

# Evaluation of M.O.B.I.L.I.S. light – a health and fitness program for overweight people

## Evaluation von M.O.B.I.L.I.S. light – ein Gesundheitssportprogramm für Übergewichtige

### Summary

- › **M.O.B.I.L.I.S. light**, a preventive health and fitness program based on the biopsychosocial model of health, intends to change exercise and diet behavior in slightly overweight people (BMI between 25 and 30).
- › **The present study** aims to evaluate short- and medium-term effects of the program on core goals associated with health-enhancing exercise as well as on health behavior and subjective health. M.O.B.I.L.I.S. light consists of ten exercise- and four diet-sessions (90 min/week). In a one-group repeated measures design, n=127 participants (from 15 company- and club-sports groups, 76.4 % female, 49.59 ± 9.79 years) completed a comprehensive set of questionnaires at the beginning and at the end of the intervention as well as three months later (follow-up). A part of the sample additionally did fitness tests at the first and second measurement.
- › **All in all, the health and fitness program** shows positive effects for most of the included variables (p<0.05) which can still be demonstrated in the follow-up-measure. Not only weight and BMI were reduced and diet- and exercise-behavior was changed, physical fitness and physical and psychological health improved as well. The absence of positive changes in some few variables may be due to the fact that these aspects couldn't be trained sufficiently during the short duration of the program.
- › **In spite of some methodological limitations**, a positive outcome of M.O.B.I.L.I.S. light can be presumed on grounds of the specific and precisely demonstrated effects.

### KEY WORDS:

Health promotion program, evaluation, behavior change, weight loss, M.O.B.I.L.I.S. light

### Introduction

Overweight and obesity are today defined as widespread disease. Obesity gradually develops from physical inactivity and poor diet, and should be viewed as a behavior-related morbidity risk (4, 16). Changing health-related practices and developing stable patterns of behavior is one of the most difficult challenges for many people. This may also be the case even if supported by appropriate interventions, e.g., by health programs (3, 5, 21).

### Zusammenfassung

- › **Das präventive**, an einem biopsychosozialen Modell der Gesundheit orientierte Gesundheitssportprogramm M.O.B.I.L.I.S. light zielt auf die Veränderung bewegungs- und ernährungsorientierter Verhaltensweisen bei leicht übergewichtigen Personen (BMI zwischen 25 und 30).
- › **Ziel der vorliegenden Studie** ist die detaillierte Evaluation der kurz- und mittelfristigen Effekte des Gesundheitsprogramms hinsichtlich gesundheitssportlicher Kernziele sowie dem damit verbundenen ernährungs- und bewegungsbezogenen Gesundheitsverhalten und der Gesundheit. Das Programm besteht aus zehn Bewegungs- und vier Ernährungseinheiten (90 Minuten/Woche). In einem Ein-Gruppen-Versuchsplan mit Messwiederholung wurden n = 127 Personen (aus 15 Vereins- und Betriebssportgruppen, 76,4 % weiblich, 49,59 ± 9,79 Jahre) mit Hilfe eines umfangreichen Fragebogens zu Beginn und am Ende der Intervention sowie in einer Follow-up-Messung (drei Monate später) untersucht. Ein Teil der Stichprobe absolvierte zum ersten und zweiten Messzeitpunkt zusätzlich sportmotorische Tests.
- › **Insgesamt zeigt das Gesundheitssportprogramm** für den Großteil der erfassten Variablen positive Effekte (p<0,05), die in den meisten Fällen auch noch für die Follow-up-Messung nachweisbar sind. So werden nicht nur Körpergewicht und BMI reduziert, nicht nur Ernährungs- und Bewegungsverhalten umgestellt, sondern es verbessern sich auch die körperliche Leistungsfähigkeit und die körperliche und psychische Gesundheit. Das Ausbleiben positiver Veränderungen in einigen wenigen Variablen kann als Hinweis interpretiert werden, dass diese Aspekte in der kurzen Laufzeit des Programms nicht in ausreichender Weise geschult werden konnten.
- › **Trotz einiger methodischer Einschränkungen** ist aufgrund der spezifischen und detailliert nachweisbaren Effekte eine positive Wirkung von M.O.B.I.L.I.S. light durchaus anzunehmen.

### SCHLÜSSELWÖRTER:

Gesundheitssportprogramm, Evaluation, Verhaltensänderung, Gewichtsreduktion, M.O.B.I.L.I.S. light

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Table 1

Core objectives associated with health-enhancing exercise in relation to the three measurements ( $t_1$  = start,  $t_2$  = end,  $t_3$  = follow-up); ANOVA: \*\*\*  $p < 0.001$ ; significant pairwise comparisons (PC): a =  $t_1$ - $t_2$ , b =  $t_2$ - $t_3$ , c =  $t_1$ - $t_3$ ; n = 66; †Low values represent a positive expression of the characteristic.

