Brain, Behavior, and Immunity, founded in 1987, is the official journal of the Psychoneuroimmunology Research Society (PNIRS). This innovative journal publishes peer-reviewed basic, experimental, and clinical studies dealing with behavioral, neural, endocrine, and immune system interactions in humans and animals. It is an international, interdisciplinary journal devoted to original research in neuroscience, immunology, integrative physiology, behavioral biology, psychiatry, psychology, and clinical medicine and is inclusive of research at the molecular, cellular, social, and whole organism level. The journal features online submission and review. Manuscripts are typically peer-reviewed and returned to authors within 30 days of submission, leading to timely publication of experimental results. There are no submission fees or page charges for Brain, Behavior, and Immunity, which is published eight times a year. Detailed instructions for authors can be found at http://ees.elsevier.com/bbi/.

Research areas include: Physiological mechanisms that convey messages between the immune and nervous systems and regulate their functions Stress and immunity, including the role of stress-related hormones and neurotransmitters on the immune system. Actions of cytokines, growth factors and PAMP activation on neuronal and glial cells that regulate behavior, learning, memory and neurogenesis Role of hormones, growth factors and cytokines in the immune and central or peripheral nervous systems Interactions between the immune system and brain that are involved in development of neurological, psychiatric, and mental health disorders Role of immunological processes in neurodegenerative disorders The effects of psychotropic medications on immunological mechanisms and their potential relevance to therapeutic interventions Neuroimaging studies examining how immunological mechanisms affect brain structure and function Clinical trials and experimental studies testing the effects on both immune stimulation and immune suppression on brain and behavior The role of microglia in pain, psychological processes and in psychiatric disorders Immunological mechanisms involved in traumatic brain injury and its resolution Immunologic disorders, infection and behavior Role of the immune system in development and maintenance of inflammatory and chronic pain Immune mechanisms that regulate the blood-brain-interface (BBI) Immune factors that affect health psychology Sleep, exercise, immunity and health Immune system interactions that affect behavior following use of psychotropic drugs, alcohol and other drugs of abuse Healthy aging of the immune system and brain Role of inflammation and stress during perinatal development Cancer and its treatment, stem cells and their effects on brain behavior and immunity Reciprocal communication between the microbiome, immune and nervous systems Regulation of nerve injury and repair by the immune system Psychosocial, behavioral, and neuroendocrine influences on immunity and on the development and progression of immunologically-mediated diseases Nutrition, inflammation, obesity and behavior Genomics of behavior and immunity
AUDIENCE
Neuroscientists, Immunologists, Endocrinologists, Physiologists, Psychiatrists, Rheumatologists, Clinicians

IMPACT FACTOR
2018: 6.170 © Clarivate Analytics Journal Citation Reports 2019

ABSTRACTING AND INDEXING
Scopus

EDITORIAL BOARD

Editor-in-Chief
C.M. Pariante, King's College London Institute of Psychiatry Psychology and Neuroscience The Maurice Wohl Clinical Neuroscience Institute, Cutcombe Road, SE5 9RT, London, United Kingdom

Associate Editors
N. Harrison, Brighton and Sussex Medical School, Brighton, United Kingdom
M. R. Hutchinson, The University of Adelaide, Balhannah, South Australia, Australia
M. Lynch, University of Dublin Trinity College, Dublin, Ireland
S.F. Maier, University of Colorado Boulder Department of Psychology and Neuroscience, Boulder, Colorado, United States

A.H. Miller, Emory University, Atlanta, Georgia, United States
V. Mondelli, King's College London, London, United Kingdom
Q.J. Pittman, University of Calgary, Calgary, Alberta, Canada
T.M. Reyes, University of Cincinnati College of Medicine, Cincinnati, Ohio, United States
S. Spencer, RMIT University, Melbourne, Victoria, Australia
K.P. Su, China Medical University, Taichung, Taiwan
L.R. Watkins, University of Colorado Boulder, Boulder, Colorado, United States

Editorial Board
S. Allan, The University of Manchester, Manchester, United Kingdom
P. Ashwood, M.I.N.D. INSTITUTE, Davis, California, United States
M.T. Bailey, OHIO STATE UNIVERSITY, Columbus, Ohio, United States
W.A. Banks, University of Washington, Seattle, Washington, United States
R. Barrientos, University of Colorado Boulder, Boulder, Colorado, United States
M.E. Bauer, Pontifical Catholic University of Rio Grande do Sul, PORTO ALEGRE, Brazil

