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# AOK Herzgesundheit digital: promoting and inhibiting factors of digital prevention interventions

The national care guideline on hypertension recommends regular physical activity for patients suffering from high blood pressure (Bundesärztekammer et al. 2023: 21). This raises the central question of which factors are responsible for the success of digital prevention interventions in positively influencing heart health. The following evaluation results of the 'AOK Herzgesundheit digital' pilot project are intended to help identify factors that have a positive effect on health behaviour, health literacy and self-/disease management and can promote or hinder the (long-term) use of such interventions.

AOK Herzgesundheit digital: Promoting and inhibiting factors of digital prevention interventions

**Background:** One-third of the German population suffers from high blood pressure. Digital interventions are particularly suitable for promoting a healthy lifestyle. The model project "AOK Herzgesundheit digital" (AOK Digital Heart Health) was initiated to support patients with hypertension.

**Methodology:** The aim of the study (with three survey waves) was to identify factors from the participants' perspective that promote or inhibit the (long-term) use of such interventions.

**Results:** The subjective self-/disease management, the general state of health and health literacy could be improved. In particular, the personal counseling proved to be beneficial and motivating. Technical and motivational barriers could be identified.

**Conclusion:** The results show that personal components can have a significant influence on the success of digital interventions.

Keywords:
app, digital, heart health, hypertension, physical activity, self-management

## Hintergrund

Im Jahr 2022 waren in Deutschland rund 30 % der Bevölkerung (29,14% Frauen, 30,82% Männer) von Bluthochdruck bzw. (arterieller) Hypertonie betroffen (WIdO 2024). Dieser hohe Anteil an Bluthochdruckerkrankten geht mit einem erhöhten Risiko für Folgeerkrankungen einher, zu denen bspw. Herz-Kreislauf-Erkrankungen, Schlaganfälle und Nierenschäden zählen (WIdO 2024). Im Jahr 2023 gingen die meisten Todesfälle (348.312) auf das Konto von Herz-Kreislauf-Erkrankungen (Statistisches Bundesamt 2024). Vor diesem Hintergrund sind präventive Interventionen zur Reduzierung des Bluthochdrucks von großer Relevanz. Insbesondere mHealth-Interventionen zur Förderung des Selbstmanagements bei Bluthochdruck (z. B. Mobiltelefone, Patientenüberwachungsgeräte, drahtlose Geräte) (Li et al. 2020: 2) eignen sich, um das Medikamentenmanagement und die Selbstwirksamkeit Betroffener zu verbessern. Zudem können mithilfe von digitalen Präventionsinterventionen (z. B. Gesundheits-Apps) ein gesunder Lebensstil gefördert, das Wissen über die Hypertonie verbessert (Israfil et al. 2022: 233; Li et al. 2020: 10) und gesundheitliche Verhaltensweisen positiv beeinflusst werden (Gray et al. 2022: S. 15). In Bezug auf gesundheitliche Verhaltensweisen ist anzumerken, dass Bewegungsmangel zu den häufigsten Risikofaktoren für kardiovaskuläre Erkrankungen zählt (Bundesärztekammer et al. 2023: 7).

## Methodology

### AOK Herzgesundheit digital intervention

>> As part of the 'AOK Herzgesundheit digital' project, patients aged between 20 and 75 who suffer from hypertension-associated secondary diseases according to ICD I10-I10.91 were given the opportunity to participate. The project comprised three components: 1) the 'myHeartHealth' health app, 2) a blood pressure monitor (Tel-O-Graph) and 3) telephone counselling by a sports scientist. The main aim of the programme was to lower the participants' blood pressure by promoting their physical activity, among other things. At the start of the programme, a telephone call was made to a sports scientist in which the current fitness level, exercise preferences and barriers were identified. Based on this, a personalised training plan containing both strength and endurance exercises was created and stored in the app. The app contained a selection of videos that included various strength exercises with and without equipment (e.g. dumbbells, balls) for different fitness levels. The range of difficulty was varied and included activities such as getting out of a sitting position or performing a one-armed push-up. There was also the option to take part in an endurance programme in which participants could perform various activities (e.g. cycling, endurance running, tempo running, walking, strolling). They wore a chest strap, which was used to transmit the heart rate data to the app. The app also included a 'digital coach' who gave acoustic instructions during training to ensure an optimal heart rate range. In addition to the heart rate measurement, the app documented other data (e.g. altitude metres, speed, calories burned, distance covered). With regard to individual progress, in addition to the first telephone consultation, further telephone calls were made after two, six and ten weeks in order to customise the training plan. Participants had the opportunity to measure their blood pressure twice a day using a measuring device provided. The components were provided for a planned period of 52 weeks (start: 1 August 2021), which was extended to 183 weeks (end: 31 January 2025) due to the Covid-19 pandemic. A total of 20 medical practices took part in the pilot project, with the help of which and additional AOK events 223 participants (dropouts: 29) were enrolled in the programme.

