

# VU Research Portal

## Functional performance tests and return-to-sport decision-making:

Tassignon, Bruno

2021

### **document version**

Publisher's PDF, also known as Version of record

[Link to publication in VU Research Portal](#)

### **citation for published version (APA)**

Tassignon, B. (2021). *Functional performance tests and return-to-sport decision-making: Focusing on translational research with special interest in fatigue and the brain*. [PhD-Thesis - Research and graduation internal, Vrije Universiteit Amsterdam]. VUBPRESS Brussels University Press.

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

### **Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

### **E-mail address:**

[vuresearchportal.ub@vu.nl](mailto:vuresearchportal.ub@vu.nl)

# Table of Contents

|  |    |
|--|----|
| Glossary .....   | 13 |
| <b>Chapter 1: General introduction</b> .....   | 17 |
| Sports in the context of physical activity and health: benefits and risks.....   | 18 |
| Mitigating the risk of musculoskeletal injuries: the role of injury risk screening .....   | 18 |
| Mitigating the risk of re-injury: the role of return-to-sport decision-making .....  | 19 |
| Functional performance tests: lack of context and translational research? .....  | 20 |
| Rationales, aims and outline of this thesis.....   | 21 |
| References .....   | 24 |
| <b>Chapter 2: Criteria-based return to sport decision-making following lateral ankle sprain injury: a systematic review and narrative synthesis.</b> ..... | 33 |
| <b>Abstract</b> .....  | 35 |
| <b>Key points</b> .....  | 36 |
| <b>Background</b> .....  | 37 |
| <b>Methods</b> .....   | 38 |
| Information sources .....  | 38 |
| Eligibility criteria .....   | 38 |
| Search strategy.....   | 38 |
| Study selection and assessment of risk of bias.....  | 38 |
| Data extraction and synthesis .....  | 39 |
| <b>Results</b> .....   | 39 |
| Study collection.....  | 39 |
| Test inventory created during the data collection and extraction processes .....   | 41 |
| <b>Discussion</b> .....  | 42 |
| Use of the outcome “time to return to play, sport or work”.....  | 42 |
| Rationales and considerations for RTS decision-making following acute LAS injury .....   | 43 |
| Directions for future research.....  | 53 |
| Limitations .....  | 54 |
| <b>Conclusions</b> .....   | 55 |
| <b>References</b> .....  | 56 |

|  |     |
|--|-----|
| <b>Chapter 3: Test-retest, intra- and inter-rater reliability of the reactive balance test in healthy recreational athletes.</b> ..... | 75  |
| <b>Abstract</b> .....  | 77  |
| <b>Highlights</b> .....  | 78  |
| <b>Introduction</b> .....  | 79  |
| <b>Materials and methods</b> .....   | 80  |
| Participants .....   | 80  |
| Procedures .....   | 81  |
| Raters .....   | 84  |
| Statistical Analysis .....   | 85  |
| <b>Results</b> .....   | 85  |
| <b>Discussion</b> .....  | 87  |
| Limitations and future research .....  | 88  |
| <b>Conclusion</b> .....  | 89  |
| <b>References</b> .....  | 90  |
| <b>Chapter 4: Mental fatigue impairs clinician-friendly balance test performance and brain activity.</b> .....                         | 93  |
| <b>Abstract</b> .....  | 95  |
| <b>Introduction</b> .....  | 96  |
| <b>Materials and methods</b> .....   | 97  |
| Participants .....   | 97  |
| Experimental protocol (see Figure 1) .....   | 97  |
| Clinician-friendly Balance Tests .....   | 99  |
| EEG recording and analysis .....   | 100 |
| Statistical Analysis .....   | 101 |
| <b>Results</b> .....   | 102 |
| Indicators of mental fatigue .....   | 102 |
| Balance performance (see Table 3) .....  | 106 |
| Brain data .....   | 106 |
| <b>Discussion</b> .....  | 107 |
| Mental fatigue: successfully induced? .....  | 107 |
| Mental fatigue impairs RBT performance, but not YBT performance .....  | 107 |

|  |            |
|--|------------|
| Mental fatigue and electrophysiological brain activity during balance performance.....                           | 108        |
| Future directions .....  | 109        |
| Perspective.....   | 109        |
| <b>Conclusions</b> .....   | 109        |
| <b>References</b> .....  | 110        |
| <b>Chapter 5: Acute fatigue alters brain activity and impairs reactive balance test performance.....</b>         | <b>113</b> |
| <b>Abstract</b> .....  | 115        |
| <b>Introduction</b> .....  | 116        |
| <b>Materials and methods</b> .....   | 117        |
| Participants, ethical approval and protocol registration .....   | 117        |
| Study protocol.....  | 118        |
| Acute physical fatigue protocol.....   | 120        |
| Balance Tests .....  | 120        |
| Markers of acute physical fatigue .....  | 121        |
| EEG recording and analysis .....   | 121        |
| Statistical Analysis .....   | 122        |
| <b>Results</b> .....   | 124        |
| Markers of acute physical fatigue .....  | 124        |
| Balance tests.....   | 125        |
| Brain data.....  | 126        |
| <b>Discussion</b> .....  | 129        |
| Acute physical fatigue and balance test performance.....   | 129        |
| Acute physical fatigue and brain activity during YBT and RBT performance .....                                   | 130        |
| Perspective.....   | 131        |
| <b>Conclusions</b> .....   | 131        |
| <b>References</b> .....  | 132        |
| <b>Chapter 6: General discussion</b> .....   | <b>135</b> |
| <b>Main research findings</b> .....  | 137        |
| <b>Criteria-based return-to-sport decision-making following lateral ankle sprain injury.....</b>                 | <b>138</b> |
| <b>Functional performance tests integrating reactive &amp; decision-making aspects of the sport context.....</b> | <b>139</b> |
| <b>Translational research: bridging the gap between fundamental research &amp; clinical practice .....</b>       | <b>140</b> |

|  |     |
|--|-----|
| <b>Strengths and limitations</b> .....       | 143 |
| <b>Practical implications</b> .....          | 144 |
| <b>Future perspectives and outlook</b> ..... | 145 |
| <b>General Conclusion</b> .....              | 148 |
| <b>References</b> .....                      | 149 |
| <b>Summary</b> .....                         | 157 |
| <b>Samenvatting</b> .....                    | 163 |