

## MEDICAL PROBLEMS AND ISSUES

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## Non-competitive Tuishou, a modality of Chinese Martial Arts applied to the field of Health and Wellbeing

Submission: 10.02.2022; acceptance: 15.08.2022

**Key words:** Chinese martial arts, proprioception, balance, duets, tactile stimulation, health

### Abstract

Background. Most Taichi Chuan studies related to health and proprioception are experimental in nature. Other studies on Taichi Chuan have been applied to improve stability and balance in the elderly population, with the aim of preventing falls and accidents. Problem and aim. With regard to Tuishou a modality involving high contact skill in pairs or duets, there are no studies to date that analyse the benefits of proprioception in Tuishou. Our aim was to analyse the possibilities that the Tuishou partner system could provide as a model for the development of strategies applied to both psychological and physical health and well-being.

Material and methods. Methodology involved a systematic bibliographical search of the concepts Tuishou and proprioception in relation to health. Logical deductive reasoning methods were applied from the professional practice of the team of experts, with different subjects and professional contexts.

Results. Seven relevant studies were pinpointed in our search in scientific databases.

Conclusions. Tuishou allows for a greater multidirectional forces as the upper limbs intervene and interact in a plane above the ground. This aspect doubly stimulates global proprioception in the context of the theories of self-regulation of emotions, it could help develop strategies for adaptation, concentration and attention in many population groups. We recommend Tuishou as a practice with a multiplicity of useful therapeutic benefits in the treatment, not only of neurodegenerative or neurological pathologies but also in programmes of functional recovery, health and well-being.

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### For citation – in IPA style:

Gomez-Lozano S., Barbera-Inocencio M., Kelly-Lahon C., Leon-Guzman K., Garcia-Sottile M.E., Vargas-Macias A. (2023), *Non-competitive Tuishou, a modality of Chinese Martial Arts applied to the field of Health and Wellbeing*, “Ido Movement for Culture. Journal of Martial Arts Anthropology”, vol. 23, no. 4, pp. 68–78; doi: 10.14589/ido.23.4.8.

In other standard – e.g.:

Gomez-Lozano, S., Barbera-Inocencio, M., Kelly-Lahon, C., Leon-Guzman, K., Garcia-Sottile, M.E., and Vargas-Macias, A. (2023), Non-competitive Tuishou, a modality of Chinese Martial Arts applied to the field of Health and Wellbeing. *Ido Mov Cult J Martial Arts Anthropol*, 2023, 23 (4): 68–78 DOI: 10.14589/ido.23.4.8

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## Introduction

The so-called “internal” Chinese Martial Arts recognizable in the West [Ryan 2008] are Taichi Chuan [DeMarco 2009; Wile 2012] along with its “sisters” [Wile 2007], the Baguazhang [Joern 2012] and the Xingyiquan [Henning 2006]. These three styles display various sequences of individual training movements, also called routines, forms or “Taolu”. They can be grouped into different movement units, which can allow us to determine the origin of what is known as noble movement techniques [Yang 1996], i.e. technical gestures that aim to avoid the opponent’s aggression and remain unscathed in combat. Globalisation, the migratory movements of the 20th century, and the political situation of the People’s Republic of China itself, have allowed the West to gain access to martial arts over the last fifty years [Ryan 2008].

Etymologically speaking, Taichi Chuan is a Chinese Martial Art based on the search for balance between opposing forces. To this physical principle of complementarity (“yin-yang”) corresponds the term Taiji. Quan, on the other hand, translates as “fist” or “boxing”. Hence “*Taichi Chuan*” is “taiji boxing” or “martial art that seeks balance between extremes”. It is now an art used internationally as a source of health [Yang, Grubisich 2005] and is considered a mind-body integrator that enhances neuromuscular control [Yang *et al.* 2007]. According to Lephart *et al.* [1997], proprioception, a key component of Martial Arts which will be discussed at length here, is used to manage strategies for functional recovery. Furthermore, several studies report that proprioception decreases with age [Skinners *et al.* 1984; Petrella *et al.* 1997; Xu *et al.* 2004] and that it can be altered by craniocerebral traumas [Gomez-Lozano *et al.* 2019] or other types of injuries [Lephart *et al.* 1997]. Tuishou enhances the improvement of mobility through neuromuscular facilitation [Kilinc *et al.* 2016], so its benefits can be applied not only to people in the recovery process but also to the general population.

Most *Taichi Chuan* studies related to health and proprioception are experimental in nature [Xu *et al.* 2004; Yang *et al.* 2007; Hackney, Wolf 2014]. Other studies on Taichi Chuan have been applied to improve stability and balance in the elderly population, with the aim of preventing falls and accidents [Xu, Hong, Chan 2004; Li *et al.* 2005; Yang *et al.* 2007; Li, Xu, Hong 2008; Leung *et al.* 2011; Hackney, Wolf 2014]. On the other hand, with regard to *Tuishou* or push hands [Chen, Ku, Cheng 2011; Chang, Chang, Huang 2014] a modality involving high contact skill in pairs or duets, Wong *et al.*’s [2013] research has established that it has great potential to specifically improve balance among its practitioners. However, as far as we are aware, there are no studies to date that analyse the effects and indeed potential benefits of proprioception in Tuishou in the context of both mental and physical health and wellbeing.

