

Flow State Experiences as a Biopsychosocial Guide for Tai Ji Intervention and Research in Neuro-Rehabilitation

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Abstract

- Q1** This theoretical paper considers the attainment and maintenance of flow state experiences (FSEs) as a guiding principle in the bespoke adaptation of *tai ji* with neurological groups. This adaptation is in response to heterogeneous physical, cognitive, and emotional difficulties within and across neurological conditions. Fragmentation, cluttered minds, and inertia are common disturbances to self-experience in neurological conditions. Mindfulness-based meditation approaches have been increasingly applied with neurological populations, but may not address some of these distressing self-states, nor be accessible to all in the presence of varied physical, cognitive, and emotional difficulties. FSEs within Tai Ji practice are advocated here as a parallel opportunity for clinical application from eastern spiritual traditions. FSEs are characterised by experiential continuity, deep absorption, and a merging of self-awareness and activity. Their theoretical value for neurological patients are discussed, and FSEs are advocated as a driver for increased psychological and spiritual focus in *tai chi* neuro-rehabilitation practice.
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Key words: tai ji, tai chi, flow state, neuro-rehabilitation, martial arts, mindfulness, positive psychology, brain injury, stroke, Parkinsons, multiple sclerosis

Introduction

This article will introduce the need for biopsychosocial interventions that can respond to multi-domain disturbances to self-states in neurological patients, states that have yet to benefit from existing psychological interventions. In particular *tai ji* (TJ) is suggested, with an emphasis on the subjective experience during practice. It is argued that the psychological dimension of TJ practice has been neglected in the existing literature on TJ with neurological conditions. The enhancement of flow

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state experiences (FSEs) is a goal within TJ practice, derived from the Daoist spiritual heritage of TJ. FSE is described (in its philosophical and practical aspects) and substantiated, linking to both parallel concepts in Western positive psychology and the existing research on TJ practice with neurological conditions. This article concludes by formulating suggestions for a future research programme to scientifically validate the underlying concept of FSE, in addition to targeting and evaluating its clinical application via TJ groups in neurological services.

Fragmented vs. coherent experiences in neurological conditions

If something is broken into many pieces, how can wholeness and coherence be achieved once more? One possibility is when those pieces become assimilated into a higher-level process or form, where they are bound together through the forces or structures inherent in the higher-level process. Fragments of paper being held in the same trajectory of movement or shape, within the current of air or water would be a good example.

Fragmented, oscillating, and incoherent self-states characterise many neurological conditions (e.g., Charmaz, 1990; Luria, 1975). Other experiences involve inertia, and a mismatch of intention and action without a cue or external stimulus (e.g., Sacks, 1973). In addition to the aims of western talking psychotherapies with neurological groups, a newer focus on shifting the relationship of a person to their mental contents has been introduced by psychological interventions influenced, in part or whole, by Eastern spiritual traditions (e.g., Bedard et al., 2012; Deepak et al., 1994; Lynton et al., 2007; Yeates & Farrell, 2014). Targeting ruminative content-filled minds in neurological conditions, stillness is often strived for in response to busy, cluttered psychological experiences.

However, fragmentation and inertia in self-experience have not been targeted by this class of intervention to date. Furthermore, it is possible that some of these very issues have challenged many service users' ability to tolerate and benefit from aspects of the mother Eastern traditions. For example, the requirements of embodied stillness and concentration in sitting meditation practices may exclude many (Russell, 2011; Russell & Tatton-Ramos, 2014). Many people with neurological conditions are predominantly distressed/preoccupied by their embodied and mobility experiences (e.g., regaining functional limb use following hemiparesis in stroke; initiating or terminating movement in Parkinson's disease; managing balance difficulties across a range of conditions), and would not find face validity or relevance in a talking or meditative therapy.

