

# Participant satisfaction with a comprehensive lifestyle counselling Program for health promotion, disease prevention and patient education

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## Abstract

**Objectives:** To overcome challenges in the development and implementation of the lifestyle counselling program IHM (Individual Health Management) in order to enhance medical quality for prevention and rehabilitation.

**Methods:** Three paper-based questionnaire surveys have been conducted in a time period of 18 months among 286 participants in the lifestyle intervention program IHM, executed in Germany in six Bavarian health resorts and the Competence Center for Complementary Medicine and Naturopathy (CoCoNat) of the Technical University Munich. Descriptive statistics was carried out to identify and evaluate factors influencing the quality and outcome of lifestyle intervention measures.

**Results:** Most of the participants (>70%) were satisfied with the IHM whereby males expressed a higher level of satisfaction with the program than females. Additionally, users with a high degree of healthiness gave a more positive feedback (69%) than those with a high level of morbidity (58%). Age did not correlate with user satisfaction. In contrast willingness of cost sharing was highly linked to younger people and those with good state of health.

**Conclusion:** Up to now there are no comparable comprehensive programs of patient reported outcomes (PROs) and quantified-self in prevention and rehabilitation. Therefore the here presented survey on participant satisfaction in the lifestyle intervention program IHM is trendsetting and must be seen as part of the process of quality management in such programs. Our IHM program combines digital recording and analysis of PROs with personal lifestyle counseling. Future surveys should offer the possibility to distinguish between these two parts of the IHM.

**Abbreviations:** IHM: Individual Health Management; PRO: patient reported outcome; CoCoNat: Competence Centre of Complementary Medicine and Naturopathy; TUM: Technical University of Munich

## Introduction

Increasing prevalence of obesity and stress leads to the development of related disorders like type 2 diabetes mellitus and cardiovascular diseases, which have become a big issue for medical care and health systems. Both conditions could be prevented by life style intervention programs [1,2] which are based on the concepts of either 'life counseling' where participants are trained and supervised by coaches [3] or 'quantifying self' where participants use measuring devices to periodically capture their single body conditions [4]. However, comprehensive programs combining both concepts are largely missing.

In the last ten years, the Competence Centre of Complementary Medicine and Naturopathy (CoCoNat) of the Technical University of Munich (TUM), has been generating an Individual Health Management (IHM) program that enables the individual to optimize his or her own so called physiological basic functions as well as psychosocial and cognitive basic competences during daily life combining 'life counseling' with 'personal coaching' [5].

The IHM program is based on empirical findings of stress management, self-help techniques and behavioral change. It has been designed as a 'blended learning' program, which means the mixing and linking of modern e-health technologies with traditional personally attended lessons or counselling [6].

IHM was designed to promote behavior changes in both healthy and ill people, aiming to enhance their individual responsibility, self-determination and healthy literacy [5].

IHM is structured into 4 phases - a 'screening program', an 'introduction program', an 'everyday program' (3 months) and a 'maintenance program' (9 months) - and the entire lifestyle intervention program takes about 12 months. The 4 phases have

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**Key words:** Individual Health Management (IHM), patient reported outcome (PRO), e-health, life style intervention, user satisfaction

**Received:** April 13, 2019; **Accepted:** April 22, 2019; **Published:** April 25, 2019

different intentions. While the screening and introduction phases target to bolster the participant's self-efficacy and thereby to enable her or his ability to change risk behaviors, the everyday program aims to determine lifestyle goals and to tailor the program to the participant. Finally regular appointments during the maintenance program shall remind the participants of their goals and provide detailed advice on strategies aimed at avoiding relapses.

IHM was introduced in seven Bavarian health resorts as lifestyle intervention program in order to advance medical quality in the spas. For the purpose of improvement of previously identified weak points in the program, adaption and implementation of the conception of IHM was evaluated by 286 participants in a time frame of 18 months.

Three standardized paper-based questionnaires were designed by the CoCoNat according to the special aspects of each phase of IHM (Tables 1-3) and handed out to the participants directly after each phase (Table 4). Important subjects of the survey were usability and satisfaction with the e-health portal VITERIO® (www.viterio.de) which is an inherent part of IHM and guidance for lifestyle changes given to the participants in electronic form through VITERIO® as well as the quality of the personal support by the on-site health coaches.

