



Mindfulness and Taijiquan

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Abstract

The practice of mindfulness as a meditation process has become highly topical with numerous reported links to benefits for physical and psychological wellbeing. In this commentary paper, we begin by defining the term mindfulness. Second, we provide an overview of how the practice of mindfulness has been used in the therapeutic sense. Lastly, we draw attention to the application of mindfulness not only as an exercise of the mind but also as a process that allows the mind to be finely integrated with kinaesthetic movements. Following this discussion, we consider some implications for research.

The aim of this paper is to extend the notion of mindfulness as cultivation of the mind, and to consider how the practice of mindfulness can be used for the development of exercise systems that incorporate a strong meditational aspect. The meditational exercise system that we have used as an exemplar in this paper is the practice of Taijiquan.

What Does the Term Mindfulness Mean?

The state of mindfulness is cultivated through a meditation process whereby the mind is empowered and becomes more aware. The practice of mindfulness involves “paying attention to what is presently occurring, with kindness and curiosity” [1]. A further definition asserts that mindfulness implies a “state of being attentive to and aware of what is taking place in the present” [2]. Kabat-Zinn [3] proposes that mindfulness practice encompasses paying attention in a systematic way through being aware of the present moment and being non-judgmental. Brown and Ryan [2] propose that mindfulness promotes the deliberate development of consciousness, and this development creates an opportunity to enhance awareness and attention.

Awareness occurs through the consistent monitoring of the mind in relation to identifying and accepting the thought processes that arise but extending this to the emotions and sensations identified within the body. There is also continuous acknowledgement of the state of the mind as it relates to physiological activities. The process further extends to the acceptance and recognition of disturbances that are brought about by the external environment. Attention allows for a more focussed conscious

mind through cultivated attention to a physiological process, such as breathing, which becomes the centre of the meditative state [4]. Breathing in this context allows the practitioner to develop focussed attention on a tangible and realised state that starts as the foreground but inevitable fades into the background as other thoughts, feelings and sensations disrupt the breathing contemplation. However, the practitioner, once realising that they might be drifting off, will then refocus on their breathing.

How Can Mindfulness be Beneficial?

Brown and Ryan [2] propose that the active practice of mindfulness through meditation cultivates not only a state of heightened conscious awareness but creates habits for the practitioner to become more observant of their automatic thoughts, habits, and dysfunctional behaviour patterns.

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This process then creates the opportunity for self-development through 'self-endorsed behavioural regulation', which inevitably allows for the potential for greater wellbeing. In their critical review article, Davis and Hayes [5] found mindfulness practice to be effective in reducing anxiety by decreasing tendencies for rumination. Other sources propose that the practice of mindfulness increases the feelings of calmness, improves cognitive awareness, heightens immune functioning, increases information processing speed, reduces stress and promotes healthy relationships [1,5]. Furthermore, there is burgeoning empirical evidence on the practice of mindfulness and its impact on alleviating symptoms associated with anxiety, stress, depression, psychophysiological disorders, and other psychopathological conditions [6-9].

In a meta-analysis, Grossman, Niemann, Schmidt and Walach [10] reviewed the salient literature related to measuring the effectiveness of mindfulness-based stress reduction (MBSR) programmes. Grossman, et al. found overwhelming support, with demonstrated strong effect sizes, to convincingly suggest that MBSR approaches are effective in alleviating the symptoms associated with a wide range of chronic disorders, such as fibromyalgia, cancer diagnoses, coronary artery diseases, depression, and sustained pain. In a randomised controlled trial study, Shapiro, et al. [7] found that the participants within the MBSR intervention group reported, in comparison to controls, significant decreases in perceived stress over time and greater self-compassion. They also reported decreased psychological distress and low levels of job burn-out, and higher satisfaction with life over time, although these results did not reach significance. In their review of the literature, Block-Lerner, Adair, Plumb, Rhatigan, and Orsillo [11] tentatively indicated that mindfulness-based approaches may be useful for developing higher levels of empathy which in turn would allow for more meaningful and successful interpersonal functioning. Nonetheless, they further suggested that more research is required to examine how empathy and mindfulness interact, such as including multimodal methods of operationalising the measurement of empathy and mindfulness which will increase the validity of self-report systems.

