

MoveBuddy

Intrinsically motivate obese children with an innovative and child-friendly digital solution that promotes long-term physical activity through gamification.

Challenger

Az groeninge is a dynamic general hospital located in Kortrijk (Belgium) with more than 1000 recognized beds. We are known for our advanced medical services and high-quality care. More than 2800 employees and approximately 260 hospital doctors strive every day to provide quality, safe, accessible, expert, and integrated care to every patient, with respect for everyone's individuality. To respond to the changing needs of the patient, the broadest possible medical offering is provided based on multidisciplinary and transmural collaboration with other healthcare institutions and primary care.

We do not shy away from innovative projects with clear added value for patient care. 'The greenhouse', an institute for clinical growth, was initiated because innovation, development, research, education and expertise are extremely important to az groeninge. A cluster of specialists who aim to build bridges for new trends, innovative treatments and quality.

Challenge description

Childhood obesity is a pressing health issue, with profound implications for individuals, and society at large. Beyond immediate impacts on self-esteem and quality of life, it significantly elevates the risk of chronic illnesses like diabetes and cardiovascular diseases, alongside psychosocial complications. This burdens healthcare systems with increased medical costs but also undermines societal productivity and well-being.

In Belgium alone, over 133400 children aged 2-18, representing approximately 5,8% of the population in this age group, are affected by obesity. (Belgische Kamer van Volksvertegenwoordigers, 2022) Currently, healthcare professionals rely on self-reporting or subjective observations when treating obese children, which is prone to biases and inaccuracies. In addition, healthcare professionals use generic approaches that may not be tailored to the specific requirements of individual children with obesity. This one-size-fits-all approach limits the effectiveness of interventions, as it fails to account for the diverse needs and preferences of each child.

Therefore, the solution must collect accurate data such as physical activity and sedentary behaviour (e.g. through an accelerometer). This includes steps taken, distance travelled, prolonged sitting time, sleep tracking, heartrate, intensity of the activity, ... To avoid falsification of the values, it must be an accelerometer and not a regular pedometer.

The values can help identify patterns which can improve interventions to increase activity levels and promote healthier habits. Sleep plays a crucial role in overall health. Sometimes obesity can be associated with sleep disturbances. The tool should be equipped with sleep tracking capabilities to monitor duration, quality and disturbances. The tool would not only provide accurate data, allowing healthcare professionals to tailor interventions based on individualized insights and track progress. By integrating the measurement data into the electronic patient record, healthcare providers can monitor the child remotely and make

timely adjustments, which will most likely lead to more successful outcomes. This strategy improves the efficiency of the use of scarce hospital resources through tiered care. Children can be guided to the most appropriate level of intervention. Supervision in the hospital is reserved for children who require (renewed) intensive follow-up. Those who meet the exercise standards can receive guidance from regular sports clubs.

It is also important that the children are intrinsically motivated to exercise more through the tool due to the gamification aspect. By gamification they learn how to make the healthier choices and the pleasure of movement.

Challenge main objectives

The goal is to enhance the intrinsic motivation of children with obesity via gamification to consistently meet the daily exercise standard outlined by Flemish health recommendations for long-term physical activity. This entails at least 60 minutes of moderate to high-intensity exercise per day, aligning with both Flemish health guidelines and those set by the World Health Organization (WHO).

Solution functional requirements

Compulsory functional requirements

1. The solution (e.g. through an accelerometer) must accurately track and record children's daily physical activity levels: heartrate (steps taken, distance travelled, pace, intensity and duration of the activity, sleep-wake cycle, activity recognition or setting up the measurement of a certain activity (E.g. swimming, bicycling, running...):
<100 counts per minute (cpm): sedentary,
101-2295 cpm: moderately physically active,
>2296 cpm: high physically active.
(Evenson et al., 2008)
2. The tool must be child-friendly, engaging and age-appropriate interfaces to promote intrinsic motivation: catch the eye of children; attractive, easy to use, correct sizes and colours, safe...
3. It shall provide real-time feedback and progress tracking features for both children, parents and healthcare professionals to monitor adherence and empower to daily exercise goals. For example, if the daily exercise standard is not achieved during a certain period, the child and parent receive a reminder. If it persists, a notification is sent to the healthcare professional (HCP); physiotherapist or pediatrician. The real-time feedback mechanism allows children and parents to celebrate achievements, set goals, work collectively towards a healthier and more active lifestyle. It is vital for proactive intervention.
4. The solution must be capable of generating personalized intervention strategies for physical activity based on individualized insights derived from collected data. This data will be used for the gamification element in the wearable. The solution should be worn continuously to get the complete picture (24 hours a day). Therefore, it seems necessary to work with a wearable.
5. A user-friendly dashboard: easy interpretation of collected data and efficient consequence (E.g. Fail to meet daily exercise goal, actively encouraging more exercise through gamification, challenges...). Where the main users of the dashboard are the clinicians, nurses and physiotherapists.

6. The app should function on iOS and Android.
7. It should contain gamification elements to further stimulate children's engagement and motivation towards physical activity.
8. It should prioritize privacy and data security, adhering to relevant regulations and guidelines to safeguard sensitive health information.

Desirable functional requirements

1. The architecture should already take into account an integration with Electronic Patient file systems will be feasible: Klinisch Werkstation (KWS) or MyNexuzHealth. The integration with the system can be provided by using HL7.
2. It would be nice if the tool contains collaboration features to enable communication and coordination between HCP, parents and other children combatting obesity (by challenging each other...)
3. Scalability to accommodate a growing user base.
4. Ability to manually set activity zones by a healthcare professional based on exercise test results. (E.g. endurance (VO2 max), maximum heart rate...)