Besides gaining information of participant satisfaction, the survey was conducted to obtain valuable information on possible improvements of IHM. As IHM is unique in its way to combine digital recording and analysis of PROs with personal lifestyle counseling, quality management measures as described in the here presented

**Table 1.** Items of questionnaire 1 (translated from German into English) and results

Nr.	Question	Possible Answers	Result % (excl. Nr 8)
1	How would you estimate your actual health state?	- Excellent / very good - Good - Poor / Bad	10.3 57.3 32.4
2	How did you find the handling of PIN, password and activation key? (more than one answer is possible)	- Comprehensible - Easily operated - Had problems - Could not handle it	64.7 56.6 10.1 0.7
3	How was your first impression of the e-health portal VITERIO® (www.viterio.de)? (more than one answer is possible)	- Clearly arranged - Informative - Appealing - Confusing - Hardly comprehensible	40.9 60.5 45.5 15.4 1.0
4	How was the handling of the website? (more than one answer is possible)	- Good menu navigation - Clearly structured - Runs trouble-free - Reacts too slowly - Too confusing	43.2 54.0 33.3 3.9 13.0
5	How did you cope with the determination of your proper health data? (more than one answer is possible)	- Unproblematic - Had the data already at the fore - Was unsecure with the measurement - Was not able to measure by myself	70.6 21.3 15.7 4.5
6	How is your impression about the utilities in the starter kit (ribbon, step counter, mental state scale)? (more than one answer is possible)	- Helpful - Encouraging to participate - Did use them often - Essential	67.1 60.1 27.6 5.2
7	How did you experience health check 1? (more than one answer is possible)	- expenditure of time was acceptable - too long - did perform only partially - did not perform at all	89.5 7.3 1.4 2.1
8	How much time did you spend for processing the questionnaires of health check 1?	Time in minutes: _____	Mean 19.3 SD 10.0 Median 17.7 Min 2 Max 60
9	How did you find the results of your personal health state in the Health Report? (more than one answer is possible)	- As expected - Surprising - Misjudged myself being healthier - Misjudged myself having more health risks - Does not make sense to me	46.9 31.1 25.9 10.5 2.8
10	What was your personal impression of the Health Report? (more than one answer is possible)	- Insightful - Comprehensible - Hardly comprehensible - Too extensive - Not helpful	57.0 69.9 2.1 2.8 1.0
11	Do you have concerns about privacy when entering your personal health data into the e-health portal?	- Not at all - Minor concerns - Serious concerns	70.2 28.1 1.8
12	Altogether, how content have you been with the IHM program?	- very content - Rather content - Rather discontent - Very discontent	59.7 38.9 1.4 0
Item 13: What did you like most? Item 14: What did you dislike? Item 15: Do you have any suggestions for improvement?			

