Skateboarding injury prevention
Danger of functional ankle instability

Demonstration of the Y Balance Test

INTRODUCTION

Skateboarding is an upcoming sport that's increasing in popularity and gets acknowledged as Olympic sport in Tokyo in 2020 (1,2).

It's considered an urban sport without evidence-based training or safety guidelines (3). Hence, athletes are prone to injure themselves. In 2017, *NEISS* reported 77476 hospital intakes (4).

Investigation on the injuries show that 32% are ankle injuries with the leading cause being a loss of balance resulting in a fall (3,5).

For skateboarders, dynamic balance (DB) is a fundamental skill and closely linked to the ankle joint which plays an important role in the generation of balance by providing proprioception and compensation strategies (6-7). Considering these occurrences, active skateboarders might be sensitive to develop functional ankle instability (FAI), which this study hypothesizes to negatively affect DB, which again provokes falling and reinjury (3).

RESEARCH QUESTION

Does a negative difference exist between dynamic balance of FAI affected and non-FAI affected skateboard athletes?

METHODS

RESEARCH DESIGN:
- Cross sectional study

POPULATION:
- 44 active skateboarders (18+) from Benelux

INVESTIGATION/TESTING:
- Test for dynamic balance in 3 directions in terms of reach distance
- Questionnaire about demographics & identification of functional ankle instability.

EQUIPMENT:
- Y Balance test
- IdFAI Questionnaire

PROCEDURE:
- Recruitment of athletes in skateparks in the Netherlands and Luxembourg.
- Participant completes consent form & questionnaire.
- Try out and execution of 3 valid tries per leg in the 3 direction of the YBT.
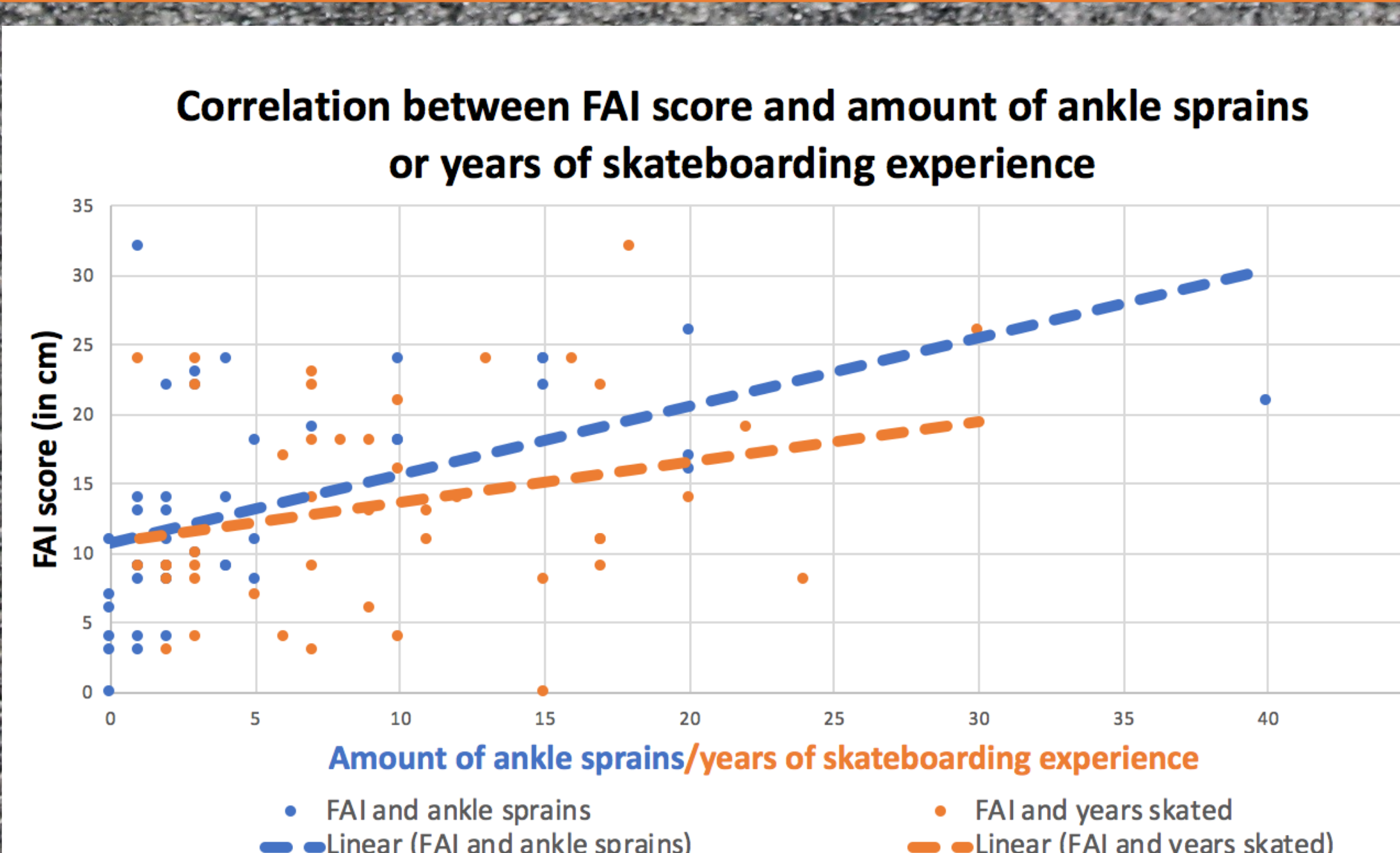
DATA ANALYSIS:
- Statistical comparison of DB between FAI affected and non-affected athletes through an independent t-test.
- Pearson's/Spearman's correlation between FAI score and DB or amount of ankle sprains or years of skateboarding experience.
- ANOVA analysis of FAI score per categorical skateboarding frequency.

