Biopsychosocial medicine research trends: connecting clinical medicine, psychology, and public health

Mutsuhiro Nakao1*, Gen Komaki2, Kazuhiro Yoshiuchi3, Hans-Christian Deter4 and Shin Fukudo5

Growth of biopsychosocial medicine

The journal BioPsychoSocial Medicine was launched in January 2007, nearly 13 years ago. This is a peer-reviewed online journal that encompasses all aspects of the interrelationships between the biological, psychological, social, and behavioral elements of health and disease [1]. The journal emphasizes a biopsychosocial approach to illness and health, covering the behavioral sciences, social sciences, neuroscience, stress physiology and epidemiology, psychoneuroendocrinology/immunology, gut-brain axis, psycho-cardiology and psycho-oncology, all of which are associated with mind–body interactions and psycho social interventions including psychosomatic/behavioral therapeutic approach.

As of October 2020, 331 articles have been published, comprising 222 original research reports (67.1%), 63 reviews (19.0%), 25 case reports (7.6%), 14 editorials (4.2%), and seven other articles (2.1%). When all published articles were assigned to three main areas of study, biological/psychosomatic medicine, psychology, and public health, 142 (42.9%) articles were categorized in the biological/psychosomatic domain, 120 (36.3%) in the psychological area, 51 (15.4%) in public health, and 18 (5.4%) as “others”. The main topics in each area are shown in Table 1. A variety of psychosomatic illnesses have been investigated, including eating disorders, irritable bowel syndrome, chronic pain, chronic fatigue syndrome, coronary heart diseases, and allergic diseases. Articles related to women’s and children’s health and series in several clinical fields like pediatrics, gynecology, and dentistry were initiated. Cognitive behavioral therapies, relaxation training, and special treatments as Yoga or Kampo medicine have often been employed with such psychosomatic illnesses, and were carefully evaluated. Social factors such as work stress and over-adaptation have been shown to be associated with mind/body health.

Recent interest in biopsychosocial medicine

Interest in biopsychosocial medicine has grown recently. For example, according to tabulations by Springer Nature, articles in this journal were accessed 197,797 times during 2019. This translates to an average of 16,483 accesses per month, with frequencies ranging from 12,345 in January to 21,324 in December 2019. Major visits by geography were as follows; United States (35%), United Kingdom (10%), Japan (9%), India (7%), Australia (6%), Canada (5%), Philippines (3%), Germany (1%), Netherlands (1%), Italy (1%), Ireland (1%), and Indonesia (1%).

The top 10 articles, selected from among those published during 2007–2019 and most frequently accessed by Internet in 2019, are shown in Table 2. It is surprising that the first two original articles, one by Decety et al. (2007) and one by Sugimoto et al. (2009), are still accessed often, although it is now more than 10 years since their publication. When limiting the analyses to the articles published in the past 3 years, i.e., 2017–2019, the most frequently accessed article, authored by Hirayama et al. (2019), was a case series reporting the treatment effects of behavioral activation therapy for depression and anxiety in cancer patients (Table 3). No article published in 2017 and only one published in 2018 were identified among the top 10 in the 2019 access ranking.

Concerning the number of journal citations, Web of Science, the top 20 articles were shown in Table 4 [2].

* Correspondence: m-nakao@iuhw.ac.jp
1Department of Psychosomatic Medicine, School of Medicine, International University of Health and Welfare, 4-3, Kozunomori, Narita-shi, Chiba 286-8686, Japan
Full list of author information is available at the end of the article

© The Author(s). 2020 Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article’s Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article’s Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/. The Creative Commons Public Domain Dedication waiver (http://creativecommons.org/publicdomain/zero/1.0/) applies to the data made available in this article, unless otherwise stated in a credit line to the data.
Half of them were review articles, and the remaining half were original research ones. The most recent articles listed in the table were one by Kano et al. (2013) and one by Moriguchi et al. (2013), both of which were reviews addressing brain function of alexithymia.

**Future directions of biopsychosocial medicine**

Editors and colleagues have regularly carried out thematic series addressing psychosomatic medicine to facilitate researchers’ submission of reports focusing on a variety of biopsychosocial topics (Table 5). Interestingly, behavioral medicine was featured twice in the journal in 2016. Ours is an interdisciplinary field combining medicine, psychology, and social science, and the practice of psychosomatic medicine is closely related to that of behavioral medicine, particularly in terms of the biopsychosocial aspects of health.

