024; Koenig et al., 2020; Lucchetti et al., 2021; Ouwehand et al., 2020). Furthermore, they highlight the significance of soft care technologies, which prioritize relational aspects by fostering bonds, autonomy, empathy, accountability, and other factors as effective mechanisms for achieving clinical outcomes and improving care management. These strategies comprehensively address prevention, promotion, protection, and the recovery of a healthy balance (Aggarwal et al., 2023; Brečka et al., 2024; Dubey et al., 2024; Koenig et al., 2020; Lucchetti et al., 2021; Ouwehand et al., 2020).

In Latin America, Brazil has the highest depression rate, at 5.8 %, and globally, it leads the world in anxiety cases, with 9.3 %, predominantly affecting women (Baldacara et al., 2024; Bonadiman et al., 2020; Lopez et al., 2023). Brazil specifically shows an increasing trend in the prevalence of depression and anxiety in its population, with approximate increases of 36.7 % between 2013 and 2019 (de Souza Lopes et al., 2022) and 45 % in 2020 (Mattiello et al., 2022), respectively, especially after the COVID-19 pandemic. Religious involvement may be associated with less depression, faster recovery from depression and reduced symptoms (Koenig et al., 2012), being associated with improvements in other aspects, such as systolic blood pressure (Teixeira et al., 2025).

With the possibility of religious attendance having a positive effect on anxiety and depression traits, being less prevalent in participants who receive religious interventions (Koenig et al., 2012, 2020), with possible bidirectional effects on depression, at least in women, but not yet demonstrated for men (Koenig et al., 2020; Li et al., 2016).

Among the diverse and often divergent definitions, this study conceptualizes religiosity as an integral part of religion, understood as a structural set of principles, beliefs, practices, rituals, and symbolic language designed to facilitate connection with the sacred or transcendent (Koenig et al., 2001).

In this context, considering the lack of consensus on the concept and its relationship with mental health, there is a clear need for standardized methodological approaches in this field, the objective of this research was to examine the association of religiosity on symptoms of anxiety and depression in a sample of female and male Brazilians older than 18 years and to analyze whether there are any differences according to sex. The hypothesis proposed is that religiosity may be positively associated with symptoms of anxiety and depression.

2. Methods

2.1. Study design and study site

This is a cross-sectional, observational study conducted online with adult participants from different regions of Brazil. The data was collected during the month of May 2020, through a digital questionnaire distributed via social media platforms such as WhatsApp, Instagram, Twitter, and Facebook.

2.2. Ethical procedures

Our study was previously approved by the Human Research Ethic Committee (number - 4025956, CAAE - 31,540,620.9.0000.5505). All protocols and procedures were carried out in accordance with the Declaration of Helsinki and Brazilian resolution of the Ministry of Health. All participants provided written consent for participation in the study.

2.3. Participants

The sample for this study was recruited by convenience sampling through posters published and shared on social networks. Although it is not possible to determine the exact number of individuals who accessed the survey, a total of 1112 individuals responded the online questionnaire. Of these, 1017 participants composed the final sample (65.7 % female), with a mean age of 40.0 ± 14.2 years, from all regions of Brazil, met the inclusion criteria and completed the questionnaire. Participants who did not complete all required items or failed to follow instructions were automatically excluded by the platform. The study was not restricted to a specific physical site, as it was carried out entirely in a virtual environment during the social distancing measures implemented due to the COVID-19 pandemic.

Inclusion criteria were: being Brazilian, being over 18 years old, and agreeing to the terms of the study. The exclusion criteria were: not answering all the questions of the questionnaire and not completing the questionnaire according to the objectives of the study. The questionnaire was made available online (https://forms.gle/vzWqCCJ5dD4UYFVDA), and participants were invited to complete it remotely between May 1 and 31, 2020, with the link disseminated through social networks. The free and informed consent form was made available via this link. Participants were asked to read the form and confirm their agreement to participate in the study.

2.4. Covariates

Sex (male and female), age, body mass and body height were assessed in a self-reported manner. Body Mass Index (BMI), using the eq. BMI = body mass/body height^2, was calculated and used as continuous data.

