

# Onderzoek en mogelijkheden VKB- blessurepreventie

Anne Benjaminse, PhD, PT



university of  
groningen



umcg

DAZN



1) **communicatie** met speelsters

**Zorg voor een programma met optimale motorische ontwikkeling:**

2) werk samen met de coach - **wat**

3) geef effectieve instructies en feedback - **hoe**

# 1) Communicatie met speelsters

Female adolescent athletes' attitudes and perspectives on injury prevention programs

Jessica C. Martinez<sup>a,\*</sup>, Stephanie M. Mazerolle<sup>b</sup>, Craig R. Denegar<sup>b</sup>, Michael F. Joseph<sup>b</sup>, Kelly D. Pagnotta<sup>c</sup>, Thomas H. Trojian<sup>d</sup>, Lindsay J. DiStefano<sup>b</sup>



weten wel iets over oefeningen



maar coach/fysio/fysiek trainer moet voordelen uitleggen



vertrouwen in coach/fysio/fysiek trainer

meer betrokkenheid coach/fysio/fysiek trainer implementatie



# Elite female footballers' stories of sociocultural factors, emotions, and behaviours prior to anterior cruciate ligament injury

Andreas Ivarsson, Urban Johnson, Jón Karlsson, Mats Börjesson, Martin Hägglund, Mark B. Andersen & Markus Waldén

“My mind is all over the place, worries about training and diner.”

“It is a mess inside my head”

“My body feels like a bag of garbage.”

“I think I wanna stay in bed for the whole day.”

“Game day finally! I am still a bit tired.”

In both Malin's and Sara's cases, their relationships and communications with their coaches were problematic. From our experiences as applied practitioners, the most common problems for athletes are not things such as performance anxiety, but rather they are interpersonal issues between athletes and coaches. It is undeniable that coaches can have important and positive influences in athletes' lives. For example, coaches have been found to be important social agents in: (a)

# Is there a correlation between coaches' leadership styles and injuries in elite football teams? A study of 36 elite teams in 17 countries

Jan Ekstrand,<sup>1,2</sup> Daniel Lundqvist,<sup>1,3</sup> Lars Lagerbäck,<sup>2</sup> Marc Vouillamoz,<sup>4</sup>  
Niki Papadimitiou,<sup>4</sup> Jon Karlsson<sup>2,5</sup>

The incidence of severe injuries was 29%–40% lower in teams where coaches communicated a clear and positive vision of the future, supported staff members and gave staff encouragement and recognition.

## 2) Werk samen met de coach - WAT



# Huidige preventie



Casus: wenden en keren / agility

# FIFA 11+

## PART 1 RUNNING EXERCISES - 8 MINUTES

<p><b>1 RUNNING STRAIGHT AHEAD</b></p> <p>The coach is making a 10 x 10 meter grid of cones, spaced 5.0 meters apart. The players start at the center from the top part of cones. They jog straight ahead and touch the top part of cones. On the back, you can measure your speed progress by your own up. 2 min.</p>	<p><b>2 RUNNING HIP OUT</b></p> <p>Well, it's a goodly, jogging with each part of cones in 10 meters and making your hip outwards. After a cone, touch the right leg and continue some. 2 min.</p>	<p><b>3 RUNNING HIP IN</b></p> <p>Well, it's a goodly, jogging with each part of cones in 10 meters and making your hip inwards. After a cone, touch the left and right leg and continue some. 2 min.</p>
<p><b>4 RUNNING CIRCLING PARTNER</b></p> <p>Run forwards a cone to the first part of cones. Then, it's a goodly, 90 degrees to the right in the middle. Then, it's a goodly, 180 degrees to the right and touch the cone. Repeat for each part of cones. Remember to stay on previous and keep your cones of goodly touch by touching partner and cones. 2 min.</p>	<p><b>5 RUNNING SHOULDER CONTACT</b></p> <p>Run forwards a cone to the first part of cones. Then, it's a goodly, 90 degrees to the right in the middle. Then, it's a goodly, 180 degrees to the right and touch the cone. Repeat for each part of cones. Remember to stay on previous and keep your cones of goodly touch by touching partner and cones. 2 min.</p>	<p><b>6 RUNNING QUICK FORWARDS &amp; BACKWARDS</b></p> <p>As a pair, you jog to the second part of cones where you can be easily visible to the first part of cones. Jogging your legs and touch the right leg. Then, it's a goodly, 180 degrees to the left, touching your legs and touch the left leg. Remember to stay on previous and keep your cones of goodly touch by touching partner and cones. 2 min.</p>

