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Suman, A.

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# Chapter 9

Effectiveness and cost-effectiveness of a multifaceted eHealth strategy to improve back pain beliefs of patients with non-specific low back pain: a cluster randomised trial

Arnela Suman, Frederieke G. Schaafsma, Johanna M van Dongen, Petra JM Elders, Rachelle Buchbinder, Maurits W van Tulder, Johannes R Anema

Submitted



## ABSTRACT

**Background:** Low back pain is the world's leading cause of disability and has a high burden on individuals and societies. Many guidelines recommend self-management for patients with low back pain. The current study aims to assess whether a multifaceted eHealth strategy is effective and cost-effective compared to usual care in improving patients' back pain beliefs and quality of life, and in decreasing their disability and absenteeism.

**Methods:** This study was a stepped wedge cluster randomised controlled trial with a parallel economic evaluation performed from a societal perspective. Four clusters of general and physiotherapy practices and occupational physicians were randomised and recruited patients with low back pain for this study. 779 patients participated in this study, of which 331 were randomised to the intervention group (multifaceted eHealth strategy), and 448 were randomised to the control group (usual care). All patients were followed up at 3, 6, and 12 months.

**Results:** There were no between-group differences in back pain beliefs or other health outcomes at any time point. While the intervention group had lower costs due to absenteeism, presenteeism, and unpaid productivity losses, none of the costs were significantly different to the control group. At baseline, 37% of participants did not have back pain anymore.

**Conclusion:** The study results show that the multifaceted eHealth strategy was not effective or cost-effective in improving patients' back pain beliefs and quality of life, and in decreasing their disability and absenteeism.

### What is already known on this topic

Low back pain is the leading cause of disability worldwide.

### What this study adds

A multifaceted eHealth strategy does not seem effective in improving patient outcomes, but might be cost-effective from other perspectives.

## BACKGROUND

Low back pain (LBP) is a major medical problem throughout the world. The global 1-month point prevalence is estimated to be 23.2%.<sup>[1]</sup> LBP is the leading cause of musculoskeletal and work disability, and years lived with disability (YLDs) worldwide.<sup>[2-3]</sup> Recent estimates from the Global Burden of Disease Study indicate that LBP accounts for 57 million YLDs, and that over 250 million people develop LBP annually.<sup>[2]</sup> The economic burden of LBP is high. Estimates of the annual economic burden of LBP vary from between AU\$9.17 billion in Australia, £12.3 billion in the UK, and US\$91 billion in the United States.<sup>[4-6]</sup> In the Netherlands, recent estimates report the costs of LBP to be around €1.3 billion, a quarter of all healthcare costs due to musculoskeletal disorders.<sup>[7]</sup> However, indirect costs due to absenteeism, and productivity losses due to disability are not included in this estimate. Previous research has shown that indirect costs make up 88% of all societal costs due to LBP.<sup>[8]</sup> Since LBP leads to a high proportion of work absence, the costs of LBP in the Netherlands are much higher than suggested.<sup>[7]</sup> Besides the burden on society, LBP has a high burden on the lives of individuals. Over the past decades, several studies have shown that people with negative back pain beliefs have more pain, disability, negative work-related outcomes (i.e. productivity loss and sickness absence), and higher health care utilization.<sup>[9-12]</sup> Many guidelines for LBP recommend self-management for patients, which is a reflection of a newly proposed definition of health, i.e. "health as the ability to adapt and self-manage."<sup>[13-14]</sup> A systematic review on the effectiveness of education programmes designed to improve self-management suggested that these programmes are effective in improving pain intensity and disability, but did not measure actual self-management.<sup>[15]</sup> Underlined by the high economic, societal, and individual burden of LBP, no highly effective treatment for LBP has yet been found. However, eHealth, which is the provision of (personalised) health care at a distance (e.g. through internet and thus digital), has shown promise with regards to its' effectiveness and cost-effectiveness in improving outcomes such as patient health, patient satisfaction, self-management and healthcare costs in patients with physical diseases.<sup>[16-17]</sup> Therefore, the current study aimed to assess whether a multifaceted eHealth strategy to improve belief, knowledge, and self-management of LBP is effective and cost-effective compared to usual care in improving patients' back pain beliefs and quality of life, and in decreasing their disability and absenteeism.

