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Music Rhythmic Therapy - A Novel Versatile Add-On Support in Paediatrics

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ABSTRACT

Music rhythmic therapy is a novel discipline and a contribution to integrative paediatrics. Based on an interdisciplinary systemic meta-synthesis involving medicine, neuropsychology, cultural anthropology, philosophy of arts and aesthetics, music rhythmic therapy focuses on the health promoting and curative power of music and movement as well as the artistic and creative nature of the child.

Considered an efficient and versatile add-on therapy, it contributes to paediatric psychiatry (e.g. childhood trauma therapy, communication disorders and internet gaming disorder), paediatric neuro-rehabilitation (e.g. cerebral palsy, foetal alcohol spectrum disorder and poly-lingual withdrawal syndrome), paediatric psychosocial oncology, and treatment of the metabolic syndrome in children.

Music rhythmic therapy was developed at the Beijing Normal University Research Centre for Arts Therapies and comprises elements of Chinese music rhythmic education, which was founded by Lele Kremer. Intersections between music rhythmic therapy and arts education in schools also apply to health education. Further research is needed to substantiate its models and enhance related clinical practice and public health measures.

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Introduction and Backgrounds

When children with serious diagnoses need long-term treatment, paediatrics usually face two major difficulties: (i) sustainable adherence to curative programmes and satisfactory compliance and (ii) adverse impact of disease experiences, hospitalisation and medical interventions on the child's mental development and self-image. Various approaches such as token economy can improve compliance and many of them are based on behavioural conditioning and/or extrinsic motivation [1]. Nonetheless, paediatric paradigms such as empowerment, e.g. of children with congenital heart disease, and mindfulness, e.g. in child psychiatry, vote for adequate intrinsic motivation and treatment compliance which match the child's personality, and these are also core features of music rhythmic therapy [2,3].

It goes without saying that serious health conditions and chronic/long-term illnesses are a heavy burden and require emotional, behavioural and social adjustment, e.g. in children with coronary heart disease [4]. Moreover, worries of primary caregivers, e.g. of children with end-stage kidney disease receiving chronic peritoneal dialysis or haemodialysis, also affect a broad spectrum of young patients with various medical conditions: disease management and a highly uncertain future, emotional and social adjustment,

acceptance of the current situation, adaptation of life goals and/or sense of self, personal growth versus overwhelming hardship and obstructions of educational progress and social inclusion. To provide individual support to handle such issues is a main purpose of music rhythmic therapy [5].

The question of intrinsic motivation and approaches which match the child's personality is inextricably linked with issues of developmental and differential psychology, anthropology, philosophy of life and health, and socio-cultural features of the child's living space. Experiencing heavy burden, trauma and disruption goes hand in hand with the awareness of a sharp dissonance between ideal and reality. This calls for multi-disciplinary approaches which involve self-images and identity, mystical knowledge and religious thought, genetics and epigenetics and cultural sciences. These perspectives also inhere in the nature of music rhythmic therapy.

While evidence based medicine emphatically advocates randomised controlled trials with large samples and deliberate neglect of the individual, both history of medicine and ethno-medicine shed light on person-centred and systemic practices, e.g. in Tibetan medicine [6]. Significantly different from axioms of evidence based medicine and statistical methodology of empirical research, these approaches often rely upon the subtle interplay between the unique actuality of the individual and the ontological macro-cosmos of existence.

Without exhibiting any anachronistic tendencies, modern systemic and integrative medicine tries to synthesise even entirely dissimilar approaches and makes an effort to identify their strengths and deficiencies. Of course, holistic medicine does not apodictically reject outcomes of quantitative medical research, but it debunks – from an epistemological perspective – the myth of the pyramid of evidence, which rates as the paradigm of evidence based medicine. Beyond the reductionist overestimation of effect sizes and statistical power, it takes a broad spectrum of techniques to elucidate healing mechanisms and curative principles into account.

With regard to traditional health systems in Southern India, Maria Costanza Torri (2009-2010) pointed out that social, cultural, and environmental factors influencing health as well as traditional health systems have to be regarded as an interactive system, and that these interdependencies are inextricably linked with health promoting and curative effects. These factors also encompass traditional arts therapies and an important perspective of music rhythmic therapy comes into play: the healing power of creative musicking and symbolic movement and body expression [7].

Psychological aesthetics and cultural anthropology substantiate the theorem that artistic processes and work of art not only form isolated objects, which are typically found in concert halls and exhibitions, but go hand in hand with the human nature and ontological principles. From this point of view the arts (as used in arts therapies) must not be regarded as mere vehicles for personal growth and improved health, but have to be considered unique entities, which also embody a wealth of potential benefits, curative power included.