## PART 2 STRENGTH · PLYOMETRICS · BALANCE · 10 MINUTES

<p><b>LEVEL 1</b></p> <p><b>7 THE BENCH STATIC</b></p> <p>Starting position: Sit on your feet, supporting yourself on your forearms and feet. Your elbows should be directly under your shoulders. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. Your body should be in a straight line. To make it more difficult, you can hold the position for 30-20 sec. 2 min.</p>	<p><b>LEVEL 2</b></p> <p><b>7 THE BENCH ALTERNATE LEGS</b></p> <p>Starting position: Sit on your feet, supporting yourself on your forearms and feet. Your elbows should be directly under your shoulders. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. Your body should be in a straight line. To make it more difficult, you can hold the position for 30-20 sec. 2 min.</p>	<p><b>LEVEL 3</b></p> <p><b>7 THE BENCH ONE LEG LIFT AND HOLD</b></p> <p>Starting position: Sit on your feet, supporting yourself on your forearms and feet. Your elbows should be directly under your shoulders. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. Your body should be in a straight line. To make it more difficult, you can hold the position for 30-20 sec. 2 min.</p>
<p><b>8 SIDEWAYS BENCH STATIC</b></p> <p>Starting position: Sit on your side with the front of your forearms facing 90 degrees. Support your upper body by resting on your forearms and feet. The elbows of your supporting arm should be directly under your shoulders. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>	<p><b>8 SIDEWAYS BENCH RAISE &amp; LOWER HIP</b></p> <p>Starting position: Sit on your side with both legs straight. Lie on your forearms and the side of your feet on your buttocks in an upright position. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>	<p><b>8 SIDEWAYS BENCH WITH LEG LIFT</b></p> <p>Starting position: Sit on your side with both legs straight. Lie on your forearms and the side of your feet on your buttocks in an upright position. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>
<p><b>9 HAMSTRINGS BEGINNER</b></p> <p>Starting position: Sit on your side with both legs straight. Lie on your forearms and the side of your feet on your buttocks in an upright position. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>	<p><b>9 HAMSTRINGS INTERMEDIATE</b></p> <p>Starting position: Sit on your side with both legs straight. Lie on your forearms and the side of your feet on your buttocks in an upright position. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>	<p><b>9 HAMSTRINGS ADVANCED</b></p> <p>Starting position: Sit on your side with both legs straight. Lie on your forearms and the side of your feet on your buttocks in an upright position. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>
<p><b>10 SINGLE-LEG STANCE HOLD THE BALL</b></p> <p>Starting position: Stand on one leg. In each 30-second hold, support on your forearms and feet. Your elbows should be directly under your shoulders. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>	<p><b>10 SINGLE-LEG STANCE THROWING BALL WITH PARTNER</b></p> <p>Starting position: Stand on one leg. In each 30-second hold, support on your forearms and feet. Your elbows should be directly under your shoulders. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>	<p><b>10 SINGLE-LEG STANCE TEST YOUR PARTNER</b></p> <p>Starting position: Stand on one leg. In each 30-second hold, support on your forearms and feet. Your elbows should be directly under your shoulders. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>
<p><b>11 SQUATS WITH TOE RAISE</b></p> <p>Starting position: Stand on one leg. In each 30-second hold, support on your forearms and feet. Your elbows should be directly under your shoulders. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>	<p><b>11 SQUATS WALKING LUNGES</b></p> <p>Starting position: Stand on one leg. In each 30-second hold, support on your forearms and feet. Your elbows should be directly under your shoulders. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>	<p><b>11 SQUATS ONE-LEG SQUATS</b></p> <p>Starting position: Stand on one leg. In each 30-second hold, support on your forearms and feet. Your elbows should be directly under your shoulders. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>
<p><b>12 JUMPING VERTICAL JUMPS</b></p> <p>Starting position: Stand on one leg. In each 30-second hold, support on your forearms and feet. Your elbows should be directly under your shoulders. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>	<p><b>12 JUMPING LATERAL JUMPS</b></p> <p>Starting position: Stand on one leg. In each 30-second hold, support on your forearms and feet. Your elbows should be directly under your shoulders. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>	<p><b>12 JUMPING BOX JUMPS</b></p> <p>Starting position: Stand on one leg. In each 30-second hold, support on your forearms and feet. Your elbows should be directly under your shoulders. In each 30-second hold, support on your forearms, pull your elbows in, and hold the position for 30-20 sec. 2 min.</p>

## PART 3 RUNNING EXERCISES - 2 MINUTES

<p><b>13 RUNNING A CROSS THE FITCH</b></p> <p>Run across the pitch, from one end to the other, at 75-80% maximum pace. 2 min.</p>	<p><b>14 RUNNING BOUNCING</b></p> <p>Run with high knees and a high frequency, landing gently on the ball of your foot. Use an exaggerated arm swing for each step. Jogging on the ball of your foot. Repeat the exercise and your partner with other side of pitch, changing feet. 2 min.</p>	<p><b>15 RUNNING PLANT &amp; CUT</b></p> <p>Use 10-15 cones, arranged on the middle third of the pitch. Jogging on the ball of your foot. Use an exaggerated arm swing for each step. Jogging on the ball of your foot. Repeat the exercise and your partner with other side of pitch, changing feet. 2 min.</p>
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# Injury Prevention Exercise Programs for Professional Soccer: Understanding the Perceptions of the End-Users

