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## Sports injuries patterns in children and adolescents according to their level of sports participation, age and maturation

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### ABSTRACT

**Introduction:** Engaging in sports activities at a young age has numerous health benefits but also involves risk of injury. Growth can make young athletes more vulnerable to sports injuries [1]. Few studies have produced information about injury profile and its predictors at these ages. The aim of this study is to determine the influence of age, maturation and physical activity (PA) level on injury type and body area injury location on a Portuguese sample.

**Methods:** A descriptive epidemiological study was conducted. Injury profile and PA level information's were obtained by LESADO and RAPIL II questionnaires. These data allowed to create four groups of PA levels. The no sports participation group, with no time spent in PA per week (except mandatory physical education classes), the recreative sports group with at least 90 min of PA per week being at least 60% of this volume of recreational activity; the school sports group with at least 90 min of PA per week being at least 60% of this volume of school sports activity and the federated sports group with at least 120 min of federated activity. Maturity measures were evaluated through maturity offset and Tanner-Whitehouse III method. Univariate analysis was used to identify the set of candidate predictors for multinomial logistic regression analysis that was used to determine significant predictors of injury type and body area injury location. Ethics Committee of the Faculty of Human Kinetics approved the research protocol. Before inclusion in the study all subjects' parents gave their written informed consent.

**Results:** A total of 651 adolescents participated in this study, aged between 10 and 18 years (Mean = 13.7 years; Standard Deviation = 1.8 years), being 343 boys (52.7%) and 308 girls (47.3%). Regarding injury type predictors recreative boys had more chances of having a sprain or a fracture than a strain when compared to federated boys ( $\chi^2(4)=15.165$ ,  $p=.004$ ). Also, recreative and scholar girls had more chances of having a sprain than a strain when compared to federated girls ( $\chi^2(6)=16.474$ ,  $p=.011$ ). As maturity offset decreased, the chances of girls having a strain or a fracture when compared to sprains were higher ( $\chi^2(2)=15.115$ ,  $p=.001$ ). For body area location boys with 10–11 years were more likely to have upper limbs injuries than boys of other ages ( $\chi^2(6)=13.587$ ,  $p=.033$ ). This was also confirmed by maturity offset ( $\chi^2(2)=6.014$ ,  $p=.049$ ). Spine and trunk injuries were more likely to occur in federate and no sports participation girls ( $\chi^2(6)=14.587$ ,  $p=.022$ ).

**Discussion and conclusions:** Each sport group presented a specific injury profile and Peak Height Velocity was a significant predictor of injury patterns in adolescents of both sexes. The combination of growth, sport training and competition, create situations conducive to the development of specific injuries [2]. At these ages chronological age may be an incomplete indicator for injury risk, as some authors are starting to recognise [2,3]. It seems warranted that the influence of maturity status and PA level on sports injuries should be studied in future studies.

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## Sport practice and plantar pressure in children aged 10–18 years: evaluation using Namrol® Podoprint®

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### ABSTRACT

**Introduction:** The foot is key to sport [1] and is part of a set of mechanisms responsible for absorbing impacts, maintaining balance and distribution of forces. Therefore, special attention to the distribution of plantar pressure is necessary [2]. Baropodometry consists of the quantification of anteroposterior and lateral oscillations of the sole of the foot, while the individual remains under a pressure platform [3]. The goal of this investigation is to verify if there is an association between students' sports practice and their distribution of plantar pressure and to analyse whether there are differences regarding plantar pressure distribution between students who practice and those who do not practice a specific modality (volleyball, swimming or soccer).

**Material and methods:** The current research is a cross-sectional study carried out in a non-probabilistic sample comprising 499 students from Amares, Portugal aged 10–18 years (average age:  $13.79 \pm 2.50$ ), 238 (47.7%) being males and 261 (52.3%) females. An informed consent was given to all participants and a questionnaire was used to ascertain whether individuals practiced physical exercise and, if so, what type of exercise they practiced. Finally, an evaluation of the plantar pressure distribution of the study participants was made using the Namrol® Podoprint® baropodometry platform. All data were analysed using descriptive and inferential statistics, which were performed using the Mann–Witney (*U*) test for association. Significance levels (denoted as  $\alpha$  or alpha) of 0.05 and 0.01 have been considered for the presence of statistically significant association between the considered variables.

**Results:** There was no statistically significant association between sport practice and the presence of pressure changes in the plantar area of the students analysed. Regarding the students who practice volleyball, we found statistically significant differences in the right/left pressure distribution, with a predominance of pressure in the right foot ( $U = 12327.000$ ;  $Z = -1.968$ ;  $p\text{-value} = .049$ ).

**Discussion and conclusion:** This study verified that there is no statistically significant association between the practice of sport and the presence of changes in the plantar zone when comparing students who practice sports and those who do not. It was verified that the volleyball practitioners presented a predominance of plantar pressure in the right foot, in contrast with the non-practitioners, which showed an equal distribution of plantar pressure. In this sense, future studies comprising a larger sample of participants of different sports, namely volleyball, may help identify which technical movements may be contributing to these baropodometric imbalances. In addition, these studies are important to help develop strategies that counterbalance these differences in foot pressure of children, minimising the future appearance of postural changes and related problems.

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