English abstract

While exercise is generally advocated to contribute to overall well-being, it comes with a health risk, both for the individual, as for society as a whole. The body parts that are most often affected by an injury are the knee and the ankle, with respectively 970,000 and 680,000 injuries in the Netherlands alone. The single most common injury is an ankle sprain, which makes up 85% of all ankle injuries. In addition to societal costs, there is extensive evidence that there is an up to twofold increased risk for ankle re-injury during the first-year post-injury. In about 50% of all cases recurrences may result in disability, can lead to chronic pain or instability and may require prolonged medical care. As such, ankle sprains pose a significant burden to the individual athlete and to society.

Previous research has shown that both externally applied ankle supports (i.e. taping or bracing), as well as neuromuscular training programs are successful in preventing recurrent cases of ankle sprain, both from an effectiveness, as well as a cost-effectiveness perspective. These measures can reduce the increased risk of recurrent injury to the same level as never injured athletes. However, although the neuromuscular program has been proven (cost-)effective compliance with the program is poor.

The aim of this thesis is to evaluate the implementation value of the ‘Versterk je Enkel’ App as compared to the usual practice of providing injured athletes with ‘ordinary’ materials. The premise is that use of the ‘Versterk je Enkel’ App would increase compliance to the prescribed program and, consequently, would decrease ankle sprain recurrence incidence.

In the short-term study we compared the compliance rates of the intervention program from App users with those using a printed Booklet. Participants were asked weekly about their compliance with the ‘Versterk je Enkel’ program and about the recurrence of self-reported ankle injury. It was shown that using an App versus a Booklet, did not lead to significant different mean overall compliance rates. Additionally, the percentage of participants that was highly compliant – i.e. those following at least 70% of the program, the arbitrary threshold necessary for the program to be efficacious - was not different between groups. The mean compliance to the exercise scheme was 73.3% (95% CI: 67.7-78.1) in the App group, compared to 76.7% (95% CI: 71.9-82.3) in the Booklet group. Additionally, the incidence densities of self-reported time-loss recurrences were not significantly different between both groups (HR 3.07; 95% CI 0.62-15.20).

In the long term study, we asked the participants to complete an online questionnaire monthly to examine re-injury and to register any residual functional disability or pain. After the total time frame of 12 months, there were no differences in injury incidence rates (HR 1.06; 95% CI 0.76-1.49) nor differences in residual functional disability or pain. It was concluded that when the participant is compliant with the program, both methods showed similar effectiveness in reducing the risk of recurrent ankle sprains, on both the short and the long term.

Looking at the incidence density of ankle injuries and the the incremental cost-effectiveness ratio (ICER), we found that during 12 months follow-up, 31 athletes suffered from a recurrent ankle sprain that led to costs resulting in a Hazard Ratio of 1.13 (95% CI: 0.56-2.27). The incremental cost-effectiveness ratio (ICER) of the App group in comparison with the Booklet group was €-361.52. The CE plane presented in chapter 6 shows that there was neither a difference in effects nor in costs between both intervention methods.

To evaluate the ‘Versterk je Enkel’ NMT program, qualitatively, we used the RE-AIM framework as a reporting template. We looked at the implementation and maintenance phase to identify the barriers and facilitators as experienced by the final users. Semi-structured and online questionnaires showed that there was no significant difference in perceived simplicity, usefulness and liking of the exercise during the eight weeks of the NMT program. 14/16 participants from the interviews agreed that an App would be of additional benefit over a Booklet. After twelve months’ follow-up, when asked how they evaluated the overall use of the App or the Booklet, users of the App gave a mean score of (mean ± sd) 7.7±0.99 versus a mean score of7.1±1.23 for the users of the Booklet. This difference in mean score was significant (p=0.006).

In conclusion, we found that the method of implementing the ‘Versterk je Enkel’ NMT program did neither lead to different rates of compliance nor to differences in (cost-)effectiveness. Both in the short and long term, rates of re-current ankle sprain were similar when using the App or the Booklet, and compliance with the program did not differ between both methods during the 8 weeks of the intervention.
The semi-structured interviews and our thorough analysis of compliance and (cost-)effectiveness showed us that there is no such thing as THE (injured) athlete with set determinants of behaviour. Each of the 220 participants had its own story on how the first ankle sprain arose, if and how it was treated and how the individual went about preventing (or not) re-injury. During both the short and the long term, each of the participants had to find the time, the motivation and the resources to do so. Some succeeded, some did not and some only to a certain extent. It became clear that not all participants preferred the use of the mobile app. This led us to conclude that traditional methods of delivery should not be forgotten and if possible, should co-exist with more innovative, mobile options. With multiple options, the diversity in individual limitations and barriers can be acknowledged.

Our advice for the individual athlete and stakeholders involved would therefore be to use the method that is preferred by the athlete. This can be the App, the Booklet or even a combination of both, such that the athlete can choose the method of implementation that is most easily accessible at a certain moment of time. Our main message is that the program is effective but should be executed.