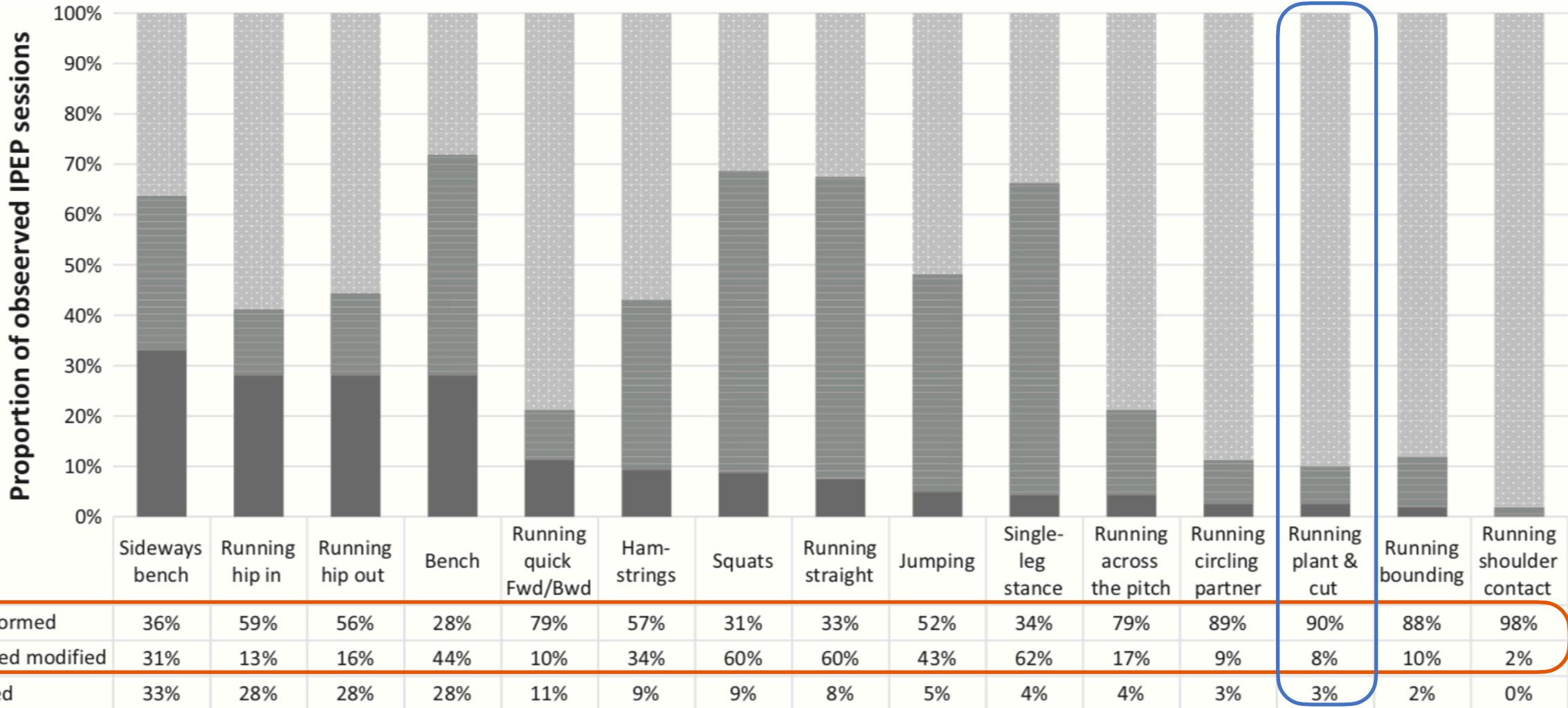
*James O'Brien, MASc and Caroline F. Finch, PhD*

**TABLE 2.** Respondents' Awareness, Use and Perceptions of the FIFA 11+ Program

Question or Statement	Health Belief Model Construct	RE-AIM* Framework dimension(s)	n	Yes % (95% CI)	No % (95% CI)	Unsure % (95% CI)	Agree % (95% CI)	Neither Agree nor Disagree % (95% CI)	Disagree % (95% CI)
Had you heard of the FIFA 11+ before taking part in this questionnaire?	Cues to action	R	64	27 (19–35)	70 (62–78)	3 (0–6)			
Does your team currently use the FIFA 11+?	Perceived benefit	R, A, M	61	11† (5–17)	41 (32–50)	48 (39–57)			
Have you ever been in a team which used the FIFA 11+?	Perceived benefit	R, A	55	11 (5–17)	51 (41–61)	38 (28–48)			
Does the FIFA 11+ need to be improved for use in your team?	Perceived benefit	A, I, M	58	47 (38–56)	3 (0–6)	50 (41–59)			
Should your club develop its own version of the FIFA 11+?	Cues to action	A, I, M	60	68 (59–77)	2 (0–5)	30 (22–38)			
The FIFA can prevent LL injuries in your team	Perceived benefit	E, A	60				45 (36–54)	43 (34–52)	12 (6–18)
The FIFA 11+ is soccer specific	Perceived benefit	A, I, M	61				53 (44–62)	34 (25–43)	13 (7–19)
The FIFA 11+ is too long	Perceived barrier	A, I, M	60				22 (14–30)	58 (49–67)	20 (13–27)
The FIFA 11+ contains adequate variation and progression for our team	Perceived benefit	A, I, M	61				30 (22–38)	46 (37–55)	25 (17–33)
The FIFA 11+ could be maintained over multiple seasons by our team	Cues to action	A, I, M	61				30 (22–38)	43 (34–52)	28 (20–36)

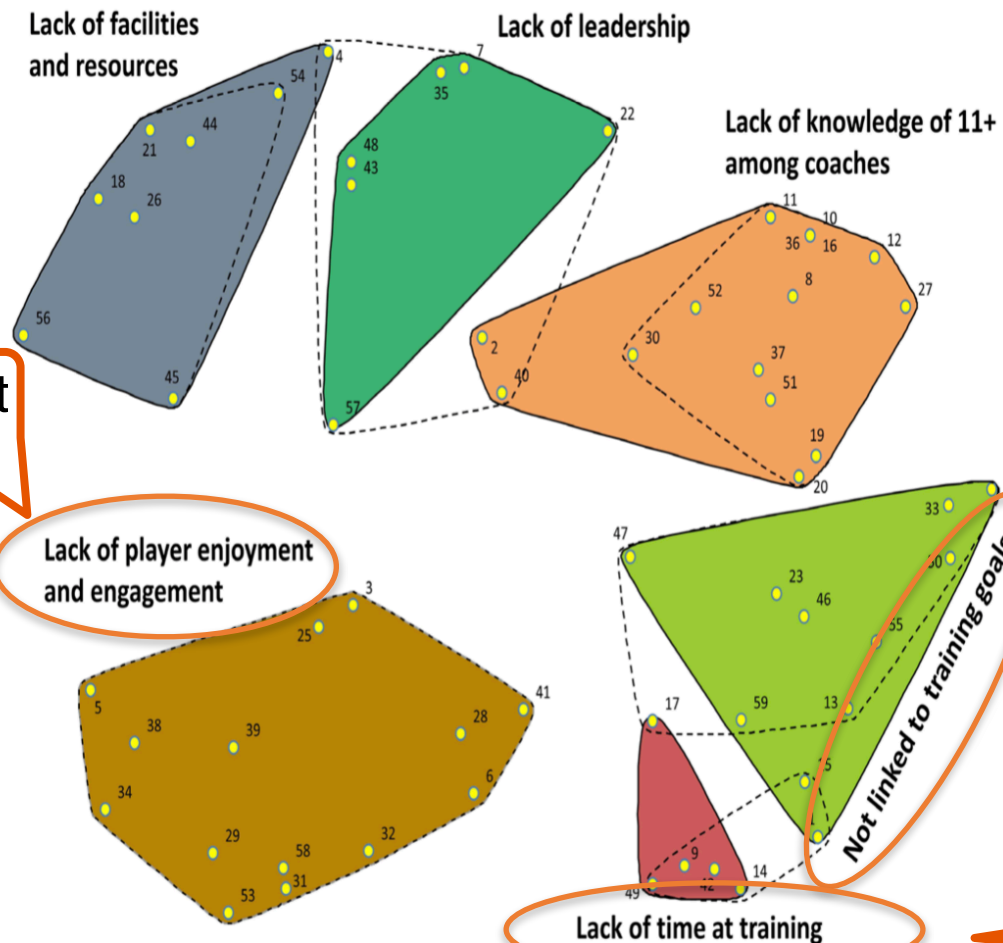
# The use and modification of injury prevention exercises by professional youth soccer teams

