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App4Support: Supporting Volunteer Sports Coaches in 'Reading' and Handling Difficult-to-Understand behaviors of Children; A Protocol Study

Sanne Bakker*; Janet MoeijesDepartment of Human Movement and Education,
Windesheim University of Applied Sciences, The
Netherlands***Corresponding author: Sanne Bakker**Department of Human Movement and Education,
Windesheim University of Applied Sciences, Campus 2-6,
Zwolle, 8017, CA, The Netherlands.
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Introduction

Sports participation benefits a child's physical and psychosocial health [1-3]. Psycho-social health can be defined as the absence or lower levels of internalising problems and externalising problems on the one hand and the presence or higher levels of appropriate social behaviour on the other [3,4]. Internalising problems are behaviours reflected in emotional disorders (i.e. depression and anxiety disorders), such as social withdrawal, sadness and peer problems. Externalising problems are those associated with behavioural problems such as oppositional defiant disorder, conduct disorder, and Attention-Deficit/Hyperactivity Disorders (AD/HD). They can manifest as delinquency and aggression [5]. Lastly, prosocial behaviour refers to voluntary actions intended to benefit others, such as helping peers or sharing toys [6]. With approximately 69% of the children aged 6-11 being a member of a sports club in 2022 [7], organised sport is the most prominent form of children's sports participation in the Netherlands. Organised sports participation has previously been shown to be correlated with lower prevalence of internalising [3,8-12] and externalising problems [11-15] and higher

Abstract

Children with mild psychosocial problems are at significant risk of avoiding participation in sports club activities or leaving the sports club prematurely. Volunteer sports club coaches cannot 'read' and handle their difficult-to-understand behaviour adequately. The present study addresses the question: 'What is the design and content of the prototype of an app that is helpful for volunteer sports club coaches in 'reading' and handling difficult-to-understand behaviour of children with mild psychosocial problems?' The needs of volunteer sports club coaches for support on the playing field regarding supervising children with difficult-to-understand behaviour are explored through semi-structured interviews and focus groups with volunteer sports coaches and professional sports coach advisors, semi-structured interviews with children and their parents, and sports training session observations. This will result in an overview of various forms of difficult-to-understand behaviour of children during sports club. Subsequently, rules of thumb for volunteer sports club coaches on how to deal with diverse forms of difficult-to-understand behaviour will be formulated. Finally, a framework for an app prototype will be sketched. To conclude, we are facing the challenge of developing the prototype of a mobile app to prevent sports drop-out of children with mild psychosocial problems displaying difficult-to-understand behaviour.

Keywords: Difficult-to-understand behaviour; Psychosocial problems; Sports participation; M-health; Volunteer Sports coaches; Sports coach advisors

levels of prosocial behaviour, especially in boys [11,12,16-18]. Longitudinal research highlighted the importance of organised sports participation for children's psychosocial health by showing that membership of a sports club and a higher frequency of sport participation have a beneficial influence on children's level of internalising problems [3,19,20] and their prosocial behaviour [3]. Studies in the Netherlands found for children aged 10-12 that 5.4-6.9% had abnormal scores for internalising problems, 15.5-17.7% had abnormal scores for externalising problems and 6.5-7.6% had abnormal scores for prosocial behaviour [3,11]. Although the children with abnormal scores could benefit most from participation in organised sports, they are most at risk of leaving the sports club after a short time [3,10]. One of the most dominant factors related to sports drop-out in children and adolescents is the participants' perceptions of their physical or sports competence [21]. Children with internalised problems tend to perceive their competence to be lower than their peers [22,23]. Nevertheless, organised sport is a context which can facilitate opportunities for Positive Youth Develop-

ment (PYD) [24]. PYD aims to realise the youth's potential by emphasising strengths and opportunities rather than problems and deficits [25,26]. Most importantly, volunteer sport coaches play a significant role in developing these positive experiences, as organised sport only stimulates PYD when the coaches and peers provide positive guidance and parental involvement is present [27].