About one century ago, two great minds were inspired by such ideas and consequently established educational frameworks, which internationally gained momentum: the Swiss composer Émile Jaques-Dalcroze (1865–1950) and the Bavarian composer Carl Orff (1895–1982). Jaques-Dalcroze (2017) created the so called ‘Eurhythmics’, an educational concept, which gave rise to the foundation of the ‘Fédération Internationale des Enseignantes de Rhythmique’ [8]. From a theoretical perspective his complex approach can be considered a method, a pedagogy and a philosophy [9].

While internationally Eurhythmics are mostly based on phenomenological considerations and reflective practice [10], Mastnak suggested a neuroscientific theoretical framework and inspired the discussion about related therapeutic perspectives [11]. Today we encounter a conceptual variety of terms and models, such as ‘Rhythmisch-musikalische Erziehung’ in Germany or 音乐律动 yīnyuè lǜdòng in China. ‘Music Rhythmic Therapy’, in Chinese language 音乐律动治疗 yīnyuè lǜdòng zhìliáo, also uses, because of the significance of its components, this term. Nonetheless, (Chinese) Music Rhythmic Therapy differs – particularly with regard to interdisciplinary research, cultural sensitivity and therapeutic relevance – considerably from Eurhythmics and Western models of music-rhythm-education.

The composer Carl Orff, whose main oeuvre comprises operas, was inspired by the rhythm and dance movement of his time and founded, together with Dorothee Günther, a teacher of gymnastics, the Günther-School in Munich [12]. Their developments became the basis of today’s ‘elemental music education’ and the ‘Orff-Schulwerk’-societies [13]. With regard to principles of elemental music education, Gertrud Orff, Carl Orff’s second wife, founded the Orff Music Therapy, which specialises in paediatrics, and Wilhelm Keller (1920–2008), professor of the Mozarteum

in Salzburg, went in for Orff-education, social inclusion and paediatric rehabilitation [14]. Given that Orff’s approach was derived from music-ontological and anthropological perspectives, multiple intersections with other international music educational concepts hardly surprise [15].

Generally speaking, there are two fairly contradictory approaches in international music education and music therapy. On the one hand e.g. Orff-Schulwerk societies or some US-American groups of music therapists try to implement their models in other cultures. On the other hand there are experts who take various cultural features and backgrounds into account and go in for culturally sensitive arts-based education and therapy. This article advocates the second mode, and in the realm of culturally sensitive Chinese music rhythmic education, three names are of major importance: Lele Kremer, Cheng Xie and Yijing Zhou.

Cheng Xie 谢呈 studied rhythmic education in Germany and holds a PhD in music education. Today he teaches at the Beijing Dance Academy 北京舞蹈学院 and specialises in comparative studies on Chinese cultures (e.g. elements of the Beijing Opera) and music-rhythmic education. After her graduation in music therapy at the Shanghai Conservatory of Music, Yijing Zhou 周祎婧 went to Europe to study music rhythmic education. After her return to China, she particularly went in for the integration of music therapy and music rhythmic education on the basis of Chinese cultures. Lele Kremer is Chinese and her original name is Lele An 安乐乐. Holding German diplomas in music rhythmic education, she has conducted most profound research on genuine Chinese forms of music rhythmic education. According to her findings, traditional Chinese philosophies and arts provide a logic frame for a genuine Chinese school of music rhythmic education.

Defining the theoretical framework of a genuine Chinese school of music rhythmic education, Wolfgang Mastnak and Lele Kremer suggest four cornerstones: (i) dynamic morphology which refers both to dynamics of body-movement and the principle of changes in Daoism, (ii) ‘psychophilosophy’, which involves philosophical thought about the human mind in Chinese cultures and which is – in spite of huge differences to Western psychology – of high relevance for psychological epistemology, (iii) ‘neurosystemic substance’ which relates to the assumption that mental processes, creativity, aesthetic experience and artistic skills have their material basis in neuronal systems of the brain, hence the necessity to also discuss musical rhythmic on this background and (iv) transpersonal anthropology, which concerns the idea and image of human beings from a culturally sensitive interdisciplinary perspective [16]. This four arm framework also applies to music rhythmic therapy and its paediatric relevance.

Method: Systemic Meta-Synthesis

In medical domains, accumulated robustness of single studies is in the ascendant, while generation of ingenious theories seems to be on the decline. This inverse proportionality possibly interdepends with the excessive promotion of purely quantitative studies and meta-analyses. The pool of single data is immense, but their synergetic epistemological potential has not been taken full advantage of. In response to this deficiency, systemic meta-synthesis is a model and technique to process a sample of methodologically different studies on a given topic and to unearth the inner logic of their substantial interconnections.