J. O'Brien<sup>1</sup>, W. Young<sup>1,2</sup>, C. F. Finch<sup>1</sup>



# A concept mapping approach to identifying the barriers to implementing an evidence-based sports injury prevention programme

Alex Donaldson,<sup>1,2,3</sup> Aisling Callaghan,<sup>4</sup> Mario Bizzini,<sup>5</sup> Andrew Jowett,<sup>4</sup> Patrick Keyzer,<sup>2</sup> Matthew Nicholson<sup>1</sup>

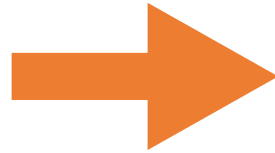


gebrek aan sport specificiteit  
 gebrek aan variatie

gebrek aan sport specificiteit  
 gebrek aan variatie  
 te statisch in warming-up

apart van de warming-up

gesloten  
voorspelbaar  
weinig variatie ('perfecte beweging')



representatief ?

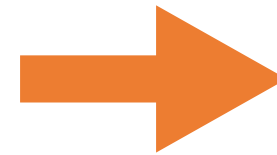
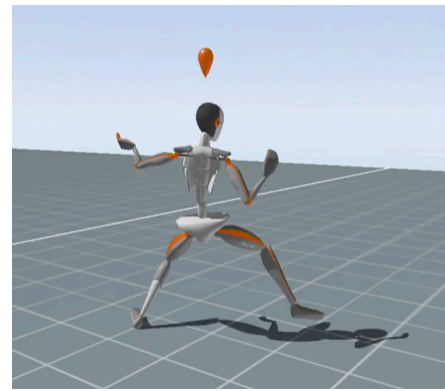
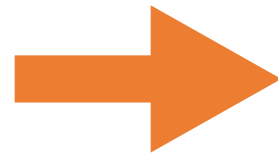
open  
onvoorspelbaar  
veel variatie



Article

# Definition of High-Risk Motion Patterns for Female ACL Injury Based on Football-Specific Field Data: A Wearable Sensors Plus Data Mining Approach

Stefano Di Paolo <sup>1,\*</sup>, Eline M. Nijmeijer <sup>2</sup>, Laura Bragonzoni <sup>1</sup>, Alli Gokeler <sup>3,4,5</sup> and Anne Benjaminse <sup>2,6</sup>



✓ in LAB goede knie flexie en weinig knie abductie > ✓ ook op VELD

✗ in LAB veel knie abductie > ✓ beter op VELD

✗ in LAB weinig knie flexie > ✗ ook op VELD



# Wat (dan wel) ?

## Suboptimale implementatie & impact in sportpraktijk



**Evert Verhagen**  
@EvertVerhagen

Following



For those interested in implementation of injury prevention evidence - We dare to ask new questions; are we also brave enough to change our approaches?



