**Validation of a protocol (testing and fixes) for the mobility and stability of the athlete, and construction of a statistical model to predict the risk of injury among high-performance athletes**

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**Abstract (Thomas):**

A vast majority of the new young athletes of a high-performance center injure themselves during the first year and must stop their sporting activity. In order to keep a high level of performance, several members of the sport performance department of the CREPS of Toulouse developed a protocol to test the mobility and the stability of their athletes (TM2S) since injury prediction is a key challenge for the center. We compare this testing with some existing ones like the Functional Movement Screen (FMS) and the Global Mobility Condition (GMC). In our paper, based on score data provided, we validate this testing while identifying some limits and correlations, depending on the sport practiced, the epidemiological data and characteristics of the athlete. Moreover, we develop a prediction statistical model for risk of injury, based on our knowledges in statistical modelling and data analysis. We apply linear model and generalized linear model to our score data and non-supervised classification methods to the injury data.

**Abstract (Célia):**

Many athletes who enter a top-level structure injure themselves during their first year. This leads to a lack of training and consequently to a lack of performance. This study presents a scientific support to enhance sport performance, by preventing athletes from injuries.

We have been working together with the CREPS of Toulouse, a public training center for top-level athletes. They constructed their own test protocol to adjust corrective strategies used to assist their athletes. In fact, such test protocols already exist, but the idea is here to build our own, with our specific definition of an injury: “An injury causes at least one week of downtime”.

By studying the correlations between the different exercises, and the relevance of each one with some statistical tests (precise which ones ...), we validate their test protocol. More detailed research on the links between downtime and the score of the test leads us to define the following thresholds to rank the scores: (to precise…).

Thus, we showed that the higher the score is, the lower the risk of injury.

However, more research is needed to construct a robust prediction model, medical confidentiality keeping us from having data that directly linked an athlete both to his score and his injuries.

(Manque éventuellement l’implication de nos résultats sur les athlètes ? Par exemple : faut-il baisser les scores pour éviter qu’ils se blessent, etc…) A voir plus tard dans le semestre ?

Parts:

* Context
* What is missing (gap)
* Aim of study
* Method
* Results
* Future applications

Idées en Français :

* Contextualisation :
  + Blessures de jeunes athlètes (souvent nouveaux arrivants) au CREPS
  + Testing mis en place sur des athlètes TM2S
  + Autres déjà existants : FMS, GMC
* Objectifs et contenu du projet :
  + Valider ce testing à partir des données de score recueillies
  + Différences à relever entre les pôles,
  + Corrélations entre exercices
  + Pointer certaines limites
* Techniques et méthodes :
  + Utiliser nos compétences et connaissances en modélisation statistique et analyse de données pour expliquer le score obtenu et prédire le risque de blessure
  + ML, MLG, ANOVA
  + Classification (non supervisée…)

**“Final” abstract:**

Many athletes who enter a top-level structure injure themselves during their first year. This leads to a lack of training and consequently to a lack of performance. This study presents a scientific support to enhance sport performance, by preventing athletes from injuries.

We have been working together with the CREPS of Toulouse, a public training center for top-level athletes. They constructed their own test protocol called Mobility and Stability Athletes Testing (TM2S) to adjust corrective strategies used to assist their athletes. In fact, such test protocols already exist, as for instance the Functional Movement Screen (FMS) and the Global Mobility Condition (GMC). The idea is here to build our own, with our specific definition of an injury: “An injury causes at least one week of downtime”.

Based on the provided score data, we validate their testing while studying the correlations between the different exercises. *Moreover, we develop a predictive statistical model for the risk of injury, thanks to our knowledge in statistical modelling and data analysis. We apply a linear model and a generalized linear model to our score data and non-supervised classification methods to the injury data. More detailed research on the links between downtime and the score of the test leads us to define the following thresholds to rank the scores: (to precise…).*

Thus, we showed that the higher the score is, the lower the risk of injury.

However, we identify some limits such as the type of sport. More research is also needed to construct a robust predictive model, medical confidentiality keeping us from having data that directly linked an athlete both to his score and his injuries.