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Master Thesis:

The impact of martial arts training on mental health and wellbeing:

A scoping review

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The impact of martial arts training on mental health and wellbeing

Abstract

Introduction: Mental health and wellbeing are crucial components of shaping individuals' experiences. However, the prevalence of mental health issues is on the rise globally. Despite advancements in evidence-based treatments, many individuals do not seek help due to stigma. Martial arts training has emerged as a promising prevention measure for promoting mental health and wellbeing that offers a holistic approach, combining physical activity with mindfulness techniques. However, it is argued that existing research primarily focuses on physical health outcomes, while methodological limitations hinder the generalisability of findings. Therefore, this scoping review aims to provide an overview of the current state of the art research on the effect of martial arts training on mental health and wellbeing Moreover, findings from this scoping review can serve as a starting point for in-depth studies of this topic. The review will examine study characteristics, martial arts disciplines, selection criteria for mental health variables, measurement tools, and feasibility considerations for integrating martial arts into mental healthcare practices. **Methods:** A scoping review was employed following PRISMA guidelines by Moher et al. (2009). Moreover, three databases (Scopus, PsycINFO, PubMed) were searched using specific terms related to martial arts, combat sports, wellbeing, and mental health. Studies included in the review were selected based on inclusion criteria set by the researcher. Next, articles were screened for relevance using ASReview before being included in the study. **Results:** In total 16 studies that met the inclusion criteria were included in the study. Included studies varied in publication years (2006-2022) and geographical locations (Asia, Europe, USA, Australia, Brazil). Various study designs were employed. The studies included diverse participant demographics and sample sizes ranging from 12 to 283. Tai Chi was the most common discipline studied, followed by Shotokan Karate. Validated measurement tools were used to assess mental health and wellbeing outcomes across studies, with quality of life, self-efficacy, anxiety, depression and mood being the most assessed outcomes. **Discussion:** This scoping review provides evidence that martial arts training has potential of being an accessible and effective prevention measure in mental healthcare and contributes to a more comprehensive overview in the field of research. While there are limitations regarding generalisability of the results, most studies showed positive significant mental health and wellbeing outcomes. Therefore, making it a valuable contribution to this field and serving as a foundation for future more extensive studies.

The impact of martial arts training on mental health and wellbeing

Introduction

Mental health and wellbeing

Mental health and wellbeing are fundamental in shaping experiences on an individual as well as societal level (Sickel et al., 2014). In the past the absence of psychopathology was widely used to define mental health (Westerhof & Keyes, 2010). Moreover, mental illness was mainly characterised by clinically significant disruptions in individuals' cognition, regulation of emotions or dysfunctional behaviour reflecting disturbance in psychological, biological and developmental processes (APA, 2013; First & Wakefield, 2013). This pathological approach to mental health disorders emphasizes a focus on identifying and treating symptoms of dysfunction while often overlooking the broader context of mental health and wellbeing (Westerhof & Keyes, 2010). Contrasting to that the World Health Organization (WHO) emphasizes that mental health is not exclusively characterised by the absence of complaints but also includes the presence of psychological wellbeing. Wellbeing is a multifaceted concept that incorporates aspects of an individual's emotional, cognitive, and social functioning (WHO, 2016). Generally speaking, modern psychology embraces a holistic approach to mental health that views mental health as a continuum that combines symptom reduction, enhancement of psychological wellbeing and absence of psychopathological symptoms (Mittelmark & Bull, 2013; Westerhoff & Keyes, 2010).

Mental health complaints are increasing worldwide despite of improved evidence-based quality and effectiveness in treatment options over the last half century (Corrigan, 2004). Lifetime prevalence of mental illness is high with almost 50 percent of adults in the US experiencing mental illness throughout their life (Sickel et al., 2014). Since many people will be affected by mental health issues at one point, neglecting mental health treatment bears consequences on the individual as well as on the societal level. Individual consequences include higher mortality rates, disability and distress. Important societal consequences can be economically due to loss of wages and workforce as well as increased costs of health care (Sickel et al., 2014). However, many individuals refrain from seeking help for their complaints due to stigma associated with mental illness (Clement et al., 2015; Corrigan, 2004; Schnyder et al., 2017; Schomerus et al., 2018). Therefore, it is important that treatment of mental health issues should go beyond symptom reduction and incorporate strengthening individuals' mental health and wellbeing as well as laying emphasis on prevention measures (Wąsik & Wójcik, 2017). Prevention measures within mental healthcare aim to reduce prevalence and relapse of mental disorders as well as improving individuals coping mechanisms associated to their mental health complaints (Arango et al, 2018). Widely known prevention measures include healthy eating habits, positive mindset,

resilience and lastly, physical activity (Wąsik & Wójcik, 2017). It is argued that promoting physical activity as a mental health strategy is promising since it positively impacts mental health (Giandonato et al., 2021). Additionally, it is argued that it can be adopted by many individuals of the population (Giandonato et al., 2021). In a review study by Mahindru et al. (2023) it was concluded that exercise may offer beneficial outcomes for certain conditions. For instance, yoga was associated with more positive outcomes among individuals with schizophrenia compared to no intervention. Moreover, regular physical activity indicated significant improvements in sleep quality. Furthermore, a combination of medical and exercise intervention seemed to be beneficial for alcohol dependence. Lastly, it is indicated that exercise might alleviate symptoms of anxiety and depression (Mahindru et al., 2023). Within this context, considered as a form of physical activity, the impact of martial arts training on mental health and wellbeing has gained increasing interest (Kim et al. 2023). Martial arts entail a wide range of disciplines, integrating combat and self-defence techniques with aspects of mindfulness (Bozdarov, 2022).

Definition of martial arts

Many martial art forms originate in Asia, more specifically China (Maliszewski, 1992). The beginning of structured and systematic fighting can be traced back to the Shang dynasty and dates back up to 1.600 B.C. (Li & Du, 1991). Evolving over time, these fighting skills became more refined and started to spread throughout Asia, leading to the emergence of the various Asian martial arts forms known today (Draeger & Smith, 1975). Beyond merely being a fighting skill, martial arts intertwine the concept of combat sports with a deeply rooted emphasis on holistic wellbeing and philosophical development (Maliszewski, 1992). Acknowledging around 200 distinct forms of martial arts, each with their respective styles, they share mental, philosophical and historical dimensions that go beyond fighting or self-defence (Bu et al., 2010; Tadesse, 2017). Although mostly originating in Asia, martial arts gained global interest and are an established component of the fitness industry with an estimation of over 100 million practitioners (Bu et al., 2010).