The notion ‘systemic meta-synthesis’ calls the terms ‘meta-analysis’ and ‘systematic review’ to mind [17]. This cognitive association relates to the core of the matter: Both approaches are

based on available studies but greatly differ in both information processing and the nature of their outcomes. Moreover, the epistemologically substantiated inner logic, the multi-disciplinary mixed-methods spectrum and the involvement of correspondence theoretical theories of truth are hallmarks of systemic meta-syntheses and distinguish them from common meta-syntheses [18].

While meta-analyses usually select studies on account of clearly delineated topics and adherence to prescribed guidelines, systemic meta-syntheses are generally free to include all types of research but have to scrutinise their core values. In other words, meta-analyses apply external criteria (e.g. randomisation or sample sizes) to judge their components while systemic meta-syntheses try to appraise their scientific essence, and the disparity between both can be huge. Even researchers themselves might be unaware of the genuine (and even seminal) value of their work, and history of science witnesses numerous cases. It goes without saying that both scientific open-mindedness and consideration of the whole spectrum of philosophy of sciences is needed to avoid systemic errors.

Next comes the issue how to find the epistemologically most appropriate way of linking and synthesising data. This step is entirely different from meta-analyses, their standardised methods of comparison and their techniques of numerical cluster analysis. By way of illustration, a systemic meta-synthesis about trance in ethno-paediatrics might involve brain mapping, interviews with members of a tribe, correlation between old myths and neuro-cognitive models of hypnotherapy, translational research on shamans in Western oncological hospitals and physical theories about information transfer. All these studies have their unique weighty core, although their nature of evidence and notions of truth are completely different.

Appropriate processing involves correspondence theoretical perspectives to satisfy criteria of adequate transitions and syntheses, i.e. (i) how objects and their (abstract) correlates, e.g. numerical values of hormone concentration or diagrams of brain waves, are qualitatively interconnected, (ii) how these correlates should be united to form a consistent framework and (iii) how this framework can count as an isomorphic representation of the studied entity in the real world.

Music rhythmic therapy is a novel discipline and its theoretical framework is based on a complex systemic meta-synthesis. There is a wealth of scientific data from different areas which substantiate music rhythmic therapy and provide a plausible basis of their interventions and methods. Nonetheless, further interdisciplinary studies are required to augment the evidence of therapeutic effects, underlying mechanisms and its relevance to national and ethnic health systems.

Music Rhythmic Therapy: Features of Intervention

In music rhythmic therapy, the artistic and aesthetic aspect plays a crucial role and this makes the difference to music and/or dance therapeutic approaches which only pay attention to effects according to pre-defined criteria such as alleviation of symptoms. The reason why music rhythmic therapy does not narrow down its substance to a therapeutic vehicle goes hand in hand with its fundamental philosophy of a profound analogy between human beings and the arts.

Myriads of similar thoughts can be found in ancient myths, ethnic traditions and cultural anthropological approaches. Associated artistic demands, however, do not relate to technical skills, which

are achieved through time consuming practising, and they must not be confused with executive functions in motor-control tasks such as targeted in piano etudes. Music rhythmic therapy focuses on artistic identity in creative processes, and the subjective validity of artistic expression and experience is vital. Music rhythmic therapy does not rely on ephemeral fun and rejects 'doing things for the sake of doing things', as well as reductionist actionism; it is based on the spirit of the arts, which cannot be defined in a few words and deeply involves philosophy of arts and cultural anthropology.

Music rhythmic therapy also regards conventional evidence based medicine as reductionist and too narrow-minded for appropriate therapeutic understanding and suggests four theoretical cornerstones: (i) it goes without saying that the therapeutic effect is an indispensable criterion of therapeutic quality. Although statistical evaluation is an important and sense-making approach, estimating the entire benefits of interventions needs a broader repertoire of assessments; (ii) underlying mechanisms of therapeutic dynamics play an important role and involve a broad spectrum of disciplines such as neurosciences, endocrinology, psychoanalysis, cognitive sciences etc. Consistent with correspondence theoretical epistemology, explanatory models must not be confused with the objects they represent, hence the necessity that researchers and clinicians are aware of the difference between reality and scientific image, an issue which also touches upon the ontology of arts [19]; (iii) music rhythmic therapy opposes monocausal explanations and one-dimensional input-outcome-studies; and it regards both pathological and curative processes as components of a multifactorial system, which also involves sociocultural conditions, individual philosophies of life, artistic identity and the creative self; (iv) in this context, music rhythmic therapy considers international diagnostic systems such as the ICD and definitions of health such as provided by the WHO as important frameworks but not as the only authoritative guidelines. Taking various cultural and ethnic conceptions of health, disease, healing and death into account, associated therapeutic processes require a flexible attitude towards pathology.