2.5. Religiosity

To assess participants' religiosity, the Duke University Religion Index (DUREL) (Koenig & Büssing, 2010), translated and validated for Brazilian Portuguese (Taunay et al., 2012), was used, with adequate internal consistency (Cronbach's $\alpha > 0.80$) and test-retest reliability (intraclass correlation coefficient > 0.90) in both samples. The DUREL consists of five items that measure three main dimensions of religious involvement: Organizational Religiosity (OR, frequency of attendance at religious gatherings), containing 1 item, assessed on a 6-point scale, ranging from 'Never' (1) to 'More than once a week' (6); Non-Organizational Religiosity (NOR, frequency of private religious activities), containing 1 item, assessed on a 6-point scale, from 'Rarely or never' (1) to 'More than once a day' (6); and Intrinsic Religiosity (IR, with three items: IR1, IR2, IR3, which reflect the internalization and full

expression of religiosity), evaluated on a 5-point scale, ranging from 'Strongly disagree' (1) to 'Strongly agree' (5) (Koenig & Büssing, 2010). The total DUREL score is obtained from the sum of the answers, ranging from 5 to 27 points. Higher values indicate a higher level of religiosity.

2.6. Anxiety and depression symptoms

Anxiety and depression symptoms were assessed through specific questions for each symptom using a Likert scale. The questions were: "On a scale from 1 to 5, where 1 (very little or slightly anxious) and 5 (very or extremely anxious), how would you rate your level of anxiety today (at this exact moment)?" and "On a scale from 1 to 5, where 1 (very little or slightly depressed) and 5 (very or extremely depressed), how would you rate your level of depression today (at this exact moment)?"

The single-item Likert-type questions were chosen for their brevity and accessibility, allowing participants to self-assess how anxious or depressed they felt "at that moment," using subjective, perceptual criteria. While this approach lacks formal psychometric validation, it has been utilized in prior research as a screening or preliminary tool to indicate general psychological distress in population-level studies, particularly when rapid deployment and participant compliance are critical, during a context (early COVID-19 pandemic) that limited more complex data collection.

To facilitate statistical analysis and interpretability of results, participants' responses to anxiety and depression items were dichotomized. Individuals who rated their current feelings of anxiety or depression as 4 or 5 on the 5-point Likert scale were classified as having "presence of symptoms", while those who responded 1 to 3 were classified as having "absence of symptoms." This cutoff was based on the assumption that ratings of 4 and 5 reflect moderate-to-severe subjective symptomatology, consistent with approaches used in prior population-based studies employing self-perceived mental health indicators. Although this is not a diagnostic classification, it provides a practical framework for analyzing symptom prevalence and associated factors in large-scale surveys.

2.7. Statistical analysis

Descriptive statistics, including absolute and relative frequencies, were used to present the distribution of participants across organizational religiosity (OR), non-organizational religiosity (NOR), and intrinsic religiosity (IR). Subsequently, the chi-square test was applied to assess proportional differences in religiosity-related variables according to participants' sex.

A Generalized Linear Model (GLM) with a robust estimator, Poisson distribution, and Prevalence Ratio (PR) estimates with their respective 95 % confidence intervals (95 % CI) was used to determine the PR of depression and anxiety symptoms in the total sample and stratified by sex. Crude (bivariate) models for anxiety and depression were constructed based on specific religiosity domains, along with multivariate models adjusted for age and BMI.

The analyses were conducted using JASP software (version 0.19.0, University of Amsterdam, The Netherlands), with a significance level set at 5 %.

3. Results

A total of 1017 individuals participated in the study, with a mean age of 40 ± 14.2 years, body mass of 72.9 ± 16.4 kg, body height of 1.6 ± 0.1 m, and BMI of 26.0 ± 4.8 kg/m^2. Of these participants, 669 were female (65,7 %). The prevalence of individuals with anxiety symptoms (scoring 4 or 5 points) was 30.1 % (n = 307), while the prevalence of individuals with depression symptoms was 5.4 % (n = 55).

Table 1 presents the questions related to faith according to participants' sex. Significant differences were observed in the response

Table 1
Faith profile of participants according to sex.