S. Ben-Eliyahu, Tel Aviv University, Tel Aviv, Israel
R. von Bernhardi, Pontifical Catholic University of Chile, Santiago, Chile
S.D. Bilbo, Harvard Medical School, Boston, Massachusetts, United States
A. Borsini, King’s College London, London, United Kingdom
J. E. Bower, University of California Los Angeles, Los Angeles, California, United States
E. Brietzke, Federal University of Sao Paulo, Sao Paulo, Sao Paulo, Brazil
L. Brundin, Van Andel Research Institute, Grand Rapids, Michigan, United States
C. Buss, Charite University Hospital Berlin Institute of Clinical Psychology, Berlin, Germany
L. Capuron, NutriNeuro Laboratory, Bordeaux, France
M.J. Carson, University of California Riverside, Riverside, California, United States
L. Carvalho, Queen Mary University of London, London, United Kingdom
A. Cattaneo, King’s College London, London, United Kingdom
J. Cavanagh, University of Glasgow, Glasgow, Scotland, United Kingdom
L.M. Christian, OHIO STATE UNIVERSITY WEXNER MEDICAL CENTER, Columbus, Ohio, United States
C. Coe, University of Wisconsin Madison, Madison, Wisconsin, United States
B. Conti, Scripps Research Institute, La Jolla, California, United States
E. S. Costanzo, University of Wisconsin Madison, Madison, Wisconsin, United States
J.F. Cryan, University College Cork National University of Ireland, Cork, Ireland
C. Cunningham, University of Dublin Trinity College School of Biochemistry and Immunology, Dublin 2, Ireland
A-M. van Dam, VU Amsterdam, Amsterdam, Netherlands
A. Danese, King’s College London, London, United Kingdom
A.C. DeVries, OHIO STATE UNIVERSITY, Columbus, Ohio, United States
T. Deak, Binghamton University, Binghamton, New York, United States
GUIDE FOR AUTHORS

Your Paper Your Way

We now differentiate between the requirements for new and revised submissions. You may choose to submit your manuscript as a single Word or PDF file to be used in the refereeing process. Only when your paper is at the revision stage, will you be requested to put your paper in to a ‘correct format’ for acceptance and provide the items required for the publication of your article.

To find out more, please visit the Preparation section below.

INTRODUCTION

*Brain, Behavior, and Immunity*, founded in 1987, is the official journal of the Psychoneuroimmunology Research Society (PNIRS). This innovative journal publishes peer-reviewed basic, experimental, and clinical studies dealing with behavioral, neural, endocrine, and immune system interactions in humans and animals. It is an international, interdisciplinary journal devoted to original research in neuroscience, immunology, integrative physiology, behavioral biology, psychiatry, psychology, and clinical medicine and is inclusive of research at the molecular, cellular, social, and whole organism level. The journal features online submission and review. Manuscripts are typically peer-reviewed and returned to authors within 30 days of submission, leading to timely publication of experimental results.

There are no submission fees or page charges for *Brain, Behavior, and Immunity*, which is published eight times a year. Detailed instructions for authors can be found at http://ees.elsevier.com/bbi/.

Research areas include: Physiological mechanisms that convey messages between the immune and nervous systems and regulate their functions Stress and immunity, including the role of stress-related hormones and neurotransmitters on the immune system. Actions of cytokines, growth factors and PAMP activation on neuronal and glial cells that regulate behavior, learning, memory and neurogenesis Role of hormones, growth factors and cytokines in the immune and central or peripheral nervous systems. Interactions between the immune system and brain that are involved in development of neurological, psychiatric and mental health disorders. Role of immunological processes in neurodegenerative disorders. The effects of psychotropic medications on immunological mechanisms and their potential relevance to therapeutic interventions. Neuroimaging studies examining how immunological mechanisms affect brain structure and function. Clinical trials and experimental studies testing the effects on both immune stimulation and immune suppression on brain and behavior. The role of microglia in pain, psychological processes and in psychiatric disorders. Immune mechanisms involved in traumatic brain injury and its resolution. Immunologic disorders, infection and behavior. Role of the immune system in development and maintenance of inflammatory and chronic pain. Immune mechanisms that regulate the blood-brain-interface (BBI). Immune factors that affect health psychology. Sleep, exercise, immunity and health. Immune system interactions that affect behavior following use of psychotropic drugs, alcohol and other drugs of abuse. Healthy aging of the immune system and brain. Role of inflammation and stress during perinatal development. Cancer and its treatment. Stem cells and their effects on brain behavior and immunity. Reciprocal communication between the microbiome, immune and nervous systems. Regulation of nerve injury and repair by the immune system. Psychosocial, behavioral, and neuroendocrine influences on immunity and on the development and progression of immunologically-mediated diseases. Nutrition, inflammation, obesity and behavior. Genomics of behavior and immunity.

Types of Article

Original full-length research reports, full-length review articles, short communications, brief commentaries, and letters to the editor will be considered for publication.

Full-length research reports: The chief criteria for the acceptance of submitted papers are the quality, originality, and clarity of the work reported, addressing one or more of the research areas reported above. There is no word limit on full length research reports, but papers should be consisely written and most should be able to articulate their findings within approximately 6,000 words.

