Guidelines for Physical Activity and Return to Sport after COVID-19 Lockdown and Future Societal Restrictions

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Abstract

Many people believe that as long as they are healthy and asymptomatic, their conditioning programme may begin where they had left off before the coronavirus lockdown. This is fallacious thinking, as this long layoff may lead to injuries, overtraining and staleness. It is, rather, a progressive process where the principles of exercise science need to be heeded when they start a training programme after the layoff, as well as preventative measures. Further, it is not only fitness that needs to be considered, but also the skills that may have also regressed with lockdown as a result of COVID-19. The psychosocial factors of not training may also impact progress towards total fitness. This chapter provides such guidelines for athletes and recreational persons who have had a layoff or have been injured for a prolonged period of time. It provides fundamental principles that need to be considered. Finally, guideline tables are provided to assist all stakeholders with risk and gauging where to begin (with respect to the intensity and duration for a safe return to activities, match training or performance). Players, coaches and support staff are encouraged to take cognisance from the guidelines and recommendations in this chapter for prevention from COVID-19 and return to athletic and fitness activities.

Keywords: Physical activity, return to sport, guidelines, COVID-19, lockdown

DOI: https://doi.org/10.29086/978-0-9869937-0-1/2022/AASBS9/4
Chapter URL pp 29 - 57: http://alternation.ukzn.ac.za/Files/books/series/09/02-coopoo.pdf

1 Introduction

In a number of sectors, particularly in sport and physical activity, we have come to understand that change is inevitable. There has never been a time when athletes and those who worked with them needed to be more flexible and creative. The current pandemic offers opportunities that recreational persons, athletes and their providers will (and must) find in order to pave an ideal pathway for preparation and/or team success (Schinke *et al.* 2020)[1].

Despite rigorous global containment and quarantine efforts, the incidence of the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), also known as COVID-19, continues to surge, with more than 28 million laboratory-confirmed cases and over 900,000 deaths worldwide (as of 13 September 2020) (Noorbhai *et al. 20*20; Sohrabi *et al. 20*20). While the trajectory of this outbreak is impossible to predict, effective response requires prompt action from the standpoint of classic public health strategies to the timely development and implementation of effective countermeasures (Paules *et al.* 2020).

While the numbers of confirmed cases and deaths have risen drastically, globally, people are taking brave actions to mitigate transmission and save lives, with a reduction of COVID-19 cases is most countries. However, the role that sport and physical activity play in this pandemic is unprecedented, fascinating, and reveals the immense impact that exercise has on every aspect of our lives (Gilat & Cole 2020).

From a sports perspective, literature has begun to shed light on athlete behaviours within a community, as well as the health implications due to the uncertainty of returning to play during mega-events (or how a return to sport may even be seen in the future due to the emphasis of physical distancing) (Mann *et al.* 2020). Stakeholders are also treading a fine line between prosperity and the protection of global health. The examination of sports actions related to COVID-19 is imperative, as there are important lessons to be taught (Parnell *et al.* 2020). Under lockdown, such lessons include a guideline for training, physical health and mental health (WHO 2020). There has also been

[1] Please note that this paper was submitted in July 2020 during the beginning of the COVID-19 lockdown. Much of the paper is relevant to COVID-19 but can also be applied to future societal restrictions for athletes/ persons participating in sport or physical activity.

a call to action for sports, particularly in football, to recommend maximal caution on the decision when to restart sport activity. Furthermore, a specific protocol to assess cardiological, pulmonary and, systemic sequelae of COVID-19 before resuming sporting activities has been suggested to be considered (Corsini *et al.* 2020).

The methodology used in this commentary involved the collation of data from primary and secondary resources into a summarised document. Most of the literature was published in 2020 as this was the period of the greatest infection.