Core objectives in fitness and health	$t_1$ M ± SD	$t_2$ M ± SD	$t_3$ M ± SD	$\eta^2$	PC
<b>Strengthening of physical health resources</b>					
Motor fitness status	67.42 ± 14.42	71.84 ± 14.44	73.10 ± 15.24***	.23	a, c
Ability to relax	2.59 ± 0.65	3.72 ± 0.73	2.88 ± 0.69***	.60	a, b, c
<b>Reduction of risk factors</b>					
Weight (kg) <sup>†</sup>	84.94 ± 15.80	82.36 ± 15.81	82.27 ± 15.67***	.28	a, c
BMI (kg/m <sup>2</sup> ) <sup>†</sup>	29.58 ± 4.23	28.74 ± 4.27	28.65 ± 4.46***	.32	a, c
<b>Strengthening of psychosocial health resources</b>					
Practical knowledge exercise	37.43 ± 8.50	48.02 ± 7.95	50.16 ± 4.71***	.57	a, c
Practical knowledge nutrition	52.67 ± 9.04	60.33 ± 7.96	62.69 ± 5.94***	.47	a, c
Effect knowledge exercise	8.59 ± 3.17	10.53 ± 1.78	11.35 ± 1.13***	.34	a, b, c
Effect knowledge nutrition	9.43 ± 5.12	11.9 ± 4.88	16.84 ± 2.53***	.48	a, b, c
Self-efficacy exercise	4.42 ± 1.02	4.45 ± 0.98	4.61 ± 1.16	–	–
Self-efficacy nutrition	2.99 ± 0.61	3.31 ± 0.71	3.33 ± 0.68***	.16	a, c
Consequential expectations exercise <sup>†</sup>	2.69 ± 0.34	2.62 ± 0.36	2.65 ± 0.32	–	–
Consequential expectations nutrition <sup>†</sup>	3.31 ± 0.47	3.19 ± 0.47	3.26 ± 0.57	–	–
Body image <sup>†</sup>	27.89 ± 8.00	24.70 ± 7.50	22.98 ± 8.01***	.24	a, c
<b>Social ties</b>					
Attraction to physical activity	14.92 ± 3.96	18.02 ± 1.67	16.60 ± 3.65***	.28	a, b, c

risk factors, diseases or mental eating disorders requiring treatment. The program is based on a biopsychosocial model of health and pursues basic health and fitness aims, namely strengthening physical and psychosocial health resources, reducing risk factors, coping with health complaints, social ties and enhancing social-structural resources (17).

The present study's purpose is a detailed evaluation of the short-and-medium-term effects of the program concerning the core objectives of health enhancing exercise as well as its associated health behavior in terms of diet and exercise and the subjective health.

## Material and methods

### Intervention

The program consists of ten exercise and four diet sessions (90 min/week) (17). It is a modification of M.O.B.I.L.L.I.S., a training program designed for clinically obese people (BMI ≥ 30), which achieved good results (1, 6, 8, 9). The objective of the M.O.B.I.L.L.I.S. light program is for participants to take responsibility for handling their own weight and target a healthy balanced lifestyle. A combination of more physical activity and, at the same time, less calories leads to a change in lifestyle. This health and fitness program focusses on physical exercise. One key area of the exercise sessions is to teach practical exercises for a more active everyday life, for example Nordic walking or various strengthening and stretching exercises. During the diet sessions, participants learn strategies to help achieve a healthy and balanced diet. The exercise sessions are held by instructors certified by the German Gymnastics Federation ("Pluspunkt Gesundheit.DTB") or graduate sports teachers/sports scientists, the diet session by certified dietitians or nutritionists.

### Data collection and operationalization

In a one-group repeated-measures design, the data were collected during the first ( $t_1$ ) and last session of the program ( $t_2$ ), as well as three months after the program concluded (follow-up,  $t_3$ ). On one hand, the study concentrated on establishing selected core objectives in terms of health and fitness (strengthening physical

and psychosocial health resources, reducing risk factors, social ties) and on the other hand the potential effects of these core objectives. The potential effects specifically include aspects of diet and exercise-related health behavior as well as health-related quality of life as a criterion for health. The data were collected using a comprehensive questionnaire. Standardized scales were primarily used, but in some cases specially developed or adopted instruments.

