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A Literature Review into Brazilian Jiu Jitsu including  
Learning, Fitness, Training, Injury Prevention and Resulting Mental Health Benefits

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***Aim***

The aim of the research was to undertake a systematic review of published research articles with the intent of identifying the current state of the literature into Brazilian Jiu Jitsu as it relates to learning, fitness, training, injury prevention and resulting mental health benefits for athletes.

***Significance of the Research***

This literature review may be used to build evidence-based curriculum and training while also informing future research, policy development and service design for the use of Brazilian Jiu Jitsu as a treatment for mental health issues.

***Introduction***

The ground fighting art of Brazilian Jiu Jitsu can be traced back to the 1800s to the Japanese Judo master Mitsuyo Maeda who taught the Kodokan style to Carlos Gracie in Brazil in 1914. From there the Gracie family developed the art into what is now known as Brazilian Jiu Jitsu (BJJ). BJJ has grown tremendously over the years aided not only by the entrepreneurial aptitude of the Gracie family and their success in competition, but also the emergence of Mixed Martial Arts (MMA) challenges, particularly the Ultimate Fighting Championship (UFC) where BJJ has been found to be one of the most effective ground fighting styles besides wrestling and Judo (Wikipedia, 2020).

With the tremendous growth as a competitive and recreational sport there have, however, been concerns with the traditional teaching method of BJJ and the lack of evidence-based approach to learning, fitness, training and

injury prevention (Dearing, 2015; Peng, 2017). In addition, the high number of dropout rates (Canaria, 2016) would suggest that BJJ training methods might benefit from an evidence-based approach.

Furthermore, BJJ has now been proposed to be beneficial for mental health and, as such, has been used as an intervention in the treatment of veterans suffering from Post-Traumatic Stress Disorder (PTSD) and other mental health conditions (Collura, 2018; Walker, 2017; Veteran Grappling, 2020). If, in fact, there are mental health benefits then the research into an evidence-based approach to BJJ would be even more important since a lack of a scientific approach may lead to unwanted consequences for vulnerable populations. This literature review aims to assist as a first step into reviewing and researching such evidence.

### ***Literature Review***

A literature review was conducted using an electronic search for open-access peer-reviewed published studies in Google Scholar a “web search engine that indexes the full text or metadata of scholarly literature across an array of publishing formats and disciplines” (Wikipedia, 2019). Articles identified were to CONTAIN “Brazilian Jiu Jitsu” in its TITLE dated between 2000 and 2019, excluding patents and citations.

The search returned 118 results (see Appendix A). Of these 88 were open-access with the remaining 30 being closed-access. One-hundred-two (102) journal articles were peer-reviewed, fifteen (15) unpublished doctoral or masters thesis and one (1) a video. One of the studies was listed but excluded from the review, as it was the same study published twice under similar titles. The studies were categorised as follows and ranked by frequency:

Table 1

*Categorised Studies Ranked by Number and Inclusion*

Category	Studies	Peer Reviewed	Thesis	Other	Included in Review
Fitness / Training	51	51			5
Injuries	24	22	2		1
Psycho-Social	24*	17*	7		13
Learning	8	3	4	1	8
History	4	2	2		
Nutrition	3	3			
Exercise	3	3			
No Category	1	1			

*Note.* \* One of the studies in the psychosocial category was a study published twice with similar titles.

A review of each of the studies identified 27 articles relevant to the subject matter of contributing to the evidence-base of BJJ in learning, fitness, training, injury prevention and the treatment of mental health issues.

### ***Learning***

BJJ is a complex system with thousands if not more techniques and countless combinations making it difficult to learn. Practitioners often want to achieve a certain competence early so as to be able to fully (or even partially) participate in the sport. As there are countless techniques to learn, it has been suggested by Ferris (The Tim Ferris Experiment, 2015) to start learning BJJ principles through one submission (i.e. the Guillotine Choke). Using the learning principles of Chess as practiced by Chess Master and Black Belt BJJ practitioner Josh Waitzkin. His proposition is that instead of using the traditional way of learning BJJ through individual techniques (moves) and positions (strategy) before submission (end game); to first concentrate on the submission (end game). This is a contrarian approach to the traditional teaching of BJJ sequences and strategy. Josh Waitzkin emphasises learning the micro skill (submission) in order to learn the macro game. By focussing first on the submission followed by set-ups to get to the submission from various positions. This approach is logical as it gives the practitioner a visual goal. Then, they may be able to construct better cognitive pathways to get to that goal. An analogy may