## METHODS

### Study design

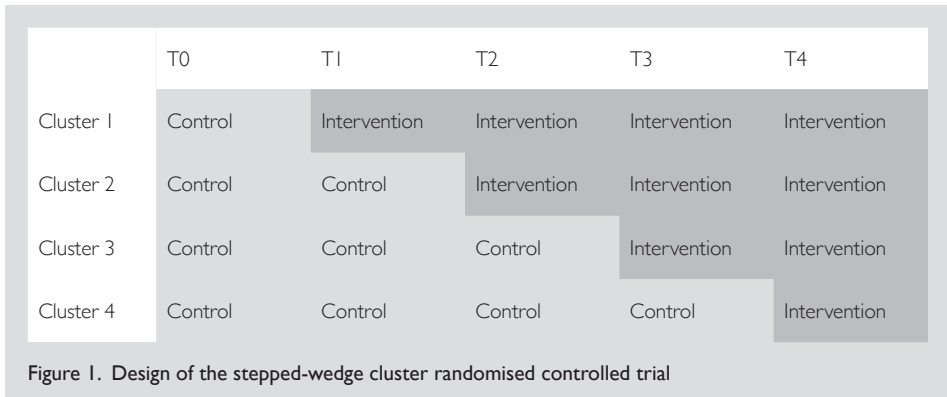
This study was part of a cluster-randomised controlled trial that was registered in 2013 with the Netherlands Trial Register (NTR) under number NTR4329.<sup>[18]</sup> The Medical Ethics Committee of the VU University medical centre assessed this study's design and procedures, and in accordance with the local regulatory guidelines and standards for human subjects protection in the Netherlands (Medical Research Involving Human Subjects Act [WMO], 2005), this study proved to be exempt from further medical ethical review. A detailed description of the design of this study has been published elsewhere.<sup>[18]</sup>

### Participants

Twenty-five general practices, 19 physiotherapy practices, and 29 occupational physicians in the Amsterdam area participated in this study and recruited patients for this trial. Patients were aged 18-75 years and were diagnosed with nonspecific LBP by their general practitioner (GP) or physiotherapist (PT), whom they had visited due to back complaints no longer than 3 months prior to inclusion in the study. Nonspecific LBP was defined as LBP with or without motor and/or sensory deficits in one or both legs, including sciatica and radiculopathy, that is not caused by underlying specific pathology (red flags), i.e. a tumour, (osteoporotic) vertebral fracture, ankylosing spondylitis, and cauda equina syndrome. Exclusion criteria were: serious comorbidities including Alzheimer's disease, multiple sclerosis, Parkinson's disease, amyotrophic lateral sclerosis, cerebrovascular accident in the last year, confirmed pregnancy in the last year, malignancy in the last five years, and severe psychiatric disorders, i.e. schizophrenia and bipolar disorder.

### Randomisation

This study was a stepped-wedge cluster randomised controlled trial. The participating general practices, physiotherapy practices, and occupational physicians were assigned to one of four clusters based on their geographic proximity to each other. The clusters sequentially received a multifaceted continuing medical education training (see Figure 1). This clustering allowed for minimisation of contamination between the participants. Patients were allocated according to the group their general practitioner, physiotherapist or occupational physician were assigned, i.e., patients registered within a practice that was in the control group at time of enrolment were allocated to the control group for patients. Randomisation was performed by means of computer-generated allocation. An independent research assistant performed the concealed allocation, enrolling of participants, and assignment of participants to groups.



### Intervention and control

The intervention was provided to patients on an individual level. Patients in the cluster whose GP or PT was randomised into the intervention group received access to a multifaceted eHealth strategy that aimed to reduce patients' negative back pain beliefs and improve their knowledge and self-management of LBP. The campaign included an informative website, digital monthly newsletters, and social media platforms. The website provided comprehensive information about LBP, such as practical advice (e.g. on self-management), working and returning to work with LBP, exercise tips, and short video messages. In these videos, actors and healthcare professionals shared their experiences with LBP and provided tips on self-management, coping, and working with LBP. The videos were inspired by the effective Australian mass media campaign 'Back Pain: Don't Take It Lying Down'.<sup>[19]</sup> Social media platforms included a forum on the website, and a Facebook page where patients could contact researchers, healthcare providers, and other patients. All parts of the intervention were also available in a mobile version that was adaptive to any electronic device. The patient intervention was supported by continuing medical education for GPs, PTs, and occupational physicians (OPs). More detailed descriptions of the patient and professional based interventions are published elsewhere.<sup>[20-21]</sup> Patients in the control group received a digital patient information letter and had no access to the intervention website, materials or social media platforms. Results of the professional based intervention will be published elsewhere.