	Sex		
	Male	Female	
	n (%)	n (%)	p
How often do you go to a church, temple or other religious gathering?			0.178
More than once a week	47 (34.81)	88 (65.18)	
Once a week	65 (28.76)	161 (71.23)	
2 to 3 times a month	20 (29.85	47 (70.14)	
A few times a year	82 (33.88)	160 (66.11)	
Once a year or less	50 (35.46)	91 (64.53)	
Never	84 (40.77)	122 (59.22)	
How often do you dedicate your time to individual religious activities, such as prayers, meditations, reading the Bible or other religious texts?			<0.001
Daily	113 (27.56)	297 (72.43)	
More than once a day	37 (31.62)	80 (68.37)	
2 or more times a week	43 (33.07)	87 (66.92)	
Once a week	13 (34.21)	25 (65.78)	
A few times a month	30 (30.030)	69 (69.69)	
Rarely or never	112 (50.22)	111 (49.77)	
In my life I feel the presence of God or the Holy Spirit			<0.001
Totally true for me	169 (28.69)	420 (71.30)	
Mostly true for me	76 (36.19)	134 (63.81)	
Mostly not true for me	20 (46.51)	23 (53.48)	
Not sure	31 (40.26)	46 (59.74)	
Not true for me	52 (53.06)	46 (46.93)	
My religious beliefs are really behind my whole way of life			<0.001
Totally true for me	113 (31.65)	244 (68.34)	
Mostly true for me	26 (37.68)	43 (62.31)	
Mostly not true for me	74 (45.12)	90 (54.87)	
Not sure	100 (30.48)	228 (69.51)	
Not true for me	35 (35.35)	64 (64.64)	
I try very hard to live my religion in every aspect of my life			0.001
Totally true for me	83 (29.85)	195 (70.14)	
Not generally true for me	37 (44.04)	47 (55.95)	
Not generally true for me	98 (29.08)	239 (70.29)	
Not true for me	91 (43.33)	119 (56.66)	
Not sure	39 (36.11)	69 (63.88)	

Note: Data are presented in absolute and relative frequency.

proportions for four questions, related to the domains of intrinsic and non-organizational religiosity, while no statistical differences were found for the organizational religiosity domain.

Table 2 presents the prevalence ratios for depression and anxiety among participants according to religiosity domains. After adjusting for sex, age, and BMI, we observed that participants with lower involvement in organizational (PR: 1.19; 95 % CI: 1.03–1.39) and non-organizational religiosity (PR: 1.19; 95 % CI: 1.04–1.36) were approximately 19 % more likely to report depressive symptoms. No significant association was found for intrinsic religiosity and depression symptoms. For anxiety symptoms, only intrinsic religiosity showed a statistically significant association (PR: 1.60; 95 % CI: 1.30–1.96), suggesting that individuals with higher levels of intrinsic religiosity were 60 % more likely to report anxiety symptoms.

Next, we present the prevalence ratios for anxiety and depression among participants based on their sex (Table 3). Among male participants, lower religious involvement in both organizational (PR: 1.47; 95 % CI: 1.06–2.04) and non-organizational domains (PR: 1.48; 95 % CI: 1.13–1.94) was associated with a 47–48 % greater likelihood of reporting depressive symptoms. No significant associations were observed for depression among female participants. Regarding anxiety, only female participants with lower intrinsic religiosity showed increased prevalence (PR: 1.03; 95 % CI: 1.01–1.05), indicating a modest 3 % increase in the likelihood of reporting anxiety symptoms.

4. Discussion

Our study aimed to examine the association of religiosity on anxiety and depression symptoms in a sample of female and male Brazilians older than 18 years and analyze potential differences according to sex. Our results demonstrate that organizational religiosity (OR) and non-organizational religiosity (NOR) were significantly associated with depressive symptoms in the overall sample, while intrinsic religiosity (IR) was related to anxiety symptoms. When stratified by sex, OR and NOR showed stronger associations with depressive symptoms among male participants, whereas only IR was significantly associated with anxiety symptoms in female participants. From a practical standpoint, these findings suggest that religiosity may function as both a protective and a potentially stress-inducing psychosocial factor, depending on the dimension and context. Specifically, participants with higher levels of intrinsic religiosity were approximately 60 % more likely to report anxiety symptoms, which may reflect underlying mechanisms such as heightened introspection, spiritual struggle, or existential concerns. In contrast, lower levels of OR and NOR were associated with a 19 % to 48 % greater likelihood of reporting depressive symptoms, particularly among men, indicating a modest but meaningful protective association of external religious engagement with depressive symptomatology. These findings partially confirm our hypothesis that religiosity is associated with the presence of anxiety and depressive symptoms, although the direction and strength of these associations differ by sex and religiosity domain.