be the learning of a route by first knowing where to go. By knowing where we want to go we can remember better how to get there. This approach is supported by Bennett (2018) who using a psycho-cultural model of investigating the skill acquisition in BJJ, found that beginning practitioners use strategic selection of techniques in a hierarchical manner but that this approach to learning BJJ is counter productive at higher belt stage as these athletes use fluidity rather than hierarchy of techniques. Hence, a more fluid way of learning may be utilised by emphasising the end-game (submission) and using greater flow to get to that point.

Furthermore researchers (Stolovitch, Keeps & Learning 2002; Engle et al, 2012) identified schemas as important in learning a sequence of techniques and the way in which the practitioner processes working-memory into long-term memory (Bennett, 2018). The difference between an expert and a novice is that a novice has not developed schemas or constructed knowledge banks. Hence it is difficult for them to incorporate new information from working knowledge into long-term knowledge. In addition, Dearing (2015) reports how most BJJ academies and their instructors are not familiar with Cognitive Load Theory, hence, overloading student practitioners with information especially the novice student while attempting to teach a diverse group of students from beginner to expert and often moving on without assessing if students have mastered

the skill. Savery and Duffy (1995) also suggest that a constructivist approach to teaching and learning rather than the traditional process of drilling techniques without any consideration to where the student is at and wants to be heading. The constructivist approach takes into consideration teaching problem solving, self-discipline and (Posner, 2004) flexibility of method.

Both De Paula Lima et al. (2017) and Baez et al. (2019) are fitness articles, however, they provide information specific to learning by identifying two combat styles in BJJ the pass and the guard fighter. Pass fighters attempt to pass the guard of the opponent in order to secure a dominant position, whereas guard fighters defend the guard and react from this position. Some BJJ athletes clearly prefer one style to the other and may be seen as offensive versus defensive in their combat style. Identifying personal combat style may inform curriculum development and simplify the learning process by focussing on techniques, which are specific to personal combat style. A pass fighter may focus on learning techniques specific to passing guard and working on submission from passing the guard rather than focusing on keeping guard and looking for submissions from a defensive position.

But how could such learning take place? With the development of online media there is now an extraordinary amount of information available in videos particularly on YouTube. Spencer (2014) highlights some of the

teaching and learning history of BJJ and the development into an open community based learning network and environment. Of particular interest to the process of learning is that Spencer mentions that there is some scepticism as to the validity of learning through online videos as stipulated by Hogeveen (2013). Furthermore, the author references Dreyfus and Dreyfus (1980) stating that there are two choices of learning: first, by trial and error and; second, through instruction, asserting that the latter is more efficient. Some online instructors, such as Kit Dale (2019), propose that Open Mat and rolling is the best way to learn. However, this may not be the case, as certain mastery has to be established first and learning by trial and error could simply promote bad technique rather than enhance knowledge and mastery of technique. This is important to the development of a curriculum, as there is an abundance of online learning available in BJJ particularly via YouTube. Furthermore, Spencer stipulates that online learning may only be useful once certain mastery has been established, hence it may not be useful for beginning students. It should be noted that contrary to Spencer's (2014) proposition Cazetto (2010) found that transferring skills using visual technologies have been helpful among a group of teenagers practicing both BJJ and MMA.

To address the high dropout rate in BJJ, Rodrigues (2018) identified the importance of social networking to maintain motivation and

increase participation in classes. Social networking strength could be measured as knowing other practitioners' names and belt-colour and who they train with. This might indicate that social networking and group activities outside of the academy may be beneficial. Furthermore, the researchers found a strong correlation between social (group) identity and participation in competition. Indicating that encouraging practitioners early to participate in competitions may also increase social identity and hence participation. Additionally, Ovretveit, Saether and Mehus (2019) investigated the correlation between achievement goals and motivation in BJJ athletes. The researchers found that these variables were significantly correlated indicating that setting specific or SMART goals (Grant & Greene, 2004) may help BJJ athletes maintain motivation.

