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Asimena Gioftsidou, Ioannis Barbas, Daulet Turlykhanov, Boris Podlivaev, Harold Tunnemann, Yuri Sahmouratov, David Curby, Bahman Mirzaei, Paraskevi Malliou, Anastasia Beneka, Erasmia Giannakou, Nikolaus Aggeloussis & George Godolias

To cite this article: Asimena Gioftsidou, Ioannis Barbas, Daulet Turlykhanov, Boris Podlivaev, Harold Tunnemann, Yuri Sahmouratov, David Curby, Bahman Mirzaei, Paraskevi Malliou, Anastasia Beneka, Erasmia Giannakou, Nikolaus Aggeloussis & George Godolias (2015) Wrestling + and New Structures for Youth Wrestling, International Journal of Wrestling Science, 5:2, 93-97, DOI: [10.1080/21615667.2015.1107663](https://doi.org/10.1080/21615667.2015.1107663)

To link to this article: <https://doi.org/10.1080/21615667.2015.1107663>



Published online: 15 Mar 2016.



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## Wrestling+ New Structures for Youth Wrestling

Asimena Gioftsidou,<sup>1</sup> Ioannis Barbas,<sup>1,2</sup> Daulet Turlykhanov,<sup>2</sup> Boris Podlivaev,<sup>2</sup>  
Harold Tunnemann,<sup>2</sup> Yuri Sahmouratov,<sup>3</sup> David Curby,<sup>2</sup> Bahman Mirzaei,<sup>2</sup>  
Paraskevi Malliou,<sup>1</sup> Anastasia Beneka,<sup>1</sup> Erasmia Giannakou,<sup>1</sup>  
Nikolaus Aggeloussis,<sup>1</sup> and George Godolias<sup>1</sup>

**ABSTRACT.** Wrestling is one of the most physically demanding sports among high school and college athletics. As expected in a physical contact sport, the athletes are prone to occasional injury. The common injuries sustained in wrestling relate to musculoskeletal strength, flexibility, and skill level. It is really important to find ways to prevent many of those injuries. To properly design an injury prevention program, one should take into account parameters such as injury characteristics, the mechanism of injury, and information about the sport's physical demands. Taking these parameters into account, an injury prevention program called Wrestling + was designed. The key elements of Wrestling + are core strength, shoulder and leg strength, and balance. Wrestling + has 3 parts and 14 exercises. A key point in the program is to use proper technique during all of the exercises. Part 1 includes running exercises at a slow speed combined with active shoulder stretching, grips, and bridge positions; Part 2 includes 5 sets of exercises focusing on core, shoulder and leg strength, and balance, each with three levels of increasing difficulty; and Part 3 includes wrestling simulation exercises.

**Keywords:** wrestling injuries, injury prevention, core, strength, balance

The prevalence of football-related injuries sheds light on injuries in other sports, including wrestling. Football (soccer) is a popular sport with a high incidence of injuries; similar to football, wrestling is a contact sport, but many of the injuries in the latter are noncontact injuries. Noncontact injuries can be best prevented thorough preventive measures. With this in mind, the Fédération Internationale de Football Association (FIFA) and its medical assessment and research center, F-MARC, have developed an injury prevention program, the 11+. Major clinical research studies have clearly indicated that the consistent implementation of 11+ can lead to a 30–50% reduction in football injuries (Bizzini & Dvorak, 2015).

The key elements of effective injury prevention programs for football players are core strength, neuromuscular control and balance, eccentric training of the hamstrings, plyometrics, and agility. On the basis of the design mode of FIFA 11, we tried to create a similar injury prevention program for wrestlers, according to the sport's specificities.

To properly design an injury prevention program one should take into account some parameters, which are subsequently analyzed, such as injury characteristics, mechanism of injury and information about the sport physical demands.

### THE SPORT OF WRESTLING AND INJURIES

The sport of wrestling dates back to ancient times as one of the original Olympic sports. It is popular among adolescents because participants of equal size can compete against each other. It is one of the few sports in high school where it is an advantage to be small and wiry. There can be no argument that participation in sports helps promote a physically active lifestyle. However, despite the documented health benefits of increased physical activity, those who participate in athletics are at risk for sports-related injuries. Wrestling is considered to be one of the most physically demanding sports in high school and college athletics. To be successful, the wrestler needs to have not only strength and endurance but also technical skill (Halloran, 2008).