These views go hand in hand with the relationship between cultural sensitivity and anthropological principles of the healing arts. By way of illustration, neurosciences provided evidence that the phenomenon of (musical) sound is a most potent means to enhance brain plasticity. This anthropological principle is of general importance for therapeutic approaches, e.g. in neuro rehabilitation. Dissimilarly, people with different cultural backgrounds express their feelings through different musical representations such as ancient Chinese pentatonic patterns, microtonal Indian rāga or traditional Alpine tunes. This fact requires cultural sensitivity in arts-based therapies and limits the possibility of cross-cultural transference, as well as the application of curative interventions without respecting cultural diversity.

Particularly with regard to – both educational and therapeutic – Chinese music rhythmic disciplines, Lele Kremer referred to principles of Daoism and provided a theoretical framework which comprises 美 měi as the ontological essence of beauty, 道 dào as the principle of permanent metamorphosis, which is also of crucial importance to concepts of health, disease and therapy, 无为 wúwéi which is often misunderstood as 'doing nothing' but rather claims that we should act in accordance to universal principles of harmony and 混沌为源 hùndùn wéiyuán which refers to the mystical chaos as the source of all existence and which is mirrored by free music-rhythmic improvisation, which starts from indeterminate openness and creates a meaningful dynamic gestalt [20].

Although the theoretical and philosophical concept of Chinese music rhythmic therapy is based on distinct cornerstones and constituent elements, the overall idea of music rhythmic therapy is meant to inspire variations according to different cultural conditions and wants to encourage Western music rhythmic education and Eurhythmics to enhance cultural sensitivity and therapeutic awareness.

Relevant Paediatric Domains

Psychiatric Conditions

Trauma

Although children usually exhibit an astonishingly robust resilience and aptitude to cope with tough life circumstances, traumatisation is a core issue in child psychiatry and has a huge impact on personal growth and health conditions of the adult. The relevant spectrum of traumatisation is extremely broad: Child sexual abuse is associated with increased risk of psychological problems in adulthood [21]; numerous studies substantiate interdependencies between childhood adversity and experience of psychosis later in life and childhood trauma increases the risk of complex psychiatric conditions including post-traumatic stress disorder [22, 23]. There is also clinical evidence that childhood trauma is particularly associated with the experience of hallucinations and delusional ideas, which are key topics of creative work in music rhythmic therapy.

In addition to individual trauma conditions, also disasters such as earthquakes are very likely to cause severe child traumatisation, and Nancy Gilchrist and Joelle N. Simpson pointed out that children have unique anatomical, physiologic, immunologic, and psychosocial needs that impact their vulnerability to and resilience in a disaster, and they criticised that these have been historically underrepresented in disaster planning at local and national levels [24]. In this context, experiences with the COVID-19 pandemic have shown that also measures to control the disease can cause psychosocial traumatisation and this threat urgently calls for improved systemic approaches in epidemiological management [25].

Taking into account that cognitive abilities and language skills of children are often not sufficiently developed for adequate verbal psychotherapy, therapeutic means which embody the spirit of playing and involve symbolic elements gain momentum. Moreover, intersections between music rhythmic therapy and creative music and movement education facilitate a child's access to this add-on support. Particularly preventative measures and health education require intensified collaboration between educational systems, public health and paediatrics, and music rhythmic therapy can serve as a model.

Although adverse experiences in childhood and childhood trauma are core issues in paediatric psychiatry and child psychotherapy and considered a key challenge for health-promoting societies, in the realm of music rhythmic therapy psychopathological issues of the child must not be narrowed down to these conditions [26,27]. The following two examples – communication disorders and obsessive gambling – shall give an idea of the broad spectrum of health issues, which can be alleviated and/or treated through music rhythmic therapy.

Communication disorders

It is well known that from the cradle of modern music therapy to its advanced approaches, autism spectrum disorder (ASD) has been holding a pole position: music therapy is considered an appropriate tool to enhance social skills in children with ASD and

in addition to clinical evidence biological mechanisms substantiate the empirical results [28, 29& 30].

In this context we have to accentuate that music rhythmic therapy focuses on authentic music experience, the dynamics of individual aesthetic awareness and the healing power of creativity and rejects mere distraction or activity without artistic significance. In this context Lele Kremer emphasises the profound ontological and anthropological features of music and expressive body-movement and distances herself from music therapeutic approaches which are mainly based on entertainment and functional pragmatism [31].

Although music rhythmic therapy encompasses functional trainings and rhythmic physical exercises like artistic rhythmic gymnastics, it must not be narrowed down to these parameters: its therapeutic philosophy is based on an ontological isomorphism between the human being and the essence of the arts, and hence also their healing potential [32]. This point of view has also historical and ethnological roots, and there is support from some holistic psychosomatic positions as well. In a nutshell: there are good reasons to assume that socioculturally sensitive music rhythmic therapy is a pertinent means to support children with ASD and other social and communication issues. Mechanisms are not only linked to functional trainings or behavioural adjustment, but also to the experience of communication within spaces of creative interaction, individual symbolising and aesthetic significance.