Peng (2017) published a manual to assist coaches in building an evidence-based method of teaching and instructing BJJ. Peng found that the vast majority of BJJ coaches learned BJJ using the traditional method and that they became coaches as they performed well in tournaments and rose to black belt. But that they do not have knowledge of learning or performance theory as many other professional coaches do such as in football, basketball and soccer. In this manual, Peng provides information from exercise science to assist BJJ instructors to construct evidence-based lesson plans including biomechanics,

motor control, injury prevention, strength and conditioning.

In summary, early focus on limited individual techniques and particularly the end-game (submission), as either a guard passer (offence) or guard retainer (defence) may assist the beginning BJJ athlete in building schemas and retain technique sequences in long-term memory and avoid cognitive overload. By doing so the athlete can use a flexible constructivist (problem solving) approach toward submission. Learning through instruction seems to be more beneficial though than learning through online videos especially when teaching the beginning athlete. Additional factors to assist in the long-term motivation and participation in BJJ are regular socialising, participation in competition and SMART goal setting.

### ***Fitness***

Physical fitness, as in strength and cardiovascular endurance, is an important goal and element in participating in BJJ. A fitter athlete will be able to perform better not only while learning techniques but also particularly while sparring and/or participating at competitions. For this reason, fitness becomes an important part of the development of an evidence-based training plan.

Jones and Ledford (2012) is a fitness specific study with the researchers discussing injury prevention, strength, power, conditioning, and flexibility in BJJ. To prevent BJJ specific

injuries the researchers recommend a light full-body warm up and joint rotation, which does not fatigue the stabiliser muscles for the primary workout to come. As a BJJ athlete needs to be as strong and powerful as possible without gaining excessive weight, which may effect their weight division during competition, the researchers recommend 'complex training' including both high-load/low-repetitions for strength once per week (i.e. 5 sets with 5 repetitions) and low-load/high-repetition for power once per week (i.e. 3 sets with 15 repetitions). Furthermore, to assist with anaerobic and aerobic endurance, required in high-intensity five-minute rounds of sparring in BJJ, conditioning is required. Jones and Ledford recommend two days per week of interval training for this purpose. As flexibility may assist the BJJ athlete in implementing grappling techniques the authors recommend including 5 to 10 minutes of dynamic stretching before every

workout and 5 to 10 minutes of static stretching after.

Furthermore, Ribeiro et al. (2015) found that High Intensity Interval Training (HIIT) has a greater impact on improving BJJ practitioners' cardiovascular, speed, and endurance performance than traditional training alone. In this study HIIT was build into the traditional training method rather than performed on it's own. Also, Tavares et al. (2017) found that in order to maximally increase muscle power performance athletes should use loads of 45 to 50 percent of one rep max for high-load/low repetition training.

Table 2 bellow summarises the components a complementary fitness program would need to include for maximal support of a BJJ athlete as outlined by Jones and Ledford (2012), Riberairo et al. (2015) and Tavares (2017).

Table 2

*Components of Complementary Training for Brazilian Jiu Jitsu*

<i>Warm Up</i>	
Joint Rotations	
Full-body Warm-Up	
<i>Flexibility</i>	
5 – 10 Minutes Dynamic Stretching before each work out	
Conditioning – 2 days p/w	Lifting – 2 days p/w
HIIT	Heavy – Full Body 5 Sets 5 Reps*
	Light – Full Body 3 Sets 15 Reps
<i>Flexibility</i>	
5 – 10 Minutes Static Stretching following each work out	

\* Performed at 45 to 50 percent one repetition maximum.

Additionally, the authors (Jones and Ledford, 2012) recommend a body fat composition of 5-10 percent for athletes who want to compete. This should avoid moving up weight divisions due only to unnecessary body fat. This recommendation may be considered as part of the goal setting for athletes.

Overall, the information may be helpful in developing an evidence-based training programme in that it provides specific information for a complimentary fitness programme and targets for body fat compositions, which can be incorporated into the overall goals of the athlete.