Flexibility should be emphasized as an important component of the conditioning of wrestlers. Shoulder flexibility is critical, but flexibility of lower back, hamstrings, elbows, and cervical spine should also be included. A study by Ro-

<sup>1</sup>Democritus University of Thrace, Komotini, Greece

<sup>2</sup>UWW Scientific Commission, Corsier-sur-Vevey, Switzerland

<sup>3</sup>UWW Technical Commission, Corsier-sur-Vevey, Switzerland

Correspondence should be addressed to Asimena Gioftsidou, Department of Physical Education and Sport Sciences, Democritus University of Thrace, Komotini, Greece. E-mail: agioftsi@phyed.duth.gr

emmich and Frappier (1993) found that more successful wrestlers had better left and right grip strength and flexibility of the lower back and hamstrings and completed sit-ups, pull-ups, and pushups. Successful wrestlers also covered a greater distance during a 12-min run test and had significantly greater anaerobic power. Muscular strength and endurance, flexibility of the low back and hamstrings, aerobic fitness, and relative anaerobic power were predictors of fewer injuries. Core strength, flexibility, and anaerobic power are important elements in injury prevention.

However, as expected in a physical contact sport, athletes are prone to occasional injury. Wrestling injuries account for the second most frequent sports injuries after football (Centers for Disease Control and Prevention, 2006). Common injuries sustained in wrestling relate to musculoskeletal strength, flexibility, and skill level. Agel, Ranson, Dick, Opplinger, and Marshal (2007) examined data of the National Collegiate Athletic Association Injury Surveillance System on collegiate wrestling over a 16-year period and found that wrestling had an injury rate of 9.6 injuries per 1,000 athlete exposures. Competition had a significantly higher injury rate than did practice, but the injury profiles of these two areas showed both to be equally important. Injury percentages were similar among the 10 weight classes (Agel et al., 2007).

## INJURY CHARACTERISTICS

### Injury Type

Common general injury categories in pediatric wrestling include muscle strains, joint sprains, concussions, contusions, and abrasions or lacerations (Hewett, Pasque, Heyl, & Wroble, 2005). Muscle strains usually involve the shoulder or lower back. Joint sprains usually involve the ankle, knee, or hand/wrist regions. Contusions typically involve the knee, chest, and head. Abrasions or lacerations almost always involve the face area (Pasque & Hewett, 2000) but can also occur on the extremities. Agel and colleagues (2007) supported that sprains, strains, and contusions were the most common injuries in wrestling.

### Mechanism of Injury

Takedowns and sparring were the most common activities at the time of injury. The most common mechanism of injury was a joint forced past acceptable range of motion (Agel et al., 2007). The largest percentage of injuries was associated with direct contact between wrestlers during takedown (43%).

Similarly, Pasque and Hewett (2000) reported that most of the injuries in their studies occurred during takedowns in which both wrestlers are in the standing position attempting

to take the other down to the mat (Requa & Garrick 1981), but more specifically, when the athlete was at a disadvantage or in the defensive position. Most of these injuries occur in the defensive wrestlers, given that they are at the mercy of their opponents while trying to protect themselves as they are being taken down to the mat (Pasque & Hewett, 2000). Hoffman and Powell (1990) also cited the takedown as the most injurious action.

### Injury Location

The body region that incurs the greatest percentage of injuries is the head, spine, and trunk area (range = 24.5–48%) followed by the upper extremity (range = 9.3–42%). The next highest is the lower extremity (range = 7.5–45.1%) and, last, the skin (range = 5–21.6%; Hewett et al., 2005).

### Upper Extremity

Upper extremity injuries are also commonplace in the sport of wrestling because of the heavy forces placed on this region and the extreme positions that can occur during wrestling (Halloran, 2008; Hewett et al., 2005; Lorish, Rizzo, Ilstrup, & Scott, 1992; Requa & Garrick, 1981). In general, these injuries are caused by a combination of leverage and twisting (applied by the dominated wrestler). Most often these opposing forces act on a joint, which sustains the injury. These injuries have been reported anywhere from 9.3% to 42% of all injuries. The shoulder had the highest proportion of injury, as high as 24% of total reported injuries (Halloran, 2008). Shoulder injuries have been reported in the range of 3.5–24% of wrestling injuries in the pediatric population and occur second only to injuries occurring at the knee (Pasque & Hewett, 2000). A recent prospective study showed shoulder injuries to be the most common overall injury in a high school wrestling population, at 24% of the total injuries reported (Pasque & Hewett, 2000).

Often shoulder injuries occur when the wrestler is trying to escape a hold and inadvertently forces the joint past what would be the individual's normal range of motion. Injuries may also occur when shoulder joints are held in either extreme abducted or adducted positions and the wrestler in control forces his opponent to the mat (Brindle & Cohen, 1998; Mudgal & Waters, 1998).