It is important to be aware of the ramifications that people will face after a long layoff from sport or physical activity, due to lockdown or a major injury. Simultaneously, the person may be active with home exercise program-mes or rehabilitation routines (Hammami *et al.* 2020). In both cases, the stimulus of the training is not high enough to maintain match fitness levels. The lag in fitness becomes greater, if the break from sport-specific condi-tioning programmes is long, including skill development. In simple terms, a player can get 'rusty' and lose their form. In order to alleviate players from being out of form, it will take a number of weeks which depends on the players' absence from specific conditioning and skill programmes as delivered by sports coaches and conditioning coaches (NSCA 2020). Aside from the fitness that deteriorates, the physiological parameters in the body also returns to untrained or slightly higher than untrained persons. It is advised that one needs to observe the commencement of training close to or a little more than pre-sea-son training. Therefore, this chapter aims to provide guidelines for prevention of COVID-19 and principles to return to play for athletes and recreational persons, amid lockdown and the COVID-19 pandemic. It is also important to emphasise that guidelines may differ depending on the level of athlete (elite, competitive, recreational, youth sport, etc), as well as the type of sport being played (individual or team sports).

The first table (Table 1) shows how the bodily functions decrease over time with little or no training. This provides an understanding of how the human body is affected having little or no training, which will impact on what intensity and duration the athlete or recreational person will have to commence with. This table in conjunction with Table 2 will be looked at together in order

to determine the intensity and duration of training after a long or short layoff as a result of COVID-19.

Table 1. The effects of non-training on specific physiological parameters over various time frames

Duration of break	Musculo-skeletal	Cardio-respiratory	Metabolic	Body Mass
0 to 2 weeks	Not likely to disrupt previous fitness development	Not likely to disrupt previous fitness development of VO_2max	Not likely to disrupt previous fitness development	No likely to increase body weight
2 to 4 weeks	Muscle tone begins to be less - no significant loss	4% loss in oxygen uptake	Insulin sensitivity is reduced. Lactate levels take slightly longer to dissipate from the body	Body weight can show increases, particularly if diet was not monitored
4 to 6 weeks	Muscle mass loss is noticeable - lean body mass loss is great	7 to 12 oxygen uptake percent loss	Density of capillaries get smaller - because less is blood is required	An increase of between 2 to 3 kg in weight. Loss in lean body weight
6 to 8 weeks or more	Muscle strength levels are at pre-training levels, yet, higher than untrained 20 percent of	Cardiorespiratory-about 13-15 percent of VO_2 max – individual's levels equals to untrained state	The mitochondrial enzymes begin to decrease, which was required to release more oxygen to the	Body weight increases can be substantial, if a eating plan was not taken into account

	VO_2 max individuals		body during exercise	

Adapted from: Hughes *et al.* (2020) and Hamilton (2020). (http://www.220triathlon.com/training/what-happens-to-your-body-if-you-suddenly-stop-training/12732.html - Andrew Hamilton in Base Endurance Training, Endurance Health and Lifestyle, Endurance Injuries and Health.)

Armed with this knowledge, one is able to make adequate choices as to where to start with training programmes for preparation to full fitness readiness. It should be emphasised that the skill levels must also be concentrated on with movement in order to enhance the time for return to sport, match play or fitness. Individual differences is also important and should be taken into account as two people may not be at the same level of skill or fitness to start off with. For example, one person may need to start at 50% intensity, while another person may have to begin at a 40% intensity level. This is a larger challenge for the conditioning coach or trainer, because if the starting level is too intense, injuries may occur. Similarly, if too low, it is of minimal value for the person to improve fitness. Ultimately, the aim is for athletes and recreational persons is to get back to full fitness so that activities may begin.

It is also important to consider the following, in reference to Table 2. Firstly, athletes and recreational persons are not totally inactive during lockdown. As a result, the loss in maximum oxygen will be less. Strength losses is also significant, however, it would be better than baseline values. Lastly, body mass can increase by two to three kilograms, which also depends on inactivity levels.

Table 2. Intensity for getting back to match training

Duration of no or very little training	**Where do you start?**
If you're off **one week** or less	Begin your plan where you left off
If you're off **up to 10 days**	Start training 70 percent of the previous intensity
If you're off **15 to 30 days**	Start training at 60 percent of previous intensity

If you're off **31 days to 12 weeks**	Begin training at 50 percent of previous intensity
If you're off **12.1 weeks or more**	Start as an untrained person

Adapted from: *Runners World* (2020)

For example, (Table 3), a modified training period will need to be adhered to on return from reduced training. After having two weeks of reduced load (40%), the athlete would require 2.5 weeks of incremental training to return to full training. Returning quicker than this period exposes the athlete to increased risk of injury. The time away from full training is approximately 4.5 weeks.

