**Maximising individualisation of sports injury risk reduction approach to reach success**

## Legend of the Figure 1:

The figure 1 illustrates this conceptual strategy by the metaphor of the Trojan horse approach.

The upper part of the illustration (A) represents an injury risk reduction approach without individualisation: the injury risk reduction measures (IRRM) implementation and the IRRM are the same for all athletes, illustrated by the fact that the Trojan horses have all the same colour, including the same soldiers inside whatever the village that they address. The lower part of the illustration (B) represents an individualised injury risk reduction approach: the IRRM implementation and the IRRM are adapted to each athlete, illustrated by the fact that each Trojan horse has a colour adapted to the colour of the village that it addresses, and the soldiers on the horse are adapted to the addressed villagers. The Trojan horse is open, the soldiers (i.e., IRRM) are visible for the village (i.e., athlete) since the IRRM should have been co-constructed with the athlete.

The Trojan horse represents the method of presenting IRRM to the athlete (i.e., IRRM implementation) and different colours represent different IRRM implementation approaches. The Trojan horse soldiers represent the characteristics of the IRRM. The different soldiers (numbers 1 to 6) represent, as an example and illustration, potential specific measures that can be proposed to the athlete to improve his/her weakness and risk factors. The village represents the athlete, and the different colours represent different behaviour change determinants. The villagers represent the strengths / protective factors (soldiers with numbers 1 to 6) and weaknesses / risk factors (weak villagers with numbers 7 to 12) of the athlete; the characteristics presented in the Figure are examples and do not exhaustively present all existing strengths / protective and weaknesses / risk factors. The soldiers with numbers 1 to 6 illustrate, as an example, different IRRM when they are on the horse and strengths when they are in the village. The soldiers illustrate physical IRRM or strengths: strengthening or strength (1), stretching or flexibility (2), sprint mechanics training or sprint performance (3), sensorimotor control training or sensorimotor control (4), recovery (5), and injury management (6); or psycho-behavioural IRRM or strengths: self-determination (1), psychological flexibility (2), perseverance (3), stress management (4), relaxation (5), and adaptive coping strategies (6). The weak villagers represent, as an example, the weakness or injury risk factors that an athlete should improve to reduce the risk of injuries. The weak villagers illustrate physical weakness/risk factors: strength deficient or imbalance (7), lack of flexibility (8), sprint mechanics weakness (9), lack of sensorimotor control or core stability (10), physical fatigue (11), and poor previous injury management (12); or psycho-behavioural weakness/risk factors: lack of self-determination (7), automatic pilot (8), impulsivity (9), anxiety and stress (10), mental fatigue (11), and non-adaptative coping strategies (12). These different characteristics for soldiers and villagers are only example to illustrate the concept; they should not be considered as evidence-based IRRM in the present illustrative example.

**An example to concretely describe the conceptual strategy of the maximised individualisation approach:**

We propose here an example based on Figure 1 of the present editorial to describe the conceptual strategy of the maximised individualisation approach.

The upper part of Figure 1 (A) represents an injury risk reduction approach without individualisation. A standardised injury risk reduction programme (symbolised by the horse and soldiers) is proposed to all athletes (symbolised by the villages). It includes the same IRRM (symbolised by the soldiers) for all athletes; note that it is advised to base IRRM on the higher level of scientific evidence. In the present example, it is composed of 50% strengthening / self-determination exercises, 25% sensori-motor control / stress management exercises, and 25% stretching / psychological flexibility exercises (this is an example to illustrate the proposal of strategy). The programme uses the same method to be presented to all athletes (i.e. same horse's colour). In the present example, a health professional says to the athlete "these are relevant IRRM, it is important for you to do it". The red village is likely to accept the red horse, i.e. the red athlete is likely to accept the IRRM, because the health message matches the determinants of IRRM adoption of this athlete: in this case, the athlete already presents a self-determined motivation and good planning skills regarding the IRRM. However, there is a high risk that the other athletes (blue, yellow, and green) will not be compliant with the IRRM as their determinants of IRRM adoption do not match with the health message (examples of the determinants below) symbolised by different colours of the villages than the proposed red horse. In addition, the standardised IRRM programme is not appropriate for all athletes. The current programme matches the deficiencies of the red athlete and only partially for other athletes (1 out 6 of the deficiencies for the blue and green athletes, and 2 out 6 for the yellow athlete), which reduces for them the chances of the IRRM being beneficial at the individual level.

The lower part of the illustration (B) represents an individualised injury risk reduction approach. In order to develop such individualised IRRM programme, we suggest an individual screening of the athlete's risk and protective factors in addition to an evaluation of the socio-cognitive determinants of IRRM adoption. In the present example, the four athletes were screened at the start of the sporting season for their risk and protective factors for strength (1), flexibility (2), sprint performance (3), sensori-motor control (4), sleep quantity (5), previous injuries (6), self-determination (1), psychological flexibility (2), perseverance (3), stress management (4), relaxation (5), and adaptive coping strategies (6), using appropriate, objective, reliable, and valid methods. Additionally, they were also screened for their motivation, beliefs (attitudes, subjective norms, perceived control), intentions, and planning skills to perform an IRRM (i.e. socio-cognitive determinants). Based on this screening, four individualised IRRM programmes were co-constructed by a multidisciplinary team including the athlete, researchers, clinicians, end-users and members of the target community. In addition, an education of all actors should be performed to explain the interest of the overall injury risk reduction approach and IRRM programme development.
These IRRM programmes are proposed with four different health messages. Since the methods of IRRM presentation to the athletes matches its IRRM adoption determinants (i.e. each horse's colour matches the addressed village's colour), there is a high chance that the IRRM programme will be accepted and performed by the athletes. If the athletes are compliant with the IRRM, there is a higher chance of reaching success. As mentioned above, the red athlete is already likely to perform the IRRM program with a simple invitation to do it "because it is important". For the blue athlete, who for example presents no motivation to perform IRRM, because he/she doesn't perceive it as potentially beneficial for him/her, a first motivational phase will be

necessary in order to implement an intention to perform the recommended programme. The yellow athlete has for example the intention to perform the IRRM programme, however he/she doesn't succeed in finding the time to do the exercises. With this athlete, an intervention to help him/her plan the action of performing an IRRM programme despite his/her perceived barriers. For the green athlete, who thinks for example that an IRRM programme may be beneficial but does not perceive the health professional as a competent individual, showing him/her that other athletes perform the IRRM programme may increase his/her compliance to the programme, because subjective norms seem to be the determinant for him/her.

In addition, for each of the four athletes, the IRRM match the athlete' risk factor / athlete' weakness: the IRRM proposed in the IRRM programme are appropriate to the weakness / risk factors of the athlete detected through the screening procedures (i.e. soldiers on the horse match weak villagers). For example, the red athlete presents deficiencies in strength, flexibility, neuro-muscular control, self-determination, psychological flexibility, and stress management. The red horse thus proposes IRRM targeting these deficiencies. On the contrary, the blue athlete presents deficiencies in sprint performance, neuro-muscular control, perseverance and stress management, and the proposed IRRM are appropriated to these deficiencies. The two athletes (red and blue) do not need the same IRRM to try to reduce injury risk. An individualised IRRM seems more appropriate than a standardised one (Figure 1 A) to reach success.

The development of the IRRM programme should be performed or adapted regularly, to match with potential changes of athlete's characteristics with time. Such individualised approach should increase the chance of efficacy of the IRRM at the individual level. Indeed, the individual IRRM will facilitate the improvements of the weaknesses of the athlete, and thus reduce the individual risk factor and in turn reduce the risk of injury at the individual level.