Based on this finding, our aim was to analyse the possibilities that the Tuishou partner system could provide as a model for the development of strategies applied to both psychological and physical health and well-being. Our study methodology involved a systematic bibliographical search of the concepts Tuishou and proprioception in relation to health. Different academic databases such as Web of Science, Scopus, Dialnet, Ebsco Host, and in a complementary way Google Scholar have been used for this systematic search. In addition, the authors have about 20 years of experience with subjects in the field of Chinese Martial Arts, such as Taichi Chuan – Tuishou, or in modalities with elements in common with Tuishou, such as partner acrobatics and the duet dance style of Contact Improvisation. Logical deductive reasoning methods were applied from the professional practice of the team of experts, with different subjects and professional contexts.

## Results

Seven relevant studies were pinpointed in our search in scientific databases: [Gaffney 2012; Kautz 2007; Wolfson 2007; Mosher 2011; Chen *et al.* 2010; Redondo 2011; Dreyer 2017]. These articles will be discussed in detail below in particular in relation to the following aspects which directly relate to the objectives of this research:

- Tuishou and Taichi Chuan: Principals, Foundations and Modulations.
- Components of Taichi Chuan and Tuishou practice.
- Tuishou – a system which involves interacting forces.
- Proprioception and Tuishou.
- Other benefits of Tuishou to physical and mental health and well-being.
- Other fields of application.

### Tuishou and Taichi Chuan: Principals, Foundations and Modulations

A relatively recent scientific interest can be observed in this field where the range of publications is centred on the last 18 years or so. This therefore reflects the emerging nature of the study of Tuishou as a paired discipline within Taichi Chuan, which is not as popular as the individual forms of work known as *Taolu*. *Wushu*, in turn, is where competitive Taolu is integrated. The articles analysed reflect three types of areas of interest: one concerning the intergenerational transmission of its practice [Gaffney 2012; Kautz 2007; Wolfson 2007; Mosher 2011]; another in relation to the area of biomechanical analysis [Chen *et al.* 2010]; and a third, the area of cognition [Redondo 2011; Dreyer 2017].

The cultural and artistic legacy of Taichi Chuan is referred to by Chen Xiaowang [Soldevila 2005]. Chen

Xiaowang alludes to the fact that after World War II, there was a very small period of revival due to the imminent coming to power of Mao Tse Tung in 1949 and that Taichi Chuan re-emerged with his death in 1976. These events of the 20th century, according to Chen Xiaowang, are the most recent ones that have marked the path of these arts. Yang Chengfu, the founder of the Yang style in the early 20th century, was also explicit in declaring that Taichi Chuan should be spread as a tool for the cultivation of the health of the entire population [Yang 2005]. Traditional Chinese medicine accompanies the practice of Taichi Chuan in a holistic way. It has spread to Europe as both a complementary and alternative therapy [Cynarski and Sieber 2015].

Therefore, social revolution and the actions of the Chinese government [Filipiak 2010] have promoted a homogenisation of both certain forms of Taichi Chuan and other Chinese martial arts. This process culminated in the creation of the International Wushu Federation (IWUF) in 1990 (<http://www.iwuf.org/about-iwuf/>). Likewise, the opening up of China to the West [Ryan 2008], and the diaspora especially to the USA, where culture is strongly influenced by cinema [Han 2018], allowed certain styles to survive far from their place of origin. A particular case is that of the simplified Yang-based Taichi Chuan style of Cheng Manching. Cheng emigrated to the USA in 1964, bringing with him his form of 37 movements and a Tuishou model which he shared in intellectual circles in the United States in the following years [Lowenthal, 1992]. Fu Zhongwen in 1993 supported Cheng Manching's legitimacy to teach in North America. Furthermore, Fu Zhongwen endorsed subsequent generations of Cheng Manching to investigate the sources of his teachings.

In the whole range of Chinese Martial Arts including internal styles, and in particular Taichi Chuan, the subtle pair work of Tuishou requires analysis in order to understand why it is of interest, particularly in relation to physical and mental health. And this is not only in terms of its practice but also in relation to the possible transfers of its knowledge and applicability to other fields. The next section deals with this analysis.

### Components of Taichi Chuan and Tuishou practice

In the learning process of Tuishou, there is a battery of basic fixed-foot exercises called “8 disc methods” passed down in the West through the Canadian master, Sam Masich [Mroz 2011]. Chen Yanlin was instrumental in this systematisation based on the traditional Yang style, applied in a Western way from a healthy movement perspective [Wolfson 2007; Kauz 2007]. Initially, Chen Yanlin [1943] describes a traditional systematisation of Tuishou work based on the acquisition of specific

basic skills before the 4 frontal techniques or “four sides”. This previous systematisation by Chen Yanlin, is trained through a sequence of fixed exercises of: a) one-handed horizontal push and neutralisation; b) two-handed circle grip; c) two-handed push and pull back; d) one-handed pull back; e) two-handed push and neutralisation; f) two-handed pull and neutralisation; g) two-handed folding; and h) one-handed vertical circulation. These types of systematisations are a way of ordering the general principles that are common to all styles. This is the case of Dr. Yang Jwing-Ming [Yang 1996] who explained schematically that learning should be: “from static to moving mode” (steps), “from slow to fast”, “from low to high” or “from expanded to compact”.