More than 40 years have passed since Engel developed a biopsychosocial model that went beyond traditional biochemical models of clinical medicine [3], and more than 1500 articles have been published, according to the PubMed search using a text word of “biopsychosocial-
# Table 3
Top 10 articles published in *BioPsychoSocial Medicine* in the past 3 years (2017 to 2019) that were most frequently accessed through the Internet during 2019

| Authors               | Title                                                                 | Article type   | Publication year | Access number in 2019 |
|-----------------------|----------------------------------------------------------------------|----------------|------------------|-----------------------|
| Takatoshi Hirayama et al. | Behavioral activation therapy for depression and anxiety in cancer patients: a case series study | Case report    | 2019             | 5447                  |
| Nagisa Sugaya et al.  | Bio-psychosocial factors of children and adolescents with Internet gaming disorder: a systematic review | Review         | 2019             | 3906                  |
| Trang T. H. Tu et al. | Current management strategies for the pain of elderly patients with burning mouth syndrome: a critical review | Review         | 2019             | 3189                  |
| Mutsuhiro Nakao       | Board games as a promising tool for health promotion: a review of recent literature | Review         | 2019             | 3101                  |
| Hiroshi Sugimoto et al. | Iron deficiency anemia induced by magnesium overuse: a case report | Case report    | 2019             | 2870                  |
| Rasool Kawyanejad et al. | General health of students of medical sciences and its relation to sleep quality, cell phone overuse, social networks, and Internet addiction | Original       | 2019             | 2533                  |
| Filiberto Toledano-Toledano et al. | Psychosocial factors related with caregiver burden among families of children with chronic conditions | Original       | 2019             | 2359                  |
| Toru Takahashi et al. | Changes in depression and anxiety through mindfulness group therapy in Japan: the role of mindfulness and self-compassion as possible mediators | Original       | 2019             | 2236                  |
| Takakazu Oka et al.   | Changes in fatigue, autonomic functions, and blood biomarkers due to sitting isometric yoga in patients with chronic fatigue syndrome | Original       | 2018             | 1783                  |
| Yohei Okawa et al.    | Specific foods can reduce symptoms of irritable bowel syndrome and functional constipation: a review | Review         | 2019             | 1597                  |

# Table 4
Top 20 articles published in *BioPsychoSocial Medicine*, based on the number of journal citations, Web of Science, in October, 2020 [2]

| Authors                                | Title                                                                 | Article type | Publication year | Citation |
|----------------------------------------|-----------------------------------------------------------------------|--------------|------------------|----------|
| Jean Decety, et al.                    | The empathic brain and its dysfunction in psychiatric populations: implications for intervention across different clinical conditions | Review       | 2007             | 210      |
| Louis T van Zyl, et al.                | Effects of antidepressant treatment on heart rate variability in major depression: A quantitative review | Review       | 2008             | 73       |
| Alexander Hansel, et al.               | The ventro-medial prefrontal cortex: a major link between the autonomic nervous system, regulation of emotion, and stress reactivity? | Review       | 2008             | 72       |
| Michiko Kano, et al.                   | The alexithymic brain: the neural pathways linking alexithymia to physical disorders | Review       | 2013             | 71       |
| Michael P Muehlenbein, et al.           | The costs of dominance: testosterone, cortisol and intestinal parasites in wild male chimpanzees | Original     | 2010             | 71       |
| Yoshiya Moriguchi, et al.              | Neuroimaging studies of alexithymia: physical, affective, and social perspectives | Review       | 2013             | 62       |
| Daisuke Nishi, et al.                  | Posttraumatic growth, posttraumatic stress disorder and resilience of motor vehicle accident survivors | Original     | 2010             | 62       |
| Mutsuhiro Nakao, et al.                | Clinical application of somatosensory amplification in psychosomatic medicine | Review       | 2007             | 60       |
| Yoshiya Moriguchi, et al.              | Age and gender effect on alexithymia in large, Japanese community and clinical samples: a cross-validation study of the Toronto Alexithymia Scale (TAS-20) | Original     | 2007             | 59       |
| Sidney Bloch, et al.                   | Psychological adjustment of men with prostate cancer: a review of the literature | Review       | 2007             | 56       |
| Nahathai Wongpakaran, et al.           | The Thai version of the PSS-10: An Investigation of its psychometric properties | Original     | 2010             | 56       |
| Mutsuhiro Nakao                        | Work-related stress and psychosomatic medicine | Review       | 2010             | 48       |
| Hiroko Ishikawa, et al.                | Health literacy and health communication | Review       | 2010             | 44       |
| Masayo Kojima                          | Alexithymia as a prognostic risk factor for health problems: a brief review of epidemiological studies | Review       | 2012             | 44       |
| Antonina A Mikocka-Walus, et al.       | Does psychological status influence clinical outcomes in patients with inflammatory bowel disease (IBD) and other chronic gastroenterological diseases: An observational cohort prospective study | Original     | 2011             | 41       |
| Bo Simonsson, et al.                   | Psychosomatic complaints and sense of coherence among adolescents in a county in Sweden: a cross-sectional school survey | Original     | 2008             | 41       |
| Motosyori Kanazawa, et al.             | Translation and validation of a Japanese version of the irritable bowel syndrome-quality of life measure (IBS-QOL-J) | Original     | 2007             | 39       |
| Mariko Ogawa, et al.                   | Evaluation of factors associated with the anxiety and depression of female infertility patients | Original     | 2011             | 39       |
| Kazufumi Yoshihara, et al.             | Profile of mood states and stress-related biochemical indices in long-term yoga practitioners | Original     | 2011             | 38       |
| Takakazu Oka, et al.                   | Rikkunshi-to attenuates adverse gastrointestinal symptoms induced by fluvoxamine | Original     | 2007             | 35       |
model”. The Japanese Society of Psychosomatic Medicine defines psychosomatic illness as any physical condition with organic or functional damage affected by psychosocial factors in its onset or development [4], and the biopsychosocial model is useful in improving clinical outcomes of such psychosomatic illnesses and a variety of chronic diseases, through creating awareness on the interactions among biological, psychological, sociocultural, and spiritual factors, and to enhance self-management of illness conditions through multidisciplinary approach of patient care and other medical settings [5]. Although we know both favorable and critical opinions in the pre-existing literature, we still believe that the biopsychosocial model continues to offer valuable insights into clinical practice, medical education, and psychosomatic research and that it should be further developed to treat and prevent stress-related conditions.