Reviews: The journal publishes invited or unsolicited reviews on a contemporary topic, discussed authoritatively with the aim of providing a solid, and often novel, interpretation of research evidence, and of integrating a mechanistic model when applicable. Reviews consist of approximately 6,000 words of text and no more than 100 scientific references. Reviews must contain at least one figure highlighting the key aspects of the article, complete with explanatory figure legends. If appropriate,
a color version of the figure can be published in the online publication, with a black-and-white figure in the print version. If the author chooses this option, the figure legend must be self-explanatory in the absence of color-coding.

Short communications: Manuscripts published as short communications are, primarily, reports of novel, solid, important findings on contemporary, fast-moving topics. Small replication studies or incomplete data that do not move the field forward, and descriptions of methods and techniques, are not appropriate for this format. Papers will be considered short communications if the text, references, and a maximum of two tables or figures (or one of each) are limited to 3,500 words. Authors may elect to include additional illustrations, but the limitation to 3,500 words will remain.

Commentaries: These are short pieces written to accompany the publication of impactful full-length research reports. Invited by the Editor, they are limited to 900-1000 words and 5-10 references (including a reference to the relevant published report).

Viewpoints: These are opinion pieces that provide a personal view on broad, contemporary topics relevant to the interaction between health, brain, behaviour and immunity. Invited by the Editor, they are limited to 900-1000 words and 5-10 references, and will generally be immediately ‘open-access’ at no costs to the authors.

Letters to the editor: These should be of high scientific quality, contain less than 500 words, and cite no more than 5 scientific references. If the letter is directed to a paper published in Brain, Behavior, and Immunity, the author of that paper will be provided an opportunity to respond. Both the letter to the editor and the author’s response will be published simultaneously.

Announcements: Brain, Behavior, and Immunity will consider for publication announcements of interest to the readership such as notices of scientific meetings.

Language (usage and editing services)
Please write your text in good English (American or British usage is accepted, but not a mixture of these). Poor standard of grammar or spelling will lead to the paper being sent back to Authors without peer-review. Authors who feel their English language manuscript may require editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English may wish to use the English Language Editing service available from Elsevier’s WebShop.

Study design and statistical reporting

BBI aspires to publish papers with the highest standards of reporting and presentation of methodological details, including the study design and the statistics used.

Study Design: State whether: 1) samples/animals were assigned randomly to various experimental groups (and the specific method of randomization); 2) the data collected was processed randomly and appropriately blocked; 3) experimenters were blind to group assignment and outcome assignment; and 4) an appropriate sample size was computed when the study was being designed.

Data Handling: Clearly state the numbers of participants, animals, or samples included in the study. Provide detailed explanations of the reasons for any attrition in the study. Explain how outliers are defined and handled and any data removed before analysis must be reported. Report how often each experiment was performed and whether the results were substantiated by repetition under a range of conditions. Sufficient information about sample collection must be provided to distinguish between independent biological data points and technical replicates.
Statistical reporting: Authors should identify the precise statistical tests used. In addition, planned comparisons, details of controls and power analyses to determine sample sizes, if applicable, should be reported. Complete results of the statistical analyses, including p values (rather than ranges), degrees of freedom and any estimates of effects size, should be reported in full in the Results section, including all within- and between-subject factors. For multiple comparisons and multiple correlations, define measures taken to reduce Type 1 errors. For neuroimaging studies, methods for controlling for multiple comparisons and the cluster-forming statistical threshold used must be reported. For ANOVAs, and other multivariate analyses, define measures taken to control for violation of the sphericity assumption and how you report results of corrected degrees of freedom statistics. Finally, state the name and version of the statistical software that was used.

Addressing Sex as a Biological Variable: We ask all authors to ensure proper consideration of sex as a biological variable. For example, any papers utilizing subjects (cells, animals, humans) of only one sex must state the sex of the samples in the title and abstract of the paper, with the obvious exception of sex-specific issues (e.g., prostate or ovarian function). Authors must also state the rationale for using samples from one sex rather than from both. For cellular work, the sex of origin of cells used should be reported, or if cells or tissue from both sexes were used without regard to sex, this fact should be indicated. Finally, the inability for any reason to study sex differences where they may exist should be discussed as a study limitation.

Format
Manuscripts should be prepared using a 12-point font, double-spaced throughout (including tables, footnotes, references, and figure captions) with 1-in. margins on all sides. Unusual typeface is acceptable only if it is clear and legible. For initial submission, all manuscripts must be prepared and submitted in one of the following formats: Microsoft Word (.doc), WordPerfect (.wps), or Rich Text Format (.rtf). All figures and tables should be clearly labeled at the top.

Revised manuscripts should not be marked using underlined or bolded words to indicate changes from the original submission. Instead, changes in the revised manuscript must be explained in a rebuttal letter. Submission of all revised manuscripts requires both figures and tables to be submitted separately from the manuscript text: do not insert figures and tables at the end of the text for revised manuscripts. Instead, the electronic submission system requires identification and submission of figures and tables separate from the text of revised manuscripts (see information below for graphs, scans, and illustrations). For more information, please also see the Author Gateway Web page for Brain, Behavior, and Immunity available through the journal home page at https://www.elsevier.com/locate/ybrbi.