In the practice of Tuishou, the aim is to maintain body structure with the minimum of force necessary to maintain the verticality of the axial skeleton. The basic work of Tuishou always begins with a series of pre-set exercises aimed at learning not only to move properly but also to “listen” to the actions of the partner through constant body contact. This work forms a fundamental part of Tuishou training. Gaffney [2012] describes individual fundamentals work, also called “chipen kung”, empty hand forms, weapon forms to work on qualities and skills in a very specific way; and sometimes training with specific equipment.

The predefined Tuishou exercises are always ordered in such a way that those executed with “fixed feet” give way to more complex ones with increasingly free steps and movements until they reach the almost complete freedom of sparring. On a formal level, Gaffney in 2012, reminds us of the importance of recognising these phases in the duet system. The reaction forces of the ground change during the practice of Tuishou, as there is a redistribution in the play of pressures between the practitioners. Such exercises constitute one of the Tuishou practitioner's experimental laboratories [Wolfson 2007] with a playful and social component [Gomez-Lozano *et al.* 2019]

In any of the Taichi Chuan styles we can find the so-called “13 techniques”, which include eight qualities or ways of expressing movement [Gaffney 2012]. Four would be frontal or “square”: “peng” (warding), “lu” (diverting), “ji” (squeezing), and “an” (pressing down) [Wong *et al.* 2013]. The other four, are called “diagonals” or corners: “cai” (downward pull or plucking), “lie” (splitting or splitting), “zhou” (elbowing or elbowing), and “kao” (“leaning”, shoulder strike or bumping). The remaining five “techniques” relate to orientations in space (“five lines”). They correspond to the cross directions from the base position: forward, backward, right, left and centre. The understanding and mastery of these thirteen techniques are sought in Tuishou through exercises of increasing difficulty and complexity. Each school systematises it in a different way but always in a certain order. In Tuishou, all the work of these 13 ‘techniques’

underlies a dynamic of interaction in the duo that can be divided into the following strategies: “Zhan”, “Nian”, “Lian”, “Sui” (stick, adhere, continue, follow). In addition, we find a fundamental quality known as the Chansi Jin (Reeling Silk, “reeling silk” coordinated rotation). These traits of Tuishou are essential elements of Taichi Chuan as Tuishou, as previously noted, is part of Taichi Chuan [Wang 2009].

### **Tuishou – a system which involves interacting forces**

Tuishou, a type of interactive paired body contact exercise [Chen, Ku, Cheng, 2011; Chang, Chang, Huang 2014] is an integral part of Taichi Chuan. It is a technically complex duet practice that explores the interaction between forces during body contact between two people. In Tuishou the aim of both participants is to remain in balance during sparring while trying to unbalance the opponent. The fundamental actions used by the two subjects are receiving and emitting force. This pushing of hands is performed in a fluid, continuous manner, and with the minimum tension necessary [Dudukchan 2017]. In Tuishou there is an interplay of forces in the duo where pushing and yielding alternate. Importantly, this ‘yielding’ becomes the essential element for all selected authors in the review methodology. Yang Jwing-Ming [1996] agrees with the model of explanation of Tuishou put forward by Gaffney [2012], Wolfson [2007] or Mosher [2011], based on the fact that the cession must come before the neutralisation in order for the opponent’s attack to pass into the void.

In Tuishou, there is a continuous shared movement through body contact that responds to the needs of both practitioners to overcome a conflict situation [Redondo 2011]. At the level of forces, this translates into a pressure game. This is modulated around the exchange of complementary forces between the two participants. In order to assimilate this type of work, it is analysed within the patterns set out in the aforementioned systematisation of Tuishou work. These patterns help to recognise the natural time to move from one force to another and to be able to manage the next phase [Mosher 2011]. In the learning environment, Tuishou can have a playful approach, where it is intended that the force received does not meet with any resistance. A common mistake is to offer some resistance, which would mean giving the opponent a foothold to be unbalanced. Therefore, in Tuishou, constant but light contact is sought in order to maintain control of the opponent’s redirection of forces and to properly chain one’s own forces [Wang *et al.* 2010].

This play of fluid readjustment is a constant premise in Tuishou. Both practitioners must respond to each change by maintaining their own stability while the joints are free to rotate in each of their possible axes.

In this sense, Master Zhan Zhijun expresses that Taichi Chuan-Tuishou comprises divergent three-dimensional circular movements that create a centrifugal force thanks to an “internal opening”. In Taichi Chuan-Tuishou, this opening is directed by the limbs that conduct the expanding forces from the innermost part of the body. In addition, convergent movements created by centripetal forces are complementarily expressed by an “external closure” [Xin 2010].