**Table 2.** Items of questionnaire 2 (translated from German into English) and results

Nr.	Question	Possible Answers	Result %
1	How would you estimate your actual health state?	- Excellent / very good - Good - Poor / Bad	34.0 56.4 9.6
2	Did the health seminars help you to implement the IHM program? (more than one answer is possible)	- Have learned a lot / was very useful - Helpful - Not much novelty - Too long / extensive	80.3 51.8 5.2 2.6
3	How did you experience the time-mood-analysis? (more than one answer is possible)	- Insightful - Easily manageable - Did handle it only partially - Too extensive in the every-day-routine	46.1 29.0 26.9 37.3
4	How did you experience health check 2 and the report on risk and protective factors? (more than one answer is possible)	- Expenditure of time acceptable - Too long - Did handle it only partially - Did not do it	83.4 10.4 6.7 2.1
5	How did you find the report on risk and protective factors and the individual results? (more than one answer is possible)	- Insightful - Comprehensible - Hardly comprehensible - Too extensive - Not helpful	58.0 69.4 2.1 4.1 1.6
6	How did you get along with the traffic light chart?	- Very good - Predominantly good - Partially good - Not at all / needed explanation	49.0 38.0 12.5 0.5
7	How did you get along with the training packages?	- Very good - Predominantly good - Partially good - Not at all / needed explanation	37.4 40.5 20.0 2.1
8	How helpful did you find the Info@zepte? (more than one answer is possible)	- Very good - Informative - Clearly arranged - Hardly useful	42.0 73.1 29.5 6.2
9	How did you find the recommendations for lifestyle intervention? (more than one answer is possible)	- Very good - Well tailored to my situation - Motivating to change my lifestyle - Manageable in every-day-routine - Hardly workable - Too superficial	29.5 29.0 57.5 38.9 20.7 2.1
10	How did you find the weekly after-work seminars? (more than one answer is possible)	- Have learned a lot / was very useful - Helpful - Not much novelty - Too often / extensive	77.7 66.3 3.1 6.2
11	What kind of experience did you make with the intense training week? (more than one answer is possible)	- Very interesting experience - Not very useful - Could not implement it - Did not want to participate	38.9 7.3 21.2 12.4
12	Do you feel that the IHM program supports you in the implementation of lifestyle modification?	- Yes, a lot - Yes, partially - Not so much - can't tell yet	56.5 36.1 3.1 4.2
13	Altogether, how content have you been with the IHM program?	- very content - Rather content - Rather discontent - Very discontent	67.4 30.0 2.1 0.5

Item 14: What did you like most? Item 15: What did you dislike? Item 16: Do you have any suggestions for improvement?

project are an essential tool in the development of lifestyle intervention programs.

## Methods

### Questionnaires

Three standardized paper-based questionnaires (Tables 1-3) have been developed by the Competence Center for Complementary Medicine and Naturopathy (CoCoNat) of the TUM. The questionnaires consist of 14-16-item divided into two sections: 11-13 closed-ended questions using 3-6-point response options and 3 semi-structured qualitative interview questions aiming to evaluate detailed

reasons what individuals liked or disliked. The participants could give recommendations how to improve IHM and were encouraged to freely express their reservations and approval of the program. For those questions where more than one answer could be ticked, the sum of all given answers was more than 100%. All questionnaires contain items on sociodemographic information (gender and age) at the very beginning.

Each questionnaire was designed to specifically address problems or concerns with the respective phase of the IHM lifestyle intervention program. The questionnaires were handed out by the IHM team at the end of phases 2, 3 and 4 (Table 4) during group meetings (health

**Table 3.** Items of questionnaire 3 (translated from German into English) and results

Nr.	Question	Possible Answers	Result %
1	How would you estimate your actual health state?	- Excellent / very good - Good - Poor / Bad	43.8 51.0 5.2
2	How did you find the refresher-seminars in the previous months? (more than one answer is possible)	- Have learned a lot / was very useful - Helpful and motivating - Should take place more often - Not much novelty - Too often / extensive	63.9 72.2 38.0 7.0 0.6
3	How often in the last 6-9- months did you record your health data (e.g. body weight) in the e-health portal VITERIO®?	- Daily - Weekly - Occasionally - In the end not any more	15.2 41.8 30.4 12.7
4	How often in the last 6-9- months did you use the e-health portal VITERIO® in order to obtain instructions on how to improve your lifestyle?	- Weekly - Monthly - Occasionally - Not at all	26.3 21.2 44.2 8.3
5	How did you find mentoring by the health coaches in the last 6-9 months (telephone, email)?	- Spot-on - Too often - Too little	83.7 0 16.3
6	What did you like most regarding the support by the health coaches? (more than one answer is possible)	- Very motivating - Have obtained novel information - Support regarding questions on lifestyle - Personal contact - Nothing	65.2 72.8 49.4 49.4 1.9
7	What did you dislike most regarding the support by the health coaches? (more than one answer is possible)	- Too demanding - Not enough information - Support regarding VITERIO® - Too unspecific regarding my personal needs - Nothing	1.3 2.5 7.0 7.0 74.1
8	How would you assess the implementation of the new lifestyle in your every-day-routine? (more than one answer is possible)	- Get along very well - Has become naturally - I have to remind myself every day - Has decreased lately - Returned to my old lifestyle	50.6 31.0 43.7 21.5 3.2
9	Do you think you will maintain the new lifestyle in future?	- Yes, sure - Rather yes - Rather no - No, can't make it	43.7 53.8 2.5 0
10	Altogether, how content have you been with the IHM program?	- very content - Rather content - Rather discontent - Very discontent	58.3 41.0 0.6 0
11	Would you recommend the IHM program to your friends and family?	- Yes, unconditionally - Yes, with minor restrictions - Rather not - No, absolutely not	72.6 26.8 0.6 0