Flow and change practices in Daoist traditions

Q3 Mindfulness and non-judgmental relationship to mental events and desires, concepts and practices derived from Buddhist and Vedic ideas (Kabat-Zinn, 2003), have been applied widely within western psychotherapy and health settings, including neurological services (Bedard et al., 2003, 2005, 2012; Detert & Douglas, 2014; Grossman et al., 2010; Johansson et al., 2012). While other major Eastern theological and philosophical systems may offer similar applied potential, they have yet to be exploited. Gains reported for Vedic yoga practices in neuro-rehabilitation (Bastille & Gill-Body, 2004; Lundgren et al., 2008; Lynton et al., 2007; Rajesh et al., 2006; Shravat, 2014; Yeates et al., in press) suggest that embodied mindfulness approaches beyond sitting meditation may be of value, as suggest by Russell (2011; Russell & Tatton-Ramos, 2014).

A further heritage to explore for future clinical application is Daoism (Taoism), practiced by at least twenty million people in China and worldwide. An early and long-lasting system of thought (formalised in the second century CE), Daoism is thought to have developed from pre-historic shamanic beliefs. Its core features are communicated in various bodies of literature, famously including the *Dao De Ching*, attributed in Chinese folklore to a semi-historical/mythological figure, Lao Tzu (Kaltenmark, 1969). In ancient Daoist writings, philosophical ideas were communicated powerfully through imagery and allegory, famously including the Zhuangzi's (fourth century BC) butterfly dream:

Once upon a time, I, Chuang Chou, dreamt I was a butterfly, fluttering hither and thither, to all intents and purposes a butterfly. I was conscious only of my happiness as a butterfly, unaware that I was Chou. Soon I awoke, and there I was, veritably myself again. Now I do not know whether I was then a man dreaming I was a butterfly, or whether I am now a butterfly, dreaming I am a man. Between a man and a butterfly there is necessarily a distinction. The transition is called the transformation of material things. (cited in Merton, 1969)

Q4 This account conveys a central Daoist concept: the impermanence of states in the universe, and the constant transition from one state/form to another as part of the endless flow of universal forces. This was represented by Zhang Huang (1527–1808) in a famous diagram called taijitu, “the diagram of the supreme ultimate”, Figure 1.

The presence of a black circle inside the white section and vice-versa represents motion and the constant state of change in the harmonising and re-balancing between two different types of universal forces, form/presenting/pushing/pervading/punctuating (Yang) and yielding/embracing/incorporating/receiving (Yin). The surrounding eight trigrams represent constituent universal eight dimensions/expressions organised



Figure 1: Taijitu diagram

within these two meta-principles. Those pursuing a Daoist spiritual framework, such as the priests, monks, and nuns in isolated temple complexes around China, aim to cultivate internal health and well-being through *Neidan*, “inner alchemy” processes and the harmonisation of their life patterns and activities within the flow of wider forces in the universe. This internal cultivation is conceptualised within a Daoist framework as a continual process of converting lower forms of energy (taken from the external environment via breath and receptivity to external sources) into progressively higher ones (qi to jing to shen) at key bodily locations, and finally returning the reified energy form back into the external universe, so completing a cycle.

One aspired principle and subjective experience within this harmonisation is called *Wu Wei*: the practice of non-action, an uncontrived non-effortful experience of oneself to be in harmony with greater universal forces. Methods to achieve and maintain this harmonisation include meditation, diet, music, horticulture, architecture, communing with nature, and exercise/movement regimens. A key quality of this simultaneous view of the universe and body (as an element of the universe) is the priority of flow, the movement and transition of one state into another. In martial arts and wider philosophies, Bruce Lee (explicitly acknowledging a Daoist heritage) has offered famous injunctions to prioritise flow. These include:

Be like water . . . empty your mind, be formless, shapeless like water. If you put water in the cup, it becomes the cup. You put water in the bottle, it becomes the bottle. You put it in the teapot, it becomes the teapot. Now, water can flow or it can crash. Be water my friend. (Little & Lee, 2000, TV documentary)

We are always in a process of becoming and nothing is fixed. Have no rigid system in you, and you'll be flexible to change with the ever changing. Open yourself and flow, my friend. Flow in the total openness of the living moment. If nothing within you stays rigid, outward things will disclose themselves. Moving, be like water. Still, be like a mirror. Respond like an echo. (Lee, 2000, p. 13).

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Outside of traditional Chinese medicine (and the Western evaluation of its specific treatments), the applied benefits of underlying Daoist concepts and practices have received relatively little attention.