Sports Medicine  
<https://doi.org/10.1007/s40279-021-01560-4>

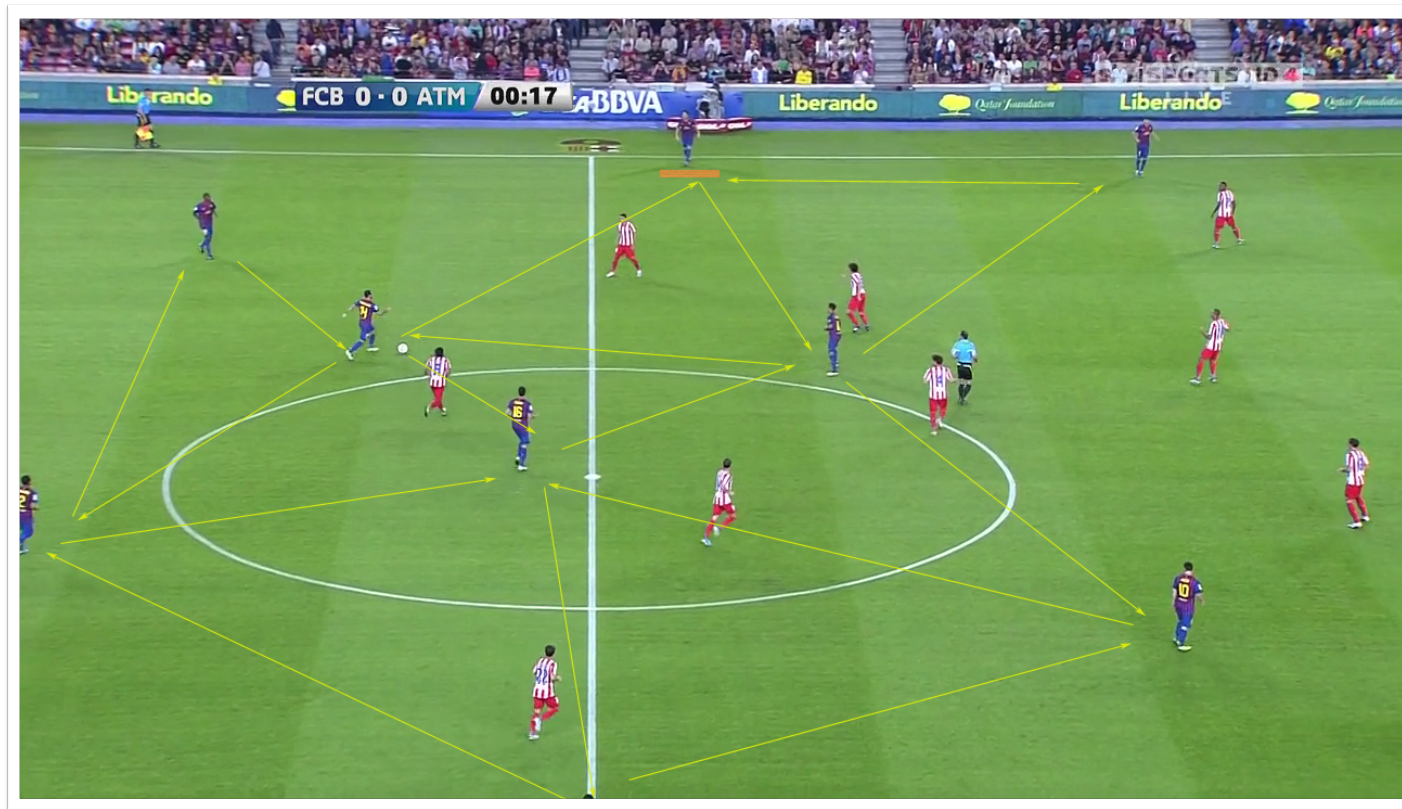
CURRENT OPINION

**Implementing ACL Injury Prevention in Daily Sports Practice—It's Not Just the Program: Let's Build Together, Involve the Context, and Improve the Content**

Anne Benjaminse<sup>1,3</sup> · Evert Verhagen<sup>2</sup>

# Wat is vaardig bewegen ?

The opportunity to efficiently and accurately find a movement solution for every situation that arises (Bernstein 1996).



'ideale' beweging ?



flexibele bewegingsoplossingen



binnenin persoon



**"PERFECT" FORM?**

Acceptable

Unacceptable Unacceptable

Acceptable is a **range**,  
not one specific output.

@fitness\_pollenator



implicaties voor coaching



tussen personen



# Gevarieerd bewegen - leren van verschillen



“repetition without repetition”



opnemen in oefenprogramma

# Motor learning methods that induce high practice variability reduce kinematic and kinetic risk factors of non-contact ACL injury

Behzad Mohammadi Orangi<sup>a</sup>, Rasoul Yaali<sup>a,\*</sup>, Abbas Bahram<sup>a</sup>,  
Mohammad Taghi Aghdasi<sup>b</sup>, John van der Kamp<sup>c</sup>, Jos Vanrenterghem<sup>d</sup>,  
Paul A. Jones<sup>e</sup>



kníe flexíe



verticale grond reactie kracht

Linear Pedagogy (LP)	Non-Linear Pedagogy (NLP)	Differential Learning (DL)
There is only one ideal and universal movement pattern!	Variability during execution is necessary for learning!	Variability of task goal and during execution is necessary for learning!

UP!

**NLP and DL showed greater benefit in terms of kinematic and kinetic risk factors for ACL injury**

## TAKE HOME MESSAGE



Increase **variability** during practice!



Encourage athletes to **find their own solutions** by **self-regulated exploration!**



Promote **flexibility of learning** to find **alternative solutions** when a practiced solution is not feasible!



**GOALS**









JEUGOPLEIDING





# omgeving en taak geeft speler informatie > omzetten in actie

perceptie

actie



- ☑ Relatie sporter-omgeving gekoppeld houden  
> betekenisvol bewegen
- ☑ Stimuleren van creativiteit  
> middels zelf-organisatie, exploratie en variabiliteit



### 3) geef effectieve instructies en feedback - HOE

"Tell me and I forget.  
Teach me and I  
remember. Involve me  
and I learn."

-- Benjamin Franklin



# Motorisch leren

**Leren is een probleem-oplossend proces**



betrokkenheid reflecteren  
op eigen acties



leer opbrengst

# Implicaties voor feedback

zelfregulatie / ontdekken

overcoaching?

overcorrigeren?