### Sample size and outcomes

The primary outcome measure was back pain beliefs, assessed using the Back Beliefs Questionnaire (BBQ). The BBQ is designed to measure the inevitable consequences of LBP (e.g. there is no real treatment for back trouble, back trouble must be rested). It is a validated questionnaire consisting of 14 items, and rates back pain beliefs on a scale of 9 to 45, with higher scores indicating more positive (better) back pain beliefs (e.g. exercising through LBP is good).<sup>[22-23]</sup>

The sample size calculation was based on a hypothesized 10% improvement in back pain beliefs as measured by the BBQ, based on an observed mean improvement of 9.6% between three successive surveys in the Australian campaign.<sup>[19]</sup> An intra-class correlation coefficient (ICC) of 0.05 was applied to adjust for the cluster randomisation design. Assuming a 10% improvement from a mean score of 26.5 (95% Confidence Interval (CI) 26.1-26.8, SD 6) on the BBQ, and applying an ICC of 0.05, the necessary sample size was estimated to be 500 patients. This calculation takes into account a dropout-rate of 20%, power (1-beta) of 0.90 and an alpha of 0.05.

The secondary outcomes included disability, measured with the Roland Disability Questionnaire (RDQ-24), which has been shown to be a valid and reliable instrument for patients with LBP.<sup>[24]</sup> The RDQ-24 consists of 24 items, rating disability on a scale of 0 to 24, with higher scores indicating more disability. The EQ-5D-3L was used to measure quality of life.<sup>[25]</sup> Health care use, absenteeism, presenteeism and unpaid productivity losses were measured with the generic PROductivity and Disease Questionnaire (PRODISQ) and the Healthcare Utilization and Productivity Losses Questionnaire (TIC-P).<sup>[26-27]</sup> All outcomes were measured at baseline and after 3, 6, and 12 months follow-up.

For the economic evaluation, the scores on the EQ-5D-3L were converted into utility scores using the Dutch tariff.<sup>[28]</sup> These utility scores range from 0 (death) to 1 (maximum health). Quality adjusted life years (QALYs) were calculated using linear interpolation between measurement points. Societal costs included intervention costs, costs for the use of healthcare, and costs for informal care (e.g. care by family and other volunteers), work absenteeism, and paid and unpaid productivity losses. The intervention costs comprised all costs for the development and implementation of the intervention, including costs for materials and personnel (Appendix 1). There were no costs for the intervention for the control group. Healthcare utilization included primary healthcare (e.g. GP, PT), secondary healthcare (e.g. diagnostic imaging, medical specialist), alternative healthcare (e.g. acupuncture or massage), and medication (both prescribed and over-the-counter).

To value healthcare utilization, prices from the Dutch Manual for Costing (DMC) were used.<sup>[29]</sup> Where standard costs were unavailable, we used prices provided by professional organizations. Medication use was valued using the prices of the Royal Dutch Society of Pharmacy.<sup>[30]</sup> Informal care was valued using a recommended Dutch shadow price according to the DMC.<sup>[29]</sup> Absenteeism was calculated and valued using patient data collected with the PRODISQ and TIC-P. In accordance with the DMC, patients' daily absenteeism cost was calculated by dividing their self-reported gross annual salary by their total number of workable days per year. Using the Friction Cost Approach (FCA, friction period 23 weeks), absenteeism costs were estimated by multiplying the total number of sick leave days during follow-up by their



associated costs. Presenteeism was calculated using patient data collected with the TIC-P questionnaire, where patients indicated how many days they went to work while having LBP. To obtain workday equivalents lost to presenteeism, this number of days was multiplied by a self-reported inefficiency score ranging between 0 (could not perform any tasks) and 1 (could perform all tasks as efficient as without LBP). Presenteeism costs were subsequently calculated by multiplying the total number of presenteeism days by their associated costs.

### Statistical analyses

Analyses were performed according to the intention-to-treat principle. Descriptive statistics were used to compare baseline characteristics between intervention and control group participants as well as between participants with complete and incomplete data. Missing values for costs and effects were imputed using multiple imputation, and imputations were performed separately for the intervention and control group.<sup>[31-32]</sup> Effectiveness analyses were performed using maximum likelihood estimation longitudinal mixed-effects models with multilevel structure and 'missing at random' assumptions.<sup>[33]</sup> The mixed-effects models adjusted for the effect of clustering. Analyses of effect and cost data were performed in Stata 14, and the statistical significance level was set at  $p < 0.05$ . Regression coefficients or odds ratios (ORs) were calculated with 95%-confidence intervals (CIs).