On the circular trajectories of Tuishou, Yang Jwing-Ming [1996] points out that the most important purpose of the single-handed push is to develop the ability to neutralise through such trajectories. The size of the circle depends on the style, but mainly on the degree of skill and the type of strategy used according to the level of the opponent. During the ‘combat’ application of Tuishou, the ability to perform smaller circles depends on the degree of skill of the performer. For this type of skill there are exercises called chansigong (“silk reeling exercises”). These develop movements that promote self-defence [Xin 2007]. The theory of “two poles coiled on the same axis” described by Zhan Zhijun [Xin 2010] is closely related to this type of twisting force during execution among Tuishou practitioners.

In Tuishou, it is also essential to seek the necessary tight rotation to redirect the opponent’s force. During Taichi Chuan-Tuishou movements, certain joints must remain fixed so that the structure as a whole remains rooted, i.e. with the ability to redirect forces to and from the ground. The gravity factor is the most decisive ally in this type of combat. Gravity must be used to the advantage of every Tuishou practitioner [Zheng Manqing 1999]. Gravity is part of the habitual state of the human being both at rest and in situations of confrontation of forces. Tuishou is an exponent of the use of this Force.

During Tuishou practice, the forces felt in one’s own body provide information about the actions of the opponent. Reading and understanding these signals is the basis for responding quickly with timely and accurate actions. This response can be evasive, but in addition, if the alignment is correct, the Ground Reaction Force [Zhang, Hao, Zhang 2007] can be applied against the opponent’s thrust or push. In Tuishou combat, compliance with the instruction to “stick to the ground” is assessed by measuring how the magnitude of this “ground reaction force” is constant or invariant during advance and retreat. This value was found not to be significantly different from body weight [Chang, Chang, Huang 2014]. These results imply that the centre of the gravitational movement is not executed by excess forces between the foot and the ground. In Tuishou practice the overall structure supporting that line of force must be readjusted without losing its qualities to return the thrust in the form of that normal force or for the opponent’s force to deviate tangentially without disturbing one’s own balance [Chen, Ku, Cheng, 2011].

With regard to Martial Arts, the most efficient way to avoid the opponent’s thrust is by moving the centre of gravity downwards and laterally rotating the hip, followed by pushing the opponent [Gaffney 2012; Wong *et al.* 2013].

### Proprioception and Tuishou

Lephart *et al.* [1997] define proprioception as a type of afferent information associated with conscious sensation [muscle sense], segmental posture [joint stability] and total posture [postural balance] (Figure 1). The maintenance of postural balance requires proprioceptive acuity and precise neuromuscular control.

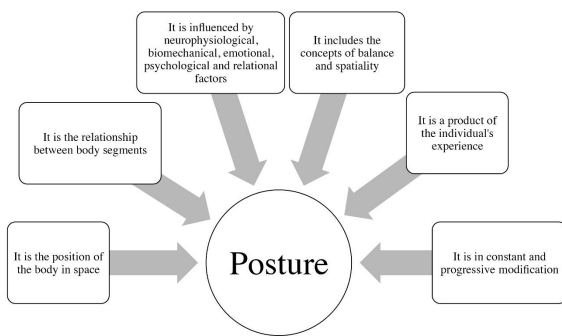


Fig. 1. The conceptual features of posture

Static and dynamic postural balance is conditioned by four essential components: the proprioceptive system, the visual system and the vestibular system. In addition, the cerebellum, as a region of the brain, is a determining factor in integrating sensory and motor pathways (Figure 2).

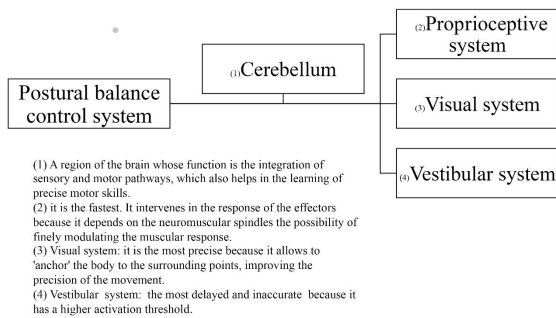


Fig. 2. Postural balance control system

In Tuishou, the expression proprioception [Chen *et al.* 2010] extends to both the perceptual [Dreyer 2017] and the sensory [Gaffney 2012; Kauz 2007; Mosher 2011; Redondo 2011] or sensory domain [Dreyer 2017]. Wolfson [2007] emphasises the tactile component and kinaesthetic awareness in the management of this type

of information. The transmission of forces in Tuishou is translated into a proprioceptive communication between both practitioners which is rich in terms of the exchange of afferent or sensitive inputs (Photo 1).



Photo 1. Zones of body contact during the practice of Tuishou

The movement itself can become imperceptible to the spectator, indeed, Tuishou is, according to Gibson [1966] an orbital interaction of lines of force that seems to rely more on skeletal joint receptors than on muscular ones. Mosher [2011] stresses that the technique must achieve a use of sensitive softness in the upper body and dynamic solidity in the lower body for its application in both individual forms and in the martial application of duets. Evolutionarily, thanks to the reflex movements of the proprioceptive system in the lower limbs, which develop in the first stages of life, the actions necessary to resist gravity and reach verticality are achieved [Gibson 1966]. There are proprioceptors in muscles, tendons and joints and the skin’s own receptors that also help to develop this sense (Figure 3).