The psychological study of flow states

While the validity and application of the esoteric energetic theory inherent in Daoist health cultivation will not be considered here, the subjective dimension of harmonised flow in Daoist mind-body practices is a key focus. This overlaps significantly with the concept of flow states conceptualised in Western positive psychology, in the work of Mihály Csíkszentmihályi (1990, 1997) in particular. He has studied intense states of absorption in the domains of sport, music, creativity, and work. Flow states are routinely described by practitioners as involving the dissolving of a self-state and loss of normal self-boundaries (loss of reflective self-consciousness), distortion of temporal experience, a merging of action and awareness where intention is not effortful and the activity concerned seems to flow forth of its own accord. Practitioners feel intense well-being, ecstatic experiences at the time, and part of something bigger than themselves. Importantly, those experiencing flow states in a particular activity have attained some level of mastery over that activity through practice and experience, such that there is a dimension of automaticity and diminution of effort. Practitioners across diverse fields consistently use a metaphorical language of creativity and action flowing forth, hence Csíkszentmihályi's term flow states.

Csíkszentmihályi acknowledged historical precursors to his psychological study of flow, notably religious thought from near and far eastern traditions. Many faiths have historically articulated and practiced a desired goal to be at oneness with something greater, via dissolution of the boundaries of present sensory experience. In addition to Daoism these include: in Islam, Sufi Dervishes' practice of spinning and whirling; in Vedic/Hindu thought a form of flow-like psychological absorp-

tion in an object of meditation, Samyama, aimed for in Raja Yoga and in fast forms of physical yoga flow states are explicit as the desired vehicle for self-transcendence; Gregorian chanting in Christianity and the use of prayer beads and repetition of prayer forms/mantras in all the major faiths.

While there is clearly overlap between Daoist and positive psychological conceptualisation of FSEs, the latter differs in emphasising explicit appraisal as a critical dimension. This includes assertions of flow components and conditions for flow such as an individual's sense of personal control or agency, involvement in a task with a clear set of goals and progress, and which provides immediate feedback, simultaneous perception of high task challenges alongside high personal skill (Csíkszentmihályi et al., 2005; Shaffer, 2013). While Daoist masters clearly have mastery of highly skilled practices such as martial arts, accounts of their subjective experiences during practice indicate a diminution of explicit appraisal processes generally and subjective absence of perceived challenge or personal skill (see *The Taijiquan Classics*, Davis, 2004; or for a contemporary account: www.wellcomecollection.org/whats-on/events/martial-arts-and-the-inner-you.aspx).

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Tai ji quan

See Q1

Tai ji quan (TJ) means “supreme ultimate fist” (often spelled *tai chi* in the English language), an expression through movement of the principles of harmony and change in the Daoist view of the universe. It is characterised by soft flowing movements (done from either standing or sitting positions), punctuated by sudden explosive movements in some styles. These movements are synchronised with enhanced proprioceptive and interoceptive awareness, breath control, and attentional focus. The practitioner aims to still their mind through movement, an immersion into a broader form (the shape and sequence of movements) and force (the flow, direction, and emphases of the movements). The shape and sequence of movements become over-learned through many repetitions to allow progressive automatisations, removal of conscious interference, and the enhancement of a subjective state absorbed in the present moment, in the flow of movements. There is a simultaneous holding of “inner stillness” alongside movement, which rather than a contradiction is described in a classical Daoist text as a “still-point” or “pivot” in the flow changing states (*Daoshu*):

So is there really a “this” and “that”? Or is there really no “this” and no “that”? When there is no more separation of “this” and “that”, we have what is called the still-point of the Dao. (Zhuangzi Qiwulun, cited in Merton, 1969)

Within the mind-body practice of TJ, the subjective quality of flow is associated with embodied feelings of lightness and bodily coherence/unity within movement, as indicated in these excerpts from the earliest attributed writing on TJ:

In motion the whole body should be light . . . with all parts of the body linked as if threaded together . . . All movements are pivoted by *I* (mind-intention), not external form . . . If the *I* wants to move upward, it must simultaneously have intent downward. (Zhang San Feng, 1279–1386, cited in Davis, 2004)

The “*I*” in these writings should not be confused with an over-thinking prioritised self. While “intention” is a critical aspect of TJ practice, this is an “in-the-moment” distributed focus, not an a priori top-down anticipatory process. Increased awareness of internal and external stimuli is recruited in the optimisation of the practitioner’s lightness and effortlessness (*Wu Wei*) of movement.