Cost-effectiveness analysis (CEA) and cost-utility analysis (CUA) were performed from a societal perspective. Imputation models included intervention costs, age, gender, educational level, nationality, being employed, performing physically demanding work, physical activity (minutes per week), and available cost and effect measure values. Using predictive mean matching, 10 complete data sets were created (loss-of-efficiency 5%).<sup>[34]</sup> Pooled estimates were calculated using Rubin's rules.<sup>[35]</sup> Cost and effect difference estimates between intervention and control group were analysed using seemingly unrelated regression (SUR), while simultaneously adjusting for the possible correlation between costs and effects.<sup>[36]</sup> Incremental cost-effectiveness ratios (ICERs) were calculated by dividing the adjusted mean cost differences by those in effects. Uncertainty surrounding the cost differences and ICERs was estimated using Bias Corrected and Accelerated bootstrapping (BCA) with 5000 replications, and presented by 95%-CIs and plotted on cost-effectiveness planes.<sup>[37]</sup> Cost-effectiveness acceptability curves (CEACs) presented the probability of the intervention being cost-effectiveness at different values of willingness to pay.<sup>[38]</sup>

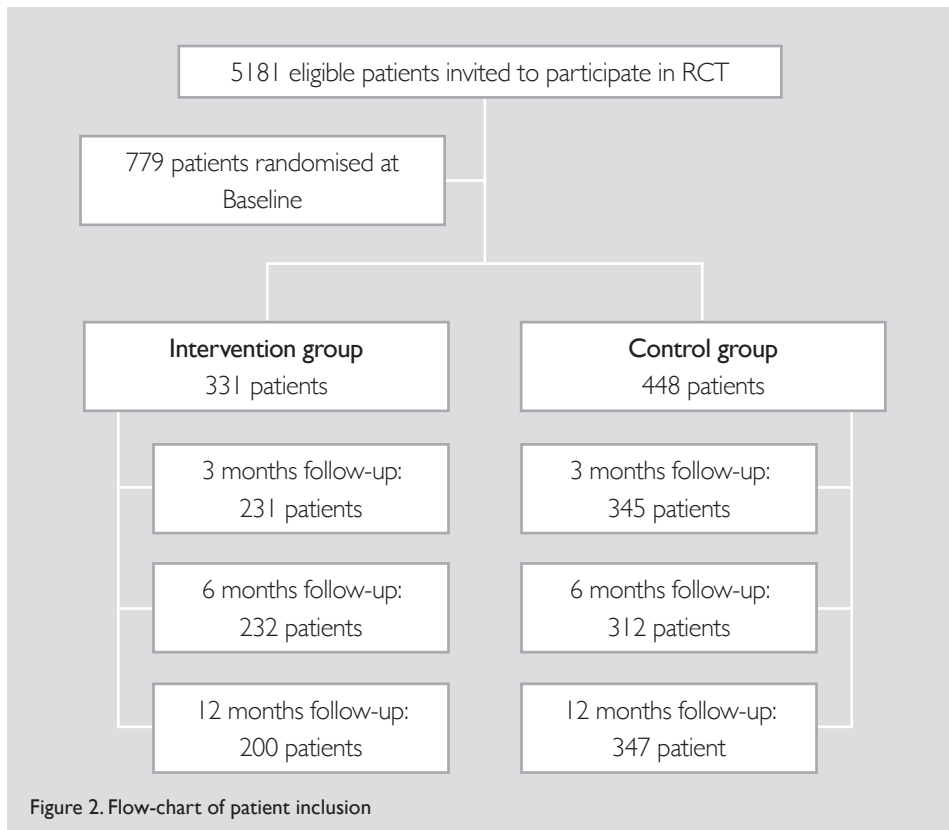
### Patient involvement

The Dutch patient association for spinal disorders ("NVV De Wervelkolom") was involved in the design of this study and provided advice about the content of the intervention.

## RESULTS

### Participants

In total, 5181 eligible patients were invited to participate in this study. Of these patients, 779 (response rate of 15%) agreed to participate and were randomised to the intervention (n=331) and control (n=448) groups (Figure 2). Follow-up responses in the intervention group were 69.8% at 3 months follow-up, 70.1% at 6 months follow-up, and 60.4% at 12 months follow-up. The follow-up responses in the control group were higher than in the intervention group at 3 months follow-up (77%) and 12 months follow-up (77.5%). At 6 months follow up the responses in the control group were similar to those in the intervention group (69.6%).