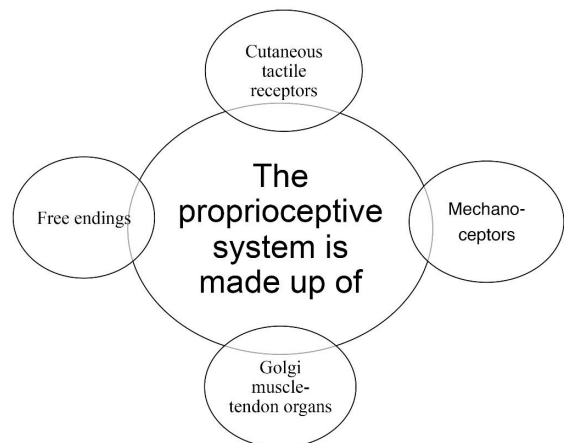


Fig. 3. Key components of the proprioceptive system

Proprioception, as mentioned above, is a type of afferent information, and this contributes to conscious muscle

sensation, integral postural balance and joint segmental awareness [Lephart *et al.* 1997]. Gibson [1962] highlights seven sites in the body where proprioceptive senses are located: muscles, tendons, skin, eyes, inner and outer ear. Balance, on the other hand, as a human quality, responds to adaptive mechanisms of internal reactions which depend on sensors located mainly in the joints. The sensors inform the brain of the position of the body axis in relation to the vertical [Gibson 1966] or Zhongding, as it is called in the context of Chinese Martial Arts [Wang 2009].

In this dynamic generated by Tuishou, the intra- and inter-articular relationship of the individual predominates over the translation of the movement. This capacity and potential for listening to this neuro-muscular and osteo-articular state are translated into physiology as the sense of proprioception [Jing 2009]. More specifically, Sherrington's contribution with the 1906 publication of his book "The Integrative Action of the Nervous System" is prescient in terms of understanding the paired dynamics of Tuishou. Sherrington demonstrated experimentally how the posture and movement of animals are governed by the self-stimulation or circular action of the nervous system [Sherrington 1952]. More recently, Greg Wolfson [2007] indicates that this intrinsic quality of Tuishou allows us to sense the force and direction of the thrusts of our partners.

The following features are observed in the selected articles in relation to the field of proprioception and Tuishou:

First – Proprioception is a quality that is acquired more in the upper body during the practice of Tuishou [Gaffney 2012]. Whereas in the individual forms of Taichi Chuan or Taolu it is emphasised in the lower extremity joints, such as in the ankles and knees [Xu *et al.* 2004] and the coxo-femoral zone [Jing 2009].

Second – Kautz [2007] highlights proprioception as a quality of constant listening, smoothness and delicacy during the flow of forces between opponents. Perhaps this aspect is the one that differentiates Tuishou from other martial arts modalities.

Third – Proprioception is associated with the sense of touch and is made visible and conscious when there is an interaction of two in body contact [Wolfson 2007].

Fourth – It is a quality closely linked to the space/time dimension in terms of timing and joint location [Wolfson 2007]. Chen *et al.* [2010] express it in terms of proprioceptive acuity in the accuracy of neuromuscular control.

Fifth – The external or visible action that characterises proprioception is the ability to yield to external forces from the opponent [Mosher 2011]. Redondo [2011] translates it as the ability expressed in the absence of tension.

If we delve deeper into Chinese terminology that allows us to analyse this field of study, we find parallels between the concepts of proprioception and the concept of "listening energy". For example, the search for the minimum tension necessary in the process of both physical and mental adaptation in the dynamics of forces in

Tuishou is called "song" or fansong [Dreyer 2017] which fits well with "touch" which is referred to as "listening" in Chinese Martial Arts. Ting jin, is the quality or ability to "listen" to one's opponent, and therefore to oneself. It is a key concept underlying the whole philosophy of this type of martial art [Dreyer 2017; Chen *et al.* 2010; Wolfson 2007]. Thus, from this point of view, Tuishou becomes the ideal modality for the development of the proprioceptive system found in the whole organism [Gibson 1966].

Gaffney [2012] refers to two classic concepts: improving the compression of internal force and the ability to know how to express that force. In short, the work of self-awareness is developed through physical contact with others. Knowing and accepting one's own bodily limits [Hyams 1982] in the practice of martial arts is part of this listening energy. In this work in pairs specific to Taichi Chuan called Tuishou, these bodily limits are extended ad infinitum, generating a shared meta-stability [Redondo 2011].

The skill of listening, a quality highlighted in all of the seven articles selected in this methodology, depends not only on the sense given by touch but also on the awareness of the whole body. Every time we perform the "individual" forms or Taolu, awareness and intention must be present. The changes must be produced with prior listening in four phases: "ting, hua, na, fa". Listening, transforming, controlling and emitting. As mentioned above, in Tuishou, "Listening" refers to the sensory ability to be able to read movements, and to be aware of what our opponent is doing [Kautz 2007; Wolfson 2007; Chen *et al.* 2010; Mosher 2011; Redondo 2011; Dreyer 2017] in order to overcome it [Gaffney 2012], and not in hearing ability [Boisseranc 2015]. Whether it is called feeling, listening, or perceiving, we always refer to an input necessary to execute a motor action. That input is a means to efficient functional ends. Understanding of force is acquired through dedicated training spread over time.