Elbow injuries are sustained less frequently than shoulder injuries but appear to be more severe, accounted for 1.0–7.9% of all wrestling injuries (Hewett et al., 2005). The most common elbow injury is the hyperextension abduction sprain affecting the ulnar collateral ligament and the anterior capsule. Younger wrestlers appear to be susceptible to various types of avulsion fractures about the elbow, including the olecranon and the medial humeral epicondyle (Banas & Lewis, 1995; Haugegaard, Rasmussen, & Johannsen, 1993; Hewett et al., 2005; Weiss & Sawers, 1990).

### *Head Injury*

Concussions and other head injuries have occurred from 1% to 8% of all wrestling injuries (Lorish, Rizzo, Ilstrup, & Scott, 1992; Pasque & Hewett, 2000). Bruce, Schut, and Sutton (1984) documented the low incidence of major head and spine trauma in children but showed an increase in the 15–18-year-old age group. Powell and Barber-Foss (1999), in a 3-year high school study, found that concussions occur more frequently in matches and that takedowns were the most high-risk situation for concussion.

### *Neck Injury*

In a variety of prospective and retrospective epidemiological studies of wrestling injuries, neck injuries comprised 0.8% to 14.9% of the total number of injuries (Lok & Yuceturk, 1974; Lorish et al., 1992; Snook, 1980). A cervical strain is a tear of one of the musculotendinous units in the neck. The spectrum of injury ranges from mild to moderate, with rupture being extremely rare. These account for approximately 50% of neck injuries in wrestling.

### *Trunk and Spine*

Low back injuries have comprised 1.2% to 18.6% of total wrestling injuries in prospective and retrospective studies (Hewett et al., 2005). Estwanik, Bergfeld, Collins, and Hall (1980) also noted that 25% of the wrestlers in his study presenting with back pain had spondylolysis or spondylolisthesis; 58% of his patients were diagnosed with lumbar strain. Rossi and Dragoni (1990) reviewed the radiographs of 3,132 athletes 15–27 years of age who were evaluated for low back pain over a 26-year period. Wrestlers with back pain had a 29.8% prevalence of spondylolysis (17 of 67 wrestlers).

### *Lower Extremity*

In prospective studies, knee injuries range from 7.6% to 18.7% of all wrestling injuries (Hewett et al., 2005). In the only study with the percentage of knee injuries less than 10%, Lorish and colleagues (1992) described injuries in tournaments to wrestlers 6–16 years of age. A liberal injury definition was used that required only that medical attention be sought. A study of high school wrestlers showed that knee injuries were the most common season-ending injuries and represented 44% of the total (Pasque & Hewett, 2000). Common knee injuries include prepatellar bursitis, medial and lateral collateral ligament sprains, and medial and lateral meniscus tears. The most common knee injuries are sprains, which constitute 30–65% of the total number of knee injuries. Meniscal injuries are also common, with a relatively high proportion of lateral to medial meniscus tears. In the two studies that broke this down, lateral meniscus injuries represented 46% of the total number of

meniscal injuries (Estwanik et al., 1980), and there were 45% lateral versus medial meniscectomy in a study of 56 meniscectomies in wrestlers (Baker, Peckham, Puppato, & Sanborn, 1985).

In prospective studies, ankle injuries range from 3.2% to 9.7% of all wrestling injuries. Garrick (1975) described the results of the first year of the Seattle High School injury study. Ankle injuries occurred in 6 of 105 cases (6% of wrestling injuries in that portion of the study). The most common ankle injury is the lateral ligament sprain, which most often occurs during takedowns (Sofokleous et al., 2012).

### *Training Methods/Conditioning*

Few data are published on training conditions as risk factors in wrestling, but anecdotal observations can be made. Inadequate supervision of a wrestling team, especially in younger athletes, may increase injury risk by lack of monitoring potentially dangerous situations and techniques, and the inability to discourage horseplay. Inappropriate pairing of athletes during training, that does not consider size, ability, and maturation level may also be a risk factor. Improper wrestling technique may also increase injury risk (Hewett et al., 2005).

### *Structure of Wrestling+*

Wrestling+ is the name given to our injury prevention program for wrestlers, and is shown in Figure 1. Wrestling + has three parts and 14 exercises, which should be performed in the specified sequence. A key point in the program is to use the proper technique during all of the exercises and to pay full attention to correct posture and good body control. Part 1 consists of running exercises at a slow speed combined with active shoulder stretching, grips, and bridge positions. Part 2 consists of five sets of exercises focusing on core, shoulder and leg strength and balance, each with three levels of increasing difficulty. Part 3 consists of wrestling simulation exercises.