At baseline, characteristics of patients in the intervention group were similar to those in the control group. Table 1 shows that a high percentage of participants were female, 60% (intervention group) and 57% (control group) had a high educational level, and over half of the participants were employed. They performed about 3 hours of physical activity per week. Table 1 also shows the baseline scores on the BBQ, RDQ-24, absenteeism, and quality of life for both groups. At baseline, there was a lower absenteeism rate in the intervention group compared to the control group.

Table 1. Baseline characteristics of patients

	Intervention (n=331)	Control (n=448)
<b>Mean age (SD)</b>	55.7 (13.9) (n=320)	56.6 (14.6) (n=439)
<b>Female gender (%)</b>	188 (59) (n=320)	252 (57) (n=439)
<b>Back pain at baseline (%)</b>	201 (63) (n=320)	275 (63) (n=439)
<b>Nationality (%)</b>	(n=320)	(n=439)
- Dutch	298 (93)	409 (93)
- Western countries immigrant	16 (5)	23 (5)
- Non-western countries immigrant	6 (2)	7 (2)
<b>Educational level (%)</b>	(n=320)	(n=439)
- None (never attended school):	9 (3)	12 (3)
- Lower	25 (8)	42 (10)
- Vocational	92 (29)	134 (30)
- Higher	194 (60)	251 (57)
<b>Activity minutes/week (SD)</b>	161 (109) (n=196)	166 (104) (n=254)
<b>Employed (paid work) (%)</b>	183 (57) (n=320)	232 (53) (n=439)
<b>Physically demanding work (%)</b>	88 (28) (n=320)	121 (28) (n=439)
<b>Back pain beliefs</b> (measured by BBQ, range 9-45; higher score means more positive back pain beliefs)	24.7 (6.0) (n=295)	24.8 (6.2) (n=394)
<b>Disability</b> (measured by RDQ-24, range 0-24; higher score means more disability)	5.1 (4.7) (n=317)	5.9 (5.3) (n=434)
<b>Absenteeism</b> (self-reported number of days over past three months)	2.2 (7.0) (n=187)	4.0 (13.2) (n=246)
<b>Quality of life</b> (utility score measured by EQ-5D; range 0 to 1; higher score means better quality of life)	0.79 (0.22) (n=331)	0.75 (0.25) (n=448)

### Intention-to-treat effectiveness analysis

Table 2 shows the mean scores on the BBQ, RDQ-24, absenteeism, and quality of life of the intervention group compared to the control group. Table 3 shows the results of the intention-to-treat analysis. There were no significant differences in back pain beliefs, disability and absenteeism between groups at any time point. The interaction term with gender was significant for disability, showing that the effect for males was larger than that for females.

Table 2. Mean scores (SD) on BBQ, RDQ-24, EQ-5D and absenteeism

	Mean (SD) back pain beliefs <i>(measured by BBQ, range 9-45; higher score means more positive back pain beliefs)</i>		
	3 months follow-up	6 months follow-up	12 months follow-up
Intervention group	24.4 (5.8)	24.0 (5.9)	24.1 (5.8)
Control group	24.9 (6.2)	24.6 (6.0)	24.1 (6.3)
	Mean (SD) disability <i>(measured by RDQ-24, range 0-24; higher score means more disability)</i>		
	3 months follow-up	6 months follow-up	12 months follow-up
Intervention group	4.4 (4.7)	3.9 (4.3)	3.9 (4.3)
Control group	5.2 (5.1)	4.8 (4.8)	4.5 (4.7)
	Mean (SD) absenteeism <i>(self-reported number of days over past three months)</i>		
	3 months follow-up	6 months follow-up	12 months follow-up
Intervention group	1.2 (6.5)	0.9 (4.8)	0.7 (2.7)
Control group	2.6 (9.8)	0.7 (4.1)	0.7 (4.4)
	Mean (SD) quality of life <i>(utility score measured by EQ-5D; range 0 to 1; higher score means better quality of life)</i>		
	3 months follow-up	6 months follow-up	12 months follow-up
Intervention group	0.86 (0.21)	0.90 (0.16)	0.91 (0.15)
Control group	0.82 (0.24)	0.86 (0.21)	0.87 (0.19)

Table 3. Adjusted effects of the intervention based on intention-to-treat analyses

Outcome	Difference between intervention and control	95%-CI
Back beliefs <sup>1</sup>	-0.13	-0.90;0.65
Disability	M	0.93;1.37
	F	0.68;0.93
Absenteeism <sup>2,3</sup>	-0.94	0.69;1.29