However, for children with mild psychosocial problems, organised sports can also be a context in which they are (again) confronted with negative experiences. These adverse experiences are mainly caused by the difficult-to-understand behaviour that these children often show at the sports club [23,28]. Difficult-to-understand behaviour can be described as behaviour that can't be directly understood when shown by a person. It can be an expression of incomprehension, unhappiness, pain or fear. The behaviour can be aggressive, withdrawn or anxious. Examples include inhibited behaviour towards other children or abruptly leaving the field [23]. Children who are not supervised by skilled coaches are more likely to be confronted with negative experiences at the sports club [29-31]. Most youth sports coaches in the Netherlands are volunteers without pedagogical baggage. These volunteer sports coaches are insufficiently equipped to deal with the difficult-to-understand behaviour that children with mild psychosocial problems may display [32]. Therefore, it is crucial to develop interventions to support volunteer youth sports coaches when confronted with difficult-to-understand behaviour to prevent sports drop-out.

According to the recent growth of the application of mobile phone apps in sports activities, an app-based intervention is suitable to reach volunteer sport coaches. At the time of writing, a wide variety of mobile phone applications in the form of digital apps has been developed in the Netherlands to support sports coaches in various ways. Consider, for example, the apps for team management (e.g. De Voetbal Trainer, Mingle Sport, HandbalNL, and Yoursportplanner.com), creating training exercises (e.g. RINUS, FeetOn and Go4Hockey), making training schedules (e.g. FeetOn, GoFox and Handbaltrainer) and providing tactical sport-specific information (e.g. Opstellingen fout!, Hand-balCoach and FeetOn), with some having over 12.000 registered coaches as users (e.g. FeetOn). However, there is currently no app available to support volunteer sports coaches in their dealing with children showing difficult-to-understand behaviour due to mild psychosocial problems.

Hence, the App4Support project aims to answer the following research question: *What is the design and content of the prototype of an app that is helpful for volunteer sports coaches in 'reading' and handling difficult-to-understand behaviour of children with mild psychosocial problems?*

Materials and Methods

Study Design and Participants

The App4Support project aims to develop an app prototype that supports volunteer sports coaches in 'reading' and handling difficult-to-understand behaviour of children with mild psychosocial problems. For this purpose, a practice based iterative mixed-method study will be conducted. A combination of interviews, focus groups and observations will be utilized.

Semi-structured interviews with volunteer sports coaches and professional sports coach advisors will pertain to (1) the problems encountered by volunteer sports coaches when responding to difficult-to-understand behaviour of children with

mild psychosocial 100 problems and (2) possible solutions suggested by professional sports coach advisors. Volunteer sports coaches and professional sport coach advisors will be recruited by Sportservice Zwolle and Sportpunt Houten, two Dutch non-profit organizations which have connections with sports clubs and their volunteer sports coaches.

Furthermore, sports training sessions will be observed to identify and analyse the difficult-to-understand behaviours displayed by children and the reactions of volunteer sport coaches to these behaviours. Volunteer sport coaches willing to participate in the training session observations will be recruited through convenience sampling, through the researchers' personal network.

In addition, short semi-structured interviews will be held with children aged 6-13 years and their parents or guardians about experiences and desires with respect to the children's sport participation. Participating volunteer sports coaches will approach the children and their parents or guardians for recruitment, as they have prior knowledge on which children display difficult-to-understand behaviour and are in touch with their parents.

Moreover, the participating volunteer sport coaches and professional sport coach advisors will be asked to participate in focus groups in which the first provisional design and content of the app prototype is discussed.

1. The following categories of persons meet the inclusion criteria: Volunteer youth sports coaches who supervise children from 6 to 13 years of age;
2. Professional sports coach advisors who have experience in supporting volunteer youth sports coaches
3. Children with difficult-to-understand behaviour from 6 to 13 years of age;
4. Parents or guardians of children with difficult-to-understand behaviour from 6 to 13 years of age.

The following categories of persons are excluded from the study:

1. Volunteer youth sports coaches younger than 16 years of age;
2. Children who attend a school for special education;
3. Children younger than 6 years or older than 13 years of age.