In reference to neuroscience, Siegel [12] reported that mindfulness training can create greater awareness of the nature of the connections integrally linked to meta-cognition, and this connexion involves activity in the medial prefrontal and anterior cingulate areas of the brain. Davis and Hayes [5] also cite evidence to suggest that mindfulness-based training can have intrapersonal and neurophysiological benefits such as enhanced functions linked with the middle prefrontal lobe area of the brain, which relate to greater management of psychological distress and improved self-insight, ethical awareness, in-

tuition, and fear modulation. Davis and Hayes [5] also report that mindfulness training can have an impact on neuroplasticity, which results with a significant rewiring of brain function such as thicker brain regions associated with attention, sensory processing and sensitivity to internal stimuli [5]. Nonetheless, it needs to be acknowledged that, although there is a definite interest in the neuroscience investigation of mindfulness meditation, some authors suggest that the work in this area needs more methodological polish and as such more work is required to substantiate the claims being made [13].

Mindfulness as a Mind-Body Process

Much of the literature regarding the notion of mindfulness centres purely on the mind and hence tends to describe meditative processes that occur when practising in a sitting posture. We propose that the notion of mindfulness could be extended to standing meditation and/or moving meditation, which has been, to some extent, trialled with integrated mindful Yoga programmes [14]. In their qualitative study, Sistig, et al. [14] found that four themes emerged, indicating improved levels of relaxation, calmness or reduced stress, energy and focus, and motivation to engage with life. In addition, Kabat-Zinn [15] proposes that mindfulness as a practice often involves engagement in many areas of our lives, that extends from formal meditation practices to how we act and perform in our everyday lives. Salmon and colleagues [16] assert that mindfulness-based intervention programmes require an exercise integration, such as incorporating Yoga. This element of exercise prevents the problems that may arise through reduced physical activity amongst people not engaging in exercise. They further promote strategies that involve the combinations of Yoga, body scan methods and sitting meditation. Furthermore, mindfulness-based interventions have been compared with aerobic exercise regimens, with both systems reducing emotional reactivity, although mindfulness based intervention were more effective in developing emotional regulation.

We suggest that a further area of study that can be usefully explored is the application of the practice of Taijiquan or T'ai Chi Ch'uan. Taijiquan is mind-body exercise that originates from self-defence and meditation practices that were developed in China [17]. We acknowledge that there is a growing body of literature that has started to unpack the complex interconnections between Taijiquan and mindfulness. For example, Nedeljkovic, Wirtz, and Ausfeld-Hafter [18] investigated how Taiji practice could be linked with the self-attribution of mindfulness and self-compassion. In their study, they found that participants engaging in regular Taijiquan practice reported increases in self-attributed mindfulness associated with being more observant of experience, and less judgmental of, or less reactive to inner

experiences. In addition, Zahn [19] reported that Taijiquan practice had benefits for improving mindfulness, mood and quality of life amongst adolescent girls. In a later study, Schitter, Nedeljkovic, Ausfeld-Hafter, and Fleckenstein [20] reported that a Taijiquan beginner course for healthy individuals with a duration of three months elicited positive effects in terms of physical wellbeing and a decrease in depression. Other studies have examined the impact of Taijiquan practice on psychological and physiological states using a variety of measures [21]. Nonetheless, the specific component of the Taijiquan practice that impacts psychological wellbeing is still unclear and needs to be further investigated [21].

The learning process underlying Taijiquan practice focuses on developing moving postures that maximise balance and sensitivity. This process begins by developing awareness of a balanced and connected posture whilst in a standing position, and then the principles are applied to loosening and positioning exercises followed by a series of moving postures or 'forms' [22-24]. Taijiquan can be summarised according to five basic principles [25]:

1. Relaxation or just enough effort to execute the correct movement;
2. Distinguishing Yin and Yang, which infers the nature of opposites such as hard and soft force;
3. Learning the importance of the functional use of the waist when directing the force;
4. Maintaining a straight back posture to optimise balance; and
5. Cultivating an awareness and execution of a total body movement, such that the lower and upper limbs need to be synchronised.

The initial solo exercises are refined through a series of two-person exercises that are firstly choreographed and then become more freely moving including unexpected interactions [22-24]. It is important to mention that the teaching curriculum and learning modalities related to the transmission of Taijiquan are not standardised and therefore are likely to differ from teacher to teacher.