1: Adjusted for educational level, physical activity, having back pain, being employed, comorbidity; 2: Adjusted for age, physical activity, having back pain; 3: Only for participants who were employed at baseline (intervention group n=183; control group n=232)

### Cost-effectiveness analysis

Intervention costs per patient were € 70. Direct costs for primary care and medication were lower in the intervention than in the control group, while direct costs for secondary and alternative care were higher in the intervention than in the control group. Indirect costs due to absenteeism, presenteeism, and unpaid productivity loss were lower in the intervention than in the control group. The crude total cost differences were not significant (Table 4).

**Table 4. Crude costs per cost category in euros (Δ).**

Cost category	Mean costs (SEM) in €		Δ Costs (95%-CI) in €
	Intervention	Control	
<b>Direct costs</b>			
Primary care	340 (26)	405 (26)	-65 (-134;-2)
Secondary care	478 (228)	229 (42)	249 (58;515)
Alternative care	742 (218)	322 (55)	421 (182;722)
Medication	29 (7)	44 (9)	-15 (-45;-0.70)
Intervention	70	0	70 (N/A)
<b>Indirect costs</b>			
Absenteeism	1034 (242)	1547 (235)	-513 (-941;-77)
Presenteeism	5735 (681)	6342 (537)	-607 (-2076;-831)
Unpaid productivity	4000 (887)	5047 (616)	-1047 (-1954;-203)
<b>Total societal costs</b>	<b>8444 (820)</b>	<b>8979 (619)</b>	<b>-535 (-2230;1172)</b>

There was no statistically significant difference in QALYs (adjusted for age, gender, educational level, nationality, employment, and physically demanding work) over the 12-month follow-up period between the control and intervention group (adjusted ΔE 0.04; 95%-CI 0.02;0.06). The intervention did not yield significant cost savings (adjusted for age, gender, educational level, nationality, employment, and physically demanding work ΔC € -748 per patient; 95%-CI € -2341;878). The ICER for QALYs was -18,353, which indicates that one QALY gained was associated with a societal cost saving of € 18,353. The majority (79%) of incremental cost-effectiveness pairs was located in the southeast quadrant of the cost-effectiveness plane (Figure 3), indicating that the intervention was on average more effective and less costly. The uncertainty around the cost-effectiveness estimate was large. Figure 4 shows that the intervention has probability of 0.88 of being cost-effective on a willingness-to-pay of €10,000 per QALY gained, increasing to a probability of 1.00 on a willingness-to-pay of € 80,000 per QALY gained.