### *Progression to the Next Level*

Wrestlers should begin with Level 1. Only when an exercise can be performed without difficulty for the specified duration and number of repetitions should the player progress to the next level of this exercise. Wrestlers have three options:

1. Ideally, progression to the next level is determined individually for each player.
2. Alternatively, all players can progress to the next level for some exercises but continue with the current level for other exercises.
3. For simplicity, all players can progress to the next level of all exercises after 3–4 weeks.

# WRESTLING PLUS

## Warm Up Program

2 or more times per week



### Part 1: Running, Grips, and Bridges

8 minutes



**1. Shoulder Rotations**  
Jog in place while rotating the shoulders forward and backward.

45 sec total



**3. Pull each other**  
The athletes stand facing each other. They grasp their hands and attempt to pull each other.

45 sec each hand



**5. Neck**  
The athlete sits on the back of his partner and forces the neck in different directions, down & up and side to side.

20 sec each movement



**2. Grips**  
The athletes stand facing each other. They pull their partner's hands up the down.

45 sec each



**4. Shoving Hands Alternately**  
The athletes stand facing each other. Press against each other having one elbow flexed and the other extended.

1 min total



**6. Bridge**  
The athletes stand facing each other. One athlete drops back to bridge position with his partner's support.

45 sec each

### Part 2: Core, Leg Strength, and Balance

9 minutes

#### LEVEL 1



**7. Shoving Hands**  
The athletes grasp their hands with arms bent. Both try to shove the hands extending their wrists over their heads.

2 sets -1 min each



**8. Pulling**  
Grasp their hands with arms extended and knees flexed 90 degrees. Try to flex their knees more and return to original position.

2 sets -1 min each



**9. One Leg Stance**  
Hold one of your partner's legs straight while he tries to squat and straighten the other.

30 sec each leg



**10. Combat with Raised Legs**  
The athletes sit with legs slightly bent, soles touching. Push the partner.

2 sets -30 sec each



**11. Push Ups**  
The athlete does push-ups while his partner hold his feet in the air.

45 sec each

#### LEVEL 2



**7. Shoving Hands in Squatting Position**  
The athletes try to shove the hands of the other while both bend knees and extend shoulders.

2 sets -1 min each



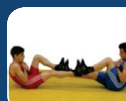
**8. Pulling Alternately**  
Grasp their hands. Both alternately extend and flex the elbow.

2 sets -1 min each



**9. One Leg-Side Rotation**  
Rotate the standing leg to the side. Try to keep both legs straight while turning the body laterally.

30 sec each leg



**10. Combat with Raised Legs Alternately**  
Push the partner and alternately try to extend and flex the knees.

2 sets -30 sec each



**11. Push Ups-Supine**  
The athlete does push-ups on supine position while his partner hold his feet in the air.

45 sec each

#### LEVEL 3



**7. Shoving Fit-Ball**  
Using a fit-ball, both try to shove the fit-ball extending their wrists over their head.

2 sets -1 min each



**8. Pulling in Bosu**  
The athletes stand on Bosu. Grasp their hands with arms extended and knees flexed 90 degrees.

2 sets -1 min each



**9. One Leg-Side Rotation on Bosu**  
Rotate the standing leg to the side. Try to keep both legs straight while turning the body laterally.

30 sec each leg



**10. Combat with Raised Legs on Bosu**  
The athletes sit on Bosu. Their legs should be slightly bent, soles touching. Push the partner.

2 sets -30 sec each



**11. Push Ups on Bosu**  
The athlete does push-ups on Bosu while his partner hold his feet in the air.

45 sec each

### Part 3: Wrestling Simulation

3 minutes



**12. One Leg Extension**  
One leg stance, and the soles of their feet together and try to extend the leg up-wards.

30 sec each leg



**13. Standing Wrestling**  
The athletes stand facing each other and make wrestling movements (ie: pummel, fakes, hand fighting, etc...).

1 min total



**14. Pushing Wrestling**  
The athlete stands behind his partner and pushes him while he works to maintain position (stance).

30 sec each athlete

Visit [www.TheMat.com](http://www.TheMat.com) for more info on this warm up and other training programs.  
Select "Coaches" then "Educational Resources".

FIGURE 1 Wrestling+, an injury prevention program.



It is important to note that for all exercises, correct performance is of great importance. Therefore, the trainer should supervise the program and correct the athletes' form, if necessary.

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