Contact details for submission
Manuscripts must be written in English and submitted electronically at http://ees.elsevier.com/bbi/. New contributors should first register at this site and then log into the Elsevier Editorial System (EES) with their user name and password. There are eight steps that must be completed to submit a manuscript: Enter Article Title; Select Article Type; Add/Edit Remove Author (corresponding author does not need to be the person who submits the paper); Submit Abstract; Enter Key Words; Select Document Classification; Enter Comments (recommend expert reviewers); Attach Files. All sections except the last one can be ‘copied and pasted’ into text boxes from existing files. The files that must be attached separately are: cover letter to the Editor-in-Chief, manuscript, figures, and tables. An introductory cover letter must outline the most important research findings and their significance. Complete legends (captions) for both figures and tables should be placed at the end of the manuscript. Figures must be attached as separate files or as a single file. Tables must also be attached as either individual tables or a single file with all the tables. All files containing figures or tables must clearly identify each figure or part of figure by adding, at the top of each figure or table, the name of the first author and abbreviated title of the manuscript. Authors can also upload supplementary material such as video, audio, movie and other files (which will be available as a link in the PDF file that the system generates). After the files are attached, the EES system will create a PDF file, which may require a few minutes. You will then be asked to approve the PDF file, a step that must be completed before the new submission is sent to the Editor-in-Chief who will initiate the review process.
**Submission checklist**

You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

**Ensure that the following items are present:**

One author has been designated as the corresponding author with contact details:
- E-mail address
- Full postal address

All necessary files have been uploaded:

*Manuscript*:
- Include keywords
- All figures (include relevant captions)
- All tables (including titles, description, footnotes)
- Ensure all figure and table citations in the text match the files provided
- Indicate clearly if color should be used for any figures in print

*Graphical Abstracts / Highlights files* (where applicable)

*Supplemental files* (where applicable)

Further considerations
- Manuscript has been 'spell checked' and 'grammar checked'
- All references mentioned in the Reference List are cited in the text, and vice versa
- Permission has been obtained for use of copyrighted material from other sources (including the Internet)
- A competing interests statement is provided, even if the authors have no competing interests to declare
- Journal policies detailed in this guide have been reviewed
- Referee suggestions and contact details provided, based on journal requirements

For further information, visit our Support Center.

**BEFORE YOU BEGIN**

**Ethics in publishing**

Please see our information pages on Ethics in publishing and Ethical guidelines for journal publication.

**Studies in humans and animals**

If the work involves the use of human subjects, the author should ensure that the work described has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans. The manuscript should be in line with the Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals and aim for the inclusion of representative human populations (sex, age and ethnicity) as per those recommendations. The terms sex and gender should be used correctly.

Authors should include a statement in the manuscript that informed consent was obtained for experimentation with human subjects. The privacy rights of human subjects must always be observed.

All animal experiments should comply with the ARRIVE guidelines and should be carried out in accordance with the U.K. Animals (Scientific Procedures) Act, 1986 and associated guidelines, EU Directive 2010/63/EU for animal experiments, or the National Institutes of Health guide for the care and use of Laboratory animals (NIH Publications No. 8023, revised 1978) and the authors should clearly indicate in the manuscript that such guidelines have been followed. The sex of animals must be indicated, and where appropriate, the influence (or association) of sex on the results of the study.

**Declaration of interest**

All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work. Examples of potential competing interests include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding. Authors must disclose any interests in two places: 1. A summary declaration of interest statement in the title page file (if double-blind) or the manuscript file (if single-blind). If there are no interests to declare then please state this: 'Declarations
of interest: none'. This summary statement will be ultimately published if the article is accepted.

2. Detailed disclosures as part of a separate Declaration of Interest form, which forms part of the journal's official records. It is important for potential interests to be declared in both places and that the information matches. More information.

Submission declaration and verification
Submission of an article implies that the work described has not been published previously (except in the form of an abstract, a published lecture or academic thesis, see 'Multiple, redundant or concurrent publication' for more information), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify originality, your article may be checked by the originality detection service Crossref Similarity Check.

Use of inclusive language
Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Articles should make no assumptions about the beliefs or commitments of any reader, should contain nothing which might imply that one individual is superior to another on the grounds of race, sex, culture or any other characteristic, and should use inclusive language throughout. Authors should ensure that writing is free from bias, for instance by using 'he or she', ‘his/her’ instead of ‘he’ or ‘his’, and by making use of job titles that are free of stereotyping (e.g. 'chairperson' instead of 'chairman' and 'flight attendant' instead of 'stewardess').