Table 3. Modified training period on return from reducing training

Weeks of training at a reduced load	Weeks of modified training required to return to full training (total weeks of modified training)				
8	8 (16)	6.9 (14.9)	5.8 (13.8)	4.8 (12.8)	3.7 (11.7)
7	7.4 (14.4)	6.3 (13.4)	5.3 (12.3)	4.2 (11.2)	3.1 (10.1)
6	6.9 (12.9)	5.8 (11.8)	4.7 (10.7)	3.7 (9.7)	2.6 (8.6)
5	6.3 (11.3)	5.2 (10.2)	4.2 (9.2)	3.1 (8.1)	2.0 (7.0)
4	5.7 (9.7)	4.7 (8.7)	3.6 (7.6)	2.5 (6.5)	1.5 (5.5)
3	5.2 (8.2)	4.1 (7.1)	3.1 (6.1)	2.0 (5.0)	0.9 (3.9)
2	4.6 (6.6)	3.6 (5.6)	2.5 (4.5)	1.4 (3.4)	0.4 (2.4)
	0%	20%	40%	60%	80%
	Percentage of training of normal training load completed				

The Australian Sports Commission (Purdam *et al.* 2015)

2 Training Principles to be Taken into Account during Reclaiming Fitness

The FITT principles, namely: frequency, intensity, time, and type of exercise:

- Frequency is how often one is training.

- Intensity is how hard one is training as a percentage of one's heart rate.

- Time is the duration of one's training session or match sessions.

- Type is what fitness methods one is using, e.g. HIIT, intervals or sprints, etc.

Specificity of training means that the training methods should be specific for the sport type.

The Progression principle is related to the increase in intensity or load in order to achieve improvement, while Periodisation (through various meso- and macro-cycles) is important in order to titrate a training programme in high, moderate and low intensity and duration sessions of the training season. This will prevent overtraining and burn out in athletes.

Reversibility, is a concept illustrating that fitness cannot be banked. Training needs to be regular or else the fitness is lost with rest or inactivity.

Individuality relates to the fact that no two persons are alike and that their training responses will differ. Thus, individualised fitness programmes are essential.

Overtraining means that if too much is done too soon, for a prolonged period of time, staleness could be a factor in slow improvement or no improvement in fitness. Factors such as poor sleeping patterns, poor eating, unwarranted stress, and irritability or mood changes are some of the symptoms of over-training. In most cases if the athlete takes a rest period to recover, it will accelerate healing.

2.1 Other Factors to be Taken into Account during Athlete Lockdown

There are a number of factors that are important to take into consideration for

the athlete during a prolonged period of rest, as experienced during lockdown. The authors have selected the important factors that would affect athletes return to play. Hence, the coach and athlete must take these factors into account, before match readiness is proclaimed. Some of these factors will be briefly described.

Psychosocial factors relate to athletes becoming anxious about training and competition. If this is not controlled, it may lead to reduced self-esteem, a lack of confidence and even depression in extreme cases. Lack of social support applies to athletes living alone during lockdown and have very little social support as they are away from home, this can affect the athlete's adaptation to lockdown, and this may induces anxiety, depression and lack of self-esteem. Another factor is reduced motivation as the interaction with coaching staff reduces the athlete interacting with coach to redesign aspects such as goal setting in order to focus towards the future. However, the uncertainty of competition may affect the athlete's motivation and no teammates around the athlete for up-liftment. In a study conducted by Chand (2015), it was demonstrated that high achiever people with superior achievement motivation possessed enhanced excellence to tolerate frustrating conditions as compared to low achiever people with poor achievement motivation.

Most athletes forget about skill execution after a layoff as they do not consider it as a factor for deterioration during a layoff. There will be little or no skill practice during this time and this will affect the person's confidence and doubt their ability. The longer the lack of skill execution, the greater the decrements in confidence.