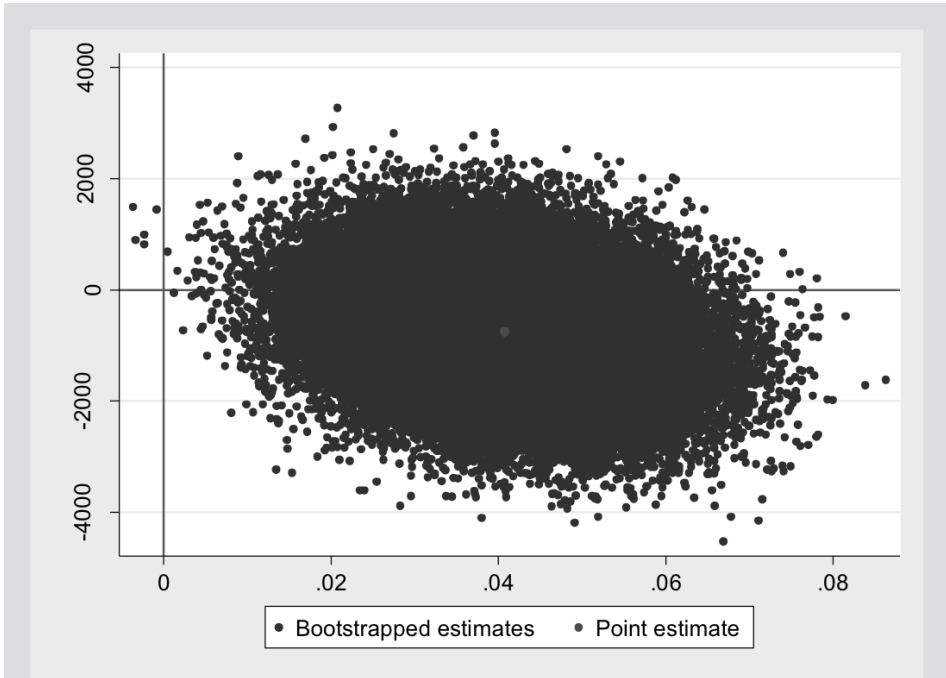


Figure 3. Cost-effectiveness plane for QALYs

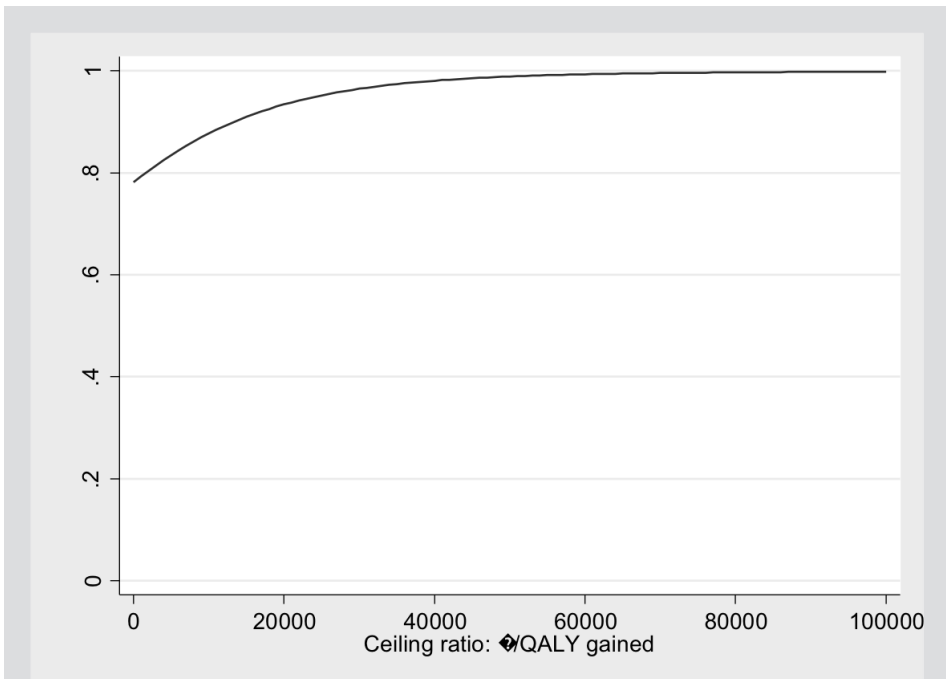


Figure 4. CEAC for QALYs

## DISCUSSION

This study evaluated whether a multifaceted eHealth strategy is effective and cost-effective compared to usual care in improving patients' back pain beliefs and quality of life, and in decreasing their disability and absenteeism. The study results show that the campaign was not effective on these outcomes. The probability of cost-effectiveness was high: 0.88 per QALY gained at a willingness-to-pay threshold of € 10.000, and increased to a maximum probability of 1 per QALY gained at a willingness-to-pay threshold of € 80.000.

A possible explanation for the lack of effectiveness might be that in this study, almost 40% of participants did not have back pain anymore at the start of the actual intervention (i.e. baseline moment). Patients who had visited their general practitioner or physiotherapist no longer than 3 months prior to recruitment could participate in this study. As a consequence, some patients may have agreed to participate while they had already recovered from their LBP at the start of the intervention. With the recruitment protocol used it was not possible to select only the chronic LBP cases. Therefore, the intervention may no longer have been necessary for the participants that did not have LBP at the start of the intervention, and for them effectiveness was not to be expected. The back beliefs of the study population were quite low at baseline compared to those of the Australian mass media campaign by which the current study was inspired. Mean BBQ scores in the Australian study were 26.5 at the start of the campaign and increased significantly to 29.7, while in the current study the BBQ scores were 24.7 and 24.8 in the intervention and control groups, respectively. This indicates that there was room for improvement in back pain beliefs in the current study.<sup>[39]</sup> Another study that assessed factors that were associated with beliefs and attitudes of elderly (mean age 69) also found low back pain beliefs scores (mean 23.7).<sup>[40]</sup> In the current study disability scores measured with the RDQ-24 showed low levels of disability, and absenteeism rates were also low. Quality of life scores were relatively high and similar between groups with no further improvement over time. It is arguable that the participating patients were in good health states from the start and gaining much improvement on these functional outcomes was not realistic. Process evaluations among participating patients and professionals alongside the present study showed that compliance with the intervention was very low. Most patients did not comply to the full e-health intervention: 31% of the participants had not used the campaign materials at all, and 42.9% had only used it once, and professionals almost never discussed the intervention with their patients. Probably most participants did not need the intervention to improve their functional ability, but improvement in back pain beliefs could have been possible had the compliance rates in this study have been higher.<sup>[20-21]</sup>

