Adherence to an injury prevention program in male amateur football players is affected by players’ age, experience and perceptions

Peter Alexander van de Hoef, Michel S Brink, Jur J Brauers, Maarten van Smeden, Vincent Gouttebarge, Frank J G Backx

ABSTRACT

Objectives Adherence to injury prevention programmes in football remains low, which is thought to drastically reduce the effects of injury prevention programmes. Reasons why (medical) staff and players implement injury prevention programmes, have been investigated, but player’s characteristics and perceptions about these programmes might influence their adherence. Therefore, this study investigated the relationships between player’s characteristics and adherence and between player’s perceptions and adherence following an implemented injury prevention programme.

Methods Data from 98 of 221 football players from the intervention group of a cluster randomised controlled trial concerning hamstring injury prevention were analysed.

Results Adherence was better among older and more experienced football players, and players considered the programme more useful, less intense, more functional and less time-consuming. Previous hamstring injuries, educational level, the programme’s difficulty and intention to continue the exercises were not significantly associated with adherence.

Conclusion These player’s characteristics and perceptions should be considered when implementing injury prevention programmes.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Implementing injury prevention programmes in football remains difficult.
⇒ Educating coaches about injury prevention programmes can increase adherence.

WHAT THIS STUDY ADDS

⇒ Players’ age and years of football experience and player’s perceptions such as usefulness, functionality, intensity and time investment were related to the adherence to the bounding exercise programme.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Player’s characteristics and perception may be important to take into account when designing and implementing injury prevention exercise programmes.

INTRODUCTION

The effectiveness of injury prevention exercise programmes (IPEP) depends on both the efficacy of the programme itself and on players’ adherence to the programme. For the Nordic hamstring exercise, for instance, it is known that football players do not adhere sufficiently to this exercise, and this reduces its potential preventive effects. To increase adherence, the bounding exercise programme (BEP) was developed. BEP consists of plyometric exercises that can be easily integrated into the warming-up or regular training session and enhance footbalspecific performance. Nevertheless, the cluster randomised controlled trial (RCT) studying the efficacy of this programme revealed that adherence decreased during the football season.

Implementing injury prevention programmes in the real world remains difficult and depends on many components. The SETTING (Setting-Exploration-Treasure-Trail-to-Inform-implementation-Strategiesgia) tool used to implement health interventions states that implementation strategies start with knowing the context. Therefore, in (amateur) football, some studies focused on coaches’ beliefs as the deliverers of IPEPs in various sports. These studies showed that educating coaches about IPEPs and their role in injury prevention benefits adherence. However, little is known about other stakeholders, such as players themselves and their role in implementing IPEPs.

Several models for health behaviour have been developed and investigated. The Health Beliefs Model (HBM) describes six constructs about individual motivation and perceptions that influence health-related behaviour, which is directly related to adherence to IPEPs: (1) perceived susceptibility, (2) perceived benefits, (3) perceived barriers, (4) self-efficacy, (5) severity of the condition and (6) personal involvement.

© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ. For numbered affiliations see end of article.
METHODS
This study was part of a large nationwide cluster RCT investigating the effectiveness of BEP. The trial was registered in the Dutch trial registry (NTR6129). The study protocol has been described elsewhere.

Participants
Adult male football players competing in the Dutch first-class amateur season and allocated to the intervention group of the cluster RCT were included in this study.

Procedures and data collection
All players gave written informed consent before the study. The BEP was introduced to the technical and medical staff through workshops. The staff members were instructed to implement the BEP at the end of the warm-up in the training sessions (two times per week). The BEP consists of a 12-week build-up and maintenance programme for the rest of the season (10 months). The build-up programme consisted of (1) 4 weeks walking lunges over a 30 m distance, (2) triplings and drop lunges over a 30 m distance and (3) the bounding exercise over 30 m distance.

Players completed a baseline questionnaire consisting of personal characteristics such as age, work/education level, years of football experience and number of previous hamstring injuries during the last football season. Education level was dichotomised as high (studying at the university or university of applied sciences and professions related to that level) and low (all other professions and studies). During the subsequent football season, the players weekly registered whether they had a hamstring injury during the study period (table 1). The mean adherence was 54% and ranged from 0% to 100%. Adherence might be underestimated since players reported 0 m when absent or injured.