Table 2
Prevalence ratio of religiosity according to depression and anxiety.

Variables	Depression			
	Crude		Adjusted	
	PR (IC95%)	p	PR (IC95%)	p
Organizational	1.19 (1.02–1.38)	**0.022**	1.19 (1.03–1.39)	0.017*
Non-organizational	1.17 (1.03–1.33)	**0.016**	1.19 (1.04–1.36)	0.007*
Intrinsic	1.04 (0.98–1.11)	0.144	1.05 (0.98–1.12)	0.107
*				
Variables	Anxiety			
	Crude		Adjusted	
	PR (IC95%)	p	PR (IC95%)	p
Organizational	1.04 (0.99–1.10)	0.072	1.04 (0.99–1.01)	0.061
Non-organizational	1.04 (0.99–1.09)	0.068	1.04 (0.99–1.09)	0.111
Intrinsic	1.03 (1.01–1.05)	**0.007**	1.60 (1.30–1.96)	**0.011**

Adjusted for: sex, age, and body mass index; CI: Confidence Interval; PR: Prevalence Ratio.
* Significant difference.

Our results both confirm and diverge from existing literature, highlighting the multifaceted nature of religiosity's impact on mental health. For instance, the protective effect of organizational religiosity against depressive symptoms, particularly among men, aligns with the findings of Santero et al. (2019), who observed a significantly lower likelihood of major depressive episodes in older adult women with religious affiliation and frequent religious attendance. This suggests that communal religious engagement can provide a buffer against depression. However, our study found no significant association between IR and depression, contrasting with Gonçalves et al. (2018) and Fernández and Rosell (2022), who reported a positive correlation between NOR and IR with reduced depressive symptoms in vulnerable populations and older adults. These discrepancies underscore the importance of cultural context and specific population characteristics in shaping these relationships.

Regarding intrinsic religiosity and its association with anxiety, our finding that higher IR was linked to increased anxiety symptoms in women is a key point of divergence from some studies. While some research, like Mosqueiro et al. (2021), Poorolajal et al. (2022), and Villani et al. (2019), suggests a direct correlation between IR and positive religious coping, particularly concerning quality of life, our results align with others (Beak et al., 2022; Villani et al., 2019) that propose a more complex, potentially curvilinear relationship. The idea that a confident worldview, rather than solely religious beliefs, might be more closely tied to well-being offers an alternative perspective to the "My religious beliefs are truly behind all aspects of my way of life" statement. The inconsistent findings across studies regarding IR and anxiety/depression, as also noted by King et al. (2013), Wang et al. (2015), Brito et al. (2021), and Bos et al. (2024), highlight the need for caution in generalizing results across different populations and contexts.

Furthermore, our observation of sex-specific differences in the association of religiosity dimensions with mental health symptoms warrants further attention. The stronger association of lower OR and NOR with depressive symptoms in men, contradicting Santero et al. (2019) and Strinnholm et al. (2019) who found no such association in similar male populations, emphasizes the need for tailored interventions. The fact that the reasons for the prevalence of depressive symptoms in women were not associated with OR and NOR in our study also contrasts with the literature suggesting a link between high religious engagement and the absence of depressive disorders in older adult women. These inconsistencies underscore the dynamic and context-dependent nature of how religiosity influences mental health, necessitating a deeper exploration of the underlying psychosocial mechanisms at play.

One important limitation of this study concerns the measurement of anxiety and depression, which were assessed using single-item self-report questions on a Likert scale from 0 to 5. While this approach facilitated rapid data collection and minimized participant burden, it does not capture the full complexity of the constructs and may be susceptible to biases such as response style or lack of introspective accuracy. The failure to assess other variables that could be adjusted in predictive models, such as schooling and income, was also limited by the failure to ask for details of the individual's type of religion. Future studies should take into account the limitations of this study and extend the findings presented here.

Our study also has strengths, such as the use of a validated and widely used questionnaire to assess religiosity and a large sample size of the adult population. This study contributes to the growing body of literature examining the psychosocial correlates of religiosity by analyzing its association with self-perceived anxiety and depressive symptoms. One of the key strengths lies in the disaggregation of

Table 3
Prevalence ratio of religiosity according to depression and anxiety according to the sex of the participants.