One common tradition holds that TJ was developed in the twelfth or thirteenth century as a martial art in Wudang Mountains, Hubei (Central China) by the author of the last quote, Daoist monk Zhang San Feng. He had a revelation when seeing a snake fight a bird (most commonly narrated as a crane) and effectively defending itself through yielding to and absorbing the attacking moves of its aerial attacker. Over nearly a millennium TJ has evolved into many different types of schools and styles across China, named after the families that have developed them. These vary significantly in emphasis, force, speed, and postures, and include the more widely known chen, yang, and wu styles, in addition to that still practiced by the monastic communities on Wudang mountains and those schools that claim direct ancestry from them.

Regular practitioners have historically learned TJ for both martial skills and simultaneous health benefits. TJ and closely related practices known as chi/qi gong are considered within the hydraulic metaphors of traditional Chinese medicine theory to free the flow and circulation of vital life force and energy (chi) from blockages in the body, thereby balancing health. Scientific studies of TJ practitioners in the general population do reliably highlight gains in physical (muscle strength, balance, flexibility, and motor control) and cognitive functioning (executive functioning) plus emotional well-being (see [Jahnke et al., 2012](#); [Wei et al., 2013](#), for review). In addition, long-term TJ practitioners are characterised by particular physiological structural differences, including bone density ([Jahnke et al., 2012](#)) and increased tissue volume in specific cortical areas ([Wei et al., 2013, 2014](#)). Wei and colleagues found that when compared to matched controls, long-term TJ practitioners (average 14 ± 8 years) were shown to have increased volume in precentral gyrus, insula sulcus, and middle frontal sulcus in the right hemisphere and superior

temporal gyrus, medial occipito-temporal sulcus, and lingual sulcus in the left hemisphere. Furthermore, the TJ group had increased functional homogeneity (improved functional integration) in the right precentral gyrus and decreased functional homogeneity (improved functional specialisation) in the left anterior cingulate. The tissue volume of the left medial occipito-temporal sulcus and lingual sulcus was positively correlated with the intensity of TJ practice (hours per week). Collectively, this data suggest unique gains and processes inherent to TJ practice that are distinct from known benefits from sitting meditation practices.

Other studies have investigated the efficacy of TJ in improving aspects of functioning for various clinical groups. A review of studies across a range of long term health conditions highlighted increased cardiovascular fitness, balance control, and flexibility (Wang et al., 2004). Alongside these gains in physical functioning, the emotional benefit of TJ has long been acknowledged. Reduced stress, anxiety, depression, mood disturbance, and increased self-esteem of practitioners have been reported by Wang and colleagues (2010).

Tai ji quan in neurological services

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When TJ is considered as a historical practice of FSE cultivation, the evaluation of TJ in neurological services may indicate the clinical relevance of such states. Clinical gains from TJ group classes are indeed reported within the neurological literature: group studies of survivors of traumatic brain injury using a control condition have produced favourable results (Blake & Batson, 2006; Gemmell & Leathem, 2006), building on earlier single case observations by Shapira and colleagues (2001). Gemmell and Leathem (2006) noted that survivors of traumatic brain injury reported feeling less tense, angry, afraid, confused, sad, and more energetic and happier following the sessions. Blake and Batson (2006) demonstrated gains for a TJ group relative to exercise-only controls in the areas of mood and self-esteem, but not physical functioning. In stroke research, TJ interventions have been shown to lead to mood and general functioning gains alongside no adverse effects for community-based participants (Hart et al., 2004), improve standing balance in elderly stroke patients (Au-Yeung et al., 2009), and a review article and pilot study recommended TJ to be a core component of stroke services (Taylor-Piliae & Coull, 2012; Taylor-Piliae & Haskell, 2007).