In this sense proprioception is key to fully understand and appreciate the Tuishou modality in itself and also its potential applicability to so many areas of physical and mental health, heretofore overlooked. During its practice, the fact that it is performed in pairs enhances the activation of a system of sensors that inform us of the state of the body in relation to three-dimensional space, and helps to provide optimal neuromuscular control of a muscle as a sensory transducer independently of its level of contractile activity [Verschuere *et al.* 1999].

### **Other benefits of Tuishou to physical and mental health and well-being**

Cheng [1984] considered that the benefits, in general terms depended on the functional application of Taichi Chuan to Tuishou. When analysing the 7 articles selected in the methodology, we found that Tuishou is a discipline that

develops connections between upper and lower sensory pathways [Gaffney 2012]. This allows a high transferability in martial art application [Dreyer 2017], a development in the faithful reproduction of movement sequences [Wolfson 2007], precise neuromuscular control [Chen *et al.* 2010] and improved balance maintenance [Chen, Ku, Cheng 2011]. These qualities can be applied to other domains. Based on this analysis, Kauz [2007] provides a holistic approach to health and well-being – a discourse more at the root of the development of self-knowledge through practice [Redondo 2011; Dreyer 2017].

As established in the introduction, the purpose of the articles selected in the methodology was to analyse the practice of Tuishou from different approaches. All of the articles highlight the benefits of practising Tuishou and the consequences for personal development [Redondo 2011]. Regardless of the field of study, whether ethnographic, experimental or purely essayistic, the benefits of the practice itself are revealed [Gaffney 2012; Chen *et al.* 2010; Mosher 2011; Dreyer 2017].

In spite of this myriad of potential and also established benefits, the practice of Tuishou is not that widespread in the West as one would expect [Kauz 2007; Wolfson 2007; Mosher 2011].

In general, these articles show a theme in Tuishou regarding conflict management and resolution. These are basically given by external forces, or pushes from the opponent that are transferred bodily into external inputs. In each of the articles reviewed, certain approaches to resolution, whether biomechanical, psychological or philosophical, are explained.

Wolfson [2007] describes essential factors such as: minimal force, change of direction in the face of resistance and yielding in the face of an attack. The development of sensitivity is established as a consequence of this way of proceeding in Tuishou. Kauz [2007] highlights adherence and listening skills as the basis for any other martial modality. Chen *et al.* [2010] describe kinetic and biomechanical success factors in the face of an opponent's attack. For his part, Mosher [2011] also talks about the importance of waist displacement and rotation, as well as the sinking of the centre of gravity. All the selected authors allude to the ability to listen and the ability to give in to an attack as fundamental keys to their practice. For his part, Redondo [2011] expresses that the adversary is oneself by being able to manage states of anxiety, fears or insecurities. Finally, Dreyer [2017] conveys to the reader concepts drawn from the philosophy embodied in the practice, such as the ability to listen, let oneself go and accept mistakes. According to this author, Tuishou reveals, both in physical and psychological terms, existential problems facing all human beings. In conclusion, both adversaries in the practice of Tuishou allow the development of a system of self-knowledge and self-improvement.

All this seems to indicate that in Tuishou the individual works with an adequate primary pattern of

tension, both psychic and muscular, in relation to the other. As Kauz notes in 2007, during the practice of Tuishou there is an extremely sensitive adaptive partnership between opponents. Another interpretation is the parallel between Tuishou and the adaptive theories between infant and mother [Carleton, Padolsky 2012] and the neurophysiological processes experienced between the two [Redondo 2011].

Furthermore, Kauz [2007] offers a mindfulness paradigm as an alternative that allows for the opportunity to develop long-term beneficial changes in the individual during Tuishou work. This is also in accordance with the premise of this research where we have highlighted the specific benefits of Tuishou, such as neuromuscular connection, inner/external listening, proprioception and balance, for psycho-physical health and well-being.

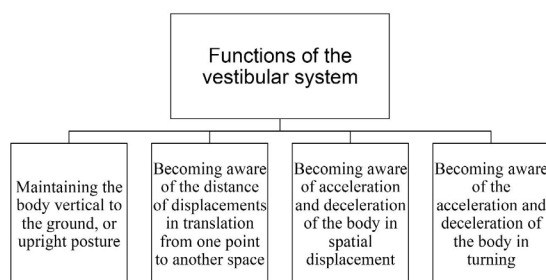
## Other fields of application

### *Balance and fall prevention*

In relation to Taichi Chuan and its individual routines, numerous programmes applied to balance improvement and fall prevention are described [Xu *et al.* 2004; Li *et al.* 2005; Yang *et al.* 2007; Leung *et al.* 2011; Hackney, Wolf 2014]. The field of application of Tuishou, however, remains largely unexplored. Nonetheless, some references do apply, for example, Wong *et al.* [2013] allude to the great usefulness of paired exercises in Tuishou in terms of adult balance training. Similarly, Chen *et al.* [2010] note that the practice of Tuishou allows the fundamentals necessary to prevent imbalance to be learned. Indeed, the specific characteristics of Tuishou, i.e. proprioception, inner listening, etc. make it possible to ensure that its practice guarantees this type of preventive benefit. For example, Tuishou intrinsically involves a constant self-assessment of the ideal state both in standing and in interaction with the environment and by extension, the opponent.