## Study design and sample

The evaluation was carried out from the perspective of the participants.

The self-assessments were collected using questionnaires via the online tool 'SoSci Survey'. The online survey was conducted anonymously and in strict compliance with data protection regu-

lations. After a pre-test, the participants were provided with an online link 1) after 5 weeks, 2) after 10 weeks and 3) after 20 weeks of programme participation. The response rates were exceptionally high at 25.7% to 37.5% (wave 1: 169 links and 62 participants, wave 2: 160 links and 60 participants, wave 3: 144 links and 37 participants). The descriptive analysis was carried out using SPSS 29. At 56.0%, the proportion of male respondents was slightly higher than the proportion of female respondents (42.8% female, 0.6% diverse, 0.6% not specified). Most respondents were between 50 and 59 years old (22.6% 50 to 54 years, 23.9% 55 to 59 years, 15.1% 60 to 64 years, 18.2% 65 to 69 years). Outside this age group, 3.1% were aged 25 to 29, 1.9% 35 to 39, 5.0% 40 to 44, 5.7% 45 to 49 and 4.4% 70 to 75. The vast majority were married (78.0%) or living in a partnership. 10.1% of the respondents were single, 8.8% were divorced and 5% were widowed. The socio-cultural background is characterised by an above-average educational background, with 27.7% having completed secondary school, 22.0% a university degree and 19.5% a university entrance qualification or A-levels. It should also be noted that the majority of respondents have many years of experience with the disease, with 28.9% having been diagnosed more than 10 years ago.

## Results

### a.) General findings

The project achieved a very high level of satisfaction overall. The majority of respondents would like to continue participating in the programme after the end of the project and would recommend the project to others (wave 1: 75.8%, wave 2: 81.4%, wave 3: 94.6%). Satisfaction increases with the length of participation in the programme. This suggests an increased perception of added value. 69.5% (wave 1) to 81.0% (wave 3) rated the programme overall as 'rather useful' to 'very useful'.

### b.) Findings on programme participation

The majority of enrolments (35.5%) were made on the recommendation of a doctor. Three quarters of the participants (wave 1: 77.4%, wave 2: 73.3%, wave 3: 75.7%) had no experience with health apps before participating in the programme and the majority had not been recommended apps to improve their health behaviour by their doctor. Only 31.1% of male and 37.9% of female participants (mainly aged 55 to 64) had used a health app before taking part in the programme or on the recommendation of their doctor. People who did not use a health app tended to have a lower level of education (e.g. lower secondary school leaving certificate). Surprisingly, only female respondents were recommended health apps according to their own statements, although this recommendation was usually followed by the people concerned.

### c.) Findings with regard to the programme elements

The telephone counselling and the sending of the blood pressure monitor proved to be by far the most important perceived support (Fig. 1). More than half of the participants (59.1%), regardless of gender, found the telephone counselling to be very motivating. With regard to the app, it should be noted that older people aged 60 and over in particular found it less helpful than younger participants. The blood pressure monitor was used most frequently, followed by the MyHeartHealth app, which was used several times a week. The documentation function was the most frequently used function of the app (35.4%), which was perceived as very motivating by 30.2%. The intensity of use of the app decreased over the course of the project. These findings are in line with other scientific findings (Lee et al. 2018: 4; Rasche et al. 2018: 5), which show that the use of apps decreases significantly over time. No gender or educational differences were observed with regard to app use. The personal component (telephone counselling) can be seen as a success component of the project, as has also been demonstrated in other interventions (Cheah et al. 2024; Choo et al. 2023; Wong et al. 2023).

### d.) Findings with regard to health-related improvements

An improvement was observed in the area of subjective self-/disease management, particularly with regard to knowledge about one's own clinical picture. In addition, participants reported an increase in stamina, general health and quality of life. Around 15% and 16% of participants stated that their stamina and state of health had improved. Self-management has also improved. The comparison between waves 1 and 2 (as well as 3) shows that self-/disease management, in particular knowledge about one's own clinical picture, has improved. While the improvement in endurance and fitness was perceived as the most important benefit by both genders, for women it was also the regular intake of medication and the increase in strength. It was also found that the perceived benefit increased with increasing duration of programme participation. The increased health literacy also had a positive impact on attitudes towards the disease. This is because the increased health