Item 12: What did you like most? Item 13: What did you dislike? Item 14: Do you have any suggestions for improvement?

seminars or refresher days) and feedback of the participants was optional.

### Sample description

The first questionnaire was distributed among 286 persons who participated in the IHM program conducted in Germany in six Bavarian health resorts (Bad Kötzing, Bad Wörishöfen, Bad Tölz, Bad Griesbach, Treuchtlingen, Bad Alexandersbad) and the CoCoNat of the TU Munich in the time period between January 2015 and June 2016.

For the second survey 193 questionnaires could be analyzed and for the third survey, 158 questionnaires were retrieved.

### Descriptive analysis

All captured data were analyzed descriptively by appropriate statistical parameters: absolute and relative frequencies for categorical data and arithmetic means, medians, standard deviations for numerical data. In accordance with the given pilot study, no statistical tests were performed. IBM SPSS statistics (version 22) was used for all statistical analysis.

## Results

### Analysis of the first questionnaire

The first questionnaire (Table 1) addresses the initial two phases (“screening” and “introduction”) of IHM, where psycho-physiological and behavioral data are retrieved and individual risks (overweight, hypertension, diabetes, and burnout) are identified. The participants shall be motivated to change specific risks and the success of behavioral change shall be enhanced by teaching a healthy lifestyle.

The sample (286 participants) consists of 73.5% women and most of the participants had an age between 40 and 60 years. 10% of the participants assessed their proper health state as excellent or very good, 57% as good and 32% as poor or bad.

During the screening program the first entry into the e-health portal VITERIO® is an important step for each participant. Therefore three items (No. 2-4) of the questionnaire target directly this part of IHM [7]. While 65% of the participants evaluated the access to VITERIO®

**Table 4.** Program Phases and Time points of Surveys

<b>Phase 1: Screening Program</b>	
<ul style="list-style-type: none"> <li><b>Health Day 1:</b> My life-satisfaction and risk perception</li> </ul>	
<b>Phase 2: Introductory Program</b>	
<ul style="list-style-type: none"> <li><b>Health Day 2:</b> My personal position My check-up(initial examination)</li> <li><b>Health Day 3:</b> My training packages (see Table 1) My consultation with the IHM Health Coach</li> </ul>	← Questionnaire 1 – Phases 1-2
<b>Phase 3: Daily-Routine Program</b>	
<ul style="list-style-type: none"> <li><b>10 After-Work Practical Workshops (weekly)</b></li> <li><b>1 Intensive Training Week (outpatient or inpatient)</b></li> </ul>	← Questionnaire 2 – Phase 3
<b>Phase 4: Maintenance Program</b>	
<ul style="list-style-type: none"> <li><b>Weekly Monitoring of my internet recordings (e.g. Body weight) through my IHM Health Coach</b> Personal feedback if necessary</li> <li><b>Health Day as quarterly refresher</b></li> <li><b>Repetition of the Check-Up (final examination) in the 13th month</b></li> </ul>	← Questionnaire 2 – Phase 3

IHM overview representing the 4 phases “screening”, “introduction”, “everyday” and “maintenance” programs. At the end of phases 2, 3 and 4 the questionnaires were handed out to the participants.

(use of PIN, password and activation code) as comprehensible and 57% as easily operated, about 10% experienced difficulties with the e-health portal. The first impression of the portal was described as “informative” (60%), “clearly arranged” (41%), and “appealing” (45%). However 15-16% experienced it as “confusing” or “hardly comprehensible”. Handling was described as “clearly structured” by 54% of the users; 43% acknowledged the menu navigation as good, and 33% expressed that the portal runs trouble-free; 4% of the users felt it was running too slow and 13% found it too confusing.