Authorship

While the journal does not request details of authors contribution, in accordance with the Consensus Statement on Surgery Journals Authorship (2005) we expect that all authors meet all three of the following conditions: 1) Authors make substantial contributions to conception and design, and/or acquisition of data, and/or analysis and interpretation of data; 2) Authors participate in drafting the article or revising it critically for important intellectual content; and 3) Authors give final approval of the version to be submitted and any revised version.

Authors are expected to consider carefully the list and order of authors before submitting their manuscript and provide the definitive list of authors at the time of the original submission. Any addition, deletion or rearrangement of author names in the authorship list should be made only before the manuscript has been accepted and only if approved by the journal Editor. To request such a change, the Editor must receive the following from the corresponding author: (a) the reason for the change in author list and (b) written confirmation (e-mail, letter) from all authors that they agree with the addition, removal or rearrangement. In the case of addition or removal of authors, this includes confirmation from the author being added or removed.

Only in exceptional circumstances will the Editor consider the addition, deletion or rearrangement of authors after the manuscript has been accepted. While the Editor considers the request, publication of the manuscript will be suspended. If the manuscript has already been published in an online issue, any requests approved by the Editor will result in a corrigendum.

Reporting clinical trials
Randomized controlled trials should be presented according to the CONSORT guidelines. At manuscript submission, authors must provide the CONSORT checklist accompanied by a flow diagram that illustrates the progress of patients through the trial, including recruitment, enrollment, randomization, withdrawal and completion, and a detailed description of the randomization procedure. The CONSORT checklist and template flow diagram are available online.

Registration of clinical trials
Registration in a public trials registry is a condition for publication of clinical trials in this journal in accordance with International Committee of Medical Journal Editors recommendations. Trials must register at or before the onset of patient enrolment. The clinical trial registration number should be included at the end of the abstract of the article. A clinical trial is defined as any research study that prospectively assigns human participants or groups of humans to one or more
health-related interventions to evaluate the effects of health outcomes. Health-related interventions include any intervention used to modify a biomedical or health-related outcome (for example drugs, surgical procedures, devices, behavioural treatments, dietary interventions, and process-of-care changes). Health outcomes include any biomedical or health-related measures obtained in patients or participants, including pharmacokinetic measures and adverse events. Purely observational studies (those in which the assignment of the medical intervention is not at the discretion of the investigator) will not require registration.

Article transfer service
This journal is part of our Article Transfer Service. This means that if the Editor feels your article is more suitable in one of our other participating journals, then you may be asked to consider transferring the article to one of those. If you agree, your article will be transferred automatically on your behalf with no need to reformat. Please note that your article will be reviewed again by the new journal. More information.

Copyright
Upon acceptance of an article, authors will be asked to complete a 'Journal Publishing Agreement' (see more information on this). An e-mail will be sent to the corresponding author confirming receipt of the manuscript together with a 'Journal Publishing Agreement' form or a link to the online version of this agreement.

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the Publisher is required for resale or distribution outside the institution and for all other derivative works, including compilations and translations. If excerpts from other copyrighted works are included, the author(s) must obtain written permission from the copyright owners and credit the source(s) in the article. Elsevier has preprinted forms for use by authors in these cases.

For gold open access articles: Upon acceptance of an article, authors will be asked to complete an 'Exclusive License Agreement' (more information). Permitted third party reuse of gold open access articles is determined by the author's choice of user license.

Author rights
As an author you (or your employer or institution) have certain rights to reuse your work. More information.

Elsevier supports responsible sharing
Find out how you can share your research published in Elsevier journals.

Role of the funding source
You are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s), if any, in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. If the funding source(s) had no such involvement then this should be stated.

Funding body agreements and policies
Elsevier has established a number of agreements with funding bodies which allow authors to comply with their funder's open access policies. Some funding bodies will reimburse the author for the gold open access publication fee. Details of existing agreements are available online.

Open access
This journal offers authors a choice in publishing their research:

Subscription
• Articles are made available to subscribers as well as developing countries and patient groups through our universal access programs.
• No open access publication fee payable by authors.
• The Author is entitled to post the accepted manuscript in their institution's repository and make this public after an embargo period (known as green Open Access). The published journal article cannot be shared publicly, for example on ResearchGate or Academia.edu, to ensure the sustainability of peer-reviewed research in journal publications. The embargo period for this journal can be found below.

Gold open access
• Articles are freely available to both subscribers and the wider public with permitted reuse.
• A gold open access publication fee is payable by authors or on their behalf, e.g. by their research funder or institution.

Regardless of how you choose to publish your article, the journal will apply the same peer review criteria and acceptance standards.

For gold open access articles, permitted third party (re)use is defined by the following Creative Commons user licenses:

Creative Commons Attribution (CC BY)
Lets others distribute and copy the article, create extracts, abstracts, and other revised versions, adaptations or derivative works of or from an article (such as a translation), include in a collective work (such as an anthology), text or data mine the article, even for commercial purposes, as long as they credit the author(s), do not represent the author as endorsing their adaptation of the article, and do not modify the article in such a way as to damage the author's honor or reputation.

Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND)
For non-commercial purposes, lets others distribute and copy the article, and to include in a collective work (such as an anthology), as long as they credit the author(s) and provided they do not alter or modify the article.

The gold open access publication fee for this journal is **USD 3150**, excluding taxes. Learn more about Elsevier's pricing policy: [https://www.elsevier.com/openaccesspricing](https://www.elsevier.com/openaccesspricing).

Green open access
Authors can share their research in a variety of different ways and Elsevier has a number of green open access options available. We recommend authors see our [open access page](https://www.elsevier.com/openaccesspage) for further information. Authors can also self-archive their manuscripts immediately and enable public access from their institution's repository after an embargo period. This is the version that has been accepted for publication and which typically includes author-incorporated changes suggested during submission, peer review and in editor-author communications. Embargo period: For subscription articles, an appropriate amount of time is needed for journals to deliver value to subscribing customers before an article becomes freely available to the public. This is the embargo period and it begins from the date the article is formally published online in its final and fully citable form. [Find out more.](https://www.elsevier.com/openaccesspage)

This journal has an embargo period of 12 months.

Submit your article
Please submit your article via [http://ees.elsevier.com/bbi](http://ees.elsevier.com/bbi)

Referees
Please submit the names and institutional e-mail addresses of several potential referees. For more details, visit our [Support site](https://www.elsevier.com/support). Note that the editor retains the sole right to decide whether or not the suggested reviewers are used.

Additional information

**PREPARATION**

**NEW SUBMISSIONS**
Submission to this journal proceeds totally online and you will be guided stepwise through the creation and uploading of your files. The system automatically converts your files to a single PDF file, which is used in the peer-review process.

As part of the Your Paper Your Way service, you may choose to submit your manuscript as a single file to be used in the refereeing process. This can be a PDF file or a Word document, in any format or layout that can be used by referees to evaluate your manuscript. It should contain high enough quality figures for refereeing. If you prefer to do so, you may still provide all or some of the source files at the initial submission. Please note that individual figure files larger than 10 MB must be uploaded separately.

References
There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the article...
number or pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct.

**Formatting requirements**

There are no strict formatting requirements but all manuscripts must contain the essential elements needed to convey your manuscript, for example Abstract, Keywords, Introduction, Materials and Methods, Results, Conclusions, Artwork and Tables with Captions.

If your article includes any Videos and/or other Supplementary material, this should be included in your initial submission for peer review purposes.

Divide the article into clearly defined sections.

**Figures and tables embedded in text**

Please ensure the figures and the tables included in the single file are placed next to the relevant text in the manuscript, rather than at the bottom or the top of the file. The corresponding caption should be placed directly below the figure or table.

**REVISED SUBMISSIONS**

**Use of word processing software**

Regardless of the file format of the original submission, at revision you must provide us with an editable file of the entire article. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier). See also the section on Electronic artwork.

To avoid unnecessary errors you are strongly advised to use the 'spell-check' and 'grammar-check' functions of your word processor.

**Article structure**

**Subdivision - numbered sections**

Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to 'the text'. Any subsection may be given a brief heading. Each heading should appear on its own separate line.

**Introduction**

State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

**Material and methods**

Provide sufficient details to allow the work to be reproduced by an independent researcher. Methods that are already published should be summarized, and indicated by a reference. If quoting directly from a previously published method, use quotation marks and also cite the source. Any modifications to existing methods should also be described.

**Results**

Results should be clear and concise.

**Discussion**

This should explore the significance of the results of the work, not repeat them. Avoid extensive citations and discussion of published literature.

**Conclusions**

The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion.

**Appendices**

If there is more than one appendix, they should be identified as A, B, etc. Formulae and equations in appendices should be given separate numbering: Eq. (A.1), Eq. (A.2), etc.; in a subsequent appendix, Eq. (B.1) and so on. Similarly for tables and figures: Table A.1; Fig. A.1, etc.
Essential title page information

**Title.** Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible. **Author names and affiliations.** Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author. **Corresponding author.** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and Materials. Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author. **Present/permanent address.** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

**Word count.** Please include a word count, excluding references and tables.

**Highlights**
Highlights are mandatory for this journal as they help increase the discoverability of your article via search engines. They consist of a short collection of bullet points that capture the novel results of your research as well as new methods that were used during the study (if any). Please have a look at the examples here: example Highlights.

Highlights should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point).

**Abstract**
A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

**Keywords**
A list of up to 10 keywords or phrases suitable for indexing should be provided.

**Abbreviations**
Do not use periods after abbreviations of measure (cm, s, kg, mA, etc.) in text or tables, except for "in." (inch). The American Chemical Society Style Guide should be used as a reference for proper abbreviations.

**Acknowledgements**
Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

**Formatting of funding sources**
List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, please include the following sentence:
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Units**
Follow internationally accepted rules and conventions: use the international system of units (SI). If other units are mentioned, please give their equivalent in SI.