Concurrent physical and psychological gains are also reported in progressive neurological conditions. A pilot study focusing on multiple sclerosis (MS) indicated improvements on measures of balance and depression following a TJ/qi gong intervention (Mills et al., 2000). A study of a twice-weekly six month TJ intervention for MS reported indications

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of gains in balance, coordination, and depression, relative to a treatment-as-usual group (Burschka et al., 2014). In two other TJ MS studies, gains in walking distance, hamstring flexibility, and psychological well-being were reported by Husted and colleagues (1999), while improved perceptions of physical and mental health (but not mobility) were reported by Tavee and colleagues (2011). Participants with Parkinson's disease demonstrated gains in postural stability, mobility, functional reaching, and balance in single case, pilot, and randomised group studies (Hackney & Earhart, 2008; Li, 2013; Li et al., 2007; 2012; Venglar, 2005) alongside answering favourably on a non-standard questionnaire of mood and well-being (Hackney & Earhart, 2008). Quinn and Jones (2012) report psychological and physiological gains across participants in a heterogeneous neurological disability sample.

While this evidence is collectively encouraging, recent critiques of the scientific TJ literature as a whole have drawn attention to a range of methodological weaknesses. These include small sample sizes, poorly described treatment protocols, and the use of inadequate outcome measures (Zhang et al., 2011). Furthermore each research-clinical team across studies has selected different movement sequences from varied TJ styles to build their intervention protocol, making comparison across studies and generalisation of results problematic. In addition, and significantly for the focus of this article, many of the aforementioned studies have favoured physical functioning as a target for TJ intervention and outcome evaluation. Outcomes in emotional functioning have often remained absent or have been operationalised without a coherent theoretical framework linking these to other aspects of functioning, nor the interrelationship of TJ to emotional experience and other facets of self-experience during TJ practice.

Burschka and colleagues (2014) have offered the most elaborated theoretical account of the subjective dimension of TJ practice and its importance to neurological conditions. These authors make specific associations between sustained and switching attentional processes, acceptance, non-elaborated awareness focus during embodied meditative practice, and gains for cognitive and physical functioning, fatigue, depression, anxiety, and well-being. They have based this model on a parallel account of mindfulness meditation (Bishop et al., 2004) and have categorised TJ as a form of mindfulness intervention, operationalising similar key processes. As noted above mindfulness has become a familiar concept in Western health care settings, and overlaps with many aspects of TJ practice (non-judgmental acceptance of experience and non-elaborated awareness in an over-thinking cognitive sense are crucial dimensions of TJ), so has face validity as a candidate for an internal psychological dimension of TJ practice.

A greater awareness of the Daoist spiritual context of TJ would caution against a simple application however. While some of the *neidan* practices are closer to Buddhist mindfulness meditation, TJ practice itself invites particular subjective characteristics for the practitioner (see above), and the Daoist focus on stillness and coherence within transitory, changing states that pervades all mind-body practices seems to be qualitatively different than mindfulness' non-judgmental acceptance of the present moment. While also a route away from self-judgmental experience, Daoist TJ attaches value to an aspired experience of coherence, inter-connection with something bigger, and flow as part of transition (but similarly discourages in-the-moment self-criticism in practitioners who feel they are falling short of such goals). This focus offers a distinct rationale for mind-body practices in response to distressing experiences of fragmented self-states and inertia in neurological conditions. However, the aforementioned Daoist meta-physical frameworks, primers for specific subjective experience during practice and the dimension of spirituality as a whole is notable in its absence from the TJ literature. A UK TJ neuro-rehabilitation research group have developed an unpublished holistic evaluation measure of TJ practice, the *Tai Chi Movement for Wellbeing Effectiveness Measure* (Quinn, unpublished), covering physical and psychological functioning. This approach to TJ evaluation remains in the minority, however.

In summary, when outcomes have been sufficiently broadened, there is encouraging early evidence from existing controlled group studies to support TJ as a biopsychological intervention, with reported gains across physical and psychological domains in a number of neurological patient groups. However, further work is needed to sensitively and reliably capture psychological and spiritual dimensions within TJ research, in addition to social dimensions (e.g., group identity/membership/affiliation experience) to fully document the biopsychosocial value of TJ. With these outstanding areas of development in mind, the study of FSEs in TJ, drawing on the Daoist heritage of this practice, may be well positioned to fill these gaps and also connect with the wider contemporary interest in the clinical value of meditative states, while retaining a distinct contribution among other traditions.