RESULTS

		FAI affected*	Non-FAI affected *	p value*
Anterior (ANT) direction	Mean	68,5	70,5	0,198
	STD*	7,3	8,1	
	IQR*	8,4	9,6	
Posteromedial (PM) direction	mean	100,8	108,4	0,003
	STD*	9,6	7,2	
	IQR*	15,6	6,3	
Posterolateral (PL) direction	mean	97,3	105	0,007
	STD*	11,9	6,4	
	IQR*	16,3	4,6	

°Reach distance in cm; STD= standard deviation; IQR= Interquartile range;
FAI affected = participants score 11 or more points in the IdFAI,
Level of statistical significance set at $p < 0.05$.

The non-affected skateboarders' DB is superior in every direction compared to FAI affected skaters. Only p of the PM and PL directions are statistically significant (< 0,05), meaning that only FAI affections in both posterior directions are considerable. In the ANT direction, $p > 0.05$, meaning that no significant difference exists between both means. Secondary findings show significant p (< 0,05) for an increasing FAI score correlating negatively with reach distance in all directions. Correlations are rated very little in ANT and low in PM & PL directions (8). Significant p *and very* little correlation was found between FAI score and amount of years skated (8). FAI score and amount of ankle sprains show moderate significant correlation and $p<0.05$ (8). No significant relation could be found between FAI and skateboarding frequency.

Correlation between FAI score and amount of ankle sprains or years of skateboarding experience

- FAI and ankle sprains
- Linear (FAI and ankle sprains)
- FAI and years skated
- Linear (FAI and years skated)

(y-axis: FAI score (in cm); x-axis: Amount of ankle sprains/years of skateboarding experience)

DISCUSSION

The study is conducted as cross sectional design. Other designs, testing at multiple moments thought to be difficult due to the need to follow up skateboarders. The number of participants has been set in comparison with other studies using the YBT or the IdFAI. External validity has been achieved by including athletes from different countries and with various skating styles backgrounds and frequency. The study is mostly applicable to men between the age of 22 and 29 (IQR=7). Only 2 women have participated, no more matching the inclusion criteria have been found. Worth noting is that the YBT is a stationary balance test, while skateboarders mostly balance on moving boards. Hence, the natural movement is altered. The study presents good intra-rater reliability due to the extensive testing protocol, research based questionnaire and respected in/exclusion criteria. However, inter-rater reliability cannot be judged since all testing has been conducted by one person alone. The p values of the results are significant (< 0,05) in only 2 of the 3 directions, explaining that the hypothesis of FAI negatively affecting DB can only be confirmed for the PM and PL directions (consequently rejecting the null hypothesis stating no influence). So, due to FAI, DB might only be negatively affected during posterior reach movements.

CONCLUSION

Functional ankle instability proves to have a negative effect on skateboard athlete's dynamic balance during posterior reach movements. Consequently, FAI forms a risk factor for reinjury that needs to be acknowledged by healthcare professionals and athletes.

CLINICAL RECOMMENDATIONS

The studies' findings should be considered by clinicians working with skateboard athletes. In preparation and rehabilitation, focus can be put on DB and FAI in order to prevent new or recurrent injuries to create safer and more effective skateboarding routines. Athletes themselves can also take notice of these findings to think about how to prepare themselves right to evade injuries. It is advised to prevent ankle injuries by training, protection gear and awareness of risk factors (9).

An addition to this study would be an investigative research on FAI prevention, DB training and identification of further risk factors.

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