✘ meer = beter



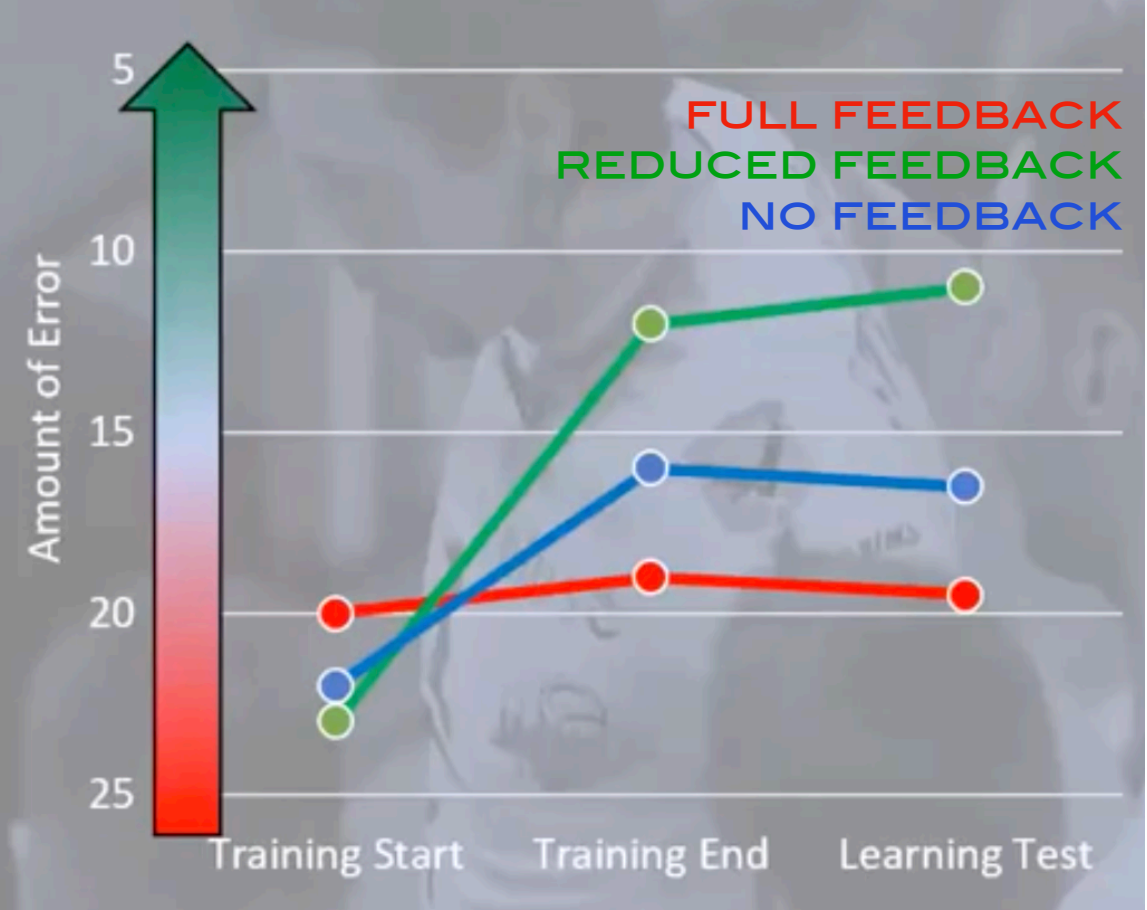
**nirit rotem**

@nirit\_rottem

Motor learning: too often we jump in after the learner has done a few reps 'incorrectly' or unsuccessfully. No, no, no 🙅  
Let them practice and explore before interrupting/correcting/etc. Think of the last time you learned a new task. It takes time and practice. 🏀 🏈 🏊 🏋️

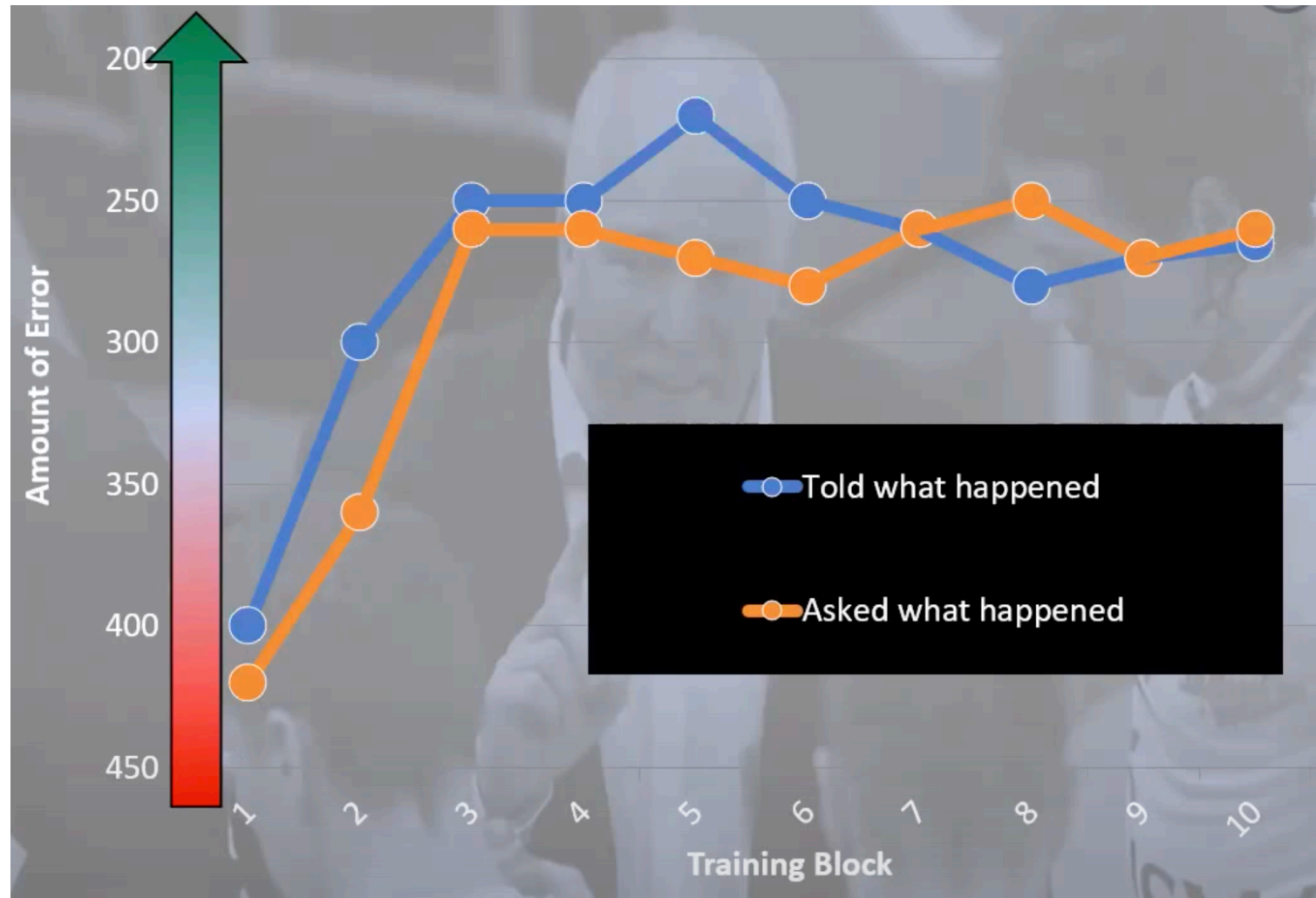
**Daniel L. Eaves\***  
School of Social Sciences and Law  
Teesside University  
Middlesbrough, TS1 3BA, UK