Data collection for this study will take place from March 2024 to February 2025. All study procedures are in accordance with and approved by the medical ethical committee of the University Medical Centre Groningen, the Netherlands (M23.320767). The study will be conducted according to the principles expressed in the Declaration of Helsinki. All participants and/or their legal representatives will be asked to provide informed consent prior to taking part in the study. They will also be informed about the opportunity to withdraw from the study at any stage. Codes instead of names will be used when quoting information given by the participants.

Procedures

Interviews with Volunteer Youth Sports Coaches and Professional Sports Coach Advisors: Semi-structured interviews will be conducted with volunteer sport coaches and professional

sport coach advisors to gain insight into problems encountered when 'reading' difficult-to-understand behaviour and finding possible solutions. In order to gain more detailed insights into different varieties of difficult-to-understand behaviour encountered by volunteer youth sports coaches during sports training sessions, the interview questions were structured along eight types of such behaviour. A number of these types of behaviour were distinguished on the basis of the Strength and Difficulties Questionnaire (SDQ) [33], the 'Rose of Leary' [34] and practise-based guidelines from Niks and Van den Dool [23]. The various types of a child's difficult-to-understand behaviour were further elaborated by insights provided by pilot interviews with professional sports coach advisors and colleague researchers. The definitively determined eight types of behaviour and their sources are shown in Table 1.

For each type of behaviour participants will be asked (1) to give examples of difficult-to-understand behaviour they have encountered during sports training sessions, (2) to present for each example their view on the cause or causes of the difficult-to-understand behaviour shown by the child, (3) to describe how the volunteer sports coach reacted to the child's difficult-to-understand behaviour, and (4) to explain whether or not this reaction was in their view an adequate response to the child's behaviour. See the supplementary material for the complete interview guide.

The interviews with volunteer youth sports coaches and professional sports coach advisers will be conducted by two researchers. The interviews will take place in person, at a location suitable to the participants. The duration of the interview will be around one hour. Interviews will be audio recorded, for the purpose of creating transcriptions. The information obtained will be checked by making a short, written report of each interview, which will then be sent to the person interviewed for confirmation. Data collection will take place until data saturation is reached.

Sports Training Session Observations: Volunteer youth sports coaches will be observed while giving a sports training session. **Table 1:** Types of a child's difficult-to-understand behaviour included in the interview guide, and their sources.

Type of a child's difficult-to understand behaviour	Source
Aggressive behaviour	The Rose of Leary
Withdrawal behaviour	The Rose of Leary
Hyperactive behaviour	The SDQ
Attention problems	The SDQ
Fear behaviour	Pilot interviews
Attention-seeking behaviours	Pilot interviews
Emotional problems	The SDQ
Rebellious behaviour	Niks and Van den Dool [23]

Table 2: Example item for each type of reaction of a volunteer youth sports coach included in the training session observation form.

Type of reaction youth sports coach	Example item
Leading	Has a centrale role in the group
Helping	Shows interest
Cooperative	Gives positive feedback
Dependent	Follows the initiative of the children
Withdrawn	Waits until the children are silent
Rebellious	Shows dissatisfaction
Competitive	Manages to get and keep the group silent
Offensive	Is controlling

session with the aim to investigate their reactions to children's difficult-to-understand behaviour. For this purpose, an observation form will be used. This form consists of four sections. Firstly, the incident concerning the difficult-to-understand behaviour of a child will be described in terms of the above explained eight types of such behaviour. Secondly, the assumed cause or causes of the shown difficult-to-understand behaviour will be noted by the researcher. Thirdly, the reaction of the volunteer sports coach to the child's difficult-to-understand behaviour will be registered in terms of the types of reaction deduced from the typology by the Rose of Leary [34]. For each possible type of reaction of a volunteer sports coach an example item is given in Table 2. The presence of each type of reaction displayed by the volunteer sports coach in question will be scored on a 5-point scale, in which 1 represents 'too little', 3 represents 'fitting' and 5 represents 'too much'. Fourthly, the response of the child to the intervention of the volunteer sports coach will be classified on the scales 'above-submission' and 'opposed-together'. It will also be noted whether or not the intervention of the volunteer sports coach adequately resolved the incident. If this is not the case, suggestions about alternative ways in which the sports coach should have reacted are given by the observer. See the supplementary material for the full observation form.