Martial arts and Mental health

Martial arts are being studied due to diverse benefits in areas like sport and fitness, self-defence and combat, meditation and mental discipline, positive development of character strengths and self-confidence and even as an alternative treatment for certain medical conditions (Sharpe et al., 2007). While literature on this topic is somewhat limited, within the domain of health promotion, martial arts are starting to gain recognition as a beneficial form of exercise for many populations (Bozdarov, 2022; Kim et al. 2023). Furthermore, it is argued that the exercise practices of martial arts that incorporate mindfulness techniques, such as deep

breathing, demonstrate more positive mental health outcomes compared to those without mindfulness components (Chekroud et al., 2018; Morres et al., 2019). Moreover, aerobic exercises that integrate high-intensity interval training (HIIT) as in many martial art forms indicate improvements in mental health (Cheema et al., 2015). One example of exercise that combines HIIT with mindfulness elements, including body awareness and deep breathing, are martial arts forms such as Boxing (Bozdarov, 2022). This unique combination of elements found in martial arts sets it apart from traditional forms of exercise and highlights their potential in mental healthcare (Bozdarov, 2022; Chekroud et al., 2018; Morres et al., 2019).

Transitioning to the impact of martial arts training on mental health and wellbeing, numerous disciplines such as Boxing, Tai Chi and Taekwondo offer a variety of benefits. For instance, Boxing is associated with improvements in stress reduction, weight loss, improvement of self-esteem, mood, and concentration (Bozdarov, 2022). Tai Chi on the other hand is found to be beneficial particularly for elderly individuals and associated with enhancement of psychosocial wellbeing and reduced risk of falling (Verhagen et al., 2004). Taekwondo training has been associated with various positive mental health and wellbeing benefits (Kim et al., 2016; Lakes & Hoyt, 2004; Tadesse, 2016). Adolescents with and without disabilities participating in Taekwondo reported improved mind-body connection, strengthened self-control, self-reflection and discipline (Kim et al., 2016; Lakes & Hoyt, 2004; Tadesse, 2016). Furthermore, individuals partaking in Taekwondo training reported increased social support and a reduction in physical and mental stress responses (Iso-Aloha & Park, 1996). Positive associations between Taekwondo training and body image, self-esteem and psychological drive have also been identified (Weiss & Miller, 2019). Moreover, higher engagement in Taekwondo training was associated to higher level of life satisfaction compared to lower engagement (Kim & Heo, 2011). Adolescents participating in Taekwondo interventions have shown significant improvements in mental health and self-regulation, while also experiencing a decrease in self-destructive behaviours (Lakes & Hoyt, 2004). Moreover, Taekwondo practice has been associated with reduced stress levels and the development of bravery, self-respect, and self-determination in university students (Petrovic, 2017). Lastly, a recent study by Kim et al. (2023) indicated that nursing home residents reported higher levels of pleasure, cultural growth, and reduced stress levels after participating in Taekwondo training. Next, Tadesse (2016) indicates that psychosocial benefits like pro-social behaviours and enhanced friendships were discovered in martial artist and trainers (e.g., respect, sociability, patience). Moreover, these psychosocial benefits extend to mental benefits such as improved confidence, bravery, psychological satisfaction, contentment, increases in cognitive capabilities, independence, self-alertness, and self-protection.

Further benefits include addiction prevention, academic enhancement and gaining new skillsets (Tadesse, 2016). The positive impact of martial arts training on mental health is further emphasised by an association of improved social skills and mental health promotion in children taking part in combative martial art forms (Kuśnierz, & Bartik, 2014). Furthermore, an educational intervention that incorporated Tai Chi training with mindfulness-based stress reduction found positive associations for children regarding wellbeing, serenity, relaxation, sleep quality, decreases in reactivity as well as amplified self-maintenance, awareness, and connection to nature (Wall, 2005).

In summary, martial arts are increasingly experiencing recognition as a holistic form of exercise, demonstrating significant mental health and wellbeing benefits. Therefore, potential implementation in mental healthcare could serve as a cost-effective and accessible option, providing physical and psychological benefits and serving as a promising prevention measure (Bu et al., 2010).

Current study

Implementing martial arts training into mental health care is promising. However, Burke et al. (2007) argue that existing martial arts research predominately focuses on physical health related aspects of martial arts. Therefore, more exploration of mental healthcare variables is needed. Furthermore, existing research on psychological effects of martial arts training often focuses on aggression and personality traits, with sometimes opposite findings (Moore, 2020). Generally, several studies show positive effects of martial arts training on mental health and wellbeing (Tadesse, 2016; Verhagen et al., 2004). However, only a limited number of studies examine whether martial arts training promotes mental health and wellbeing or whether it should be implemented into mental healthcare (MacQuarie & Roberts, 2010). Also, despite of several positive findings the generalisability of these findings is rather difficult due to methodological issues (Moore, 2020). Moreover, former systematic reviews and meta-analyses only offered limited understandings concerning the effects of martial arts training on mental health and wellbeing. It is argued that the focus in these studies is often on a single type of martial arts form or a single aspect of mental health. In turn, leading to difficulties in comprehensiveness concerning the topic. Other main issues identified in the existing literature are methodological issues since majority of research designs display homogeneity and non-transparent research designs. Research designs are often cross-sectional, have small sample sizes, self-selection bias, rely on non-validated self-reported data, and disregard gender differences. Moreover, it is often uncertain where the data used in the studies was acquired. This confounds the process of assessing reliability and validity of the study results. Lastly, a tendency of selectively

interpretating results in favour of martial arts training seems to be present in the research concerning the topic. This in turn leads to doubts about credibility and robustness of outcomes. (Moore et al., 2020).

While acknowledging the existing literature on this topic, it is important to recognise its drawbacks and limitations. Therefore, to address these gaps and methodological limitations, a comprehensive examination of the existing literature is necessary. It is essential to conduct a review that considers a wide range of martial arts disciplines, covers various aspects of mental health and wellbeing variables and utilises rigorous methodological standards to provide a more nuanced understanding of the relationship between martial arts training and mental health and wellbeing. In turn, this study can contribute to a more comprehensive understanding in this field and summarise the existing body of research into one paper. Therefore, the aim of this current study is to review studies that investigate the effect of martial arts training on mental health and wellbeing.

This will be executed in form of a scoping review. According to Munn et al. (2018) scoping reviews are beneficial in guiding further research and identifying gaps in knowledge. Therefore, findings from this scoping review can serve as a starting point for in-depth review of this topic. The current study will provide a thematic overview of the current state of the art research on the effect of martial arts training on mental health and wellbeing. These following research objectives will be addressed:

1. What are common characteristics (e.g. study design, sample size, participants) of studies that examine the impact of martial arts training on mental health and wellbeing?
2. Which specific martial arts disciplines are predominantly chosen for research studies in this field?
3. What criteria and methods are employed to select variables related to mental health and wellbeing in the context of martial arts training studies?
4. Which validated measurement tools and techniques are employed to assess mental health and wellbeing outcomes in martial arts training studies?
5. What are practical considerations and potential benefits that determine feasibility of integrating martial arts training into mental healthcare practices?

Methods

Research design

The research method employed in this study is a scoping review. This scoping review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines extension for scoping reviews (Moher et al., 2009; PRISMA-ScR). The aim of scoping reviews is to systematically identify and map existing literature on a specific topic (Grant & Booth, 2009). Moreover, the aim is to identify gaps in research, key concepts and the overall state of the art in the field of the topic (Grant & Booth, 2009).