Table 1  Player’s characteristics (N=98)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mean (SD)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>24.6 (4.03)</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>78.16 (7.45)</td>
<td></td>
</tr>
<tr>
<td>Height (cm)</td>
<td>183.93 (5.46)</td>
<td></td>
</tr>
<tr>
<td>Experience (years)</td>
<td>18.48 (4.56)</td>
<td></td>
</tr>
<tr>
<td>Previous injuries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Injuries during the study period</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>86</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

RESULTS
Ninety-eight male amateur football players were included (mean age: 24.6; mean football experience: 18.5 years). Fifteen players had one hamstring injury, and five players had two hamstring injuries in the previous season. Twelve players sustained a hamstring injury during the study period (table 1). The mean adherence was 54% and ranged from 0% to 100%. Adherence might be underestimated since players reported 0 m when absent or injured.
Player’s characteristics and adherence
Significant but low correlations were found between adherence and age (r=0.25, 95% CI 0.054 to 0.429) and adherence and years of football experience (r=0.20, 95% CI 0.004 to 0.387). Adherence did not significantly differ between players with or without previous hamstring injuries (F_{1,96}=0.874, p=0.420) and between players with or without future hamstring injuries (F_{1,97}=0.228, p=0.634) or between high or low educational level (F_{1,97}=0.602, p=0.512) (figure 1).

Player’s perceptions about BEP and adherence
Adherence was higher in players who perceived BEP as more useful (F_{1,97}=2.747, p=0.033), less intense (F_{1,97}=3.202, p=0.027), more functional (ie, exercise that corresponds with a key activity in football) (F_{1,97}=4.181, p=0.018) and less time-consuming (F_{1,97}=4.317, p=0.003) than the group that reported the contrary. No evidence was found for a relationship between adherence and difficulty of the programme (F_{1,97}=0.637, p=0.593), and between adherence and intention of performing the BEP in the coming season (F_{1,97}=1.465, p=0.219) (figure 2).

DISCUSSION
This study found that increased age and years of football experience were poorly related to higher adherence. Players who considered BEP useful, less intense, functional or less time-consuming adhered better than players who reported otherwise.
Player’s characteristics
This study found that older and more experienced players tended to adhere better to IPEPs than the younger and less experienced players. These older players seemed to have developed a certain routine and were more motivated to invest in staying fit than younger players. Older, experienced players seem to have learnt how to apply preventive measures and become more accountable for their health protection.

No significant relationship was found between previous or new hamstring injuries and adherence to the hamstring IPEP. This was unexpected since players tend to change their risk-taking behaviour when an event has occurred. These results are based on the number of injuries and not on the injury severity, as it was not recorded in our study (recall bias). According to the HBM, perceived seriousness and, therefore, the injury severity of the previous injury may be more relevant. Additionally, players that sustained an injury during the football season might have thought that the programme failed and changed their behaviour accordingly.

Player’s perceptions
Usefulness was related to adherence as players who perceived the BEP as useful in hamstring injury prevention adhered better to the programme. This confirms that personal motivation for IPEPs depends on perceived benefits and influences the intention to continue using an IPEP. Perceptions and knowledge about the effectiveness of the IPEP are key to successful implementation. Perceptions about intensity, functionality and time expenditure are also related to adherence and could be considered when designing and implementing an IPEP in football. These results confirm that efficacious injury prevention measures must be easy to execute and take little time.

Strengths and limitations
Although data were collected in a large cluster RCT, the power was low for correlations due to the relatively low incidence of hamstring injury. Furthermore, adherence was probably underestimated because players with missing weekly reports were considered non-adherent. This decision was made because players were instructed to report 0 m when absent or injured. Nevertheless, this has likely created some measurement error, which may have affected the correlation coefficient. Additionally, only players that filled in both questionnaires were included, and therefore selection bias cannot be ruled out, which may have resulted in an overestimation of the results. It was also considered that group dynamics might affect adherence, but the cluster RCT presented large differences within the clusters. Therefore, the influence of group dynamics may be limited in this cohort, and we did not adjust for this. Nevertheless, results need to be interpreted with caution because of the limitations mentioned above.

At last, this study only covered a part of the HBM because the questionnaires were designed to evaluate the BEP. Perceived severity, benefits and barriers have been (partly) covered. Besides the constructs of HBM, many other factors can be of importance in this complex matter. Additionally, other health behaviour models look into other aspects of health behaviour and might also be of interest in the implementation of IPEPs.