Internet Gaming Disorder

The phenomenon of obsessive compulsive behaviour has a long tradition and is inextricably linked with magical and religious explanations and anthropological interpretations of insanity [33]. Compulsive digital gaming has become an alarming mental health issue in children and an Indian study summarises that 'excessive digital gaming is emerging as a mental health disorder because youngsters are losing control of their lives by wasting their time by indulging in online multiplayer games ... The players enjoy creating and building relationships with other online characters, which provides a virtual community feeling at the expense of one-to-one social interactions and real life bonding. In due course of time, the players are preoccupied or "hooked" to the games and display mood swings' [34].

Today, Internet Gaming Disorder (IGD) is considered a clinically relevant diagnosis and involves complex pathological features and personality traits 'including introversion, inhibition, submissiveness, self-devaluation, interpersonal sensibility, obsessive-compulsive tendencies, phobic anxiety, and hostility, as well as paranoid and borderline personality traits. Other negative characteristics found in the present sample included a high level of social problems, low EI [emotional intelligence], and dysfunctional family relationships' [35].

These findings are in line with a Spanish study on internet gaming disorder and comorbidities, and the significant correlations reported comprised '92% between IGD and anxiety, 89% with depression, 85% with symptoms of attention deficit hyperactivity disorder (ADHD), and 75% with social phobia/anxiety and obsessive-compulsive symptoms' [36]. Moreover, neuropsychological studies call 'internet gaming disorder (IGD) and obsessive-compulsive disorder (OCD) ... opposite ends of the impulsivity and compulsivity dimensions' and report differential neurophysiological correlates of the 'altered response inhibition in IGD and OCD, which may be a candidate biomarker for impulsivity and compulsivity' [37].

Although there is detailed evidence of both the symptomatic features of IGD and their physiological correlates, there is astonishingly few discussion about the origin of this psychiatric pandemic. According to the theoretical background of music rhythmic therapy, explorative playing, experiencing the balance between rules and variation, and creative social interactions belong to typical needs of human beings, and cultural anthropology substantiates this hypothesis. Nonetheless, globally, societies have significantly changed their characteristics and virtual spaces, which provide unlimited time-flexibility, interpersonal encounter pools and a playground for social activities which do not require empathetic nuances and deeper mutual understanding, have immensely gained ground. Obsessive-compulsive traits, adjustment ability and the power of imagination dynamically respond to these internet offers and generate a modified personality which has a strong potential to exhibit pathological features.

In this context, virtual encounters and algorithmically determined behaviour tend to replace the depth of human relationship and creativity, and they entail an emptiness, which is expressed through depression, anxiety and hyperactive compensation of the detrimental experience of the inner void. With regard to IGD, music rhythmic therapy is not a symptom-oriented intervention but rather a means to treat the origin of this medical condition. In other words, while IGD is characterised by a distorted answer to human needs, music rhythmic therapy provides a genuine human space to re-discover and unfold talents of creative interaction and artistic playing.

Mental Disabilities & Adjustment Issues

Permanent changes of the spectrum of paediatric neurological disorders require continuous development of efficient therapeutic interventions. Nonetheless, screening the relevant literature witnesses that a huge amount of energy is invested in quantitative research on effect sizes, which is only one possibility to assess clinical value but not a comprehensive measure. Trying to avoid biased research, evidence based medicine has (unfortunately) caused a biased realm of medicine, where research on novel interventions is fairly underrepresented and the creative spirit of innovation is alarmingly on the decline. Standard phrases in systematic reviews such as 'moderate quality' blindly adhere to the evidence-based medicine pyramid and rather show that authors do not discuss relevant aspects of theory of science, theory of truth and epistemological methodology, but just carry out rules. This, however, is harmful for progress in medicine.

Disciplines such as music rhythmic therapy involve critical epistemology and philosophy of science and encourage creative sciences to avoid impasses and deadlocks. This requires complex thinking and interdisciplinary knowledge, systemic meta-syntheses and the researcher's use of his/her default mode network processors (psychology of researchers and research is still a completely underrepresented domain).

Cerebral Palsy

For instance, robot-assisted gait training is widely established and 'significant improvements in walking-related outcomes' are plausible reasons why it has become a standard treatment for children with cerebral palsy [38]. Further studies showed improvements in several aspects as strength, mean velocity, step length and gait performance, while a Swiss study qualifies that although 'robot-assisted gait training has become an established treatment option to address gait impairments, evidence for its effectiveness is vague' [39,40].

At this point music rhythmic therapy takes clinical experiences with creative approaches into account and merges them with neuroscientific and neuropsychological considerations, e.g. concerning the power of music and dance-movement to enhance brain plasticity and to activate the central nervous reward system causing elevated motivation and improved learning capacities [41, 42, 43, 44 & 45]. Systemic approaches are likely to significantly improve the efficacy of robot-assisted neuro-motor exercise training and a promising area of music rhythmic therapy.