In Tuishou, lower vertical ground reaction forces are generated than in individual Taichi Chuan [Wong *et al.* 2013]. This is an important advantage in terms of improving balance restoration. During Tuishou practice, the proprioceptive component has a global balance relationship [Chen, Ku, Cheng 2011]. In other words, this is not only part of a balance stabilisation system exclusive to the ankle or knee joints but also belongs to the entire sensorimotor neural network. Furthermore, due to the duo relationship, there are specific associations between the sense of sight and the positioning of the body as a basis for vestibular training. The orientation of the eyes in the head, the fact that they are stabilised with respect to the optical array of ambient light, depends on the compensatory movements of the eyes in the head and these depend in part on the action of the semi-circular canals of the vestibular system. The function of this system is to provide information about the linear and

rotational components of physical movement both in proprioceptive or kinaesthetic action and in the passive perception of movement [Gibson 1966] (Figure 4).



**Fig. 4.** Functions of the vestibular system

Gibson [1966] points out how proprioception extends as a neural network sharing areas of other senses such as sight. Importantly, it has been previously established that on this neurophysiological basis, recovery processes of subjects with balance disorders are developed [Han, Song, Kim 2011].

#### ***Dynamic Systems Theory and Reactive Neuromuscular Training (RNT)***

In general, Tuishou allows for a greater multidirectional of forces as the upper limbs intervene and interact in a plane above the ground. This aspect doubly stimulates global proprioception. This characteristic of globality that Tuishou possesses is associated with the Dynamic Systems Theory that explains how the organism adapts to external circumstances [Thelen 2005], where creativity emerges during improvisation following a non-linear dynamic [Martin, Hristovski, Serre 2013]. The partner or rival in Tuishou within this theory would play the role of constraint. It subjects the organism of the other to a model of chaos generating motor conflicts. For example, if a partner in Tuishou is a constraint then, the moment I have someone who does not let me do what I want or stay at rest, I am forced to adapt to what he or she is proposing to avoid imbalance, fall or defeat.

This type of work, during Tuishou practice, is directly related to Reactive Neuromuscular Training [Cook, Fields 1999; Guido, Stemm 2007; Loutsch *et al.* 2015] which is fundamentally based on provoking an error in the partner's system so that they find the solution. This triggers neurological restoration and, consequently, neuromuscular rehabilitation or fall risk prevention in Parkinson's disease patients [Seada, Elsayed, Talat 2013]. The main purpose of Reactive Neuromuscular Training is the restoration of dynamic stability, a fact that underlies working continuously in Tuishou. In this regard, Wolfson [2007] alludes to the concept of a synchronised response awareness to an external tactile stimulus, and Kautz [2007] to the ability to synchronise response or responsiveness to opponent's forces. Chen *et al.* in 2010, translates this into "interpreting force" as an ability to react to the opponent's movement.

Reliable proprioceptive information provides the basis on which dynamic stability and motor control are improved. Mosher [2011] depicts this relationship as the ability to perceive and follow the movements of a pushing partner. More research is needed to further explore the relationship between concepts such as contextual interference as unpredictable input. Such a strategy possibly belongs to a more advanced level of application, perhaps not in degenerative diseases, but more in line with the field of functional rehabilitation in athletes. This way of working on Tuishou through body contact would provide us with useful tools or strategies for neuromuscular facilitation. This is characterised by the smoothness and fluidity of movement in the upper body with an isometric muscle level or component in the lower body [Gaffney 2012; Kautz 2007].

During Tuishou work there is no doubt that opponents subject the nervous system to variability generated in the type of inputs, e.g.: change in the type of loading, cadence of inputs, or direction of stimuli. As a survival mechanism, the variability of inputs could develop during Tuishou practice into a general adaptive component through fine control of both the central and peripheral nervous system. In this context of Tuishou practice, the balance maintenance system is constantly conditioned, necessitating constant readjustment. This would provide the additional component of adaptation to the chaos that does not occur in individual or Taolu forms.

#### ***Physical and psychological therapy***

The field of application of Tuishou can be extended to the affective need itself to apply Taichi Chuan-based therapies with strategies based on tactile and proprioceptive facilitation [Habkirk 2016]. Its aspects extend to complementary therapies and to clinical therapeutic work in the treatment of various pathologies, such as in the case of patients who have suffered myocardial infarction [Pan *et al.* 2013], chronic pain [Urits *et al.* 2021], in the treatment of arthritic conditions [Lee, Pittler, Ernst 2007] and in the case of cancer patients [Lee, Choi, Ernst 2010]. Tuishou could help to enhance the sense of improved well-being and quality of life in all these types of patients.