Recommendations for implementation of preventive measures and future research
Our study highlights that to design and implement an IPEP successfully, the players themselves and all stakeholders (coaches, medical staff) should be included in the implementation process. Our study also confirms...
that older and more experienced players can be considered early adopters since they seem more motivated to adopt IPEPs. Future research could focus on methods that encourage players to change their sports behaviour. Theories from social psychology, such as ‘social proof’ and a focus on group dynamics, might be useful for implementing IPEPs.25

This study partly covered the HBM. Important information about players’ perceptions towards their own injury risk, their perceptions about self-efficacy in preventing injury and their perceptions about what exercises or strategies would be helpful and are important to investigate in future research.

This study shows that IPEPs consisting of functional, not too intense and not too time-consuming exercises are related to better adherence. Even though the BEP aimed to comply with these perceptions, adherence decreased during the RCT. This raises the question of whether we need to stick to IPEPs incorporated in group warm-ups, whether we need new thoughts and focus on implementing football-specific preventive exercises, individual targeted preventive measures or whether we need to shift perceptions from injury prevention towards performance enhancement.

CONCLUSIONS
Age, years of experience and player’s perceptions of programme usefulness, functionality, intensity and time investment correlate with adherence. Previous and new hamstring injuries, educational level, the programme’s difficulty and intention to continue were not related to adherence.

Author affiliations
1Rehabilitation, Physical therapy science & Sports, University Medical Center Utrecht, Utrecht Brain Center, Utrecht, The Netherlands
2Research Group Innovation of Human Movement Care, Research Center Healthy Urban Living, HU University of Applied Sciences Utrecht, Utrecht, The Netherlands
3Public Health and Primary Care, National eHealth Living Lab, Leiden University Medical Center, Leiden, Netherlands
4Human Movement Sciences, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands
5Julius Center for Health Sciences and Primary Care, University Medical Center Utrecht, Utrecht University, Utrecht, The Netherlands
6Amsterdam UMC Location University of Amsterdam, Orthopaedic Surgery and Sports Medicine, Amsterdam, The Netherlands
7Section Sports Medicine, Faculty of Health Sciences, University of Pretoria, Pretoria, South Africa
8FIFPRO (Football Players Worldwide), Hoofddorp, Netherlands

Twitter Peter Alexander van de Hoef @sandervdhoef, Michel S Brink @MichelBrink, Jur J Brauers @BrauersJ, Maarten van Smeden @MaartenvSmeden, Vincent Gouttebarge @VGouttebarge and Frank J Backx @fbackx71

Acknowledgements
All authors thanked all football players who contributed to this study.

Contributors All authors contributed to conducting this study. PvdDH, MSB and JJB drafted the concept of the manuscript. All other authors (MrV, VG and FJGB) reviewed and edited the manuscript. All authors read and approved the final manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by Medical Ethics Committee of the University Medical Center Utrecht, reference number 16-332/C. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement The data supporting the findings of this study are available from the corresponding author, Pavdh, on reasonable request.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: http://creativecommons.org/licenses/by-nc/4.0/.

ORCID iDs
Peter Alexander van de Hoef http://orcid.org/0000-0001-5657-1417
Michel S Brink http://orcid.org/0000-0002-0730-1979
Jur J Brauers http://orcid.org/0000-0002-1717-4977
Maarten van Smeden http://orcid.org/0000-0002-5529-1541
Vincent Gouttebarge http://orcid.org/0000-0002-0126-4177
Frank J G Backx http://orcid.org/0000-0002-2775-8773

REFERENCES
Open access

20 IBM Corp. IBM SPSS statistics version 25.0, 2017
Evaluation questionnaire

The statements below relate to the Bounding program you performed during the last season. The bounding program consists of the build-up program (1st 12 weeks walking lunges, triplings & drop lunges and bounding) and the maintenance program throughout the season (Bounding)

1. I enjoyed doing the Bounding program

   Strongly Agree  Agree  Neutral  Disagree  Strongly disagree

2. I found the Bounding program useful

   Strongly Agree  Agree  Neutral  Disagree  Strongly disagree

3. I found the Bounding program (too) intense

   Strongly Agree  Agree  Neutral  Disagree  Strongly disagree

4. I found the Bounding program (too) easy

   Strongly Agree  Agree  Neutral  Disagree  Strongly disagree

5. I found the Bounding program functional

   Strongly Agree  Agree  Neutral  Disagree  Strongly disagree

6. I found the Bounding program (too) time consuming

   Strongly Agree  Agree  Neutral  Disagree  Strongly disagree

7. I found the Bounding program easy to fit in a football training session

   Strongly Agree  Agree  Neutral  Disagree  Strongly disagree

8. I will continue to do the Bounding program the upcoming competition

   Strongly Agree  Agree  Neutral  Disagree  Strongly disagree