In this context a dynamic causal modelling (DCM) study from Norway highlights the creative aspect and concludes 'that emotional experiences during listening to music may be generated through a stronger activation and, simultaneously, reduced functional connectivity of the reward system. Thus, "The powers of cognition that are set into play by this representation [of a beautiful object] are hereby in a free play, since no determinate concept restricts them to a particular cognition" (Kant, 1790)' [46]. Such complex research-based theoretical frameworks contribute to the basis of music rhythmic therapy, which intends to provide models with both diagnosis-specific and holistic benefits and match the young patients' creativity and desire for joy.

Foetal Alcohol Spectrum Disorder

Foetal alcohol spectrum disorder (FASD) is a clinically complex syndrome which entails a broad spectrum of complications with an adverse influence on the child's neurodevelopment [47, 48 & 49]. Given that 'FASD is a broader diagnosis that encompasses patients with FAS and others who are affected by prenatal alcohol exposure but do not meet the full criteria for FAS' treatment is multidisciplinary and includes 'managing comorbid conditions, providing nutritional support, managing behavioral problems and educational difficulties' [50]. Moreover, 'early diagnosis and living in a supportive and violence-free environment are the most important protective factors for the long-term outcome of patients with FASD' and today therapies are mostly symptom-orientated [51].

It is extremely difficult to estimate the prevalence of FASD, which markedly depends on sociocultural habits and the mothers' awareness of the influence of alcohol during pregnancy. In this context there is disagreement about the estimation of FASD prevalence and cross-cultural inferential reasoning is limited [52] – this is also a challenge to Chinese work with FSAD. A Canadian review selected 62 studies out of 11110 relevant papers and 'the global prevalence of alcohol use during pregnancy was estimated to be 9,8% (95% CI 8,9–11,1) and the estimated prevalence of FAS in the general population was 14,6 per 10 000 people (95% CI 9, 4–23, 3). We also estimated that one in every 67 women who consumed alcohol during pregnancy would deliver a child with FAS, which translates to about 119 000 children born with FAS in the world every year' [53]. These numbers, which we consider too low (e.g. the US-centers for disease control and prevention said that more than three percent of pregnant women reported binge drinking – defined as 4 or more alcoholic beverages on one occasion), call for urgent measures both in preventative public health and clinical therapeutic practice.

Although research on music and dance-movement therapeutic methods for FSAD is significantly underrepresented, there are good reasons to assume their potential efficacy. For this reason, the German music educator Julia Richter conducted research on arts-based interventions to alleviate FASD-symptoms and to support the personal growth of affected children [54]. Using music and movement together with symbolic, imaginary and dramatic play,

she discovered a vivid response and readiness to deal with core issues such as aggression, violence, anger, defiance, provocation, anxiety, emotional safety and tenderness. The positive outcome of her case-series-study was much higher than expected. Taking into account that the elements of her intervention are akin to features of music rhythmic therapy, further research is likely to yield robust methods. These, however, have to tally with sociocultural conditions and should be tailored to the children's individual characteristics.

Medical research needs afresh inspired creativity and open-minded awareness of dynamic pathological developments, and scientific inventiveness that is not repressed by apodictic adherence to inflexible frames gains momentum. An enormous flood of research following standardised designs and algorithms augments detailed knowledge, while the spirit of medical discovery seems to be fading out. By way of illustration, even journals specialising in language and communication disorders and child language teaching and therapy were reluctant to deal with an emerging pathological phenomenon, which requires interdisciplinary analyses and novel intervention methods: the 'poly-lingual withdrawal syndrome'.

Poly-lingual Withdrawal Syndrome

While bilingualism in children with developmental and communication disorders is a well studied topic, a novel issue emerges when bi- or trilingual education goes wrong. Increasing Chinese migration leads to new challenges in multiracial sociolinguistics [55]. While advantages of bilingualism in German-Chinese families are evident [56], Wolfgang Mastnak and Jiawei Gu found an above-average occurrence of conspicuous child behaviour comprising signs of oppositional defiant disorder, disruptive behaviour, temper tantrum, language-related susceptibilities and idiosyncrasies, a fragile polarity of pretentiousness and self-blame tendencies, as well as short-term social withdrawal and self-isolation.

Based on differential psychology and DSM-5 criteria, a preliminary hypothesis suggests interdependencies between escalating self-expectations, language-related problems and tendencies to get self-enclosed and oblivious to the world around. Moreover, deficient skills of understanding Chinese have a negative impact on self-identity and self-esteem.