Pilot scope

Type and number of targeted end-users

End-user type	Role	Number
Children aged 6-9, 10-12, 13-15	They have to clarify their wishes, give ideas that would help them reach their activity goal on a long-term. They have to test and evaluate.	20
Parents (Equal numbers of mothers and fathers)	They have to provide requirements and feedback on the usability and effectiveness of the solution, offering insights to better meet the needs of children and families. After the requirements phase they need to evaluate and give suggestions to improve.	10
HCP: Pediatrician (3), Physiotherapist (3), dietician (2) and psychologist (2)	They have to provide requirements (specify needed data, needed interventions/consequences), recruit patients, use and validate the solution and	10

	preparatory steps for integration in the EPD.	
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Language

Dutch – simple Children’s language.

Children and parents will be recruited in the region of the hospital. Communication has to be done in their language (Dutch). Ability to communicate with young children should get specific attention.

Within the context of scale-up, it is useful to take preparatory steps to make the app also available in other languages (E.g. French or English).

Other aspects

It seems necessary to use an attractive wearable, with an accelerometer for reliably measuring children’s physical activity levels.

This technology ensures accurate tracking and provides valuable data for assessing adherence to recommended exercise guidelines.

Additionally, establishing a link between the wearable device and a mobile app enhances real-time insights for both children and their parents, as well as HCP. This connectivity allows for immediate feedback on activity levels, progress tracking, and personalized intervention planning. Moreover, it fosters transparency and accountability, empowering children to take ownership of their health while facilitating communication between all stakeholders involved in supporting their physical activity goals. Integrating these features into the solution enhances its effectiveness and attractiveness, ultimately contributing to the success of the tool in promoting sustained motivation for physical activity among children with obesity.

Pilot set up conditions

Ethical, legal or regulatory

The Ethics Committee of az groeninge will previously validate the approach of the pilot. The solutions must be fully GDPR compliant to safeguard the privacy and confidentiality of participants’ health information. Informed consents will be obtained from participants or their legal guardians.

Technological

The solution shall be able to exchange information (read and write data) preferably with the electrical patients records of az groeninge; Java - Klinisch Werkstation (launcher version 3.4.1) or MyNexuzHealth or makes the data available via another platform. Ideally this should be tested during the project.

The application should be hosted on the servers of the hospital.

The application should be compatible with the accelerometer support standards for data exchange and communication protocols to facilitate interoperability with wearable device platforms, enabling the collection and transmission of real-time physical activity data. Where the preference comes into one integrated system, where an application is seamlessly integrated with an wearable. On the other hand, it’s also possible to make an open system where the application can receive data from any kind of hardware systems.

The solution shall address cybersecurity concerns to limit the risk of data breaches or unauthorized access to sensitive health information.

Authentication measures must be implemented to ensure secure access to the solution by authorized users, including children, parents, and healthcare professionals.

The solution should consider usability and accessibility requirements to ensure it is user-friendly for children, parents, and healthcare professionals with varying levels of technological literacy.



Data access

No prior data is expected to be available, meaning all users will start as new users in the system.

Expected impact and KPIs

The expected impact of the Movebuddy is an increased the percentage of children meeting daily exercise recommendations by the end of the pilot. Even more important is that children enjoy exercising, this can enhance a long-term effect and reduces prevalence and related costs of obesity-related health conditions.

Satisfaction rate among children, parents and HCP regarding the solutions effectiveness in motivating sustained physical activity.

It enables HCP to tailor interventions for children with obesity based on real-time data insights, leading to improved outcomes.

1. Percentage of children meeting daily exercise recommendations at least 5 days per week: 50% by the end of the pilot.
2. 40% of the children discovered the pleasure of exercise (PACES-S) (Chen, 2021), have a better quality of life and self-esteem (RSES) (Wood, 2021). Conduct surveys at baseline and end pilot.
3. User satisfaction is determined using the: USEQ scale (Domingos, 2022) and feedback session. 80% of the participants score 'very good' satisfaction (15-20).
4. Number of tailored interventions: track the personalized interventions prescribed by healthcare professionals based on insights derived from the solutions data analytics.

Business opportunity

Market size

- Internally, this project would be replicable in the pediatric services in az groeninge. Potential users are -estimated at least 60 children per year.

- At the national level there are approximately 133400 children (aged 2-18) with obesity in Belgium. Considering the potential adoption of the solution by various healthcare providers and organizations across the country, the market size could encompass thousands of children with obesity receiving treatment.
- The WHO European Childhood Obesity Surveillance Initiative (COSI) shows that there is a high and increasing prevalence of overweight and obesity of children and adolescents. One in three school-aged children live with overweight or obesity in the WHO European region. (World Health Organization, 2022)

The challenge of childhood obesity presents a significant opportunity for suppliers of innovative solutions, both within the organization and beyond. Other potential customers, such as healthcare providers, hospitals, public health agencies, schools, sport clubs may also benefit from implementing such solutions to address the growing epidemic of childhood obesity. With the scalability and adaptability of the solution, there is potential for widespread adoption across various healthcare settings, both nationally and internationally, contributing to improved outcomes for children with obesity on a global scale.

Adoption Plans

After a successful pilot, the solution will be scaled up to suggesting the solution to every child undergoing treatment for obesity. Additionally, other organisations will have the opportunity to adopt and integrate this tool in their treatment protocols, enabling the delivery of personalized sustainable care over a long term.

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