427 APPLYING BAYESIAN NETWORKS TO INJURY OCCURRENCE IN PROFESSIONAL FOOTBALL

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Background Bayesian networks (BN) are directed acyclic graphs derived from empirical data that describe the dependency and probability structure. It may facilitate understanding of complex epidemiology by presenting the data in a multi-dimensional visual representation, and guiding inferences on the likelihood of the severity based on new information.

Objective To provide a brief overview of BN and demonstrate its utility on a practical example of making inferences on days of absence when hypothetically new information was introduced.

Design Retrospective analysis of prospectively collected injury data.

Participants All male football players who were playing in the highest German professional league (Bundesliga) from 2014/15 to 2019/20 seasons were included. Players were identified from a publicly available database.

Data analysis A BN structure was inferred using GeNIe 2.0. A search and score algorithm and existing empirical evidence knowledge were used to identify the structure. The variables included were age, height, weight, main position, part of the season, event, injury type, the injured body part, days of absence. The parameters were calculated with the expectation-maximization algorithm.

Main Outcome Measurements Injury severity based on days of absence (mild: <4, minimal >4–7, moderate >7–28, severe >28).

Results 3,030 player seasons were registered over the six seasons (age: 25.5±4.0, height (cm): 183.3±6.4 and weight (kg): 78.3±6.8), with 5,883 time-loss injuries. A network structure with distribution probability was built.

A hypothetical scenario is used to illustrate how a BN makes inferences regarding injury severity. Case 1, a defender, 20 years old, suffered from a groin muscle injury. Case 2, a defender, 27 years old, suffered from a thigh muscle injury. Based on the BN constructed, we can infer the likelihood of the injury severity and the result is shown in Table 1. The result is based on the Bundesliga dataset and is specific to the study population. Counterfactual analysis may be used to inform coaches and clinicians about the likelihood of severity of an injury based on the features of the injury, for example, the characteristics of the player and the game.

Abstract 427 Table 1 The probability of injury severity of two hypothetical cases

	Mild	Minimal	Moderate	Severe
Case 1	0.26	0.41	0.24	0.09
Case 2	0.19	0.31	0.32	0.17

Conclusions The BN may offer an enhanced insight into the complex epidemiological systems and guide inferences on injury severity based on new information. This may potentially help clinicians in creating hypothetical scenarios on the severity and facilitate shared decision making.

428 DOES EXERCISING WITH A FACE MASK AFFECT ATHLETES PERFORMANCE?

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Background With the spread of Coronavirus Disease (COVID-19) , wearing a mask became mandatory publicly and during exercise.

Objective To investigated the prevalence of wearing face masks and their impact on athletes' comfort and performance.

Design A cross-sectional study.

Setting An online survey.

Patients (or Participants) A total of 633 athletes participated in the study.

Interventions (or Assessment of Risk Factors) A self-administered web-based questionnaire was developed. Primary data were correlated with secondary data such as average temperatures, which were obtained from open sources.

Main Outcome Measurements The primary outcomes were the prevalence of wearing face masks and their impact on athletes' comfort and performance.

Results A total of 633 athletes from 188 countries participated in the study in the period between June and July 2020. They were mostly males (n = 536) and aged 20–29 years (n = 290). A total of 633 athletes completed a self-administered web-based questionnaire. They were mostly males (n = 536) and aged between 20–29 years old (n = 290). Four hundred twenty-three athletes reported that their performance was affected due to wearing a mask. Using a mask while exercising significantly affected performance, $X^2_{\ 2} = 633$, $p < .001$. The type of mask worn also significantly impacted performance, $X^2_{\ 6} = 656.5$, $p < .001$. Further analysis showed that 100% of those wearing N95, FFP2, or the equivalent mask reported affected performance compared to 90.9% for athletes wearing surgical masks. The point-biserial correlation was negative between performance and maximum ambient temperature, $r_{pb} = -.435$, $p < .001$).

Conclusions Performing high-intensity exercises while wearing face masks may lead to discomfort, breathing restrictions, and impaired fitness level of athletes. It is recommended to review the healthcare policies of wearing masks while exercising.