Heterogeneity in clients' needs as a challenge to tai ji practice

As noted by Yeates and colleagues (in press) in relation to Yoga interventions within neurological services, within many acquired and progressive neurological categories, there is considerable diversity in each client's constellation of physical, cognitive, and emotional needs (Yeates

& Farrell, 2014). These can uniquely challenge the standardised implementation of a body–mind intervention. For example, many clients will need to learn chair-based sequences due to mobility and/or balance difficulties. Those with fatigue may need shorter sessions. Someone with dyspraxia may not be able to match a visual demonstration of a posture/sequence to their own intentional movement, and as such would need a hands-on adjustment from the teacher to learn through proprioceptive feedback. Another person's memory difficulties may mean that learning a long sequence may best be achieved through the use of visual/written prompts and/or learning the sequence in reverse order via backward chaining or other errorless learning approaches (Wilson et al., 2010).

If anxiogenic rumination is a potential barrier to a mindful present-focus during TJ practice, then the style of teaching needs to be adapted accordingly, minimising explicit knowledge transfer and emphasising a greater degree of proprioceptive embodied focus. To return to the self-state disturbances discussed in the opening section, over-learning and repetition can be optimised for those with initiation difficulties, and TJ sequences characterised by regularities selected for those whose distress follows common incoherence and fragmentation in self-experience.

Given this complexity in learning and adaptation considerations, it is striking that there is very little mention of such issues in the TJ neurological literature, where often the group under study is directly or indirectly conveyed as homogenous. Furthermore, with the exception of Burschka and colleagues (2014), most interventions studied are often around ten to fifteen weekly sessions and so are unlikely to allow sufficient time for either adequate bespoke learning of movements across heterogeneous participants' needs, nor the progressive automaticisation of movement and attainment of FSE.

This diversity in participants' needs is both a challenge to the generalisability of TJ research and an essential clinical consideration in identifying TJ sequences that will be accessible to each client. With reference to the positive psychology literature on flow, it is easy to see how an individual trying to learn a sequence that is perceived as too difficult to master, that may lead to a self-critical inner dialogue during practice, will prevent the progressive attainment of FSE. Similarly if a sequence lacks meaning, experienced as unchallenging or irrelevant, it will lack a quality of attentional capture and absorption and equally will not be a conduit of FSE emergence. As noted above, Russell (2011; Russell & Tatton-Ramos, 2014) claims that embodied mindfulness practices such as TJ offer greater accessibility to wider groups than the attentional demands in forms of sitting meditation. This may depend on the mediation of person-sequence fit and FSE attainment.

Positive psychological study of flow articulates the need for balance in each practitioner's perception of task demands vs. perceived personal skills as a precondition for FSE emergence. As the concept of FSE articulates the need for this balance in this precise way, this is in fact suited as a guiding principle for multiple professions working across physical, cognitive, and emotional domains to inform the bespoke selection of TJ sequences for each client.

Characteristics of a flow-orientated tai ji group for neurological conditions

A FSE-orientated TJ intervention for people with neurological conditions, when founded on the above principles would have the following elements:

- It would be a group intervention. Aside from economic advantages, the experience of social fellowship, affiliation, and at times synchronised movement with others are all in keeping with FSE optimisation.
- This is envisaged as a long-term community intervention (minimum six months to a lifetime), to allow increasing familiarity and the progressive automaticisation of movements to occur over a substantial time period. The increasing recognition of long-term community exercise and well-being groups for neurological groups, such as the recent proliferation of ARNI (action for rehabilitation from neurological injury) groups for stroke survivors in the UK (Balchin, 2011; www.arni.uk.com) would be consistent with a FSE TJ remit.
- A typical session will contain both individual work and group synchronised movements. The individual work section of the session will allow the opportunity for a participant to work on their own TJ sequence. This would be chosen for optimal personal ability-task requirement fit and adapted in response to each participant's unique physical, cognitive, and emotional needs. This section would be sandwiched in between group warm up sequences (chosen for universal accessibility) and a synchronised group TJ sequence at the end, again chosen for universal accessibility. The experience of being within a shared group sequence is a further opportunity for FSE attainment and transcendence beyond individual experience.
- Typical of most TJ classes, the sessions would be at least weekly and last sixty minutes. All participants would be encouraged to do the warm-up and end group sequence. However the middle individual work section will vary across individuals in the ratio of activity/rest time, as a function of individual fatigue/pain/physical management needs.