We can also observe a wide variety of applications, or transcendence of the developmental potential of Tuishou in other aspects of daily life, with a wide variety of possible transfers. Not only in the neuromotor part as seems to be reflected in the exercises called *chansigong* "silk reeling exercises" that favour functional improvement [Xin 2007], but also in the emotional or affective aspects and by extension, general well-being [Redondo 2011]. Both aspects are connected from the earliest stages of life as shown in Milani-Comparetti and Gidoni's [1967] study. Proprioception is a fundamental quality in relation to the visual sense, an aspect that is developed during the practice of Tuishou. This association is vital in the pro-



cess of developing postural stability before infants have learned to stand [Butterworth, Hicks 1977].

Tuishou, in addition to generating a structural identity, provides great sensitive potential in interactions with others [Kauz 2007; Redondo 2011]. In the context of the theories of self-regulation of emotions [Carleton, Padolsky 2012], it could help develop strategies for adaptation, concentration and attention in many population groups. Kauz [2007] describes it as psycho-physical binding. In this sense, Skrzeta *et al.* [2021] suggest that Taichi Chuan improves the quality of psychosocial life and mental well-being. Proprioception is developed by invocation through tactile, visual and vestibular sensory stimulation. This vestibular system influences multisensory integration. A bidirectional relationship of reciprocal stimulation exists between proprioception and vision, as well as the tridirectional relationship between proprioception, vision and affective touch [Ponzo *et al.* 2018]. This triangle of psycho-physiological factors highlighted in the articles reviewed here are enhanced during the practice of Tuishou to a degree which has not been recognised heretofore.

## Conclusions

In conclusion, we can consider Tuishou as a bridge between the field of martial arts and the field of health and well-being. Tuishou has high accessibility as it does not require a high level of martial competence for its practice. Tuishou is also highly adaptable, as it does not require any special equipment or implements. Tuishou facilitates the development of a playful and social component. These three factors added to the intrinsic motivation of the practitioner can facilitate adherence to training. Therefore, the possibilities of the Tuishou partner system can become a model for the development of applied strategies towards psycho-physical health.

For all these reasons, we recommend Tuishou as a practice with a multiplicity of useful therapeutic benefits in the treatment not only of neurodegenerative or neurological pathologies, but also in programmes of functional recovery, health and well-being. In view of this, and given the lack of studies that delve deeper into the proprioceptive system and Tuishou as a field of application to health, we believe it is necessary to develop intervention programmes for diverse population groups.

## Acknowledgements

In addition to the teachers and authors referenced in the text, Miguel Barbera Inocencio is grateful for the help and support of Miguel Jeronimo, Manolo Mazon, Wen Taiyuan, Nacho de la Encina, Vanesa Palma and the rest of his colleagues along the way.

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This work was supported by Telethusa Centre [grant number PI/B4/2019].

No potential conflict of interest was reported by the authors.

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### **Tuishou bez rywalizacji, modalność chińskich sztuk walki stosowana w dziedzinie zdrowia i dobrostanu**

**Słowa kluczowe:** chińskie sztuki walki, propriocepcja, równowaga, duety, stymulacja dotykowa, zdrowie

#### **Streszczenie**

Tło. Większość badań nad *Tai Chi Chuan* związanych z zdrowiem i propriocepcją ma charakter eksperymentalny. Inne badania nad *Tai Chi Chuan* zostały zastosowane w celu poprawy stabilności i równowagi u osób starszych, w celu zapobiegania upadkom i wypadkom.

Problem i cel. Jeśli chodzi o *Tuishou*, modalność obejmującą wysoką umiejętność kontaktu w parach, do tej pory nie przeprowadzono żadnych badań, które analizowałyby korzyści związane z propriocepcją w *Tuishou*. Celem autorów było przeanalizowanie możliwości, jakie system partnerski w *Tuishou* mógłby dostarczyć jako model dla opracowania strategii stosowanych zarówno w zakresie zdrowia psychicznego, jak i fizycznego oraz dobrostanu.

Materiał i metody. Metodologia obejmowała systematyczne wyszukiwanie bibliograficzne koncepcji *Tuishou* i propriocepcji w odniesieniu do zdrowia. Logiczne metody wnioskowania dedukcyjnego zostały zastosowane na podstawie praktyki zawodowej zespołu ekspertów, z różnymi tematami i kontekstami zawodowymi.

Wyniki. W poszukiwaniach w bazach danych naukowych zidentyfikowano siedem istotnych badań.

Wnioski. *Tuishou* umożliwia większą wielokierunkowość sił, ponieważ kończyny górne działają i oddziałują w płaszczyźnie nad powierzchnią ziemi. Ten aspekt podwójnie stymuluje globalną propriocepcję w kontekście teorii samoregulacji emocji, co może pomóc w opracowaniu strategii adaptacji, koncentracji i uwagi w wielu grupach populacyjnych. Autorzy zalecają *Tuishou* jako praktykę o wielorakich terapeutycznych korzyściach w leczeniu, nie tylko chorób neurodegeneracyjnych lub neurologicznych, ale także w programach rehabilitacji funkcjonalnej, zdrowia i dobrostanu.