Self-management is recommended for the management of LBP, and healthcare professionals are advised to provide advice and information, tailored to needs and capabilities, to help

patients self-manage their LBP.<sup>[41]</sup> One possible way to help patients self-manage their LBP is through an eHealth strategy, but evidence regarding the most effective content and mode of delivery for self-management options is lacking.<sup>[42]</sup> eHealth is easy to deliver, safe, and usually inexpensive (e.g. in the current study, the intervention costs were less than € 70,- per patient), a recent systematic review on digital support intervention for LBP could not find significant beneficial effects of digital self-management interventions.<sup>[43]</sup> However, most of the participants in the included studies were Caucasian, highly educated, middle-aged females, meaning that the findings of the current study are comparable to similar studies. The results of the current study are in line with other studies that have attempted to improve patient outcomes and costs in LBP by using multifaceted strategies. A systematic review of the effectiveness of multifaceted strategies for guideline implementation in LBP and neck pain did not find that multifaceted strategies changed patient outcomes or costs of care.<sup>[44]</sup> However, the majority of the studies included in the review did not provide insight into the implementation process, raising the question whether the lack of effectiveness is caused by the failure of the theory (multifaceted strategy) or by failure of the implementation process, making it difficult to compare the current study to others. It is important to evaluate the implementation processes in order to truly understand the effectiveness of multifaceted strategies.

Another interesting thing to note is the fact that the costs for secondary care and alternative care are higher in the intervention group than in the control group. This is in line with a very similar recent implementation study for the management of LBP. In that study, patients in the intervention group had higher LBP-related costs for inpatient secondary care.<sup>[45]</sup> Studies within and outside the field of LBP research have shown similar results, where patients and participants in intervention groups show higher costs due to secondary care and/or alternative care.<sup>[46-50]</sup> The literature does not provide explanations for this fact. One explanation could lie, again, in the low compliance rate of patients in this study.<sup>[20]</sup> On the other hand, the use of alternative care could be seen as self-management, because patients decide what they want, when they want it, and how much they are willing to pay for it. It could very well be that patients try self-management through alternative care for a while, and then get referred to secondary care when and because self-management (through alternative care) did not work for them. It would be interesting to explore the reasons for the higher costs for secondary care further.

While the strategy evaluated in this study did not yield (cost)effective results, it might still be worthwhile considering the possibilities of eHealth interventions from the perspective of outcomes that were not measured in this study but might have improved, for example actual self-management. A systematic review of randomised controlled trials that have assessed self-management education programmes for osteoarthritis found a mismatch between the aims of such programmes (education and advice about how to self-manage their condition



despite their pain and fears) and how the success of the programmes were assessed.<sup>[51]</sup> Many studies have measured health-related outcomes such as pain and function but have not specifically determined whether the programmes have improved participants' ability to self-manage. Outcomes such as knowledge about the condition and self-management skills may give more insight into the value of self-management education programmes and should be considered essential to measure in future studies evaluating these types of programmes. <sup>[51]</sup> Looking at the cost savings on absenteeism, presenteeism and unpaid productivity losses in the intervention group compared to the control group, future studies could also benefit from evaluating the effects and cost-effectiveness of eHealth strategies from employer's perspective.

### **Study limitations**

The findings of these study must be interpreted with caution. In this study, the loss-to-follow-up rate was higher for the intervention group (40%) compared to the control group (23%). A possible explanation could be that the strategy provided too much information and participants were contacted too often, making them less willing to comply with completion of the questionnaires over time. The high percentage of loss to follow up may have resulted in a loss of power and in attrition bias. Furthermore the majority of participants did not need or use the intervention, and had minimal disability and impaired quality of life at baseline impacting upon our ability to test the value of our intervention.

## **CONCLUSION**

Based on this study, a multifaceted eHealth strategy for patients who had presented to primary care (i.e. general practice and physiotherapy) with LBP was not effective or cost-effective in improving back pain beliefs, disability, absenteeism, or quality of life. The multifaceted eHealth strategy should be studied in a different population, i.e. a more mixed group of participants in terms of background (e.g. education, nationality), and participants with LBP and poorer health states at start of the intervention.

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