During the “screening phase” the user performs “Health Check 1” (HC1), in order to proof cardio-vascular and metabolic risks for hypertension, diabetes mellitus, overweight and stress related disorders. Quality of implementation of HC1 was addressed in four items (5-8) of questionnaire 1. As a result 71% of the participants perceived the determination of their proper health data as unproblematic, 20% felt insecure about it or could not determine the data on their own. 21% of the users had the required health data already to the fore. The majority of the interviewees rated the utilities in the starter kit as positive and only 5% found them unnecessary. Most of the participants estimated the expenditure of time for HC1 as acceptable (89%), 7% found it too long and about 3% did not or only partially perform HC1. Average time for answering all questions in HC1 was about 19 minutes with a wide spreading from 2 to 60 minutes.

VITERIO<sup>®</sup> creates a written Health Report in form of a ‘pdf file’ delineating personal risk and protection factors. In this context 47% of the users had expected the description of their health state as it was presented in the Health Report, 31% were surprised about the results, 26% misjudged themselves being healthier than they actually were according to the Health Report and 10% were expecting more health risks than they really had. For most of the users form and content of the Health Report were comprehensible (70%) and instructive (57%). Only a minority of the users found it unintelligible (2%) or too extensive (3%) (items 9 & 10). Interestingly, most of the participants did not have any concerns (70%) about entering their personal health data into the web-based portal (item11).

Altogether the majority of the interviewees in the first survey expressed themselves as being very (60%) or predominantly (39%) content with IHM; only single participants were less content (item12).

### Analysis of the second questionnaire

The third phase of IHM (everyday program) targets to determine personal lifestyle goals and to tailor the program individually. This is achieved by face-to-face or telemedicine counseling. The second questionnaire (Table 2) addresses problems that might occur in this phase of the program (first three months of IHM) including weekly after-work group meetings.

The sample of survey 2 (193 participants) differed only marginally of that of survey 1 concerning sex and age with 75.5% females and most of the participants (69.1%) aged 40-60 years.

Regarding the health state, 34% of the participants defined it as excellent or very good, 56% as good and 10% as not so good or bad. Thereby the perception of the proper health state improved significantly since the previous survey at the beginning of IHM.

The majority of the participants found the health days useful for the implementation of their personal lifestyle modifications. 80% reported that they have learned a lot and 52% felt that the instruction of the coaches were helpful (item 2).

To assess daily activities and associated moods a “time and mood analysis” protocol was developed. The protocol addresses the time spent on specific private or occupational activities (e.g., leisure time, eating, organising, meetings) as well as the associated mood, measured with visual analogue scale (VAS). Item 3 of questionnaire 2 addresses this point. In this context 46% of the users perceived the time and mood analysis as insightful and 29% as easily practicable. 27-39% did not or only in part perform the time and mood analysis.

Within “Health Check 2” (HC2) of IHM, the participants defines their personal position: What worries me? Which protective factors do I have? A systematic ascertainment of worldwide cardiovascular risks, stress factors, neuro-vegetative stress-reactions, addictive factors (tobacco, alcohol), physical and, psychosocial protective factors with regard to exercise and nutritional behavior, resistance, sleep, health competence and social competence, form the core set of HC2. 83% of all interviewees identified the time expenditure for HC2 as acceptable. About 10% did not or only partially perform HC2. For most of the users the report on individual risk and protective factors was informative (58%) and comprehensible (68%) (items 4 & 5).

Besides creating the dynamic Health Report reflecting the participant's status quo and change in risk- and protective factors, VITERIO<sup>®</sup> provides the results graphically in form of a circular chart in traffic light colors. Most of the users got along well (38%) or very well (49%), while 12% could not completely cope with this kind of illustration (item 6).

IHM offers schemes of training plans as well as tailored information on healthy lifestyle with the help of web based training packages (Table 5) and the tool "Info@zept" which is a short information brochure tailored to the needs of the participant. All these facilities provide the participant with comprehensive advice how to modify his or her lifestyle.