The performance expectations may not have been set by the coaching team and, as such, the goal setting of a person will be affected, and the under or over estimation of a person's performance may be affected. With little or no interaction and support from staff or medical team, an injury may deteriorate as a result during lockdown, and such people may not be able to get the attention of the medical team for consultation; despite telemedicine measures that are put in place during this period.

Little or no interaction with the coach and is not in constant contact, the athlete may be left in the lurch with no communication and training updates. Insufficient training stimulus while training at home may not be of the same intensity standard in order to provide a training stimulus. This implies that a person will have to train harder in order to return to training fitness (Lim & Pranata 2020).

3 Precautions

3.1 Exercise and Sport during Lockdown

In a recent article, Roberts (2020) states that walking, running and cycling are optimal activities that can be performed outdoors during the lockdown period. Performing these activities in a rural area is not much of a problem, however, this is a bit more restrictive in a city or urban area. For walking, the physical distancing should be two meters apart while wearing masks. For cycling or running, this is a bit more difficult in which the guidelines from the Dutch and Belgium researchers were quoted. They had indicated physical distancing of between six to nine meters apart. Roberts (2020) further indicates that the two-meter safety bubble assumes static air. Based on the running and cycling data modelling, it may be more serious when walking, cycling or running behind a person downwind. At casual physical activity, conversational walking pace with no forced breathing, there is probably less virus molecules in exhaled air, compared at rest. Running will potentially breathe more droplets and viral particles in the air as harder breathing is associated with more vigorous activity.

3.2 Exercise and Sport during the Aftermath

Aside from the environment, one also needs to consider the commercial interests, which has placed unprecedented pressure on certain sporting codes to begin competition prematurely. However, there are health risks associated, especially if one is a recovered COVID-19 patient. This could include a number of cardiovascular complications as COVID-19 is a viral infection. Cardiologists have indicated that it may take between three to six months to be free of the virus, if the patient had complications such as myocarditis or pericarditis (Dores & Cardim 2020). The most common ailment facing most elite athletes are respiratory tract infections causing a significant loss in training and competition time (Hull, Loosemore, and Schwellnus 2020). Care needs to be taken when beginning exercise after lockdown, as athletes would have had minimal equipment and trained at a lower intensity during lockdown. As a result, many elite athletes are at risk, if their intensity of exercise is too high when beginning exercise after lockdown (Paoli & Musumeci 2020).

4 Mitigating Risk for Both Sport and Fitness/ Fun Activities

The Aspen Institute in collaboration with relevant stakeholders and medical

experts had formulated a risk assessment tool. Although there were a number of other sources that were analysed for risk classifications (Ramagole *et al.* 2020; Hughes *et al.* 2020), the below tables present the following risk categories: lowest, medium and highest risk. This was designed to help people of all ages assess risk in a variety of common sports and recreational activities (Tables 4 and 5). A majority of the sporting codes, fitness and activities that have been presented are relevant, mainly, to the South African context. Each country will be different in assessing the relative risks for each sporting code or activity. As such, it is important to mitigate the risk on a case-by-case basis as well as according to the various lockdown levels that each country adopts. At present, this is the best available evidence to guide participation and return to play for both athletes and recreational persons.

Table 4. Risk categories for participation and return to play (fitness and fun activities)

Fitness/Fun Activities	**Lowest Risk**	**Medium Risk**	**Highest Risk**
Bicycling	Use your own indoor cycle; ride outside alone or with household members with your own equipment in less populated setting.	Ride alone or with household members outside with your own equipment (only ride in a pace line or close group/pack with household members) in more populated setting, remaining physically distant from any non-household members.	Join group ride; ride with non-household members not keeping recommended physical distance; indoor cycle at public gym; cycle with shared equipment (e.g., bike, pump, rented bike, etc).
Sources and Resources: https://www.usacycling.org/blog			
Climbing	Perform individual skill development activities	Perform individual skill development	Perform climbing activities at indoor facilities or at

	(general fitness, strength training, hangboard work-outs) at home (backyard, inside home, at-home climbing wall), alone or with household members.	activities in public spaces alone or with household members, or with non-household members maintaining recommended physical distancing.	your local crag with non-household members not maintaining recommended physical distancing or in groups.
Sources and Resources: http://www.usaclimbing.org/Education/Training_At_Home.htm https://climbingwallindustry.org/page/Coronavirus			