Several reviews of the efficacy of Taiji have been conducted [17,26,27], all of which contending that Taijiquan has purported benefits for its practitioners. Webster and colleagues conducted a comprehensive and systematic review of Taijiquan with a defined focus on higher education students. In this study, the authors systematically screened 478 articles from both English and Chinese language databases-including 76 papers and data from 9263 participants in the final analysis of evidence. The findings indicated that Taijiquan has likely physical, psychological and psycho-social benefits such as increased flexibil-

ity, reduced symptoms of depression, decreased anxiety, and improved interpersonal sensitivity. Other secondary benefits reported were improved lung capacity, balance, and middle distance running speed, quality of sleep, and good will, with reduced symptoms of compulsion, somatisation and phobia. Taijiquan has also been used in conjunction with mindfulness training [28]. Wall's descriptive paper outlined a curriculum-based approach in reference to the application of Taijiquan and mindfulness training with middle-aged school children. However, no measures were taken to corroborate the conclusions made by Wall that this curriculum approach was applicable and beneficial for this group of children.

We conducted an additional search using the PubMed database and found that the string - ((Tai chi) OR Taiji) AND mindfulness) - generated a total of 49 hits. From this search we noted that at least 30 articles described the therapeutic benefits of using Taiji and/or mindfulness [20,29,30]. Three articles described the prevalence of using mindfulness-based techniques [31], and one article identified the neural circuits associated with focused-attention meditative practices [32]. We also noted that many articles combined cultivating mental skills such as attention, self-control or mindfulness, with movement training [20,33-37], although many combining the mind and body paradigms were not based on primary research [38-45]. The direction of effect between mindfulness and Taijiquan is unclear, but it is unlikely to be linear or unidirectional and it is likely that feedback systems occur from either seated mindfulness meditation or the practice of Taijiquan. If mindfulness is seen as an integral subset of Taijiquan then the direction of effect between mindfulness and the exercise components may be an area for further research.

We propose that separating out mindfulness and Taijiquan [28] may mask the interrelationships between the systems [36,40]. Wayne and Kaptchuk [46] propose that Taijiquan has eight different components consisting of the following facets:

1. Musculoskeletal strength, flexibility and efficiency;
2. Breathing;
3. Concentration, attention, and mindfulness;
4. Imagery, visualisation, and intention;
5. Physical touch and subtle energy;
6. Psychosocial interactions;
7. Alternative health paradigm and philosophy; and
8. Rituals, icons, and environment.

These complex layers suggest that it is difficult to

tease out the effectiveness of each component without consideration of the remaining components. Wayne and Kaptchuk [46] rightly propose that a reductionist approach is likely to fall foul of establishing valid measures purporting to be a part of the agency of change. This complexity provides implications for further research in this area.

The practices of Yoga and body scan systems differ from Taijiquan in several ways. First, Taijiquan is a self-defence system. This infers that each movement has a martial art application, so that the physical and psychological function is to: listen carefully to the attacking force, stick and adhere to the attacking force, neutralise the attacking force, and/or issue an attacking force in reply [22-23]. This self-defence function requires interpersonal kinaesthetic exercises. Second, most of the Taijiquan movements are conducted whilst standing or moving in an upright position. Thus, the main set of exercises or 'forms' constitute a connection with the earth exclusively through the feet into the body, and this sensation is cultivated by and with the mind [23-24]. Nevertheless, Wolf, Coogler and Xu [47] propose that Taijiquan has three main principles that likely have overlap with Yoga. First, they suggest that Taiji promotes the notion of postural alignment that is often integrated with breathing. Second, Taiji practice has an important mind element that promotes the notion of 'clear and alert mind'. Lastly, all movements need to be co-ordinated with an emphasis on the waist.

Implications for Further Research

We suggest that careful research could investigate how Taijiquan can further enhance the practice of mindfulness developed in a sitting posture. There are certain challenges that need to be considered in terms of guiding further research in this area, such as cost, time, and feasibility. Zhang, et al. [9] propose that future research should consider how the training of the participants could be done more cost effectively, as this type of training often incurs substantial time, commitment and effort. The hiring of qualified teachers also incurs considerable cost as well as accessing a suitable hall for training. If physiological measures are required, this will necessitate access to sophisticated technology and expertise.

