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1 **Advancing Adherence Research in Sport Injury Prevention**

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1 **Why all the fuss about adherence?**

2 Have you ever wondered why some patients do not adhere to drug prescriptions
3 despite warnings regarding the health consequences of non-adherence? The simple
4 reason is that it takes more than just a prescription and education to get patients to
5 take their drugs. A similar scenario has become apparent in the field of sport injury
6 prevention. Over the past two decades, sport injury prevention researchers have
7 developed innovative and proven interventions for injury prevention in athletes.
8 However, most interventions have been developed without the optimal
9 implementation context in mind. Researchers provide evidence of intervention
10 efficacy and as much public advocacy as possible, more like the “educate and
11 prescribe” tradition. Unfortunately, the challenge of non-adherence remains
12 palpable.

13 The World Health Organization defines adherence as “the extent to which a person’s
14 behaviour – taking medication, following a diet, and/or executing lifestyle changes –
15 corresponds with agreed recommendations from a healthcare provider.”[1] The
16 effectiveness of any treatment or prevention intervention is determined jointly by
17 its efficacy and user-adherence to the intervention. While it is common practice for
18 “compliance” and “adherence” to be interchangeably used by researchers, these
19 constructs have different meanings.[1, 2] Adherence has been identified as the more
20 appropriate concept when capturing dynamic and complex changes required to
21 assess interventions over time.[2] In the clinical setting, the idea of compliance is
22 associated with blame and signifies a paternalistic viewpoint between healthcare
23 providers and patients.[1] Thus, adherence is a preferred term from both a research
24 and clinical perspective. Currently, very little information is available on adherence
25 in existing sport injury prevention literature, as most studies have been efficacy
26 trials that have focused on compliance. There is a need to advance sport injury
27 prevention research by focusing more on implementation outcomes such as
28 intervention adherence. This editorial highlights the importance of adherence in
29 sport injury prevention research and practice and provides a framework to raise the
30 bar for sport injury prevention adherence research.

1 **Adherence as a multidimensional implementation outcome**

2 Despite irrefutable evidence of the benefits of sport injury prevention interventions
3 (e.g., the 11+, Nordic Hamstring programs[3,4]), implementation remains a major
4 challenge in real-world settings.[4,5] Adherence is an essential modifiable factor for
5 successfully implementing proven interventions. Although adherence is a behaviour
6 observed in athletes and coaches alike, causality extends beyond the athlete and
7 coach. Adherence is a complex behavioural process determined by several
8 interacting factors which may include athlete, coach and/or intervention provider
9 attributes in addition to organizational, socioeconomic- and program-related
10 factors.[1] A multilevel and interdisciplinary approach is thus crucial in addressing
11 low or non-adherence to sport injury prevention interventions.

12 To minimize the problem of low and non-adherence, researchers have been advised
13 to ensure a fair balance between evidence and ongoing consultations with intended
14 users throughout program development.[6] While this suggestion is fundamental
15 for successful implementation, identifying and modifying determinants of
16 adherence remains a worthwhile research challenge for new and existing
17 interventions.

18

19 **4 steps to advance adherence research**

20 The 4 key steps toward more rigorous approach to promoting adherence to
21 interventions are shown in Figure 1.

22 Step 1. Sport injury researchers should identify and describe the extent of (non-)
23 adherence (adherence rates) in pragmatic trials and quasi-experimental studies.
24 Researchers should also examine the type and extent of any modifications made to
25 SIP interventions by users. There is currently no consensus on how adherence
26 should be reported, so we propose that researchers should clearly provide
27 theoretical and operational definitions of adherence, including relevant calculations.
28 For instance, researchers should specify the measures of adherence to an exercise-
29 based intervention using specific terms and definitions (Box 1).

1

Box 1. Measures of adherence to exercise-based interventions (example)

- Utilization frequency: sessions completed per week [7]
- Utilization fidelity: components completed of total possible per session [7]
- Duration fidelity: sessions completed in prescribed time of total possible
- Exercise fidelity: proportion of players performing all aspects of exercises correctly [8]
- Cumulative utilization: sessions completed of total possible [7]

2

3 Step 2. Identify predictors of (non-)adherence, considering program-related factors
4 (e.g., intervention components), psychosocial factors (e.g., determinants of
5 behaviour change such as intention and self-efficacy), social factors (e.g., socio-
6 economic status), and organizational factors (e.g., club structures). These should be
7 assessed across the spectrum, from the individual user (e.g. coach, player,
8 healthcare provider) to the broader sports context (e.g. administrators).
9 Additionally, barriers, and facilitators to programme adherence within the specific
10 context of implementation should be identified.

11 Step 3. Using the evidence obtained from steps 1 and 2 and current literature,
12 develop and introduce strategies for improving adherence rates to the sport injury
13 prevention programme in the clinical context (e.g., a multi-level approach targeting
14 more than one factor and across the dimensions of adherence). This might include
15 strategies to change user behaviour, improving organizational support, providing
16 user incentives, reducing SIP intervention length, and removing identified barriers.

17 Step 4. Evaluate the effectiveness of the adherence strategies introduced in step 3
18 through pragmatic trials or by repeating step 1. This final step is imperative to guide
19 stakeholders on what works and where to direct resources to promote behavior
20 change.

21 These steps may be followed using appropriate research designs such as:

- Mixed-methods including focus-group interviews and direct observations

22

- 1 • Pragmatic trials and quasi-experimental studies using open and closed
2 ended questionnaires to obtain specific information of interest

3 It is important that sport injury prevention intervention effectiveness be re-
4 evaluated whenever intervention-related modifications are made (e.g.,
5 modifications affecting programme components/duration). The measurement of
6 adherence is an evolving science and these 4 steps provide a framework to improve
7 adherence research and ultimately intervention implementation.

8

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14

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