Dance	Dance at home alone or with household members.	Dance in public outdoor spaces alone or with household members while maintaining recommended physical distance from non-house-hold members.	Dance in public studio; not maintaining recommended physical distance from non-household members.
Sources and Resources: https://usadance.org/ https://www.danceusa.org/resources-preparing-potential-impact-coronavirus			

Running	Run on personal equipment (e.g. treadmill in your home); do sprints at home; run alone or with members of household in uncrowded nature	Run alone or with members of household in more populated rural/suburban/urban setting, remaining physically distant	Run in crowded areas; run with non-household members in close proximity; run indoors on shared equipment (e.g.,

	area/roads/sidewalks with wide paths (keep recommended physical distance).	from any non-household members.	treadmill in a shared gym).
Sources and Resources: https://www.nyrr.org/youth/active-at-home https://runningusa.org/RUSA/News/2020/Running-Industry-Response-to-COVID-19.aspx			
Walking/ Hiking	Walk/hike alone or with members of household in uncrowded space with wide paths/roads/sidewalks (keeping recommended physical distance); walk on personal equipment (e.g. treadmill in your home).	Walk/hike alone or with members of household in more populated rural/suburban/urban setting, keeping recommended physical distance from non-household members.	Walk/hike in crowded areas; walk/hike with non-household members without keeping physical distance; walk indoors on shared equipment (e.g., treadmill in a shared gym).
Sources and Resources: https://www.nrpa.org/about-national-recreation-and-park-association/press-room/NRPA-statement-on-using-parks-and-open-space-while-maintaining-social-distancing/			

Resistance Training	Train at home alone or with household members; using personal equipment or household objects.	Train in outdoor spaces alone or with household members while maintaining recommended physical distance from non-household members; sanitize personal	Training public gym, not maintaining recommended physical distance, not sanitizing personal or shared equipment, not using personal chalk.physical distance of non-

		equipment; use personal chalk.	household members; using shared equipment.
Sources and Resources: https://www.teamusa.org/USA-Weightlifting/Resources/COVID19-Updates/Programs-and-Shared-Resources https://www.nsca.com/education/tools-and-resources/covid-19-return-to-training/			
Yoga	Practice yoga alone or with household members at home.	Practice yoga alone or with household members in outdoor public space, or with non-household members physically distant and with no physical contact and use of your own sanitized equipment (mat, blocks, straps, blankets, etc.).	Participate in indoor or outdoor yoga class not maintaining recommended physical distance of non-household members; using shared equipment.
Sources and Resources: https://www.yogaalliance.org/			

Adapted from: Aspen Institute (2020). *Key: Lowest Risk - Individual exercise or training at home, alone or with shared household members, with owned and sanitized equipment; Medium Risk - Individual exercise or training in public, alone or with shared household members, with owned and sanitized equipment; individual exercise or training in public with non-shared household members physically distant; Highest Risk - Any group play or training with non-household members not physically distant in private or public; any usage of shared equipment.*

It must be noted that it has not been possible to include every activity in this table. For activities that are not listed in the table, please base your activities on the recommendations made for a similar activity.

Table 5. Risk categories for participation and return to play (sports activities)

Sports Activities	Lowest Risk	Medium Risk	Highest Risk
Cricket	Running/aerobic training (solo), resistance training (solo), skills training (solo).	Nets - batters facing bowlers. Limit bowlers per net. Fielding sessions - unrestricted. No warm up drills involving unnecessary person to person contact. No shining cricket ball with sweat/saliva during training.	Full training and competition. No ball shining with sweat/ saliva
Sources and Resources: Hughes *et al.* (2020).			
Field Hockey	Perform individual skill development activities (dribble, passing, footwork/agility drills, shooting drills, etc.) alone or with household members at home with your own	Perform individual skill development activities alone or with household members, in an outdoor public venue with your own sanitized equipment while exercising appropriate	Participate in any group, team, or multi-team structured or pick-up play, with non-household members; using shared equipment; not sanitizing shared or personal equipment (e.g., cages, balls, cones); not

