



## SAFETY ASPECTS OF KARATE AS PHYSICAL EDUCATION AND AN EXTRACURRICULAR ACTIVITY

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### Abstract:

The present study reviewed karate injuries sustained during regular training, as well as competition, to examine the safety aspects of karate as physical education and an extracurricular activity. Karate injuries during regular exercise are usually minor, most commonly contusions, bruises, superficial scratches, sprains, and/or strains. The head/neck, and/or extremities were the most commonly injured regions. If karate is included as one of the activities in the school physical education curriculum, three hours or less per week training to practice basic techniques, prearranged-sparring, and kata, without free-sparring, is recommended. If free-sparring is allowed as practice in physical education classes and/or as an extracurricular activity, teachers or instructors should stress the importance of controlling the techniques and using noncontact forms of karate.

**Keywords:** karate, injury, karate training, karate competition, physical education, extracurricular activity

### 1. Introduction

A modern Japanese school system was started in 1872. At this time, martial arts were not included in the modern school education. The Ministry of Education and scholars of

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physical education claimed that martial arts were an inappropriate component of the curriculum because they were considered dangerous and lacked a unified program of instruction. Martial arts were considered as an extra-curricular activity (Nakamura, 1980, 1981). In 1911, judo and kendo were incorporated into the school physical education curricula (Tanaka, 1980) and martial arts became more important during World War I and II (Tanaka, 1981). During World War II, martial arts were encouraged as part of the war effort and became an independent subject apart from physical exercises (Nishimura, 1984). After World War II, martial arts were prohibited, but in 1953 they were restored to school curricula as sports (Imamura and Nakazawa, 1992)

Karate is derived from a martial art developed in Okinawa, Japan ([Chaabène et al., 2012](#); Funakoshi, 1973) and is one of the most popular martial arts practiced both in and outside Japan (Imamura, 2001). The World Karate Federation is recognized by the International Olympic Committee and karate will make its first appearance as an Olympic sport at the 2020 Summer Games in Tokyo, Japan (International Olympic Committee, 2017; Kurihara, 2017).

Some Japanese martial arts including judo, kendo, and karate became compulsory in the junior high school physical education curriculum in Japan from 2011 (Ministry of Education, Culture, Sports, Science and Technology, Japan, 2018), and many senior high school and university students practice karate as an extracurricular activity. In a previous study (Imamura et al., 2012), we reviewed the related literature to examine the physical fitness aspects of karate as physical education. The present study reviewed karate injuries during training and competition to further examine the safety aspects of karate as physical education and an extracurricular activity.

## **2. Karate training**

Karate training involves basics, kata, and sparring. Basic techniques such as punching, blocking, and striking are practiced either in the stationary position or with body movement in various formal stances. Kata are set forms in pre-established sequences of defensive and offensive techniques and movements, and are performed alone against imaginary opponents. Movements in kata are very formal, systematic, and sometimes very slow, in prescribed stances and directions. Free-sparring is the execution of defensive and offensive techniques while freely moving against an opponent. To avoid injuries, free-sparring is not always practiced in a regular workout. Instead, there is prearranged-sparring, in which the prearrangement between participants allows one person to practice offensive and the other defensive techniques (Imamura et al., 1999). For safe practice in prearranged-sparring, the offensive techniques, such as punches and kicks, must be controlled or stopped before contact.

## **3. Injuries during regular karate training**

Because participants may use combat techniques designed to cause harm, karate exercises are potentially dangerous (Woodward, 2009). However, it was reported that

training in martial arts (karate or ju-jitsu) decreases hostility (Daniels and Thornton, 1990, 1992).

Karate injuries during regular exercise are usually minor (Demorest and Koutures, 2016; Destombe et al., 2006; Zetaruk et al., 2000a, 2000b; Ziaee et al., 2015), most commonly contusions, bruises, superficial scratches, sprains, and/or strains (Zetaruk et al., 2000a, 2000b; Ziaee et al., 2015). Zetaruk et al. (2000b) reviewed karate-related injuries in 114 participants and found no significant difference in sex. However, participants younger than 18 years of age had fewer injuries. Brown and black belts had a greater frequency of major injuries than the lower ranks. Furthermore, training more than 3 hours per week correlated with an increase in injuries, major injuries, and multiple injuries. Zetaruk et al. (2000a) conducted another study in children and adolescents, in which all injuries were minor, and no major injuries were reported. The authors suggested several possible explanations for the absence of significant acute traumatic injuries. The students of this karate school do not participate in tournaments and do not practice free-sparring. It was reported that most karate injuries during training occur during sparring practice (Yoshimura et al., 2003; Ziaee et al., 2015). Because 97% of participants trained 3 hours or less per week and major injuries were not reported in this study, the authors suggested that 3 hours of karate training poses a lower risk of significant injury for children at 16 years and under. The authors (Zetaruk et al., 2000a) also reported that the risk of significant injury in karate appears to be lower than in other popular children's sports. Karate may be safer (fewer major injuries) than other popular sports such as taekwondo, which originated in Korea (Zetaruk et al., 2005), soccer (Walters et al., 2014), and baseball ([Committee on Sports Medicine and Fitness Pediatrics](#), American Academy of Pediatrics, 2001).