Search strategy

To search for relevant literature three online databases were selected. The first chosen data base is Scopus since it offers extensive coverage of scientific literature (Harzing & Alakangas, 2016). Therefore, it was selected as it provides a broad range of academic articles across various disciplines to facilitate the literature search for this field of study. Next, PsycINFO offers a variety of studies that focus on psychological and mental health studies (APA, 2024). This data base was chosen to ensure the inclusion of relevant literature in the area of research for the review. Lastly, PubMed was included to find key research publications in the field of interest (Canese & Weis 2013). The search strings used for each platform are constructed by combining relevant terms related to martial arts, combat sports, wellbeing, and mental health. Combining these afore mentioned terms lead to the construction of the following search string:

Table 1

Search strategy

Databases	Search string
Scopus & PsychINFO & PubMed	ALL (("martial art*" OR "combat sport*") AND ("mental health" OR "mental wellbeing" OR "mental well-being" OR wellbeing OR "well-being" OR "emotional wellbeing" OR "emotional well-being" OR "social wellbeing" OR "social well-being" OR "psychological wellbeing" OR "psychological well-being"))

Inclusion criteria

To ensure relevance and quality of the included studies, specific inclusion and exclusion criteria were established. The criteria for study inclusion are as follows:

1. The article is written about original research

2. There is no restriction on the time of publication
3. The article is published in a peer-reviewed journal
4. The article is written in English or German
5. The article investigates the effect of martial arts training on mental health or wellbeing
6. The article uses valid measures to examine mental health/illness or wellbeing outcomes in the context of investigating the impact of martial arts training (e.g. MHC-SF, WEMWBS, SWLS, PANAS, SWBS, PWBS)

Study selection

Studies resulting from the search were further selected by one researcher. First, duplicates did get removed via EndNote. Next, the articles were downloaded as a RIS file and uploaded in ASReview (AI-based) to conclude the relevance for the systematic review process. Then, articles were labelled by screening the title, then abstract to give ASReview indications of relevant attributes about the literature. This allows ASReview to order the articles by predicting their relevance (Van de Schoot et al., 2021). The review process was terminated after finding all relevant articles. Then the full text of all relevant articles was read by the author. Based on all six inclusion criteria set by the researcher the study was either deemed eligible or not. Ultimately 16 studies were chosen and included in the current study. The flow diagram from *Figure 1* shows the step-by-step process of the inclusion process according to the PRISMA guidelines (Moher et al., 2009).

Data extraction

The articles for this review were examined based on the specified research objectives. Data extraction was conducted by the researcher of this current study. Multiple data points related to the research objectives were obtained from the studies. First, Author, year of publication, study design, participant characteristics and general findings of the studies were extracted. To address objective 1, study design (e.g., randomised controlled trial, qualitative/quantitative study), origin country of the study and duration of the intervention as well as frequency of assessment measures were extracted. Moreover, population characteristics like sample size and mental health/wellbeing state of the sample were extracted. Lastly, demographic characteristics of participants (e.g., age, gender, ethnicity) were extracted for the first objective.

To address objective 2 information on the specific martial arts disciplines investigated in each study were extracted. This was done by extracting the mentioned martial arts disciplines (e.g., karate, taekwondo, judo) as well as the frequency of the martial arts discipline mentioned and focus or variations within the disciplines like traditional or mixed martial arts or combat sports.

Next, for the third objective details regarding the criteria and methods used for variable selection in the studies were extracted. Meaning, criteria for variable selection related to mental health or wellbeing such as established theoretical frameworks or prior research were extracted. Furthermore, the methods employed for variable selection (e.g., expert consultation, literature review, pilot testing) were extracted. Lastly, the description of specific variables selected for assessment (e.g., self-esteem, mood, stress levels) were extracted.

Next, to address objective 4 measurement tools used for assessing mental health and wellbeing outcomes (e.g., standardised questionnaires, scales) and the specific names of the measurement tools (e.g., MHC-SF) were extracted as well as the purpose and psychometric properties of the scales.

For the fifth and last objective practical considerations for integrating martial arts training into mental healthcare practices such as feasibility, resource requirements or potential barriers were extracted. Moreover, potential benefits related to integrating martial arts training into mental healthcare (e.g., improved self-esteem, stress reduction) were extracted.