	sanitized equipment.	physical distancing.	maintaining recommended physical distancing guidelines
Sources and Resources: https://www.teamusa.org/USA-Field-Hockey/Features/2020/May/21/USA-Field-Hockeys-Return-to-Play-Guidelines			
Golf	Putt or chip balls at home.	If on golf course; carry own clubs or ride alone in sanitized golf cart and abide all updated club and/or US Golf Association (USGA) guidelines; maintain recommended physical distance from non-household members; keep golf bag in your possession at all times; use remote check-in; no bunker rakes; modified flagsticks and cups; with no common use distribution of tees/scorecards/pencils/ball markers.	Play with non-household members not maintaining recommended physical distance; make physical contact (e.g., handshake, high-five, fist bump), and ignore club and/or USGA guidelines using shared equipment
Sources and Resources: https://www.gcsaa.org/resources/covid-19-pandemic-resources https://www.usga.org/content/usga/home-page/course-care/covid-19-resource-center.html			

Gymnastics	Perform individual skill	Perform individual skill	Perform team or group activities

	development activities (general fitness, strength training, flexibility/holds, tumbling) at home (backyard, inside home), alone or with household members.	development activities in public outdoor spaces alone, with household members or with non-household members, maintaining recommended physical distancing; sanitize any personal equipment.	using shared equipment in gym; not sanitizing personal or shared equipment; not following recommended physical distancing guidelines share chalk
Sources and Resources: https://usagym.org/pages/aboutus/pages/coronavirus.html			

Martial Arts	Perform individual skill development activities at home alone or with household members.	Perform individual skill development activities in outdoor public spaces alone or with household members while maintaining recommended physical distance from non-household members. Sanitize any equipment.	Participate in any martial arts with non-household members; practice in public gym; not maintaining recommended physical distance from non-household members; not sanitizing shared or personal equipment.
Sources and Resources: https://www.teamusa.org/USA-Judo/Go/2020/USA-Judo-Coronavirus-Update			

https://www.teamusa.org/USA-Karate/Coronavirus-Information https://www.teamusa.org/USA-Taekwondo/V2-Resources/Coronavirus-Updates

Netball	Running/aerobic/agility training (solo), resistance and skills training (solo), shooting (outdoor or own ring) or ball skills (e.g. against a wall to self).	Skills using net-ball passing, shooting, defend-ing. Small group training (not more than 10 athletes/staff in total) based on skills with set drill, but no close contact play drills.	Full training including matchplay
Sources and Resources: Hughes *et al.* (2020)			

Rowing	Row/erg on personal equipment (e.g. ergometer at your home); perform individual skill development activities at home alone or with household members.	Row on personal equipment (e.g. ergometer or single) in public alone or with household members; perform individual skill development activities in public spaces alone or with household members or with non-household members	Rowing in crowded areas; rowing with non-household members in close proximity or same boat; erg indoors on shared equipment

		following recommended physical distancing; sanitize any equipment.	
Sources and Resources: https://usrowing.org/sports/2020/3/4/usrowing-coronavirus-information-and-updates.aspx			

Rugby	Running/aerobic/agility training (solo), resistance training (solo), skills training (solo) including kicking, passing, ball skills (e.g. against wall to self).	Skill drills using a ball, kicking and passing. No tackling/wresting. Small group (not more than 10 athletes/staff in total) sessions.	Full training and competition
Sources and Resources: Hughes *et al.* (2020).			

Soccer	Train or enjoy exercises at home (e.g., juggle, cone drills, footwork, and passing) alone or with household members and with your own equipment.	Engage in any activities in public spaces alone or with household members, and with sanitized balls.	Engage in team or large group pickup play with non-household members and shared balls
Sources and Resources: https://www.ussoccer.com/stories/2020/04/us-soccer-launches-bend-the-curve-stay-at-home-campaign https://ussoccerfoundation.org/athome/			

https://parents.dcscores.org/covid-19

Swimming	Swim in your own chlorinated pool (laps, tread water); engage in dryland training at home alone or with household members.	Swim in chlorinated public pool as long as proper steps are taken by the operator to reduce the spread of the virus, and recommended physical distancing is practiced; swim, snorkel, surf in open salt or freshwater alone or with household.	Use of water parks and water playgrounds, venues where physical distance is difficult to control; swim, snorkel, surf in open salt or freshwater with non-household members; dryland training within six feet of non-household members
Sources and Resources: https://www.usaswimming.org/utility/landing-pages/coronavirus			