- Where local weather and locations' disability access allow, opportunities should be sought to teach and practice outside in a natural setting, to allow practitioners to use their sensory experience of natural stimuli (visual, auditory, tactile sensory awareness, e.g., the sound of water moving, the sensation and sound of a breeze in the trees) as experiential drivers to attain FSE (i.e., an experience of being at one with natural processes bigger than oneself).
- Participants would be encouraged to develop a concurrent self-practice at home to increase repetitions of the sequences and progressive automatisations of the movements conducive to FSE attainment. This personal practice would be supported by multi-media materials to facilitate learning.
- The constituent TJ sequences would be drawn and adapted from classic TJ styles and forms, as per the training/experience of the instructor/facilitator. However, participants would be additionally encouraged to maximise personal experience of flow and absorption in the movements, while minimising self-consciousness and any self-critical inner dialogue.

Hypothesised value of FSEs through TJ practice in neurological services

Seven broad areas of clinical value are hypothesised to follow TJ provision across neurological groups, aimed at maximising FSEs. The initial points share a focus on immediate client gain while the latter two offer concurrent gains for research evaluation and service organisation:

1. Subjective FSEs, increasingly accessed through the repetition of appropriate TJ movements, will be pleasurable and comforting to people with neurological conditions who experience common disturbances to self-states (such as fragmentation, uncontrollable rumination, and inertia). The increasingly predictable attainment of FSEs will be associated with reductions in common forms of psychological distress such as depression, anxiety and anger.
2. The movement and bodily aspect of TJ will offer greater attentional capture and promotion of engagement for many people than a sitting meditation practice (Russell, 2011; Russell & Tatton-Ramos, 2014).
3. Regardless of an individual's focus on physical or psychological changes as part of their neurological condition, FSE-orientated TJ will offer face-validity as a relevant intervention that will actually lead to gains in both areas, avoiding any Cartesian dichotomous tension between body vs. mind focus. Reports across studies of superior performances on executive functioning tests in TJ practitioners within

the general population suggest at least a potential relevance of the practice for cognitive functioning in neurological groups too.

4. The selection of TJ postures, sequences, and styles in both clinical practice and research evaluation could be led by FSE attainment as the critical driver. The positive psychology FSE components of matched individual ability and task demands can be used to calibrate and reduce the discrepancy between the two variables during the bespoke selection and learning of TJ sequences across individuals. Different individuals may be working on different sequences but aiming towards the same relative FSE attainment, progressing in this as a function of practice. Movement from physically easier to more demanding sequences would also be paced by FSE attainment and maintenance in each sequence.
5. The bespoke matching of postures and sequences to a client's biopsychosocial needs in order to optimise FSE attainment is truly an **interdisciplinary (IDT)** process, with physiotherapists considering the physical demands of sequences in relation to client ability; psychologists similarly considering the cognitive and emotional demands; occupational therapists evaluating participation and activity meaning; and in relation to some clients all team members holding in mind the spiritual significance of FSE attainment, depending on the client's belief systems.
6. As such FSE attainment and maintenance is very usefully placed as a shared IDT goal for a neurological services team and may offset common service trends to further fragment a client's experience in an iatrogenic way, by partitioning physical, cognitive, emotional, and social needs, alongside a frequent neglect of spirituality (Yeates et al., in press). This IDT service approach is supported by TJ training models for clinicians already operating in public health services (e.g., www.balancedapproach.co.uk/rehab/tai-chi-for-rehabilitation.html www.tmwtraining.com).
7. FSE attainment will therefore be a stable point of comparison across TJ intervention studies or clinical audits, regardless of TJ style or sample characteristics.