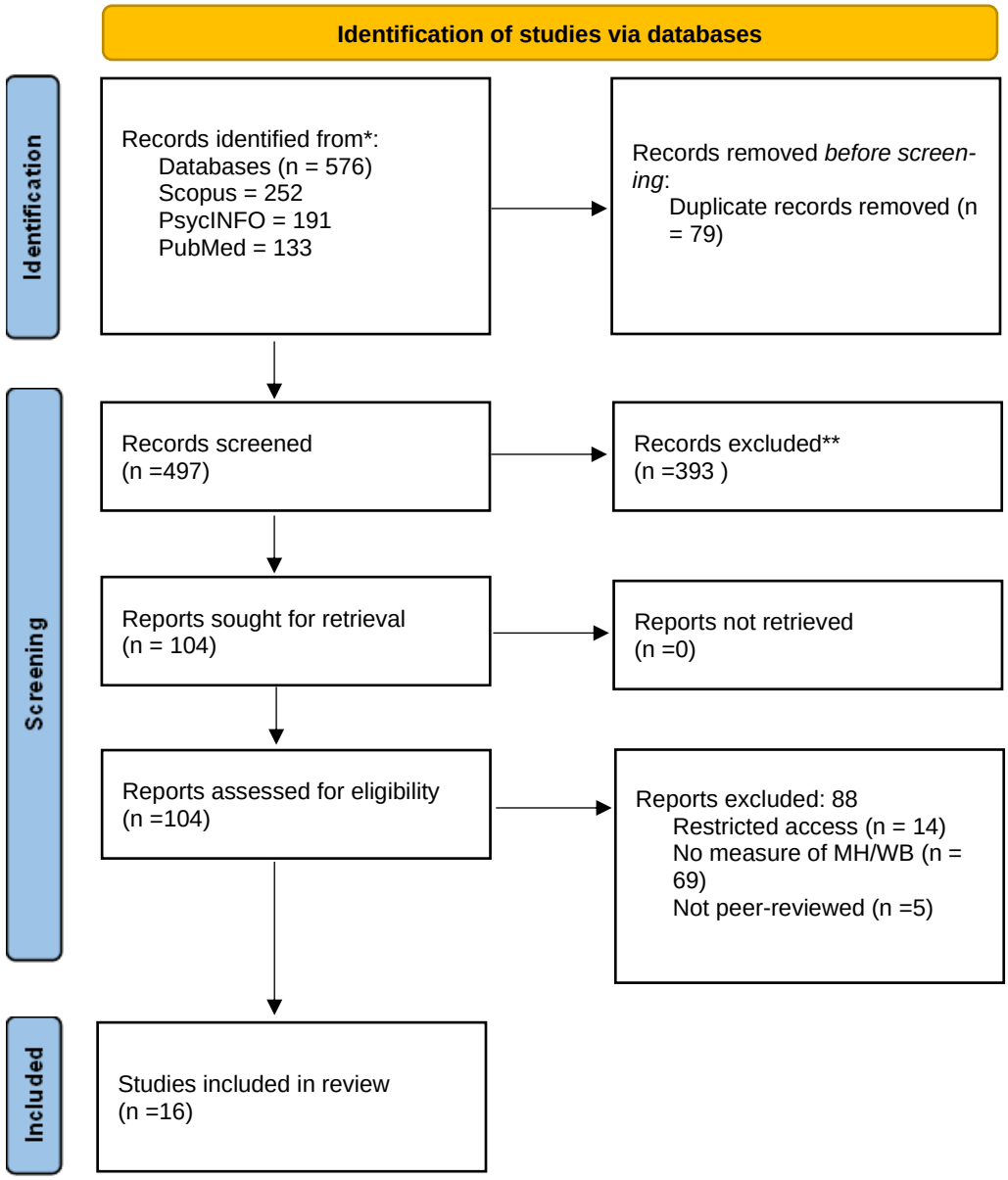
Results

Selection of studies

Searching through the databases Scopus, PsycINFO and PubMed yielded 576 search results (Figure 1). Out of the 576 records 79 duplicates got removed. Then, the remaining 497 got screened by reading title and abstracts which led to an exclusion of 393 articles not meeting inclusion criteria set by the researcher. Following that the full text of the 104 articles was read which led to further exclusion of 88 articles. Reasons for exclusion entail restricted access, no measure of MH/WB or the articles not being peer reviewed. Finally, 16 articles met all inclusion criteria and thus got included in the current review study.

Figure 1

PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only



Study characteristics

Study characteristics of the included studies are presented in Table 2. The publication years of the studies span from 2006 to 2022. Moreover, most studies were conducted in Asia (*n* = 5), namely China (*n* = 3), Taiwan (*n* = 1) and Japan (*n* = 1) and Europe (*n* = 5), namely Germany (*n* = 3), Ireland (*n* = 1) and Italy (*n* = 1). The next most studies were carried out in the USA (*n* = 3) and Australia (*n* = 2). Lastly, one study was conducted in Brazil. All studies

examined the effect of a martial arts-based intervention on a psychological or wellbeing outcome.

Different study designs were employed, including randomised controlled designs (n = 5), quasi-experimental designs (n = 2), cross-sectional designs (n = 2), pilot studies (n = 2), one experimental design, one survey, one mixed methods study, one unblinded trial and lastly, one non-equivalent pretest–post-test control group design.

Participants had large variations in ages ranging from the age of 12 to the age of 93. Recruitment sources of the included studies were also diverse. Two studies recruited population from nursing homes (Chen et al., 2007; Lee et al., 2010). Moreover, five studies recruited participants with (chronic) diseases (Fleischer et al., 2020; Redwine et al., 2012; Salchow et al., 2021; Taylor-Piliae et al., 2006; Ying et al.,2019). Furthermore, three studies examined (university) students as their population of interest (Greco et al.,2019; Moore et al.,2018; Sun et al.,2022). Sample sizes of the reviewed studies ranged from 12 to 283 participants. The study by Baxter & Francis (2013) had 68 participants with 13 males and 55 females aged between 18 and 68. Next, Chen et al. (2007) recruited 28 elders aged 28 to 88. Da Silva Duarte et al. (2022) conducted a study with 75 males aged from 18 to 54, the participants were either Kickboxers, Jui jitsu practitioners or non-practitioners. Fleischer et al. (2020) included 19 participants of whom half were female and half male participants. Greco et al. (2019) included 100 students aged 14 to 16. Jansen et al (2012), included 45 participants aged 67 to 93. In a different study Jansen et al. (2016) included 55 participants aged 52 to 81. Lee et al. (2010) included 139 nursing home residents with around 95% being female and a mean age of 83. The study by Marshall et al. (2018) included 12 mostly female healthcare workers aged between 28 and 56. Miyata et al. (2020) included 33 healthy martial arts practitioners and 66 healthy non-practitioners. Moore et al. (2018) included 283 secondary school students aged 12 to 14. Redwine et al. (2012) examined heart failure patients, aged between 48 and 83, with around 90% of male participants. Salchow et al. (2021) included 51 breast cancer survivors. Sun et al. (2022) included 60 university students with a mean age of 22. Taylor-Piliae et al. (2006), explored 39 ethnic Chinese participants with cardiovascular disease risk factors, with participants having a mean age of 66 years. Lastly, Ying et al. (2019) examined breast cancer survivors, including 86 participants.

Martial arts disciplines

The most common martial arts discipline included in the studies were different forms of Tai Chi (n = 7) followed by Shotokan Karate (n = 4). Furthermore, Jui Jitsu was examined by three studies, Baduanjin as well as Kickboxing by one study and two studies did not specify the martial arts forms examined in their study.

Methods for variable selection and measurement tools

To examine mental health and wellbeing outcome variables, validated measurement tools were employed across all reviewed studies. Most studies included measures for depression (n = 9), anxiety (n = 6), Quality of Life (QoL) (n = 5) and self-efficacy (n = 4). Most studies administered pre- and post-test assessments to investigate the impact of martial arts practice on the mental health and wellbeing outcomes. All studies selected variables theoretically supported by psychological research. For instance, Baxter et al. (2013) selected the variables General Self-Efficacy (GSE), Locus of Control (LoC), Hope and social support that are argued to positively impact QoL. To measure QoL the World Health Organization's 26-item brief quality of life scale (WHOQoL-BREF) was used. (Baxter et al., 2013).).

Next, to investigate wellbeing of institutionalised elders after Yang-style Tai Chi practice intervention, Chen et al. (2007) utilised the Chinese version of the SF-36 health survey. Moreover, other measures included in the study were blood pressure, sleep quality, fall occurrence and fear of falling to gain an accurate representation of wellbeing variables relevant for a population of frail older people. The study was a longitudinal, time-series, quasi-experimental design and went over a time span of six months with twice a week, 60-minute sessions of Yang-style Tai Chi practice administered as an intervention (Chen et al., 2007).

The study by Da Silva Duarte et al. (2022) compared mood of regular Jiu-jitsu and Kick-boxing and non-sports practitioners. For that the Brunel Mood Scale questionnaire (BRUMS) was utilised. To measure participants levels of physical activity the International Physical Activity Questionnaire (IPAQ) was used (Da Silva Duarte et al., 2022).

The study by Fleischer et al. (2020) evaluated the feasibility of Shotokan Karate classes among individuals with Parkinson's disease (PD) and explored effects of training on objective and patient-reported outcomes. To measure disease-related quality of life the researchers utilised the PDQ-8. Moreover, falls were monitored, and overall wellbeing was assessed using the PGIC. Exploratory outcomes included mobility and mood by using the Hospital Anxiety and Depression Scale and cognition by using the Digit Span Forward and Backward Symbol Digit Modalities Test. Lastly, to measure physical activity levels the International Physical Activity Questionnaire (IPAQ) was used (Fleischer et al., 2020).