Tennis	Train or engage in activities alone or with household members at home (wall rally, hot hands, shadow swing, footwork) with own equipment.	Play or train on public or shared court with household members.	Play or train on public or shared court with non-household members, and with no measures taken to minimize touching of shared objects.
Sources and Resources: https://www.usta.com/en/home/usta-covid-19-updates.html			

Volleyball	Perform individual skill development activities (passing drills, blocking, hitting, setting, serving, general fitness, strength training), at home (backyard, driveway, in-home), alone or with household members; use personal net at home to play with household members.	The above individual skill development activities in public spaces alone or with household members or individual skill development with non-household members following recommended physical distancing; sanitize volleyballs.	Participate in any team or group play; not maintaining recommended physical distancing guidelines; not sanitizing volleyballs
Sources and Resources: https://www.teamusa.org/usa-volleyball/features/usa-volleyball-response-on-coronavirus			

Adapted from: Aspen Institute (2020)

Key: Lowest Risk - Individual exercise or training at home, alone or with shared household members, with owned and sanitized equipment; Medium Risk - Individual exercise or training in public, alone or with shared household members, with owned and sanitized equipment; individual exercise or training in public with non-shared household members physically distant; Highest Risk - Any group play or training with non-household members not physically distant in private or public; any usage of shared equipment.

Note: No risk categories were allocated to cricket and rugby - risk categories for such sporting codes should be developed (despite their complexity).

It must also be noted that it has not been possible to include every sporting code in this table.

5 Guidelines for Prevention of COVID-19 and Return to Play

To protect the well-being and health of people, it is imperative to consider important steps to prevent the spread of COVID-19. The South African government has imposed rules and regulations while in public spaces. In addition, guidelines from the National Institute for Communicable Diseases (NICD) and the Department of Health (DoH) in South Africa also refer to general public health with nothing particularly related to sport and physical activity. There is an absence of conclusive evidence on the prevention of COVID-19 during sport and exercise (van Rensburg *et al.* 2020).

5.1 Preventative Measures

Athletes and teams can be supported during the COVID-19 pandemic by advocating the following preventative measures:

Hand hygiene: General guidelines include washing hands often with soap and water for at least 40-60 seconds or using hand sanitizer (at least 70% alcohol) if soap and water are not available. As the virus can survive for days on surfaces, frequently touched objects and surfaces should be regularly cleaned and disinfected (van Doremalen *et al.* 2020). Regular disinfection of heavily used areas and surfaces are also required. One should avoid touching their eyes, nose and mouth; while also adhering to hygiene rules and guidelines.

Physical distancing: The Centers for Disease Control and Prevention (CDC) describes social distancing as remaining out of congregate settings, avoiding mass gatherings and celebrations, and maintaining distance (approximately one-two meters) from others when possible (CDC 2019). This practice is being advocated by governments and promoted by professional athletes as well (Bumbaca 2020; NYC Health 2019). One should also reduce the size of training groups and gatherings.

Travel: To slow down transmission, many countries have imposed travel restrictions. Measures have ranged from suspending flights, to banning travellers from affected countries, to in-home isolation for 14 days after returning from specific destinations. Countries are also performing entry screening, including measuring body temperature and assessing for signs and symptoms

of COVID-19. Domestic travel has become challenging as busy airports can be a common site of person-to-person spread. However, as a result of the sweeping suspensions and cancelations of sports leagues and tournaments, many athletes are not needing to travel beyond returning home from where they were training or competing (Toresdahl & Asif 2020).