The training packages for lifestyle change were easily manageable for most of the users; only about 20% did not get on very well with them. The majority of the participants found the tool "Info@zept" helpful (42%) or informative (72%) (items 7 & 8). An important aspect is that 57% of the interviewees were motivated to improve their lifestyle by applying the given recommendations; 29% denoted them as very good and tailored to the individual situation (item 9). Weekly after-work seminars were perceived as useful or serviceable by the majority (78% and 66%) and only 10% expressed themselves critically in terms of lacking novelty and expenditure of time (item 10)






The question on the intense training week (item11) was answered by only 80% of the interviewees: Obviously this lifestyle modification measure could not be offered in all participating centers. 39% of the subjects who answered the questionnaire, found the intense training week interesting, 21% could not and 12% did not want to participate.

The question if IHM supports lifestyle modifications (item 12) and the question for overall satisfaction with IHM (item13) were answered positively by the majority of the participants. By trend, overall satisfaction increased during run-time of IHM.

### Analysis of the third questionnaire

The third questionnaire (Table 3) refers to the maintenance phase (phase 4) of IHM which takes 9 months and takes place immediately after the first three months (Table 4). Participants shall be reminded of their individual goals and detailed advice on strategies aimed at avoiding relapses is provided through quarterly refresher seminars and distant lifestyle counseling by email or telephone. The questionnaire is handed out to the participants at the end of phase 4 and thereby at the end of IHM; it contains some items that refer to the entire lifestyle modification program.

**Table 5.** Training Packages. The following training packages are tailored to the concept of the IHM and help to implement the basic concept:

Training Packages	
	<b>Self-observation:</b> time-mood-analysis, observation of results, behavior and attitude during daily life, self-perception
	<b>Exercise:</b> daily exercise, stamina exercise, strength, coordination
	<b>Nutrition:</b> 10 rules for daily healthy eating, rules for doing without, days with reductions, days of fasting, exchange of oil, dietary supplements
	<b>Stress Management:</b> identification and alteration of stress factors, muscle and respiratory relaxation, Qi-Gong, self-effectiveness exercises, well-being, rational emotional behavior, recognition of values and goals.
	<b>Remedies and natural substances:</b> Among other things, water and thermal application, plant and natural remedies, massages, acupressure

The sample of survey 3 (158 participants) differed only marginally of that of survey 1 and 2 concerning sex and age with 68.7% females and most of the participants (68.6%) aged 40-60 years.

As already indicated in the second survey, the health state of the participants increased further and thereby continuously throughout IHM. 44% defined their proper health state as excellent or very good, 51% as good and only a minority of 5% as poor or bad.

The majority of the interviewees described the refresher days as being helpful and motivating (72%) and useful (64%) and 38% of the participants would like to have more refresher days (item 2).

Most of the participants worked with the e-health portal VITERIO<sup>®</sup> on a daily (15%) or weekly (42%) base or at least occasionally (30%). Additionally tools, and guidance for a healthy lifestyle deposited in VITERIO<sup>®</sup> were used by almost all users except 8% (items 3 & 4).

Concerning coaching the majority was very content with the frequency (84%) of the seminars and other support services. As positive aspects "new information" (73%), "very motivating" (65%) and "very good support in queries" (49%) were mentioned. For about half of the users it was important to have personal contact to the coaches (items 5-7)

About half of the participants were easily able to implement the suggested lifestyle changes in every-day-routine; however 21% confessed that implementation decreased with time (item 8). Almost all interviewees are sure to be able to maintain the new lifestyle (98%) (item 9).

Most of the participants were very (58%) or at least predominantly (41%) content with IHM. In relation to the previous two surveys the fraction of users who were very content decreased marginally (item 10).

Almost all participants would recommend the IHM program to others (item 11).

### Discussion

Translation of lifestyle interventions persons into every-day routine for the maintenance of health or the management of obesity as well as the gain in quality of life for chronically diseased is challenging [8-10]. The main obstacle in this context is adherence of participants which is influenced by lacking family support, mediation of knowledge or motivation in general. Lifestyle intervention programs that combine methods like personal and distant lifestyle counselling by coaches with modern technologies like web-based e-health portals or quantified-self, report better outcomes [11,12]. These findings suggest that participant satisfaction has a high impact on the outcome of lifestyle intervention programs.