The study by Greco et al. (2019) examined the effect of a 12-week karate-based intervention on resilience and self-efficacy. To measure individual capacities, resources, relationship dynamics with primary caregivers, contextual factors, academic, social, emotional, and total self-efficacy the Child and Youth Resilience Measure (CYRM-28) as well as the Self-Efficacy Questionnaire for Children (SEQ-C) were used (Greco et al., 2019).

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In their experimental pilot study, Jansen et al. (2012) explored the influence of Shotokan Karate training on cognitive functioning and mental state in older individuals by using the Center of Epidemiological Studies Depression Scale (CES-D) (Jansen et al., 2012).

In a different study Jansen et al. (2016) compared the effects of Karate and mindfulness-based stress reduction on wellbeing and cognitive functioning by the means of a randomised controlled trial (Jansen et al. 2016). The measurements included the Mindful Attention Awareness Scale (MDBF), Hospital Anxiety and Depression Scale (HADS), Life Orientation Test-Revised (LOT-R), Short Form-12 Health Survey (SF-12), Trier Inventory for Chronic Stress (TICS), and Hair Cortisol Concentration (Jansen et al., 2016)

Lee et al. (2010) investigated psychosocial effects of Tai Chi on nursing home residents. This was done by using the State Self-Esteem Scale (SSES), SF-12 Health Survey, Social Support Questionnaire-6 (SSQ6), and Social Network and Health Inventory (SNHI) in a non-equivalent pretest-post-test control group design (Lee et al., 2010).

Marshall et al. (2018) utilised Tai Chi training in a mixed methods research design to promote wellbeing in healthcare staff by employing the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS).

Miyata et al. (2020) conducted a cross-sectional study to examine if practice of

martial arts are associated with mindfulness and psychological health. The researchers assessed mindfulness levels by using the Five Facet Mindfulness Questionnaire (FFMQ), subjective well-being by using the Scale of Subjective Well-being (SWBS) and depressive symptoms by using the Beck Depression Inventory (BDI) (Miyata et al., 2020).

Moore et al. (2018) conducted a randomized controlled trial with secondary school students to examine the effects of a martial arts-based psycho-social intervention on participants' ratings of resilience and self-efficacy. Moore et al. (2018) used the Strengths and Difficulties Questionnaire (SDQ), Child and Youth Resilience Measure (CYRM), and Self-Efficacy Questionnaire for Children (SEQ-C).

Redwine et al. (2012) measured the impact of a Tai Chi intervention on somatic and cognitive symptoms of depression in patients with heart failure through a pilot study. The measurement tools used are the Beck Depression Inventory (BDI) and the Multidimensional Fatigue Symptom Inventory-Short Form (MFSI-SF) (Redwine et al., 2012).

Salchow et al. (2021) conducted a randomised-controlled intervention study on breast cancer survivors examining the influence on self-efficacy by a holistic orientated training schedule based on the Kyusho Jitsu martial art and explore the effects on self-efficacy, distress, fear, and depression.

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Sun et al. (2022) assessed the impact of martial arts on the mental health of university students through an experimental intervention by using the Symptom Checklist-90 (SCL-90).

Taylor-Piliae et al. (2006) explored changes in psychosocial status following a 12-week Tai Chi exercise intervention in ethnic Chinese individuals with cardiovascular risk factors. Moreover, Taylor-Piliae et al. (2006) used the Perceived Stress Scale (PSS), Profile of Mood States (POMS), and the Multidimensional Scale of Perceived Social Support (MSPSS).

Lastly, Ying et al. (2019) conducted a randomized controlled trial evaluating the effectiveness of Baduanjin practice in breast cancer survivors. The researchers employed the Generalized Anxiety Disorder Scale (GAD), Patient Health Questionnaire-9 (PHQ-9), and lastly, the Functional Assessment of Cancer Therapy-Breast (FACT-B) for psychological rehabilitation (Ying et al., 2019).

Table 2

Study characteristics

Reference	Country	Aim	Study Design	Participants	Martial arts discipline	Measurement tool	Assessment
1. Baxter & Francis (2013)	Australia	Examine TCC impact on (QoL)	Survey	68 (13 M, 55 F) 18 and 68 years	Tai Chi Chuan	WHOQoL-BREF, General self-efficacy scale, IPC, 12 Item Hope scale, MSPSS	3 groups: TCC, Gym exercise, book club (control)
2. Chen et al. (2007)	Taiwan	examine effects of TC on physical and psychological wellbeing	Longitudinal study	28 elders in long-term care (65-88 years, 53-60% males)	Yang style tai chi	SF-36 Health Survey (Chinese version)	Baseline, 1, 2, 3, and 6-month assessments
3. Da Silva Duarte et al. (2022)	Brazil	Compare mood of MA andnon-sports practitioners.	Cross-sectional study	75 male practitioners (18-54 years)	Jiu-Jitsu, Kickboxing	Brunel Mood Scale (BRUMS)	Electronic questionnaires

4. Fleischer et al. (2020)	USA	feasibility of karate classes among PD patients	unblinded trial	19 PD patients (52,6% Female)	Shotokan Karate	PDQ-8, PGIC, HADS	pre- and post-intervention assessments
5. Greco et al. (2019)	Italy	Impact of karate on resilience and self-efficacy	Randomised controlled study	100 students (14–16 years, 50% male, 50% female)	Shotokan Karate	CYMRM-28, SEQ-C	Pre- and post-tests
6. Jansen et al. (2012)	Germany	influence Karate on cognitive functioning and mental state	Pilot study	45 older adults (67-93 years, 15 M, 30 F)	Shotokan Karate	CES-D-scala, long version	Pre and post-tests
7. Jansen et al. (2016)	Germany	effects of karate vs mindfulness-intervention	Randomised controlled trial	55 adults (52-81 years, 21 M, 33 F)	Shotokan Karate	MDBF, HADS, LOT-R, SF-12, TICS, Hair cortisol concentration	Pre- and post-test

8. Lee et al. (2010)	China	psychosocial effects of TC	Non-equivalent pretest–post-test control group design	139 nursing home residents (mean age: 82.7, 94.67% female)	Tai Chi	SSES, SF-12, SSQ6, SNHI	pre-and post-tests
9. Marshall et al (2018)	Ireland	Effects of TC on wellbeing	mixed methods design	12 healthcare workers (28-56 years, 10 F, 2 M)	Tai Chi	WEMWBS	pre- and post-tests
10. Miyata et al. (2020)	Japan	Impact of MA on mind-fulness and MH	cross-sectional design	99 practitioners and non-practi-tioners (22-67 years)	multiple styles of Japanese MA	FFMQ, SWBS,BDI,	questionnaire survey
11. Moore et al. (2018)	Australia	Effects of MA on resilience and self-effi-cacy	Randomised controlled trial	283 secondary school students (12-14 years, 143F, 136M)	Not specified	SDQ, CYRM, SEQ-C	Pre- and post-tests