**Math formulae**
Please submit math equations as editable text and not as images. Present simple formulae in line with normal text where possible and use the solidus (/) instead of a horizontal line for small fractional terms, e.g., X/Y. In principle, variables are to be presented in italics. Powers of e are often more conveniently denoted by exp. Number consecutively any equations that have to be displayed separately from the text (if referred to explicitly in the text).

**Footnotes**
Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors build footnotes into the text, and this feature may be used. Should this not be the case, indicate the position of footnotes in the text and present the footnotes themselves separately at the end of the article.

**Electronic artwork**

**General points**
- Make sure you use uniform lettering and sizing of your original artwork.
- Preferred fonts: Arial (or Helvetica), Times New Roman (or Times), Symbol, Courier.
- Number the illustrations according to their sequence in the text.
- Use a logical naming convention for your artwork files.
- Indicate per figure if it is a single, 1.5 or 2-column fitting image.
- For Word submissions only, you may still provide figures and their captions, and tables within a single file at the revision stage.
- Please note that individual figure files larger than 10 MB must be provided in separate source files.

A detailed guide on electronic artwork is available.

**You are urged to visit this site; some excerpts from the detailed information are given here.**

**Formats**
Regardless of the application used, when your electronic artwork is finalized, please 'save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):
- EPS (or PDF): Vector drawings. Embed the font or save the text as 'graphics'.
- TIFF (or JPG): Color or grayscale photographs (halftones): always use a minimum of 300 dpi.
- TIFF (or JPG): Bitmapted line drawings: use a minimum of 1000 dpi.
- TIFF (or JPG): Combinations bitmapped line/half-tone (color or grayscale): a minimum of 500 dpi is required.

**Please do not:**
- Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); the resolution is too low.
- Supply files that are too low in resolution.
- Submit graphics that are disproportionately large for the content.

**Color artwork**
Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF), or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites) regardless of whether or not these illustrations are reproduced in color in the printed version. **For color reproduction in print, you will receive information regarding the costs from Elsevier after receipt of your accepted article.** Please indicate your preference for color: in print or online only. Further information on the preparation of electronic artwork.

**Illustration services**
Elsevier's Author Services offers Illustration Services to authors preparing to submit a manuscript but concerned about the quality of the images accompanying their article. Elsevier's expert illustrators can produce scientific, technical and medical-style images, as well as a full range of charts, tables and graphs. Image 'polishing' is also available, where our illustrators take your image(s) and improve them to a professional standard. Please visit the website to find out more.
Figure captions
Ensure that each illustration has a caption. A caption should comprise a brief title (not on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

Tables
Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules and shading in table cells.

References
Citation in text
Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

Web references
As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

Data references
This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

References in a special issue
Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

Reference management software
Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support Citation Style Language styles, such as Mendeley. Using citation plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal’s style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide. If you use reference management software, please ensure that you remove all field codes before submitting the electronic manuscript. More information on how to remove field codes from different reference management software.

Users of Mendeley Desktop can easily install the reference style for this journal by clicking the following link:
http://open.mendeley.com/use-citation-style/brain-behavior-and-immunity
When preparing your manuscript, you will then be able to select this style using the Mendeley plug-ins for Microsoft Word or LibreOffice.

Reference formatting
There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the article number or pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct. If you do wish to format the references yourself they should be arranged according to the following examples:
Reference style

Text: All citations in the text should refer to:
1. **Single author:** the author's name (without initials, unless there is ambiguity) and the year of publication;
2. **Two authors:** both authors' names and the year of publication;
3. **Three or more authors:** first author's name followed by 'et al.' and the year of publication.

Citations may be made directly (or parenthetically). Groups of references can be listed either first alphabetically, then chronologically, or vice versa.

Examples: 'as demonstrated (Allan, 2000a, 2000b, 1999; Allan and Jones, 1999).... Or, as demonstrated (Jones, 1999; Allan, 2000)... Kramer et al. (2010) have recently shown ...'

List: References should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.

Examples:
- Reference to a journal publication:
- Reference to a journal publication with an article number:
- Reference to a book:
- Reference to a chapter in an edited book:
- Reference to a website:
- Reference to a dataset:

Journal abbreviations source

Journal names should be abbreviated according to the [List of Title Word Abbreviations](#).

Video

Elsevier accepts video material and animation sequences to support and enhance your scientific research. Authors who have video or animation files that they wish to submit with their article are strongly encouraged to include links to these within the body of the article. This can be done in the same way as a figure or table by referring to the video or animation content and noting in the body text where it should be placed. All submitted files should be properly labeled so that they directly relate to the video file's content. In order to ensure that your video or animation material is directly usable, please provide the file in one of our recommended file formats with a preferred maximum size of 150 MB per file, 1 GB in total. Video and animation files supplied will be published online in the electronic version of your article in Elsevier Web products, including ScienceDirect. Please supply 'stills' with your files: you can choose any frame from the video or animation or make a separate image. These will be used instead of standard icons and will personalize the link to your video data. For more detailed instructions please visit our [video instruction pages](#). Note: since video and animation cannot be embedded in the print version of the journal, please provide text for both the electronic and the print version for the portions of the article that refer to this content.