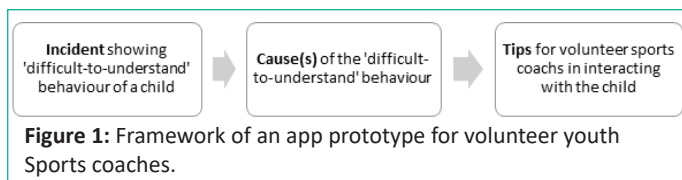
The training session observations will take place in person at the sports club where the volunteer sports coach is active. Observation moments will be chosen on the basis of 196 the schedules for the training sessions. After the training session the observer will discuss the tips noted in the observation form with the volunteer sports coach. For each sports coach in total three training sessions will be observed. There will be at least two weeks between each observation session to allow the coach to implement the feedback received during earlier observations. In each observation around ten incidents concerning difficult-to-understand behaviours will be noted, resulting in a total of 150-200 cases noted.

Pilot observations will be conducted by two independent researchers to adjust the observation form were needed. This will also be done to test the inter-rater reliability of the observation form.

Interviews with Children and their Parents or Legal Guardians: Volunteer sports coaches who participate in the training session observations will be asked to approach parents and guardians of children in their training group who often display difficult-to-understand behaviour during training sessions. These parents and guardians will be recruited for short interviews together with their children. The interviews are aimed to gain insights into the experiences and desires of parents and guardians with respect to their children's sports participation.

The short interviews will take place immediately before or immediately after a training session and will last around 10 minutes. Afterwards, a short report of what was discussed will be composed and sent to the parent or guardian for confirmation.

Focus Groups: Volunteer sports coaches and professional sports coach advisers who participate in the interviews will be asked to join in two focus groups in the summer of 2024. In these focus groups initial results from the interviews and training session observations will be discussed. Furthermore, participants will be asked to give their opinions on the first design and content of the prototype of an app for volunteer sports coaches. The focus will be on their expectations and wishes concerning the app.



The focus groups will be held after school hours, to allow professional sports coach advisors to attend. Participants will be asked to attend in person where possible. If they are not able to do so, an online option will be provided. The focus groups will take around one hour. The focus groups will be audio recorded for analysis purposes.

From Interviews, Observations and Focus Groups to an App Prototype Results of the interviews with volunteer sports coaches and professional sports coach advisors, the sports training session observations, the interviews with children and their parents or guardians and the focus groups will be processed by the researchers into a prototype of an app that supports volunteer sports coaches in 'reading' and handling difficult-to-understand behaviour of children during sports activities. In the app prototype, a relationship will be established between three factors: (1) the incident in which the child shows difficult-to-understand behaviour during a training session, (2) the assumed cause(s) of the child's behaviour, and (3) recommendations for the volunteer sports coach in question to 'read' and handle this behaviour. The three central components of the app prototype, which together constitute its framework, are displayed in Figure 1.

Data Analysis

Interviews with Volunteer Youth Sports Coaches and Professional Sports Coach Advisors: Interview data will be transcribed using the audio recordings. Analysis will be done with the program QDA Miner (Version 6.0). A deductive thematic coding approach will be used to analyse the transcripts. The codes will be based on the abovementioned various types of a child's difficult-to-understand behaviour included in the interview guide and on the app-framework presented in Figure 1. Creating the coding scheme is an iterative process. New codes are continuously added based on additional information that is currently not covered by the coding schema. See Figure A1 in Appendix A for a first draft of a possible coding scheme.

All coding processes will be undertaken by two independent researchers. Differences between them will be discussed until agreement is reached.

Sports Training Session Observations: Data analysis of the sports training session observations will be done in IBM SPSS (version 18). To examine possible correlations between types of observed difficult-to-understand behaviour of a child and types of reaction of volunteer sports coaches to the child's behaviour, Pearson or Spearman correlations will be conducted, based on the distribution of the data. To compare the different approaches displayed by coaches, t-tests will be executed.