12. Redwine et al. (2012)	USA	Impact of TC on depression	Pilot study	28 heart failure patients (48-83 years, 87.5% male)	Tai Chi	BDI, MFSI-SF	Pre- and post-tests
13. Salchow et al. (2021)	Germany	Influence of Kyusho Jitsu on depression self-efficacy, distress, fear	Randomized-controlled study	51 breast cancer survivors	Kyusho Jitsu	SWE, PSQ-20, HADS,	Pre- and post-tests
14. Sun et al. (2022)	China	impact of TC on mental health	Experimental intervention	60 university students (22 years, 30 M, 30 F)	Taijiquan	SCL-90	Pre and post-tests
15. Taylor-Piliae et al. (2006)	USA	Effect of TC psychosocial status	Quasi-experimental study	39 patients (mean age: 66 years, 69% female)	Tai Chi	PSS, POMS, MSPSS	Pre- and post-tests
16. Ying et al. (2019)	China	effect of Baduanjin on	Randomised controlled trial	86 breast cancer survivors	Baduanjin	GAD, PHQ-9, FACT-B,	Pre- and Post-tests

The impact of martial arts training on mental health and wellbeing

physical and

psychological

rehabilitation

Note: TCC= Tai Chi Chuan, TC= Tai chi, QoL= Quality of Life, MA= Martial arts MH= Mental health

Effectiveness and feasibility

Table 3 highlights key aspects of the reviewed articles including effectiveness and feasibility. By investigating adherence and withdrawal rates across the reviewed studies, insights into the feasibility as well as practical considerations and potential benefits of integrating martial arts training into mental healthcare practices were assessed. Furthermore, to gain insights on the effectiveness of martial arts-based interventions, outcomes related to the mental health and wellbeing measures were examined. Various mental health and wellbeing outcomes were measured in the studies and multiple studies included either QoL, anxiety, depression, self-efficacy, or resilience outcomes. Several key aspects emerged across the reviewed studies.

Improved wellbeing and Quality of Life

Fleischer et al. (2020) found significant improvements in overall wellbeing and QoL in individuals with Parkinsons disease that took part in Shotokan Karate classes. Another study examining the impact on emotional mental states in elderly participants taking part in Shotokan Karate discovered that integrated involvement led to enhanced self-worth as well as improved quality of life (Jansen et al., 2012). The practice of Tai Chi Chuan demonstrated benefits by improvements in both physical and psychological Quality of Life (QoL) (Baxter & Francis, 2013). In nursing home residents, Tai Chi was associated with improved state self-esteem and mental and physical quality of life (Lee et al., 2010). Furthermore, Yang Style Tai Chi exhibited positive outcomes, particularly in enhancing physical health status and social functioning for frail older individuals (Chen et al., 2007). Moreover, Marshall et al. (2018) found significant improvements in wellbeing among their participants. Taylor-Pilae et al. (2006) found significant reductions in perceived stress, improvements in mood state, and increased perceived social support in participants engaging in Tai Chi practice. Japanese martial arts practices highlighted a positive correlation between expertise through continued practice and higher dispositional mindfulness and desirable psychological status (Miyata et al., 2020). Da Silva Duarte et al. (2022) discovered that regular Kickboxing as well as Jui Jitsu practice is associated with greater mental health compared to non-practitioners.

Enhanced resilience and self-efficacy

Furthermore, a martial arts-based psychosocial intervention demonstrated consistent improvement in strengths-based wellbeing outcomes, including resilience and self-efficacy in school children (Moore et al., 2018). Participants taking part Kyusho Jitsu indicated a significant increase in overall self-efficacy scores within the intervention group, suggesting the effectiveness of the intervention (Salchow et al., 2021). Similar significant findings were also

discovered by measures of increased resilience and self-efficacy in adolescent Shotokan Karate practitioners (Greco et al., 2019).

Reduced depression and anxiety symptoms

Redwine et al. (2012) found significant reductions in total depression scores as well as in somatic affective symptoms of depression in patients with heart failure participating in their Yang-style Tai Chi programme. Additionally, Taijiquan (Tai Chi) was found to significantly improve mental health by reducing symptoms of obsessive-compulsive disorder, depression, anxiety and hostility among college students (Sun et al., 2022). Moreover, a study that examined Shotokan Karate and mindfulness interventions on mental health demonstrated Karate's efficacy in reducing anxiety and promoting self-rated mental health (Jansen et al., 2016). Finally, Baduanjin practice demonstrated positive impacts on depression and Quality of Life (QoL) for breast cancer survivors (Ying et al., 2019).

Adherence

Several studies reported high adherence rates. For instance, in the study by Chen et al. (2007), 21 out of the 28 participants completed the study. Moreover, in the study by Fleischer et al. (2020) 15 out of 19 participants completed the study with a mean adherence of 87% during ten weeks of intervention. All in all, 53% of participants continued karate training even 6 months after the intervention (Fleischer et al. (2020). Next, in the study of Greco et al. (2019), only 2 out of 100 participants dropped out and 83.7 % indicated a desire to continue Karate training after completing the intervention. In the study by Tylor-Pilae et al. (2006) 87% adherence to the intervention was found, moreover only 1 dropout after a 6-week evaluation. In the study by Lee et al. (2010) there was a 85.5% attendance rate and a 25.8% attrition rate. In the study of Redwine et al. (2012) 24 out of 28 continued the study. In Ying et al. (2019), 14 out of 100 participants withdrew after randomisation.

In the study by Jansen et al. (2012) 60 agreed to participate, 10 got excluded, 4 dropped out, 1 died thus, only 12 of the participants completed each training. Moreover, Jansen et al. (2016) showed that 66 participants completed preassessment and two thirds of the training (66% of total training sessions). After inclusion, 11 participants dropped out during study without giving reason. Thus, the final sample had 55 participants (Jansen et al., 2016).

Next, Moore et al. (2018) had a drop out of 42 participants, with 20 choosing to discontinue,13 changed schools, 9 unknown reasons. Next in the study by Salchow et al. (2021) 60 initially enrolled, only 51 came to the first assessment, 14 dropped out from the intervention group and 7 from the control group. Moreover, the average training participation was 67%.

Table 3

Effectiveness and Feasibility of studies

Reference	Martial arts discipline	MH/WB variables	Findings	Effectiveness	Feasibility
1. Baxter & Francis (2013)	Tai Chi Chuan	QoL, Self-efficacy, Loc, Hope, Social support	Partial support for Tai Chi and psychological QoL	Better physical and psychological QoL	N/A.
2. Chen et al. (2007)	Yang style Tai Chi	MH status, quality of sleep, fear of falling	Can be beneficial for frail older people	Physical health and social functioning significantly improved	25 % withdrawal rate
3. Da Silva Duarte et al. (2022)	Jiu-Jitsu, Kickboxing	Tension-anxiety, depression-melancholy, hostility-anger, vigor-activity, fatigue-inertia and confusion- disorientation	Regular combat sports practitioners had better mental health	Improved MH compared to non-practitioners	N/A.