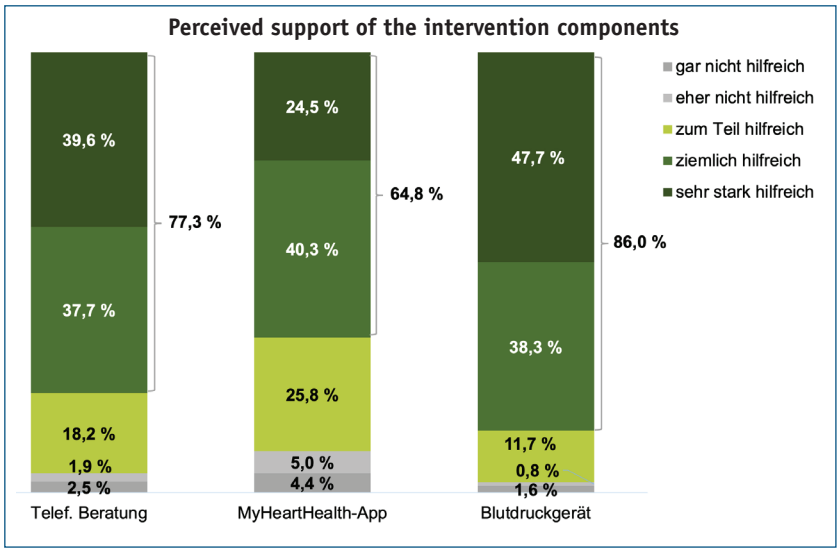



*Fig. 1:* Perceived support of the intervention components (in per cent). Own representation.

literacy proved to be particularly beneficial for the recognition of personal responsibility with regard to individual health behaviour, the identification of potentially harmful habits and the promotion of a positive attitude towards the disease (Fig. 2).

**e.) Findings with regard to hindering and favourable factors**

It was found that the participants found the telephone counselling to be particularly supportive. An open question about supportive factors (Table 1) clearly shows that personal counselling and support were mentioned most frequently. Problems and difficulties in operating the MyHeartHealth app or the chest strap in particular were cited as barriers. These technical barriers posed a particular challenge for older people. At the behavioural level, lack of time (54.1%), physical limitations (24.6%), listlessness (13.2%) and lack of motivation (13.2%) were identified as the biggest barriers, which 'tend to apply' and 'fully apply'. The training sessions themselves were regarded as easy by a third of the participants and did not represent a barrier.

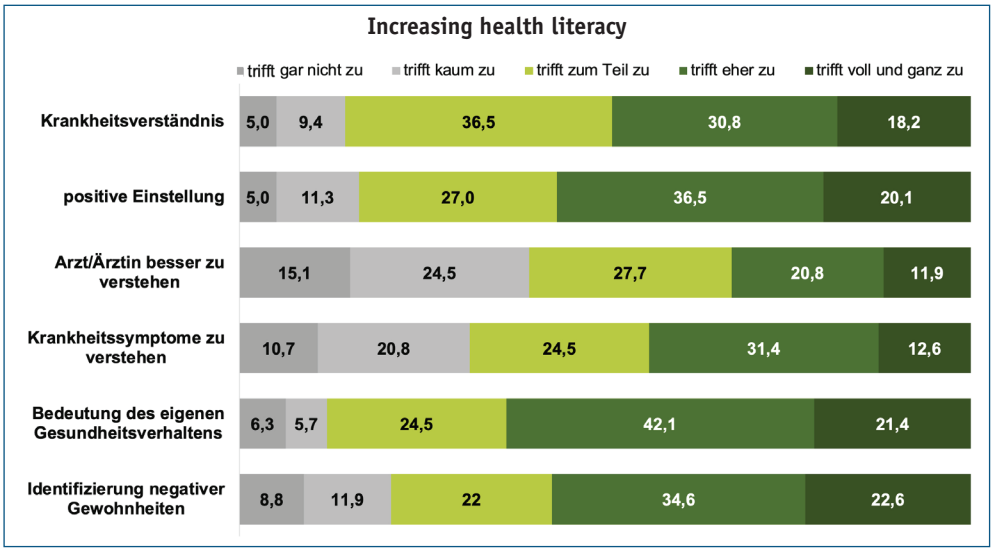



***Fig. 2:*** Increase in health literacy (in per cent). Own illustration.

## Limitation

The following limitations must be taken into account when interpreting the results. Due to the extension of the project, there were different survey and start times for the participants, which could have been influenced by external factors (e.g. Covid-19 pandemic, lockdown). These factors could have influenced the behaviour of the participants and thus led to distortions in the data collected. The app was optimised during the survey period. The improvements could have influenced the behaviour of the users and thus the survey results. The small sample size and the decrease in the samples of the individual waves limit the significance of the temporal trends. The changing sample size within the waves and the composition of the sample could have been influenced by changes in the recruitment of participants during the study. Despite all these limitations, the study provides important impetus for future digital interventions for heart health.