Differences between languages determine characteristics of speech sound disorders and some children exhibit both in Chinese and in German imprecise consonants, distorted vowels and articulatory blurring to an extent that impairs communication, at home as well as at school [57]. Moreover, symptoms akin to autism spectrum disorder emerge – in a sense the 'inverse' of ASD-issues in bilingual home environments [58].

Akin to the theory of evolution of language as a neurobiological system [59], analysis of such bi-lingual difficulties gave rise to a neuro-motor language hypothesis: The evolution of (spoken) language not only follows a cultural path but also abides by neuro-motor laws to avoid both neuro-cognitive and physiologically conflicting constellations. Neuro-motor skills in German and Chinese require enormous developmental flexibility, hence the likeliness of mismatch (like permanent 'tongue twisters') and inappropriate blending.

In this context, two novel terms were coined: 'language distance size' and 'language integration size'. The first is an interdisciplinary measure containing linguistic, neuroscientific, social-cultural and cultural anthropological perspectives and estimates the

dissimilarity of languages, along with possible strains in bi-lingual education. The second is a genuine neuro-psychological measure which estimates neuro-cognitive, neuro-motor, auditory and personal-psychological capacities of multifaceted linguistic achievement.

Case-series studies with affected children in Munich involved elements and principles of music rhythm therapy and suggest that creative, music- and movement-based artistically encouraging work with language and cultural features is a viable path to treat this socially and developmentally detrimental syndrome.

Oncology & Personal Growth

A recent review on paediatric psycho-oncology stated that 'although attention to the psychosocial needs of the child and family is increasingly recognized as an essential element of care for children with cancer, implementing evidence-based care remains suboptimal' and pointed out that 'gaps in clinical care and important directions for future research include the needs of infants and toddlers, overlooked minorities, and patients with hereditary tumour predisposition syndromes, and attention to the psychosocial impact of exciting new treatments ...' [60]. Taking into account that since the 1970s psycho-oncology has developed into a firmly established part of oncological care and that 'national societies have been created in most (developed) countries and joined forces in the IPOS (International Psycho-Oncology Society 1984)' Wiener's criticism turns into an urgent call, and music rhythmic therapy could give an answer [61].

Quite different from Wiener's review, a study from the Chongqing Medical University in China sounds promising and says that cognitive behavioural therapy (CBT) 'can effectively help Chinese pediatric cancer patients modify distorted cognition to have a positive attitude towards cancer and chemotherapy. This treatment enhances resilience and relieves negative mood, which results in good psychological adjustment ability,' and has a beneficial effect on better treatment cooperation and high long-term quality of life [62].

Nonetheless, from the perspective of music rhythmic therapy we suggest to view such results critically: (i) we do not agree with the derogatory term 'distorted cognition' but advocate mindfulness in all communication with children with cancer. Paediatricians and oncologists should not judge or devalue the child's mind and cognitive patterns but support a mutually understanding exchange; (ii) CBT usually requires relatively high cognitive and linguistic skills. As cancer also affects children at early developmental stages, with low cognitive and language abilities, and cultural backgrounds which do not square the therapists' cognitive patterns, alternative models are requisite; (iii) from an interdisciplinary perspective, psycho-oncological approaches should not only focus on the child's attitude towards cancer and chemotherapy, but also take the child's entire developing personality and cancer-associated risks into account; (iv) Lang-Rollin and Berberich alluded to the problem that psycho-oncology is not necessarily a standard in developing countries and/or regions [61]. This calls for effective approaches which are relatively easy to implement and culturally compatible; (v) from a social-psychological perspective, only working with the child might fail to reach the goal. Mutual influence of views and emotions within family structures is a psychological fact, has to be taken into consideration and touches upon 'creative interaction' in music rhythmic therapy.

For some years, psycho-oncology has more and more focused on cognitive and emotional issues of parents and relatives, both with

regard to impacts on the young patient and their own wellbeing. A review including 138 studies gives evidence that parents and caregivers of children with cancer are both resilient and deeply affected by the child's illness [63]. Although parent distress often increases around diagnosis and then returns to normal levels, post-traumatic symptoms are common and in many cases paediatric oncology faces multifaceted interrelationships between paternal stress, depression and anxiety [64]. Moreover, the child's complex pathologic conditions, low socioeconomic status and innate traits of anxiety and/or anger can aggravate the entire situation.

In paediatric oncology, educating parents has become a standard. Nonetheless, 'little is known about best practices for providing this education' [65]. Additionally, research pointed out that it might be difficult to harmonise the bioethical imperative to include children in conversations about their serious illness whenever possible and the risk that the child's presence influences the openness of parents in clinical conversation [66]. From the perspective of music rhythmic therapy, this highly positive and important standard entails a certain threat: dominant cognition of cancer, treatment and disruption of 'normal life' can repress all other facets of being and neglect that the young patient is not only a patient but also a gifted child who needs space and support to unfold its talents. Exaggerated compliance can be harmful or even pathogenic and calls for balanced developmental conditions.