# The Short-Term Effects of Real-Time Virtual Reality Feedback on Motor Learning in Dance

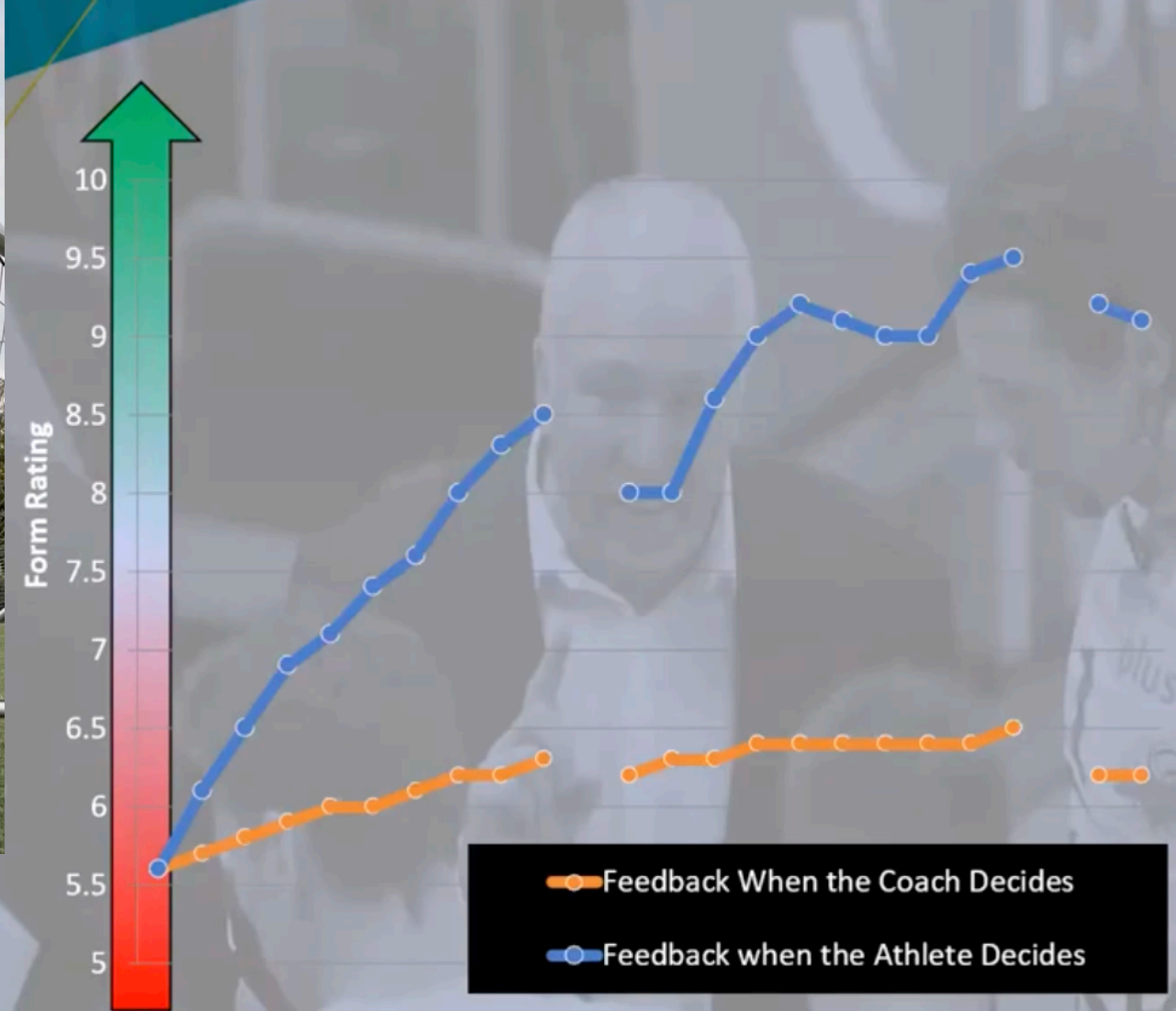


vaak  
vs  
minder vaak

vertellen  
vs  
vragen



fysio/  
coach  
vs  
sporter



## How to improve movement execution in sidestep cutting? Involve me and I will learn

Eline M. Nijmeijer<sup>a,\*</sup>, Marije T. Elferink-Gemser<sup>a</sup>, Stuart McCrory<sup>b</sup>,  
Nelson Cortes<sup>c,d</sup>, Anne Benjaminse<sup>a,e</sup>