Figure 1. An illustration documenting the practicalities of wearing a face mask during and after exercise
BJSM Blog (Blanco & Janse Van Rensburg 2020)

Face mask: All athletes should be advised to wear a cloth mask to prevent becoming infected with COVID-19 in the community setting or while traveling (CDC 2019; Greenhalgh *et al.* 2020). Inappropriate use of medical masks can affect supply and demand to the point where athletes and recreational persons will have inadequate protection shields (van Rensburg *et al.* 2020). Wearing masks for a prolonged period makes breathing during

training or exercise difficult and can also cause potential respiratory distress or pulmonary conditions (also see Figure 1). It is suggested that masks for athletes and recreational persons are innovated in a way where protection from the virus is still provided while breathing is also viable. In the interim, athletes can also use face shields.

5.1.1 Additional Guidelines

- One should use the crook of one's elbow or a tissue (always dispose of used tissues) when coughing or sneezing and greeting fellow athletes
- Do not share water bottles and/or use team water bottles.
- Avoid spitting (more research required among cricketers who shine the ball using saliva and whether transmission increases among asymptomatic players).
- Do not use communal nutritional supplements.

Exercising at home (or within immediate surrounding areas in one's neighbourhood; if the area is deemed safe or is not a hotspot) will be the safest option under such circumstances. Keeping fit for health at this stage is more important than for sport performance.

5.2 Return to Training Guidelines

According to Toresdahl and Asif (2020), for athletes with confirmed or presumed COVID-19, training can begin once symptoms completely resolve and energy levels return to normal. Since in-home isolation is necessary for at least 72 hours after resolution of symptoms, low-intensity indoor training may be attempted during that time. After discontinuing in-home isolation, an athlete can gradually return to training as tolerated. For asymptomatic athletes who are isolated due to recent travel or close contact with an individual with COVID-19, maintaining cardiovascular fitness may be difficult. Exercise that is recommended during the in-home isolation period is dependent on the available equipment, which may include a stationary bike, treadmill, and resistance training. Guidance and monitoring by a strength and conditioning coach or exercise physiologist can be provided remotely.

Recreational Athletes Guidelines

The urgency to train at high intensities are not urgent for these persons. These recreational athlete's must follow the same preventive guidelines as the elite athletes as listed above. These persons should train alone, jog in the streets, dance at home, and use dumbbells if so available. The maintenance of fitness for health and wellness is the highest imperative (Lim & Pranata 2020).

6 The Alteration of Lifestyle Modifications during COVID-19

According to Hall *et al.* (2020), during 2020, it was indicated we were currently confronted with two pandemics simultaneously (COVID-19 being one, and physical inactivity together with sedentary behaviour being the other). The latter still being a worrying pandemic, in which many people have increased their BMI, been diagnosed with chronic disease or co-morbidities, as well as experienced symptoms or illnesses of mental health. Globally, many have resumed to normality post COVID-19, however, the physical inactivity and sedentary behaviour pandemic will continue and, more concerningly, we are at an alarming risk of the obesity and physical inactivity pandemic worsening, as a result of COVID-19. Modifiable lifestyle factors such as diet and physical activity should not receive less attention. There are decades of empirical evidence that have supported these key factors as promoting health and wellness, even in times of crisis or pandemics (Carter *et al.* 2020). As a result of this dual-pandemic and the importance of lifestyle factors, we emphasise that this chapter also starts to shed light of how the general population can be active and healthier during future societal restrictions (and not just athletes and recreational persons).

7 Conclusion

It is important to take note of a number of factors that play an important role in one's fitness for full training readiness. This may take longer than anticipated and if this is not conducted scientifically or with careful caution, there may be a setback (e.g. injury or cardiovascular complications) on the road to reconditioning. It is essential to consider that full fitness is different to match readiness. Players, coaches and support staff are encouraged to take heed from the guidelines and recommendations in this chapter for return to sport participation. These guidelines are essential in order to reduce or prevent infection

during training or match play. It is important to note that one of the reasons for sport participation, is to improve health and wellness. As such, it does not make sense to train or play sport without taking precautions resulting in infection of the COVID-19 virus. This infection will delay the return to play for various athletes. All athletes and recreational persons should take precautions, be sensible, responsible and make the prudent decisions. It is also recommended that relevant stakeholders pay attention to the adoption of these guidelines in the event of future societal restrictions.

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