At this point we mount a hypothesis which – at first glance – might look inadequate or even cynical: Overestimation of the disease and neglecting the entire psychosocial dispositions and needs of the child can cause detrimental sequelae. Children are equipped with an enormously high potential to cope with hardships and to adjust to demanding situations, as long as the child feels love and experiences personal growth. In this context, a study from the University of Pittsburgh took children with cancer – stratified by time since diagnosis – and demographically matched peers, and assessed posttraumatic stress levels and symptoms. Surprisingly they reported that 'these findings suggest no evidence of increased PTSD or PTSS [posttraumatic stress disorder and posttraumatic stress symptoms] in youths with cancer. Although childhood cancer remains a significant and challenging event, these findings highlight the capacity of children to adjust, and even thrive, in the face of such challenge' [67].

All these findings together advocate a strong focus on the child's individual growth, complete, understandable and empathetic information and adequate spaces to experience and develop talents and joy, and this is where music rhythmic therapy comes into play. Whether music rhythmic therapy also has a positive impact on the oncological condition itself needs further research.

Obesity, Metabolic Syndrome & Cardiorespiratory Risks

Ten years ago Pergher et al. posed the question whether a diagnosis of metabolic syndrome is applicable to children [68], and a wealth of studies gave answers with crucial relevance to paediatrics and music rhythmic therapy. Already a few years earlier Scott M. Grundy called the metabolic syndrome a 'pandemic' and today this medical condition has become a paediatric key challenge [69,70]. Moreover, this pathological complex seems to turn into a serious threat of modern societies and the focus on cardiometabolic risk factors rapidly gains in importance [71].

The close inner connection between child obesity and metabolic syndrome is obvious and both assessing and managing this scourge of overcivilisation, which is considered 'a group of cardiovascular risk factors that are associated with insulin resistance and are

driven by underlying factors, including visceral obesity, systemic inflammation, and cellular dysfunction', has become a major paediatric concern: metabolic syndrome risks increasingly begin in childhood and adolescence and are associated with a high likelihood of future chronic disease in adulthood [72, 73].

DeBoer suggests that efforts should be made at both recognition of this metabolic risk (screening for potential associated Type 2 diabetes included) and targeting affected individuals for appropriate treatment with an emphasis on lifestyle modification. This, however, is a core issue: How shall young people modify their lifestyles? What are effective incentives and what interventions help to enhance sustainability? These issues obviously transcend the realm of conventional medicine and require interdisciplinary approaches such as music rhythmic therapy.

Development of appropriate interventions requires discovery of pathogenic factors and numerous studies focus both on eating in absence of hunger and a lack of physical exercise. Broadly speaking, the syndrome's complex conditions have to be taken into account and Richard Gill et al. called both genetic conditions, such as 16p11.2 deletion, and psychological causes, above all boredom, main triggers of obesity [74].

It goes without saying that paediatric issues of eating always have to be diagnosed in a systemic way. Nonetheless, non-pathological psychological factors often play a crucial role in pathological developments and Keren Wilson suggested that 'effective behavior strategies include the combination of motivational interviewing and cognitive behavior therapy. Other strategies include removal of environmental trigger foods, self distraction to help with cravings and boredom eating, and planning ahead' [75].

From the perspective of music rhythmic therapy, however, we emphatically contradict the suggestion to promote 'self distraction' but suggest profound support to find captivating activities which match the child's artistic talent and give full play to its innate creativity. Such approaches are inextricably linked with interdisciplinary considerations of medical, psychological, anthropological and arts theoretical perspectives.

In this context, music rhythmic therapy goes hand in hand with self-discovery and gives full play to a child's creative and artistic talents. It mirrors developmental phases and supports individual growth. In sharp contrast to mere distraction and ephemeral fun, music rhythmic therapy relates to artistic expression and aesthetic experience as core human phenomena and desires and this calls afresh for interdisciplinary approaches in treating child obesity and controlling developmental dynamics of the metabolic syndrome. Moreover, music rhythmic therapy greatly involves artistic movement which equals physical exercises – a main prescription to treat obesity and the metabolic syndrome [76].

Discussion and Prospects

Although music rhythmic therapy is a novel approach in paediatrics, and particularly in integrative paediatrics, its cultural-anthropological roots, interdisciplinary connections and meta-synthetic foundations provide a plausible theoretical framework. The research centre for arts therapies at Beijing Normal University goes in for related research, provides PhD-studies in this area and discusses basic studies in music rhythmic therapy and education. Research outcomes should provide pertinent add-on support in paediatrics, contribute to public health and improve health education. Particularly international research collaboration could greatly promote the progress and establishment of this novel discipline.

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