***Injuries***

As BJJ is a combat/contact sport injuries are frequent and can impact on the athletes' participation and performance. In fact, De Silva Junior, Kima Kons, Dellagrana, and Detanico (2018) reported that most injuries were due to overuse with joint injuries as secondary. While Da Silva Junior et al. was the only relevant study identified in the literature review it is important in that it emphasises the need to monitor training volume and intensity so as to avoid injuries related to overuse.

***Psycho-Social and Mental Health Benefits***

Participation in BJJ does not only teach skills and increase fitness but it also has community and mental health benefits.



Several studies found BJJ to have mental health benefits, particularly for male practitioners, including lowered symptoms of Post-Traumatic Stress Syndrome, Major Depressive Disorder, Generalised Anxiety and alcohol abuse (Collura, 2018; Willing et al., 2019); but there are also psycho-social skills such as developing greater patience, better stress management, able to build and maintain relationships, and greater identity of self. Furthermore, research indicates aggression in both males and females is significantly lowered when participating in BJJ long-term (Janaowska et al., 2018; Pujso, Wyzlic, & Stepniak, 2018; Blomqvist-Mickelsson, 2019; Wojdat & Ossowski, 2019) as well as inhibitory control (Bueno, 2016). Overall, BJJ practitioners would report greater satisfaction with life (Wojdat et al., 2017) as they find BJJ academies to provide safe environments for personal growth through social values and teamwork thus reducing maladaptive behaviours such as anger expression and other clinical issues (McClung-Reusing, 2014). In addition, Chinkov (2014) found that BJJ practitioners reported both personal and social benefits in practicing BJJ including self-confidence, analytical thinking, perseverance, stress relief, physical health, respect and tolerance for others, and the community. Not only do BJJ practitioners report these objective benefits, they also report a sense of spirituality (Pope, 2019) particularly when sparring with other athletes (Kohoutkova, Masaryk, & Reguli, 2018).

Mental health and social factors should therefore be considered in an evidence-based training plan in that measuring and assessing these factors early and intermittently would inform the programme about the athletes wellbeing and the benefits they may or may not be reaping from participation.

### ***Discussion and Conclusion***

The literature review identified several journal articles in the areas of learning, fitness, injuries, and psycho-social mental health, which may inform an evidence-based training programme. The findings are listed and discussed below:

#### ***Learning***

**Focus on submission techniques first** then learn techniques to get to the submission from various positions thus utilising cognitive pathways and flow (fluidity) to learn rather than learning disconnected techniques by rote. This may also assist athletes learning long-term using schemas rather than being cognitively overloaded and forgetting much of what they have practices. This approach can be broken down further by **focusing on pass-or guard fighting pathways** to submission.

Rather than using trial and error for learning or simply using visual techniques as found in online instructional videos, it seems that **learning through instruction** is far more beneficial as the beginning athlete may otherwise continue to use bad technique without correction.

**Social networking** and participation in competitions is important to promoting motivation, goal setting and long-term participation in the sport.

### ***Fitness***

To perform well at BJJ an athlete is advised to **maximise their overall fitness**. To achieve this complementary training including two (2) HIIT and two (2) strength sessions per week are recommended.

### ***Injuries***

While BJJ is a combat sport and, hence, can lead to injuries due to joint manipulation **the number one cause of injury is overtraining**. It is, therefore, recommended to monitor training volume and intensity carefully and to stick with a pre-planned training programme.

### ***Psycho-Social and Mental Health Benefits***

Long-term participation in **BJJ has mental health benefits** and aids in the acquisition of psycho-social skills with particular benefits for men suffering from PTSD and looking for ways to reduce anger and increase skills in emotional control.

This literature review has identified research, which may help in the development of evidence-based training programmes. Furthermore, it seems that participating in BJJ has mental health benefits. Nevertheless, much of the literature reviewed is presented in the form of anecdotal evidence. Future research should aim to look at more structured and empirical approaches to identifying the benefits of BJJ and the way in which it is taught. Initially, a case study may inform future studies with the aim of conducting experimental research including independent group designs.

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