Variables	Female				Male			
	Raw		Adjusted		Raw		Adjusted	
	RP (IC95%)	p	RP (IC95%)	p	RP (IC95%)	p	RP (IC95%)	p
Depression								
Organizational	1.12 (0.94–1.34)	0.178	1.13 (0.94–1.37)	0.182	1.47 (1.07–2.02)	0.016	1.47 (1.06–2.04)	**0.021**
Non-organizational	1.11 (0.95–1.30)	0.179	1.11 (0.93–1.31)	0.221	1.45 (1.09–1.92)	0.009	1.48 (1.13–1.94)	**0.004**
Intrinsic	1.04 (0.96–1.12)	0.260	1.04 (0.96–1.13)	0.263	1.06 (0.95–1.19)	0.235	1.07 (0.95–1.19)	0.224
Anxiety								
Organizational	1.04 (0.98–1.10)	0.156	1.02 (0.97–1.08)	0.364	1.08 (0.98–1.20)	0.102	1.08 (0.98–1.20)	0.108
Non-organizational	1.04 (0.99–1.11)	0.100	1.01 (0.95–1.07)	0.665	1.09 (0.99–1.19)	0.059	1.08 (0.99–1.18)	0.076
Intrinsic	1.04 (1.01–1.06)	**0.002**	1.03 (1.01–1.05)	**0.026**	1.02 (0.98–1.06)	0.194	1.02 (0.98–1.06)	0.241

Adjusted for: Age and Body Mass Index; CI: Confidence Interval; PR: Prevalence Ratio.

religiosity into its organizational, non-organizational, and intrinsic dimensions, allowing for a more nuanced understanding of how different expressions of religious engagement relate to mental health. The sexes-stratified analyses further revealed distinct patterns: while organizational and non-organizational religiosity appear to play a modestly protective role against depressive symptoms in men, intrinsic religiosity was associated with anxiety symptoms in women.

From a practical perspective, these findings suggest that religiosity, though often viewed as beneficial to mental health, can also be linked to internal psychological conflict depending on the dimension and demographic context. This underscores the importance of considering individual religious experiences and expressions when integrating spiritual aspects into psychosocial assessments or interventions. Mental health professionals and policymakers should be aware of these differential effects to avoid generalized assumptions about the protective nature of religiosity and instead adopt culturally and contextually sensitive approaches.

5. Conclusion

A strong impact of organizational and non-organizational religiosity on depression symptoms was observed, with the effect being more pronounced in male participants, as shown in the sex-specific analyses. For anxiety symptoms, only intrinsic religiosity showed an association among participants, being more evident among female participants, according to sex-specific analyses. Therefore, we suggest that religiosity, in its various expressions, may be an important factor associated with the modulation of psychological symptoms in the Brazilian population, although its effects are complex and may vary by dimension and sex.

Additionally, although the statistical associations observed were adjusted for key covariates, prevalence ratios reflect only the strength of associations, not causality. Therefore, interpretations must remain cautious, especially in domains where prevalence ratios are high but derived from self-reported, non-diagnostic symptom measures. Further longitudinal or intervention research is needed to confirm the associations between religiosity and anxiety/depression.

CRediT authorship contribution statement

Lucas Lima Galvão: Conceptualization. **Anne Sulivan Lopes da Silva Reis:** Conceptualization. **Claudio Andre Barbosa de Lira:** Conceptualization. **Marilia Santos Andrade:** Conceptualization. **Katja Weiss:** Writing – review & editing. **Beat Knechtle:** Writing – review & editing. **Barbara Juliana Pinheiro Borges:** Conceptualization. **Paulo Gentil:** Conceptualization. **Thomas Rosemann:** Writing – review & editing. **Rodrigo Luiz Vancini:** Conceptualization.

Ethical approval and consent to participate

The study was previously approved by the Human Research Ethics Committee of the Federal University of Espírito Santo (Ordinance 4025956, CAAE–31540620.9.0000.5505, year 2020). All protocols and procedures were performed in accordance with the Declaration of Helsinki and Resolution No. 466/12 of the Ministry of Health. All participants signed the informed consent form.

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Declaration of competing interest

The authors declare that they have no competing interests.

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Data availability

The data are available upon prior contact and justification, together with the corresponding author.

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