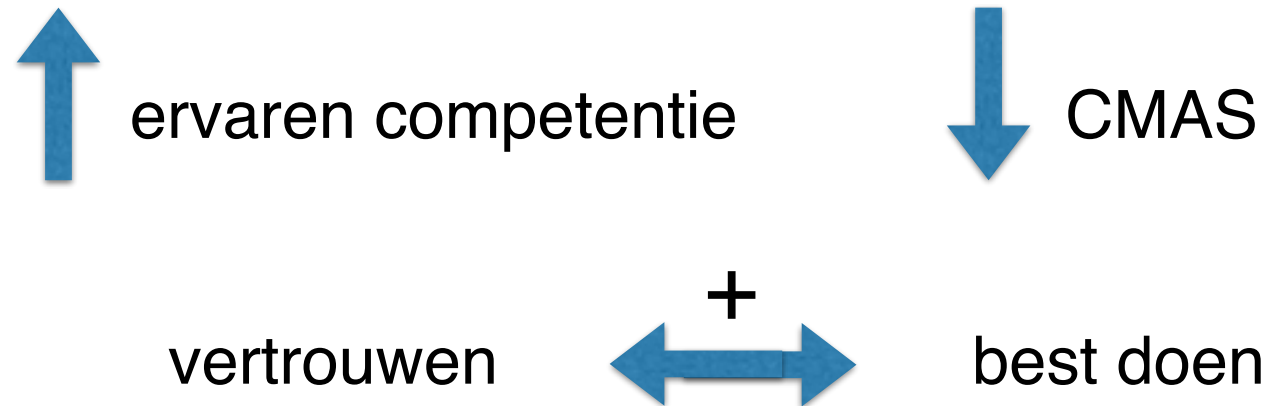
Item	Variable
1	Clear PFC braking strategy
2	Lateral leg plant
3	Hip in an initial internally rotated position
4	Initial knee 'valgus' position
5	Foot not in neutral foot position
6	Frontal plane trunk position
7	Trunk upright or leaning back throughout contact
8	Limited Knee flexion during final contact (stiff)
9	Excessive Knee 'valgus' motion during contact
	<b>Total score (CMAS)</b>





# Motivation Unraveled: Giving Choice to Football Players to Improve Anterior Cruciate Ligament Injury Prevention

Anne Benjaminse,<sup>1</sup> Eline M. Nijmeijer,<sup>1</sup> Alli Gokeler,<sup>2,3</sup> Dara C. Broekhaar,<sup>1</sup> and Nelson Cortes<sup>4,5</sup>



# Feedback: rol als fysio/coach

instrueren



faciliteren



# TAKE HOME

Beschouw goed het WAT en HOE van VKB blessurepreventie om er voor te zorgen dat de verbeterde motorische vaardigheden stabiel zijn in de sport specifieke context.

# En dan nog even dit...



The image shows a screenshot of a website header for a KNVB article. At the top left is the KNVB logo (a lion in a diamond). To its right is a navigation bar with 'KNVB APPS & WEBSITES', a search icon labeled 'ZOEKEN', and a user icon labeled 'KNVB ACCOUNT ^'. Below this is a dark blue banner with the word 'Kennis' in white. The main headline is 'GEVRAAGD: MEIDEN EN JONGE VROUWEN VOOR ONDERZOEK NAAR VOORSTE KRUISBANDBLESSURES' in large white capital letters. At the bottom of the banner, it says 'KNVB Media' on the left and '4 juli 2024, 9:00' on the right. A QR code is positioned on the right side of the banner.

KNVB APPS & WEBSITES

ZOEKEN

KNVB ACCOUNT ^

KNVB

Menu

*Kennis*

**GEVRAAGD: MEIDEN EN JONGE VROUWEN VOOR ONDERZOEK NAAR VOORSTE KRUISBANDBLESSURES**

KNVB Media

4 juli 2024, 9:00

KNVB



# Wat onderzoeken we?

Het verband tussen psychosociale factoren en  
voorste kruisband blessures  
bij vrouwelijke voetballers.

# Wie kan meedoen?

Voetbalspeelster tussen de 12 en 21 jaar.

Voetbal bij een club.

Je kunt niet meedoen als je:

- nu of kort geleden een blessure aan de voorste kruisband hebt (gehad)
- een andere, ernstige knie- of sportblessure hebt
- een ziekte hebt waardoor je niet kunt sporten of trainen

# Waarom onderzoeken we dit?

De populariteit van meisjesvoetbal is gestegen, maar ook het aantal voorste kruisbandblessures.

We kunnen met de uitkomsten van het onderzoek betere adviezen geven over het voorkomen van deze vervelende blessure.



university of  
groningen



umcg

# Elite female footballers' stories of sociocultural factors, emotions, and behaviours prior to anterior cruciate ligament injury

Andreas Ivarsson, Urban Johnson, Jón Karlsson, Mats Börjesson, Martin Hägglund, Mark B. Andersen & Markus Waldén

“Still no playing time in sight, I have become a stress puppy.”

“I think I am turning obsessive.”

“My mind is all over the place, worries about training and diner.”

“It is a mess inside my head”

“Feel hopeless, will never be happy again. Broke up with my boyfriend a few days ago after a long series of arguments.”

“I feel exhausted.”

“I should have said yes when they asked me to hang out, but I have no energy to meet anyone.”

“10:45, time to get up.”

“My body feels like a bag of garbage.”

“I think I wanna stay in bed for the whole day.”

“Game day finally! I am still a bit tired.”



Het Universitair Medisch Centrum Groningen (UMCG) gaat onder leiding van sportwetenschapper Anne Benjaminse grootschalig onderzoek doen naar een mogelijk verband tussen stressfactoren uit het dagelijks leven en het ontstaan van voorste kruisbandblessures (VKB) bij meisjes en vrouwen. Het onderzoek, dat start in september 2024, gebeurt in opdracht van UEFA en wordt ondersteund door de KNVB.

Het aantal voorste kruisbandblessures (VKB) bij voetballers in Nederland en Europa springt in het oog. Vrouwelijke jeugdvoetballers vormen daarbij de groep waar deze VKB-blessures het vaakst voorkomen. De medische wetenschap wil daarom meer te weten komen over het ontstaan van deze blessures. Het UMCG is hiervoor op zoek naar voetballende meisjes en jonge vrouwen die mee willen doen aan het onderzoek.

- Meisjes melden zich zelf aan
- 12-21 jaar
- Wekelijkse vragenlijst ~ 1 min
- Leuke en vervelende dingen voorgaande week
- Aanmelden kan tot april 2025
- Verloting 50 KNVB t-shirts + beste drie teams krijgen tickets voor wedstrijd Nederlands vrouwenelftal