## Conclusion and recommendations for action

Overall, current studies (Rowland et al. 2024) confirm that digital health interventions can make an effective contribution to improving cardiorespiratory fitness. For the acceptance of such interventions, however, it is necessary that doctors are increasingly informed about the potential of behaviour-supporting apps. This is because doctors play a key role in the acceptance of and trust in health apps (Jiang/Lau 2023: 4). In line with previous research (Cheah et al. 2024; Choo et al. 2023; Wong et al. 2023), interventions should always be hybrid in view of the positive feedback on telephone counselling. The personal component of motivation is important in such measures. Participants also expressed the desire to exchange ideas with others. An app community or the possibility of a low-threshold exchange via video conference could help to increase motivation and use of the app itself. Participants should also be taught methods for strengthening self-motivation, building habits and preventing relapse. Psychological aspects (reducing fears, feelings of guilt, etc.) should be taken into account here, e.g. through short video sequences or existing content (from SHI organisations, e.g. YouTube channels). The app content should preferably be realised with and by the same age groups in order to ensure better identification with the target group.

In addition, the physical activities should be geared towards the needs of the participants and take into account other behavioural aspects (e.g. nutrition, stress management) in order to promote heart health holistically. This also includes reminders (e.g. optional push messages for taking medication or measuring blood pressure). Such push messages or gentle nudges and encouragement to make health-related behavioural changes are crucial to counteract listlessness and lack of motivation. Behavioural aspects in particular (e.g. tips for establishing healthy habits in everyday life) are components of success, while technical barriers through the involvement of potential (older) participants in the development of such projects (e.g. app redesign, video instructions) are crucial. A high level of digital health literacy can be seen as a key factor in realising the potential of the digital transformation of the healthcare system (cf. Dratva et al. 2024). For this reason, the measures to increase the digital health literacy of SHI providers required by law in accordance with Section 20k SGB V are of particular relevance in order to ensure the acceptance and positive influence of digital prevention interventions. People from lower educational and social backgrounds have a particularly high need, as they have a

particularly low level of digital health literacy (Schaeffer et al. 2021) and, due to their age, have the greatest potential for prevention. <<

| Obstructive and supportive factors Obstructive factors Supportive factors | | |
|---|---|---|
| | **Hinderliche Faktoren** | **Unterstützende Faktoren** |
| Erste Nennung | • (technische) Probleme mit der App und/oder dem Blutdruckgerät (49)<br>• Brustgurt (5)<br>• *Programm*: Einstieg, verlegtes Startdatum, Dauer bis zum Start bzw. zur Gerätezusendung (5) | • (telefonische) Beratung, Begleitung und Erläuterung (46)<br>• *Daten (Messung/Geräte)*: Messung, Überwachung, Kontrolle, Dokumentation, Verbesserung (22)<br>• Training: Sport/Übungen, Trainingsplan, Trainingsanleitung mit Videos (7) |
| Zweite Nennung | • (technische) Probleme mit der App und/oder den anderen Geräten (33)<br>• *Training*: Sport mit App-/Handy-Begleitung, Trainingsplan, unflexibel im Hinblick auf „eigenen" Sport (6)<br>• (eigene) Fitness/Ausdauer (3) | • *Daten (Messung/Geräte)*: Dokumentation, Auswertung, Verlauf, Kontrolle, (Wochen-)Berichte (20)<br>• (technische) Beratung, Begleitung und Erläuterung (17)<br>• *Training*: Vorschläge/Plan, Einführung in sportliche Betätigung, Ausdauertraining, (Lauf-)Übungen, einfache Übungen, Videos, Trainingserfolg zu Hause (15) |
| Dritte Nennung | • (technische) Probleme mit der App und/oder den anderen Geräten (14)<br>• *Training*: Gestaltung der Übungen, (geringe) Auswahl der Sportarten (4)<br>• nachlassende Motivation (2), Zeit(mangel) (2) | • (technische) Beratung, Begleitung und Erläuterung (17)<br>• *App an sich, App-Inhalte*: Anleitungen, Analyse (Laufen), Erinnerungen, kostenlos, Videos (9)<br>• *Training*: Bewegung, Übungen, Plan, Aufbau, Steigerung, Cardiotraining (9) |

***Tab. 1:*** Hindering and supporting factors (categorised open answers and number of mentions). Own representation.

## Literature


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## Author statement

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## Ctation

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