INJURY PREVENTION IN ARTISTIC GYMNASTICS: A GUIDE FOR COACHES AND DIRECTIONS FOR RESEARCH

Phillip Cossens

Gymnastics Australia Men's Team Physiotherapist

Competitive artistic gymnastics is a high risk activity. Injury prevention essentials include: Avoid the 'lumbar fold' into extension; Maximise hip extension range; Maximise thoracic extension range; Maximise thoracic rotation range; Gain calf strength and endurance; Ankle proprioceptive training. Injury prevention essentials may be important for all gymnastics coaches to recognise, but could also be used to guide future research investigating injuries in gymnastics.

KEY WORDS: gymnastics, injury.

INTRODUCTION: Competitive artistic gymnastics is a high risk activity. There is risk of acute injury associated with difficult physical skills such as somersaults and twists, often performed at great height, great speed, and in close vicinity to solid apparatus. Those not involved with gymnastics teams may be surprised to learn that although crashes and falls are common in the gym, injuries occurring as a result of these falls are not common.

In the context of acute injury, gymnastics coaches are masters of risk aversion when it comes to their gymnasts learning and practicing high risk skills. The means by which Artistic Gymnastics coaches protect their athletes include the utilisation of progressive skill acquisition, progressive physical and mental preparation, and effective use of safety equipment.

Unfortunately, gymnasts still find themselves limited by injury all too regularly. Overuse injuries account for account for up to 40% of all injuries sustained by elite gymnasts (Dixon & Fricker, 1993), creating a primary concern for the athlete's health, as well as significantly impairing performance. In 2011, the Australian men's gymnastics national squad was monitored for health and training capacity. Of a possible 5390 gymnast training days across the squad during 2011, 1640 (30%) of these training days were limited due to injury, of which almost half (49%) were due to overuse injuries. It is the area of overuse injuries that coaches and athletes should be educated to minimise injury risk. In order to properly educate about overuse injuries, further research is required.

Research into medical or performance aspects of artistic gymnastics is scarce. Research that truly provides benefit to the athletes and coaches is even more so. Unfortunately, a divide exists between those deeply involved in the sport and the professionals who are able to conduct effective research. Too often research is conducted for the benefit of the researcher, or the research facility, and not for the benefit of the athlete. The solution to this problem lies in communication. Researchers must speak with those who spend their life in the gym. They must develop relationships that can foster a joint approach to improving the health and performance of our young gymnasts. Greater communication should also occur between researchers and the health professionals who see these athletes on a regular basis.

When considering prevention of overuse injuries in gymnasts, there are several areas that the utilisation of flexibility, strength, or technique correction could have a beneficial impact. The following recommended injury prevention essentials for all artistic gymnasts are not yet supported by scientific evidence, but are the views of the author, and come from life experiences in the gymnasium, and with consensus from physiotherapists involved in gymnastics around Australia.

1. Avoid the 'lumbar fold' into extension. We must educate gymnasts and coach how to utilise a smooth arched posture, particularly during impact skills such as tumbling on floor.

- Likely associated with stress reaction/fracture of posterior elements of lumbar spine.
- May be the most common feature seen in gymnasts with low back pain.
- Brady & Vicenzino (2002) demonstrated a link between excess use of lumbar spine extension during a gymnastics bridge and low back pain in 122 female gymnasts.

2. Maximise hip extension range. Observe the back leg position during splits.
    - Poor hip extension will contribute to poor arch posture and increase loads to the lumbar spine in extension.
3. Maximise thoracic extension range. Aim for thoracic extension beyond neutral in sitting.
    - Poor thoracic extension will contribute to poor arch posture and increase loads to the lumbar spine in extension.
    - Poor thoracic extension is a likely contributor to shoulder pain, particularly in male gymnasts (Cossens & Faulkner, unpublished).
4. Maximise thoracic rotation range. Sitting thoracic rotation should achieve 75° in each direction.
    - Improving thoracic rotation is a good way to gain thoracic extension range for the purposes mentioned above.
    - Gymnastics coaches rarely utilise thoracic rotation stretches.
5. Gain calf strength and endurance. Maximum single leg calf raises off a step should be >30.
    - Likely associated with a range of foot and ankle overuse injuries, particularly bony stress injuries.
    - Very important for performance through the entire training session.
6. Ankle proprioceptive training.
    - There is value in preventing ankle injuries via proprioceptive training, so it should be utilised more in the gym for injury prevention and performance.
7. Hand and elbow postures in weight bearing. The 'diamond' shape handstand and the 'T' shape round-off.
    - McIntosh and Davis (1997) investigated osteochondrosis dissecans of the elbow and saw greater injury incidences in the second hand of the round-off.
    - These hand positions may be used to reduce weight bearing load through the humeral capitellum.

The injury prevention essentials mentioned above may be important for all gymnastics coaches to recognise, but could also be used to guide future research investigating injuries in gymnastics. Each of these physical attributes and technique patterns may warrant further investigation, but they are just a few examples of areas that deserve attention when considering athlete-focused research. To ensure that future research provides true benefits to athletes, we must propagate effective relationships between the gymnastics community and the scientific community.

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