The comprehensive lifestyle intervention program IHM is unique in its kind as it is based on a blended learning concept combining digital recording and analysis of PROs with personal lifestyle counseling. Thereby preservation of health is the central aspect of our program [5] rather than improvement of disease symptoms, like in other lifestyle intervention programs that target only single indications (e.g. diabetes type II, cardiovascular diseases or over-weight) [13-17]. In order to maximize benefit and coverage of IHM and to develop it further, we have conducted a survey regarding participant satisfaction. Based on these insights, we discuss opportunities for refining our lifestyle intervention program.

One of the most important findings of this survey was that the majority of the participants estimated their actual health state better

at the end of IHM (after one year) than at the beginning. Interestingly males expressed themselves more content with IHM than women and the grade of satisfaction was independent from age. Interviewees with very good health state gave a better overall assessment than people with poor health.

Qualified counselling by specifically trained health coaches is one of the main aspects to positively influence the result of intervention programs. The RENEW trial has already demonstrated that regular telephone counselling has a positive impact on the outcome of lifestyle intervention studies [18]. Similarly 83.7% of the IHM participants were satisfied with frequency and quality of counselling by the health coaches which is even better compared to a survey performed with participants of the APHRODITE study, where 70% were satisfied with the guidance from their nurse practitioner [19]. Despite the fact that it is challenging to embed lifestyle modifications into every-day-routine, 95.5% of the IHM participants are sure to be able to maintain their healthy lifestyle in future. This is well in line with other results from our survey that indicate that 92.6% of the users feel that IHM supports the implementation of lifestyle modifications. The beneficial effect of personal and distant lifestyle counselling on the results of lifestyle intervention are concordantly reported by other groups [20,21].

The findings from this evaluation were encouraging overall in that almost all participants reported a high degree of satisfaction with IHM. Dissatisfaction was expressed by about 15% of the participants concerning the use of the e-Health portal VITERIO, the determination of the proper health data (20%), the time-mood-analysis (37%) and the intense training week (33%). In these aspects IHM can prospectively be improved by giving more specific support by the health coaches.

However, despite this dissatisfaction, only about 0.5% of the participants indicated that they were rather discontent. The vast majority would recommend the IHM program to others.

### Authorship and contributorship

BEB: drafting of the article and critical revision for important intellectual content; substantial contributions to analysis and interpretation of data; agreement to act as guarantor of the work

EW: substantial contributions to conception and design and acquisition of data, analysis and interpretation of data; critical revision of the manuscript for important intellectual content; final approval of the manuscript; agreement to act as guarantor of the work

KW: substantial contributions to acquisition of data, analysis and interpretation of data; critical revision of the manuscript for important intellectual content; final approval of the manuscript; agreement to act as guarantor of the work

DM: substantial contributions to conception and design, analysis and interpretation of data; critical revision for important intellectual content; critical revision of the manuscript for important intellectual content; final approval of the manuscript; agreement to act as guarantor of the work.

### Acknowledgments

We thank Mrs. Evelyn Bohnes, IHM-coach and Mrs. Yanjing Wellenhofer-Li, and Mr. Axel Eustachi, both assistant physicians, working at the health promotion center of CoCoNat, TUM, for all their valuable practical feedbacks.

Further we would like to thank the members of the local IHM campus teams at the following participating Bavarian spas for their

cooperation and support: Bad Kötzing, Bad Wörishöfen, Bad Tölz, Bad Griesbach, Treuchtlingen, and Bad Alexandersbad

Additionally, many thanks to all IHM-coaches of participating health resorts for the successful implementation and adaptation of the software. Last but not least, we appreciate the generous funds from Erich-Rothenfußer-Stiftung, Munich and all the personal engagements of both chairpersons.

### Conflict of interest statement / Competing interests

D. Melchart reports, that he has intellectual property on the software VITERIO®. However, the patent is pending, that means, it has been filed but not issued.

All of the co-authors declare, they did their work from the initial conception and planning to the present, without receiving any financial support from any third party.

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