4. Fleisher et al. (2020)	Shotokan Karate	QoL, Global impression of change, mood, cognition, depression, anxiety	Clinical improvement in QoL, no changes in mood or cognition	QoL and wellbeing improved significantly	79% completion rate
5. Greco et al. (2019)	Shotokan Karate	Resilience, self-efficacy	Significant increases in resilience and self-efficacy	Improved resilience and self-efficacy	2% withdrawal. 83.7% wanted to continue training
6. Jansen et al. (2012)	Shotokan Karate	Emotional mental state and depressive pathology	Significant improvement in emotional mental state	Improved QoL and self-worth	10 excluded, 4 dropped out
7. Jansen et al. (2016)	Shotokan Karate	Subjective wellbeing, anxiety, depression, optimism, stress	Improvement in cognitive processing speed and MH	Training effect on anxiety and MH	66% completion rate
8. Lee et al. (2010)	Tai Chi	Self-esteem, HRQOL, Social support	Significant improvement in self-esteem and QoL	Effective in promoting psychological health	Attrition rate of 25.8%

9. Marshall et al. (2018)	Tai Chi	Subjective wellbeing, psychological functioning	significant gains in wellbeing	All participants expressed positive benefits	N/A
10. Miyata et al. (2020)	Multiple styles of Japanese martial arts	Mindfulness, subjective wellbeing, depression	Practitioners had higher mindfulness and wellbeing	Continued practice associated with better psychological health	N/A
11. Moore et al. (2018)	Not specified	Behaviour, Resilience, Self-efficacy	Improved resilience and self-efficacy	Beneficial for wellbeing outcomes	42 dropped out
12. Redwine et al., 2012)	Yang-style Tai Chi	Depression, Fatigue	Reduced depression symptoms	Effective for reducing depression	24 of 28 completed study
13. Salchow et al. (2021)	Kyusho Jitsu	Self-efficacy, Perceived stress, Anxiety, Depression	Significant improvement in distress intervention	Increase in self-efficacy	Average training participation = 67%
14. Sun et al. (2022)	Taijiquan	Obsessive compulsive symptoms, depression, anxiety, and hostility	Improved MH, reduced depression and anxiety	Significant role in MH of college students	N/A

15. Taylor-Pilae et al. (2006)	Tai Chi	Stress, Mood state, Perceived social support	Significant improvements in psychosocial status, mood, stress	significant reductions stress, improvement mood state, increase in social support	87% adherence to intervention
16. Ying et al. (2019)	Baduanjin	Anxiety, Depression, Quality of Life	significant improvements in depression, QoL and breast cancer subscale	effective for improving physical and psychological health	14 withdrew

Note: TCC= Tai Chi Chuan, TC= Tai chi, QoL= Quality of Life, MH= Mental health

Discussion

The aim of this scoping review was to investigate the impact of martial arts training on mental health and wellbeing and to provide a thematic overview of the current state of the art in this field. This current study reviewed sixteen articles and contributes insights into study and participant characteristics, martial art disciplines, methodologies, effectiveness, feasibility, potential benefits and tools applied in the existing research investigating the impact of martial arts training on mental health and wellbeing. To draw comprehensive conclusions regarding the impact of martial arts training on mental health and wellbeing the five research objectives set by the researcher of this current study will be addressed in the following section.

Main findings

The first objective examined common characteristics of the reviewed studies. Publication dates varied and ranged from 2006 to 2022. This reflects the evolving and ongoing interest and exploration in this field of research (Kuśnierz & Bartik., 2014; Bu et al., 2010; Tadesse., 2016). Indicating ongoing relevance and potential advancement in understanding the impact of martial arts training on mental health and wellbeing. Next, around one third of the studies were conducted in Asia and around one third in Europe. Following that, three studies were conducted in the USA, two in Australia and one in Brazil, demonstrating that many nations practice martial arts and recognise its benefits and possibilities (Kim et al., 2023). This is in line with Tadesse (2017) that states that martial arts even though originating in Asia gained increasing popularity in the west and other parts of the world, especially in the 1970s (Tadesse, 2017). This increase in popularity is argued to be a result of Asian migration to the USA followed by popularisation of martial arts via the film industry (Tadesse, 2017). Moreover, the range of countries represented in these studies reflects diversity of cultural norms. While martial arts originate from collectivist cultural backgrounds prevalent in Asia (Li & Du, 1991), two thirds of the reviewed articles were conducted outside of Asia, mostly in western populations. This highlights the adoption of martial arts across different cultural contexts, including both individualistic and collectivist societies, as well as western and non-western cultures (Tadesse, 2017). This global acceptance elevates martial arts as an accessible form of exercise that is embraced by diverse populations around the world.

The studies employed different study designs including experimental and quasi-experimental designs, cross-sectional studies, pilot studies and mixed methods designs with around one third being randomised controlled trials. Spieth et al. (2016) argue that randomised controlled trials are reliable research methods for interventions enabling translation of research results into clinical practice. Moreover, in contrast Moore et al. (2020) argue that

generalisability of results of martial arts intervention is often difficult due to majority of cross-sectional research designs. However, from the 16 reviewed studies only two employed cross-sectional research designs. Furthermore, considerable levels of variations were found in sample sizes, ranging from as small as 12 participants to as large as 283 participants. Moreover, demographics range from school children starting from the age of twelve to nursing home residents with the oldest being ninety-three. Thus, leading to large variations in age. These variations in sample sizes and age are due to recruitments sources of the sample. Small sample sizes mostly focus on a specific population of individuals with certain diseases such as Parkinson's disease (Fleischer et al., 2020) or cardiovascular disease (Taylor-Piliae et al., 2006) while a large sample often includes students. These population differences indicate that martial arts-based interventions are predicted to benefit and be suitable for multiple populations, regardless of age or health status (Buschbacher & Shay, 1999; Verhagen et al., 2004). Additionally, gender representation in the reviewed studies varied across the different demographic groups. The gender distribution was relatively balanced in studies with student populations (Greco et al., 2019; Moore et al., 2018). However, studies that targeted specific demographic groups like breast cancer survivors exclusively included female participants (Salchow et al., 2021; Ying et al., 2019). This gender distribution across various studies reflects the specific health conditions and sample characteristics of study participants. For instance, breast cancer studies naturally involve female participants due to the nature of the disease (Anderson et al., 2010). Conversely, conditions like heart failure and Parkinson's disease have higher prevalence rates among males, hence the majority male participation in studies focusing on these conditions (Bhupathy et al., 2010; Wooten et al., 2004). Although relating to the disease in general, it could be argued that a disease that is more prevalent in males would therefore offer a sample that shares this characteristic. Thus, potentially influencing the demographics of participants in martial arts studies that focus on these conditions. These patterns highlight the importance of considering the target population when designing research studies. Also, while some gender disparities exist in the reviewed studies, they are mostly driven by inherent characteristics of conditions being studied and the affected target population.