In our PubMed search, we found that six studies explicitly used randomised control trials as their research design [20,48]. However, we noted that some articles also using a randomised control trial design were not identified by this search [18]. We also found that at least 15 of the 49 articles used a literature review strategy [9,17,38]. Typically, a randomised control trial may be the most useful method, although such a method has proven to be

difficult to implement in the study of mindfulness [49] in an enclosed education setting. One of the major problems with Moir's [49] research was contamination, that is, participants in both groups talking with each other or comparing notes. Furthermore, the problem of motivation was identified, whereby some students enjoyed the practice of mindfulness whilst others did not, which lead to the conclusion that mindfulness works mainly for those who are interested in the practice and feel that it works, which creates the problem of selection and suitability for intervention.

As aforementioned our PubMed search brought to light six articles that used a randomized control research design and each article revealed statistically significant intervention effects, although most studies were conducted in controlled clinical environments. In the Nedeljkovic, et al. [18] study, participants were screened and allocated to two groups, although some baseline characteristics were different between the two groups and no exercise control group was employed. Nonetheless, this is a good example of how a randomised control could be employed in healthy volunteers.

There are further biases that need to be carefully considered. As we have noted previously, different teachers teach Taijiquan differently, and some teachers do not necessarily focus on the mindfulness component. It would be interesting to tease out the effects of different types of Taijiquan practice and teacher emphasis, such as those who use mindfulness as opposed to those that focus on a slow aerobic exercise practices. It is well established that Taijiquan takes a lot of practice that may necessitate many years of training to gain the optimal benefits [23]. Although it is encouraging that short-term Taijiquan and mindfulness-based interventions appear to have a positive effect, it would be interesting to investigate the variables of effort and time.

Further research could also tease out the most cost-effective systems that yield the greatest benefits. We propose that naturally occurring practice environments may prove difficult but may prove to be more feasible. To annul problems associated with sample size, a multiple baseline or small-n study approach may be the most cost-effective and efficient way to show if improvement, and the extent of improvement, are indicated. Other research designs could tease out the connections between the mind-body practice of Taijiquan with actual neuro-physiological measures [50,51]. Further studies could consider the application of Taijiquan that extends the personal benefits of improved physical and psychological wellbeing to workplace benefits in terms of increased professional competence.

Final Word

The aim of this article was to consider the practices of mindfulness and Taijiquan with respect to how they work together. The literature reviewed suggest that mindfulness practice is likely an important component of Taijiquan [18,46] however, it is unclear how much this component is emphasised in the training that ameliorates the reported benefits of Taijiquan. Further research needs to continue to further investigate how the subsystems [46] work together, although some preliminary research findings are starting appear in the literature [18,20,52]. One potential extension of this research is to develop more optimal mind-body exercise systems that are fit for individual purpose and address the individual needs and expectations of the participant. In this way, Wayne and Kaptchuk's eight components could be modularised and changed depending on the individual's needs.

Research could investigate how each component could be measured and how the relative weighting of each component contributes to the proposed intervention or intention of the practice. This may have contemporary significance given the prioritisation of interests in terms of health benefits that may outweigh the present needs for the benefit of self-defence. Nonetheless, the current way in which Taijiquan is taught, by some teachers, is likely to emphasise all the eight dimensions equally but to moderate the explicit use of the self-defence aspect. The modified aspect of self-defence training thus becomes more akin to promoting the health benefits of Taijiquan, such as developing partner practices that heighten the skills of self-induced relaxation, and interpersonal sensitivity through subtle 'kinaesthetic' listening [22-23].