According to the recent report [6], mind-body approach, including Yoga, meditation, or other Eastern medicine techniques, can be a helpful adjunct in managing stress-related noncommunicable diseases by fostering resilience through self-care. BioPsychoSocial Medicine is the unique journal locating in Asia but disseminating the importance of psychosomatic medicine all over the world. Such successive activities will help mutual understanding and fusion of East and West in terms of mind-body connections of health. The editors welcome high-quality research clarifying mind/body relationship as they affect and are affected by health behaviors and social life in humans.

---

Table 5  Examples of thematic series published in BioPsychoSocial Medicine

| Proposed theme | Editor in charge | Publication year |
|----------------|------------------|-----------------|
| Perspectives of public health in bio-psycho-social medicine | Mutsuhiro Nakao | 2010 |
| Alexisomia: a shift in focus from alexithymia | Gen Komaki | 2012 |
| Bio-psycho-social medicine in pediatrics | Hitotaka Tanaka | 2012 |
| Focusing psychosocial interventions in chronic somatic disease—new tasks and strategies for conducting psychosomatic treatment studies | Hans-Christian Deter | 2012 |
| Integrating kampo into psychosomatic medical practice | Takakazu Oká | 2014 |
| The gut–brain axis: emerging evidence in health and disease | Cross-journal collection | 2014 |
| Allergic disease and psychosocial stress | Nobuyuki Sudo | 2015 |
| Current status of eating disorders: general and special population studies | Cross-journal collection | 2015 |
| History, concepts and aims of international societies in psychosomatic and behavioral medicine | Hans-Christian Deter | 2016 |
| Psychosomatic dentistry | Akira Toyofuku | 2016 |
| Recent advances in psychosomatic obstetrics and gynecology in Japan | Masakazu Terauchi | 2016 |
| The meaning of behavioral medicine in the psychosomatic field | Mutsuhiro Nakao | 2016 |
| Somatic manifestation of distress: clinical medicine, psychological, and public health perspectives | Mutsuhiro Nakao | 2017 |
| Psycho-oncology in the Asia–Pacific area | Kazuhiro Yoshiuchi | 2017 |
| Effects of board games on health education and promotion | Mutsuhiro Nakao | 2019 |

---

Trial registration
The study had no trial registration number.

Authors’ contributions
The authors wrote the manuscript and hold final responsibility for the decision to submit the manuscript for publication. The author(s) read and approved the final manuscript.

Funding
The study received no funding.

Availability of data and materials
Obtained data and materials were based on information about the journal and are available only to editorial board members.

Ethics approval and consent to participate
This is an editorial article summarizing previous articles in the journal; thus no ethical approval or consent to participate is needed.

Consent for publication
All authors have consented to publication.

Competing interests
The authors have no competing interests to declare.

Author details
1Department of Psychosomatic Medicine, School of Medicine, International University of Health and Welfare, 4-3, Kozunomori, Narita-shi, Chiba 286-8686, Japan. 2Fukuoka International University of Health and Welfare, Faculty of Medical Science, Fukuoka, Japan. 3Department of Psychosomatic Medicine, School of Medicine, The University of Tokyo, Tokyo, Japan. 4Medical Clinic, Psychosomatics, Charité Universitätsmedizin Berlin, Campus Benjamin Franklin, Hindenburgdamm, Berlin, Germany. 5Department of Behavioral Medicine, Tohoku University Graduate School of Medicine & Department of Psychosomatic Medicine, Tohoku University Hospital, Sendai, Japan.
References
1. BioPsychoSocial Medicine. Home page of BioPsychoSocial Medicine. [https://bpsmedicine.biomedcentral.com/] accessed on October 31, 2020.
2. Clarivate Analytics. Web of Science. [https://clarivate.com/webofsciencegroup/solutions/web-of-science/] accessed on October 31, 2020.
3. Engel GL. The need for a new medical model: a challenge for biomedicine. Science. 1977;196:129–36.
4. The Committee of Education and Training of the Japanese Society of Psychosomatic Medicine: An updated treatment guideline of psychosomatic medicine. Jpn J Psychosom Med 1991; 31:537–576. [in Japanese].
5. Kusnanto H, Agustian D, Hilmanto D. Biopsychosocial model of illnesses in primary care: a hermeneutic literature review. J Family Med Prim Care. 2018; 7:497–500.
6. Dossett ML, Fricchione GL, Benson H. A new era for mind-body medicine. N Engl J Med. 2020;382:1390–1.

Publisher’s Note
Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.