For the second objective regarding the martial arts disciplines chosen for the studies, the results show that five different martial art forms were specified in the articles while two studies did not specify their chosen discipline. Moreover, almost half of the studies included one form of Tai Chi, followed by four studies examining Shotokan Karate and three utilising Jui Jitsu practice. While each martial art form embodies unique styles and philosophies, they share a common objective deeply rooted in mental, philosophical, and historical dimensions that extend

beyond mere combat or self-defence (Tadesse, 2017). Employing different martial arts forms for different populations is also in line with (Verhagen et al., 2004) that argues that Tai Chi is found to be more beneficial among older populations while other styles may be more popular among younger people (Buschbacher & Shay, 1999; Sherrington et al., 2004). This is somewhat reflected in the reviewed studies where Tai chi practices are predominately used with nursing home residents (Chen et al., 2007; Lee et al., 2010) while for example Karate is chosen for student samples (Greco et al., 2019).

The third objective aimed to gain insight about the criteria employed for method and variable selection while the fourth objective addressed the selection of validated measurement tools. Different methods and approaches were employed in selecting mental health and wellbeing variables. The most common variables assessed in the studies were QoL, mood, depression, anxiety and self-efficacy. Majority of researchers justified variable selection by providing theoretical frameworks. Thus, tailoring their measurement tools to suit their specific research aims and target population. This demonstrates a comprehensive approach to assessing mental health and wellbeing outcomes in martial arts training interventions. Moreover, all studies included used statistical analysis to draw conclusions from their findings facilitating comparison of results among studies. However, these findings contrast with Moore et al. (2020), that argue that former systematic reviews and meta-analyses only offered limited understandings concerning the effects of martial arts training on mental health and wellbeing. It is argued that due to non-transparent research designs, uncertainty of data acquisition and focus of a single aspect of mental health variables, difficulties in comprehensiveness concerning the topic is present. Thus, confounding the process of assessing reliability and validity of the study results (Moore et al., 2020).

The last objective focused on assessing practical considerations and potential benefits that determine feasibility of integrating martial arts training into mental healthcare practices. Most studies demonstrated positive and significant outcomes on mental health and wellbeing variables. Even though adherence rates varied, many studies had high adherence with over 80% (Chen et al., 2007; Fleischer et al., 2020; Lee et al., 2010). Moreover, many participants expressed a desire in continuing martial arts training post-intervention (Greco et al., 2019). This indicates levels of interest and commitment among the study population and suggests potential applicability of martial arts training serving as an effective and cost-effective prevention measure in mental healthcare settings (Bu et al., 2010).

Limitations

While this scoping review provides valuable insights into the impact of martial arts training on mental health and wellbeing, several limitations should be acknowledged.

First, the literature search was conducted alone by the author of this study. Meaning that there is no inter-rater reliability in this scoping review. To ensure that all relevant studies are included, the screening should have been conducted by at least two researchers (Stoll et al., 2019). Another drawback could be missing relevant studies in the review due to limited access to databases. The researcher could solely conduct the literature search from databases provided through the university. Meaning, databases that might include relevant literature regarding this topic (e.g. SPORTDiscus) could not be accessed. The next potential limitation regarding the search strategy might be the sole reliance on a systematic database search (Wohlin et al., 2022). Thus, disregarding additional methods such as snowballing. Although replicability and transparency are increased through a systematic database search, the specificity to the exact search terms or limitations in the databases might exclude relevant literature (Wohlin et al., 2022). For instance, studies focusing on the impact of taekwondo training on mental health and wellbeing that were identified during the initial literature review presented in the introduction were not identified through the database search. However, it might also be considered that the search string constructed by the researcher could potentially not be extensive enough to identify all relevant literature. Despite these potential drawbacks rigorous research was conducted by relevant database selection and in accordance with the PRISMA guidelines by Moher et al. (2009).

Although allowing comparison between positive outcomes of various interventions, one limitation is the heterogeneity in study designs, methodologies, measurement tools, outcome variables and participant characteristics. These aspects complicate the generalisability of findings (Moore et al., 2020). The various martial arts forms found in the reviewed studies might also limit drawing overarching conclusions on the impact of martial arts training on mental health and wellbeing. It could be argued that each martial arts style holds its own unique characteristics or effects that influence mental health or wellbeing. However, as argued by Tadesse (2017) martial arts are deeply rooted in mental, philosophical, and historical dimensions that extend beyond mere combat or self-defence and therefore share a common goal despite of discipline (Tadesse, 2017). Also, former studies found preferences of different martial art forms based on age and gender (Verhagen et al., 2004). Therefore, researchers could benefit from taking sample characteristics and preferences into account. Moreover, variations in adherence and dropout rates across studies could present a possible limitation. It could be argued that the range in intervention adherence suggest challenges in martial arts practice engagement

experienced by some participants. However, many studies showed high adherence rates and participants expressing interest of continuing training post intervention (Chen et al., 2007; Fleischer et al., 2020; Lee et al., 2010; Greco et al., 2019).

Many studies examined in the review lack follow up assessments and longitudinal data. This could limit insights on long term effects of martial arts training on mental health and well-being. Risk of bias is an important limitation of this current research potentially affecting reliability and validity of the findings (Moore et al., 2020). A formal risk of bias assessment was not conducted as part of this scoping review as it is not commonly used in this type of review (PRISMA-ScR). However, such an assessment could have provided insights into the quality and reliability of the included studies. Therefore, the findings presented in this review should be interpreted with caution while taking potential methodological limitations and biases into account.

Recommendation for future research

While this review offers indications that martial arts training has positive impacts on mental health and wellbeing, it is still a developing research domain. Given the heterogeneity observed in various aspects as mentioned above, future research could benefit from greater standardisation and establishment of common outcome measures (Pérez-Gutiérrez et al., 2011). This could facilitate comparability between studies and improve generalisability of findings. To gain insights into long-term effects of martial arts training on mental health and wellbeing, future research should prioritise longitudinal studies with follow-up assessments (Keller et al., 1987). This could provide valuable information on sustained benefits of martial arts practice over time.

Moreover, the potential influence of different martial arts forms on mental health and wellbeing should be further explored. While it is argued that they share similarities in philosophies and the inclusion of mindfulness components (Tadesse 2017). Researchers could for example examine how different martial arts form impact specific mental health outcomes, such as depression or anxiety. Also, further exploration is needed in the distinction of martial arts practices from regular exercise interventions (Bozdarov, 2022). Understanding the unique aspects of martial arts training as a prevention measure in mental healthcare could inform more targeted and effective interventions in this domain. For instance, future research could compare psychological benefits of martial arts practice with benefits found from other forms of exercise.

Lastly, further investigation into individual factors that influence adherence and dropout rates in martial arts interventions is needed to inform the development of strategies aimed at enhancing adherence and retention in future interventions. This could be done by exploring

factors such as motivation, social support and perceived barriers to participation (Moroshko et al., 2011)

Conclusion

In conclusion, this scoping review provides evidence that martial arts training has potential of being an accessible and effective prevention measure in mental healthcare. Moreover, it contributes to a more comprehensive overview in the field of research and explores various aspects that assess the impact of martial arts training on mental health and wellbeing. While there are limitations regarding generalisability of the current results, most studies showed positive significant mental health and wellbeing outcomes. Therefore, making it a valuable contribution to this field and serving as a foundation for future more extensive studies.

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