References

1. (2016) Mindfulness. Mental Health Foundation of New Zealand.
2. Brown KW, Ryan RM (2003) The benefits of being present: mindfulness and its role in psychological well-being. *J Pers Soc Psychol* 84: 822-848.
3. Kabat-Zinn J (1994) *Wherever you go there you are: mindfulness meditation in everyday life*. Hachette Books, New York.
4. Arch JJ, Craske MG (2006) Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behav Res Ther* 44: 1849-1858.
5. Davis DM, Hayes JA (2011) What are the benefits of mindfulness? A practice review of psychotherapy-related research. *Psychotherapy* 48: 198-208.
6. Baer RA (2003) Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical psychology: Science and practice* 10: 125-143.
7. Shapiro SL, Astin JA, Bishop SR, et al. (2005) Mindfulness-based stress reduction for health care professionals: results from a randomized trial. *International Journal of Stress Management* 12: 164-176.
8. Speca M, Carlson LE, Goodey E, et al. (2000) A randomized wait-list controlled clinical trial: the effect of a mindfulness meditation-based stress reduction program on mood and symptoms of stress in cancer outpatients. *Psychosom Med* 62: 613-622.
9. Zhang L, Layne C, Lowder T, et al. (2012) A review focused on the psychological effectiveness of Tai Chi on different populations. *Evid Based Complement Alternat Med* 2012: 678107.
10. Grossman P, Niemann L, Schmidt S, et al. (2004) Mindfulness-based stress reduction and health benefits: A meta-analysis. *J Psychosom Res* 57: 35-43.
11. Block Lerner J, Adair C, Plumb JC, et al. (2007) The case for mindfulness based approaches in the cultivation of empathy: Does nonjudgmental present moment awareness increase capacity for perspective taking and empathic concern? *J Marital Fam Ther* 33: 501-516.
12. Siegel DJ (2007) Mindfulness training and neural integration: differentiation of distinct streams of awareness and the cultivation of well-being. *Soc Cogn Affect Neurosci* 2: 259-263.
13. Tang YY, Hölzel BK, Posner MI (2015) The neuroscience of mindfulness meditation. *Nat Rev Neurosci* 16: 213-225.
14. Sistic B, Lambrecht I, Friedman SH (2015) Journey back into body and soul-An exploration of mindful Yoga with psychosis. *Psychosis* 7: 25-36.
15. Kabat Zinn J (2003) Mindfulness based interventions in context: past present and future. *Clinical psychology* 10: 144-156.
16. Salmon P, Lush E, Jablonski M, et al. (2009) Yoga and mindfulness: Clinical aspects of an ancient mind/body practice. *Cognitive and Behavioral Practice* 16: 59-72.
17. Webster C, Luo AY, Krägeloh C, et al. (2016) A systematic review of the health benefits of Tai Chi for students in higher education. *Prev Med Rep* 3: 103-112.
18. Nedeljkovic M, Wirtz PH, Ausfeld-Hafter B (2012) Effects of Taiji practice on mindfulness and self-compassion in healthy participants-a randomized controlled trial. *Mindfulness* 3: 200-208.
19. Zahn WL (2008) *The Effects of Tai Chi Chuan on Mindfulness Mood and Quality of Life in Adolescent Girls*. Alliant International University, San Diego.
20. Schitter AM, Nedeljkovic M, Ausfeld Hafter B, et al. (2016) Changes in self reported symptoms of depression and physical well being in healthy individuals following a Taiji beginner course-Results of a randomized controlled trial. *Brain Behav* 6: e00429.
21. Esch T, Duckstein J, Welke J, et al. (2007) Mind/body techniques for physiological and psychological stress reduction: Stress management via Tai Chi training-a pilot study. *Med Sci Monit* 13: 488-497.
22. Man Ch'ing C, Smith RW (1966) *T'ai Chi: The "supreme ultimate" exercise for health sport and self-defense*. Tuttle Publishing, Boston.
23. Wee KJ (2003) *Taijiquan Wuwei: A Natural Process*. Taijiquan School of Central Equilibrium, New Zealand.
24. Wee KJ (2011) *Tàijíquán - True to the Art*. Taijiquan School of Central Equilibrium, New Zealand.