Data visualization

Include interactive data visualizations in your publication and let your readers interact and engage more closely with your research. Follow the instructions [here](#) to find out about available data visualization options and how to include them with your article.

Supplementary material

Supplementary material such as applications, images and sound clips, can be published with your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to
supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version. Please switch off the 'Track Changes' option in Microsoft Office files as these will appear in the published version.

**Research data**
This journal encourages and enables you to share data that supports your research publication where appropriate, and enables you to interlink the data with your published articles. Research data refers to the results of observations or experimentation that validate research findings. To facilitate reproducibility and data reuse, this journal also encourages you to share your software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Below are a number of ways in which you can associate data with your article or make a statement about the availability of your data when submitting your manuscript. If you are sharing data in one of these ways, you are encouraged to cite the data in your manuscript and reference list. Please refer to the "References" section for more information about data citation. For more information on depositing, sharing and using research data and other relevant research materials, visit the research data page.

**Data linking**
If you have made your research data available in a data repository, you can link your article directly to the dataset. Elsevier collaborates with a number of repositories to link articles on ScienceDirect with relevant repositories, giving readers access to underlying data that gives them a better understanding of the research described.

There are different ways to link your datasets to your article. When available, you can directly link your dataset to your article by providing the relevant information in the submission system. For more information, visit the database linking page.

For supported data repositories a repository banner will automatically appear next to your published article on ScienceDirect.

In addition, you can link to relevant data or entities through identifiers within the text of your manuscript, using the following format: Database: xxxx (e.g., TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

**Mendeley Data**
This journal supports Mendeley Data, enabling you to deposit any research data (including raw and processed data, video, code, software, algorithms, protocols, and methods) associated with your manuscript in a free-to-use, open access repository. During the submission process, after uploading your manuscript, you will have the opportunity to upload your relevant datasets directly to Mendeley Data. The datasets will be listed and directly accessible to readers next to your published article online.

For more information, visit the Mendeley Data for journals page.

**Data in Brief**
You have the option of converting any or all parts of your supplementary or additional raw data into one or multiple data articles, a new kind of article that houses and describes your data. Data articles ensure that your data is actively reviewed, curated, formatted, indexed, given a DOI and publicly available to all upon publication. You are encouraged to submit your article for Data in Brief as an additional item directly alongside the revised version of your manuscript. If your research article is accepted, your data article will automatically be transferred over to Data in Brief where it will be editorially reviewed and published in the open access data journal, Data in Brief. Please note an open access fee of 600 USD is payable for publication in Data in Brief. Full details can be found on the Data in Brief website. Please use this template to write your Data in Brief.

**Data statement**
To foster transparency, we encourage you to state the availability of your data in your submission. This may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you will have the opportunity to indicate why during the submission process, for example by stating that the research data is confidential. The statement will appear with your published article on ScienceDirect. For more information, visit the Data Statement page.

**Additional information**
AFTER ACCEPTANCE

**Online proof correction**

Corresponding authors will receive an e-mail with a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to MS Word: in addition to editing text, you can also comment on figures/tables and answer questions from the Copy Editor. Web-based proofing provides a faster and less error-prone process by allowing you to directly type your corrections, eliminating the potential introduction of errors.

If preferred, you can still choose to annotate and upload your edits on the PDF version. All instructions for proofing will be given in the e-mail we send to authors, including alternative methods to the online version and PDF.

We will do everything possible to get your article published quickly and accurately. Please use this proof only for checking the typesetting, editing, completeness and correctness of the text, tables and figures. Significant changes to the article as accepted for publication will only be considered at this stage with permission from the Editor. It is important to ensure that all corrections are sent back to us in one communication. Please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely your responsibility.

**Offprints**

The corresponding author will, at no cost, receive a customized Share Link providing 50 days free access to the final published version of the article on ScienceDirect. The Share Link can be used for sharing the article via any communication channel, including email and social media. For an extra charge, paper offprints can be ordered via the offprint order form which is sent once the article is accepted for publication. Both corresponding and co-authors may order offprints at any time via Elsevier's Author Services. Corresponding authors who have published their article gold open access do not receive a Share Link as their final published version of the article is available open access on ScienceDirect and can be shared through the article DOI link.

*Additional information*

**AUTHOR INQUIRIES**

Visit the Elsevier Support Center to find the answers you need. Here you will find everything from Frequently Asked Questions to ways to get in touch.

You can also check the status of your submitted article or find out when your accepted article will be published.

© Copyright 2018 Elsevier | https://www.elsevier.com