#### **4. Karate competitions rules**

Karate competition held under the World Karate Federation rules has 2 modalities: sparring and kata. In sparring competition, attacks are limited to the head, face, neck abdomen, chest, back, and side. Three points are awarded for kicks to the face, head and neck, and any scoring technique delivered to an opponent who was thrown or fell of their own accord. Two points are awarded for kicks to the abdomen, chest, back and side. One point is awarded for any punch delivered to any scoring area. There are age categories for both sparring and kata: children 10-11 years; children 12-13 years; cadets 14-15 years; juniors 16-17 years; and seniors 18+ years. Because World Karate Federation sparring is considered noncontact, punches and kicks must be controlled or stopped before contact with the scoring area. A score is awarded when a technique is performed to a scoring area according to the following criteria: good form, sporting attitude, vigorous application awareness (zanshin), good timing, and correct distance (World Karate Federation, 2018). The correct distance, in senior competition, is a punch or kick somewhere between skin touch and 5 cm from the face, head, or neck. When contact is deemed by the referee to be too strong, it will be penalized. In cadet and junior competition, no contact to the head, face, or neck is allowed with hand techniques. Any

contact, no matter how light, will be penalized, but very light contact is allowed using kicks (World Karate Federation, 2018).

Kata performance judgement gives equal weight to both the major criteria: technical performance and athletic performance. Concentration, power, and potential impact must be displayed in the techniques, and strength, power, and speed as well as grace, rhythm, and balance must be demonstrated (World Karate Federation, 2018).

## 5. Injuries in karate competition

Previous studies on the injury profile of the Karate World Championships held by the World Karate Federation (Arriaza et al., 2009; Arriaza and Leyes, 2005; Arriaza et al., 2017) reported that the total injury rate was high (0.18 injuries per match (Arriaza et al., 2009) or 0.31 injuries per match (Arriaza and Leyes, 2005), but the injuries were mainly minor. Severe injuries were rare. One study (Arriaza et al., 2017) examined the incidence of concussion in 4 consecutive World Karate Championships (from 2008 to 2014) and reported that there was one concussion in every 1,156 fights. A high rate of minor injuries and low rate of major injuries were also reported in studies on national level competitions (Macan et al., 2006; Tuominen, 1995) and in studies limited to a certain karate style (Critchley et al., 1999; Halabchi et al., 2007). The head/neck, and/or extremities were the most commonly injured regions ([Čierna et al., 2018](#); Pieter, 2005).

In 2000, the World Karate Federation changed the rules of karate competition in an effort to reduce injury rates (Macan et al., 2006), and the new rules were implemented from 2001 (Arriaza et al., 2009). To prevent injury, the rules were stricter about prohibited behaviors for competitors, including excessive force used in blows to permitted areas, to forbidden areas (throat, arms, legs, groin, joints, and instep), and dangerous or prohibited throwing techniques. Any illegal behavior results in a warning or penalty (Macan et al., 2006). Arriaza et al. (2009) compared the injury incidence of the Karate World Championships before and after the stricter rules were introduced and reported that the global injury incidence was almost double under the old rules (0.31 per fight) compared to the new stricter rules (0.18 per fight). The authors suggested that the most important factors in decreasing the injury rate were the willingness of referees to stop dangerously rough play, and aggressively penalize competitors who participated without proper regard for safety, as well as the outlawing of certain uncontrollable methods of attack, and the strict application of the existing rules for competition. Macan et al. (2006) reported similar results for competitors younger than 18 years, although the overall relative risk of injury for competitors older than 18 years was not significant. The authors reported that the new stricter rules in the younger categories were meticulously implemented by referees, and this may have had a significant impact on injury prevention. [Čierna et al. \(2018\)](#) reported that the total injury rate in junior competitions was lower compared with elite adult athletes, and higher compared with younger elite athletes. Arriaza et al. (2016) also reported that cadets (14-15 years old) had a low injury rate and could be safely promoted. [Čierna and Lystad](#)

(2017) reported that adolescent athletes (12-17 years old) were at a higher risk of injury compared with children.

## 6. Recommendations

If karate is included as one of the activities in the school physical education curriculum, three hours or less per week training to practice basic techniques, prearranged-sparring, and kata, without free-sparring, is recommended. If free-sparring is allowed as practice in physical education classes and/or extracurricular activities, teachers or instructors should stress the importance of controlling the techniques and using noncontact forms of karate.

## 7. Conclusions

Although many injuries were reported during karate training as well as competition, most appear to be minor, and major injuries were rare. Thus, karate can be safely practiced in the physical education classes and/or extracurricular activity.

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