Interviews with Children and their Parents or Legal Guardians: A short report of the interviews conducted with the children and their parents or legal guardians will be written by the researcher and analysed with QDA Miner (Version 6.0). Inductive thematic coding will be used to analyse the expectations and desires of the parents. In the first step, open coding will be used to highlight all relevant information concerning the participants' expectations and desires with respect to the child's sports participation. Secondly, axial coding will be applied to

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determine relevant themes and create a coding scheme. Finally, selective coding will be employed to classify relationships between the previously identified themes.

Focus Groups: All information discussed during the focus group will be summarized by the researchers. Feedback relevant to the design and content of the app content will be categorized and taken into consideration when further developing the app prototype.

Expected Results

The interviews with volunteer youth sports coaches and professional sports coach advisors, the training session observations, the interviews with children and their parents/guardians provide data, and the focus groups provide data which will lead in the Spring of 2024 to an overview of various types of 'difficult-to-understand' behaviour that volunteer youth coaches encounter on the playing field and various causes of this behaviour. Subsequently, in the Summer of 2024 recommendations in the form of rules of thumb for volunteer sports club coaches on how to deal with diverse types of a child's difficult-to-understand behaviour will be formulated. Finally, in the Fall of 2024 the research findings will be integrated into the prototype of an app that supports volunteer youth sports coaches during their interactions with children showing difficult-to-understand behaviour due to mild psychosocial problems.

Discussion

The App4Support project aims to develop the prototype of an app that supports volunteer youth sports coaches in 'reading' and handling difficult-to-understand behaviour of children with mild psychosocial problems.

Strengths and Weaknesses

The current study has multiple strengths. Firstly, to the best of our knowledge, the App4Support will be the first research-based mobile phone app aimed at supporting volunteer sports coaches who supervise children with mild psychosocial problems at sports clubs. Secondly, constructing the study protocol follows an iterative process.

This process allows for adjustments based on findings in previous steps along the way, resulting in the prototype of a mobile phone app that best meets the needs and desires of volunteer youth sports coaches. Thirdly, the data from interviews and training session observations will be coded by two independent researchers. With respect to the data from interviews, member checks with the participants will also be conducted. These measures will limit interpretation bias.

Nevertheless, a few weaknesses have to be mentioned. Due to practical limitations random sampling of children, parents, volunteer youth sports coaches and professional sports coach advisors was not possible. Participants were recruited through purposeful sampling, convenience sampling and snowball sampling. This may have detrimental implications for the generalisability of the research findings. For example, previous research has shown that environmental context has a significant influence on a child's behaviour during sports activities [35]. Volunteer sports coaches performing sports training sessions in high social economic status areas might therefore encounter other types of difficult-to-understand behaviour than coaches who execute sports training sessions in lower social economic status areas. Another weakness pertains to the fact that interviewees will be asked to reflect on behaviour previously encountered

during a sports training session, which may lead to a recall bias. To compensate this bias to a certain extent, training session observations will be executed.

Practical Implications

The App4Support project will provide volunteer sports coaches and sports coach advisors with an m-health tool useful for volunteer sports coaches in 'reading' and handling difficult-to-understand behaviour of children with mild psychosocial problems. The project's ultimately goal is preventing vulnerable children from becoming sports dropouts.

Author Statements

Supplementary Materials

The following supporting information can be downloaded at: www.mdpi.com/xxx/s1, Table S1: Interview guide volunteer sports coaches and professional sport coach advisors; Table S2: Observation form.

Author Contributions

For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used Conceptualization, S.B. and J.M.; methodology, J.M.; validation, S.B. and J.M.; writing—original draft preparation, S.B. and J.M.; writing—review and editing, S.B. and J.M.; visualization, S.B.; supervision, J.M.; project administration, S.B.; funding acquisition, J.M. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Medical Ethical Committee of The University Medical Centre Groningen (M.23.320767, 15/09/2023)."

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

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Conflicts of Interest

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

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