25. Sandlund ES, Norlander T (2000) The effects of Tai Chi Chuan relaxation and exercise on stress responses and well-being: an overview of research. *International Journal of Stress Management* 7: 139-149.
26. Klein PJ, Adams WD (2004) Comprehensive therapeutic benefits of Taiji: a critical review. *Am J Phys Med Rehabil* 83: 735-745.
27. Kuramoto AM (2006) Therapeutic benefits of Tai Chi exercise: research review. *WMJ* 105: 42-46.
28. Wall RB (2005) Tai chi and mindfulness-based stress reduction in a Boston public middle school. *J Pediatr Health Care* 19: 230-237.
29. Chou R, Deyo R, Friedly J, et al. (2017) Nonpharmacologic Therapies for Low Back Pain: A Systematic Review for an American College of Physicians Clinical Practice Guideline. *Ann Intern Med*.
30. Robins JL, Elswick RK Jr, Sturgill J, et al. (2016) The effects of Tai Chi on cardiovascular risk in women. *Am J Health Promot* 30: 613-622.
31. Olano HA, Kachan D, Tannenbaum SL, et al. (2015) Engagement in mindfulness practices by US adults: sociodemographic barriers. *J Altern Complement Med* 21: 100-102.
32. Acevedo BP, Pospos S, Lavretsky H (2016) The Neural Mechanisms of Meditative Practices: Novel Approaches for Healthy Aging. *Curr Behav Neurosci Rep* 3: 328-339.
33. Caldwell K, Emery L, Harrison M, et al. (2011) Changes in mindfulness well-being and sleep quality in college students through taijiquan courses: a cohort control study. *J Altern Complement Med* 17: 931-938.
34. Caldwell K, Harrison M, Adams M, et al. (2010) Developing mindfulness in college students through movement-based courses: effects on self-regulatory self-efficacy mood stress and sleep quality. *J Am Coll Health* 58: 433-442.
35. Naranjo JR, Schmidt S (2012) Is it me or not me? Modulation of perceptual-motor awareness and visuomotor performance by mindfulness meditation. *BMC neuroscience* 13: 88.
36. Prusak K, Prusak K, Mahoney J (2014) An Integrated Mind-Body Approach to Arthritis: A Pilot Study. *J Tradit Complement Med* 4: 99-107.
37. Rawtaer I, Mahendran R, Yu J, et al. (2015) Psychosocial interventions with art music Tai Chi and mindfulness for subsyndromal depression and anxiety in older adults: a naturalistic study in Singapore. *Asia Pac Psychiatry* 7: 240-250.
38. Bega D, Gonzalez-Latapi P, Zadikoff C, et al. (2014) A review of the clinical evidence for complementary and alternative therapies in Parkinson's disease. *Curr Treat Options Neurol* 16: 314.
39. Clark D, Schumann F, Mostofsky SH (2015) Mindful movement and skilled attention. *Front Hum Neurosci* 9: 297.
40. Ghaffari BD, Kluger B (2014) Mechanisms for alternative treatments in Parkinson's disease: acupuncture tai chi and other treatments. *Curr Neurol Neurosci Rep* 14: 451.
41. Gryffin PA, Chen WC (2013) Implications of tai chi for smoking cessation. *J Altern Complement Med* 19: 141-145.
42. Russell TA, Arcuri SM (2015) A neurophysiological and neuropsychological consideration of mindful movement: clinical and research implications. *Front Hum Neurosci* 9: 282.
43. Schmalzl L, Crane-Godreau MA, Payne P (2014) Movement-based embodied contemplative practices: definitions and paradigms. *Front Hum Neurosci* 8: 205.
44. Simkin DR, Black NB (2014) Meditation and mindfulness in clinical practice. *Child Adolesc Psychiatr Clin N Am* 23: 487-534.
45. Stan DL, Collins NM, Olsen MM, et al. (2012) The evolution of mindfulness-based physical interventions in breast cancer survivors. *Evid Based Complement Alternat Med* 2012: 758641.
46. Wayne PM, Kaptchuk TJ (2008) Challenges inherent to tai chi research: part I-tai chi as a complex multicomponent intervention. *J Altern Complement Med* 14: 95-102.
47. Wolf SL, Coogler C, Xu T (1997) Exploring the basis for Tai Chi Chuan as a therapeutic exercise approach. *Arch Phys Med Rehabil* 78: 886-892.
48. Zheng G, Lan X, Li M, et al. (2014) The effectiveness of Tai Chi on the physical and psychological well-being of college students: a study protocol for a randomized controlled trial. *Trials* 15: 129.
49. Moir F (2013) Empowering medical students to improve their mental health. The University of Auckland.
50. Reis PMR, Hebenstreit F, Gabsteiger F, et al. (2014) Methodological aspects of EEG and body dynamics measurements during motion. *Front Hum Neurosci* 8: 156.
51. Ricard M, Lutz A, Davidson RJ (2014) Mind of the meditator. *Sci Am* 311: 38-45.
52. Bu B, Haijun H, Yong L, et al. (2010) Effects of martial arts on health status: a systematic review. *J Evid Based Med* 3: 205-219.