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Critical steps in a future tai ji flow state experiences research programme

First, the attainment of FSEs needs to be reliably described, to guide interventions and validate outcome and process measurement. This would require both qualitative investigations of subjective experience during FSE in TJ practice, in addition to objective measurement. The use of a validated questionnaire of flow states from positive psychology, the

Flow Conditions Questionnaire (FCQ, Schaffer, 2013), may be additionally valuable for TJ research, but given the aforementioned lack of absolute fit between positive psychological and Daoist concepts, some adaptation of questionnaire items and revalidation (including tailoring to specific clinical groups) may be required.

Another approach would be to use psychophysiological measurement to reliably characterise FSE attainment, following existing research that has identified characteristic alpha and theta brain rhythms of experienced meditators in Himalayan Buddhist communities (e.g., Lyubimov, 1998). The use of mobile electroencephalographs (EEGs) to study neural patterns in Daoist priest TJ masters performing forms and sham movement sequences, in comparison to intermediate and novice TJ practitioners would be an interesting way of elucidating the psychophysiological characteristics of FSEs. Particular cardiac activity signatures during trained meditation states (Kim et al., 2013) and in other states of well-being (McCraty et al., 1995) have been reported in the psychophysiological literature. Kim and colleagues (2013) have observed increased concordance of alpha brain rhythms and heart-rate coherence (reduced variability in time intervals between heart beats) during meditation. This simultaneous real-time neural and cardiac activity measurement using multi-channel recorders would offer further ways to objectively characterise FSEs during TJ practice.

With FSE subjective and psychophysiological characteristics reliably described, the interrelationship of FSE attainment and neuro-disability may also be richly explored using mixed methods. Qualitative studies of long-term TJ practitioners with both chronic and recently acquired disabilities may aid the conceptual unpicking of this relationship. Correlational studies of a validated FSE questionnaire data in each major neurological group and associations with measures of physical, cognitive, emotional, and spiritual functioning would be of interest. A detailed observational study of a standard unmodified TJ class for differing neurological groups would substantiate some of the claims made above. Instances of the learning and maintenance of TJ being challenged by different kinds/combinations of neurological difficulties (physical, cognitive, emotional) could be coded and tallied. The relationship of this data to FSE attainment as measured by repeated sessional questionnaires could be explored. In addition any spontaneous adaptation strategies used by a TJ instructor in response to these difficulties could be recorded and evaluated.

Finally, TJ interventions for neurological groups based on the IDT bespoke matching of sequences to individuals' unique constellation of biopsychosocial needs to optimise progressive FSE attainment would require formal evaluation. This could be via a randomised trial

comparison with standardised but unadapted TJ provision and a control group exercise condition, focusing on a range of biopsychosocial outcomes of interest. These would include pre-post and repeated sessional questionnaire measures of anxiety, depression, anger, fatigue, flow, and well-being. Following Burschka and colleagues (2014) group interventions of six months minimum are recommended as a parameter of evaluative studies. Briefer evaluations run the risk of reflecting insufficient time spent on bespoke learning and automaticisation of the movements to access FSE. This longer time focus will also be consistent with the remits of many community service interventions. Acceptance of these group formats and the FSE-focus for neurological patients would be measured via recruitment and drop-out rates, and participant feedback. Pre-post intervention changes in physical and cognitive functioning would be a further comparison across interventions, and of interest given gains reported in the generic scientific TJ literature.

Conclusion

A case has been made for the clinical value of concept of flow state experience attainment during tai ji practice, with neurological groups in particular. FSEs have been prioritised in both Daoist spiritual and positive psychology literature, with both overlap and differences between these. It is suggested that FSEs uniquely respond to subjective experiences of fragmentation and incoherence in many neurological conditions, and that the properties of TJ forms may support these and other self-state disturbances, such as inertia. The existing neurological literature supports the clinical value of TJ in producing gains to physical and emotional functioning across a range of conditions. However, an underlying biopsychosocial theoretical framework linking these dimensions of outcome is absent and spiritual aspects neglected. FSEs are advocated as a valuable nodal point to link these dimensions and also practically guide the bespoke adaptation of TJ sequences to varied physical, cognitive and emotional difficulties within neurological groups. Finally, a programme to scientifically validate and apply these concepts clinically has been formulated.

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