The self-reported motor fitness status (2) and the ability to relax (12) were measured for the core objective of strengthening physical health resources. The weight and BMI as relevant risk factors were based on the self-report of the participants. The strengthening of psychosocial health resources referred to the practical knowledge transmitted during the health program (e.g., the importance of warm-up exercises or the intake of fluids); the knowledge about effects in the fields of exercise and nutrition (e.g., the effects of physical activity or unhealthy dietary behavior on physiological changes); self-efficacy (i.e. the conviction of being able to permanently maintain regular physical activity (7) and/or a healthy diet (10), even under adverse conditions); the positive and negative consequences of regular physical activity (modified according to (14) and permanently healthy dietary behavior (e.g., relating to social contact, dietary limitations (10)) as well as body image (negative body assessment (15)). For the core objective social ties, the attraction to physical activity in terms of integrating exercise within the daily routine during the previous four weeks was recorded (11).

The potential effects of the core objectives on the diet-related health behavior were operationalized through the implementation of the dietary recommendations given during the health program (e.g., less than 60 grams of fat per day), the eating habits (frequency of consumption of specific foods, e.g., fresh fruit (15)) as well as the intention to follow a healthy diet (level of intention ranging from 1 = no intention to 5 = intention already implemented without problem (14)). In order to assess the potential effects of the core objectives on the exercise-related health behavior, the questionnaire asked for habitual physical activity at work, during sport and leisure time (18), as well as for the level of the intention to undertake regular physical exercise (14). Finally, the

participants were asked for their subjective health-related quality of life as a measurement of physical and mental health (22).

One part of the sample (8 groups, n = 91) completed an additional motor skill test battery at t<sub>1</sub> and t<sub>2</sub> to objectively assess their physical health resources. Aspects of endurance, strength, flexibility and coordination were taken into consideration (according to (19) and (20)). Attending other health courses after the end of the program, stressful life events, the frequency of attending the program, as well as the desired weight were considered to be possible confounding variables.

**Sample group**

127 subjects (gender: 76.4 % female; age: 49.59 ± 9.79 years, 80 % between 36 and 60 years) from 15 groups (in sport clubs and companies) participated in the study. The advertisement to participate in the program was spread through various media of the German Gymnastics Federation (Deutscher Turner-Bund). The BMI at the beginning of the courses amounted to an average of 29.58 (± 4.12 kg/m<sup>2</sup>, BMI < 25: 6.7 %, BMI > 30: 38.1 %). The participants attended on average 12.23 of the 14 sessions (± 1.51); 90.4 % of the participants attended at least eleven sessions (n = 84). The dropout rate was about 22 % at t<sub>2</sub> (n = 28) and about 26 % (n = 33) at t<sub>3</sub>.

**Statistical analysis**

The data were analyzed using IBM® SPSS® Statistics 20. The effects were verified using repeated measures analysis of variance or dependent t-tests for paired samples. Pairwise comparisons with Bonferroni correction (p>0.05) were used for the post-hoc assessment.

**Results**

An analysis of the above mentioned confounding variables reveals no explicit limitations of the following results. The dropout analysis also shows no significant differences in the relevant target variables. Also, when excluding the participants with a BMI ≥ 30, there are, with two exceptions (push-ups and habitual physical activity during leisure time), no changes of the following reported effects.

Overall, positive effects of the fitness and health program can be seen in all core objectives of health and fitness (tables 1 and 2), in the diet and exercise-related health behavior as well as in the subjective health (table 3). On average, the initial values are

**Table 2**

Motor performance in relation to the two measurements t<sub>1</sub> (start) and t<sub>2</sub> (end); t-test: \*\*\*p<0.001, \*\*p<0.01, \*p<0.05; n = 59; <sup>1</sup>Low values represent a positive expression of the characteristic.

	t <sub>1</sub> M ± SD	t <sub>2</sub> M ± SD	η <sup>2</sup>
<b>Stamina</b>			
2 km walking pace (min.) <sup>1</sup>	19.13 ± 1.50	18.09 ± 1.52***	.60
2 km walking heart rate (beats/min.) <sup>1</sup>	125.89 ± 19.67	129.07 ± 23.82	–
<b>Strength</b>			
Sit-ups (quantity)	21.69 ± 6.44	24.43 ± 5.24**	.16
Push-ups (quantity)	20.00 ± 4.45	21.65 ± 4.63*	.09
Standing long jump (cm)	123.73 ± 34.98	131.17 ± 36.77***	.24
<b>Mobility</b>			
Stand-and-reach test (cm) <sup>1</sup>	1.96 ± 9.48	-1.31 ± 9.70*	.18
<b>Coordination</b>			
Standing leg circles (loops) for and back, eyes open	1.63 ± 0.69	1.71 ± 0.65	–
Standing leg circles (loops) for and back, eyes closed	0.37 ± 0.67	0.47 ± 0.70	–
6 m walking backwards (s) <sup>1</sup>	14.97 ± 13.72	12.56 ± 4.54	–

improved between five and 20 percent and these improvements are, in most cases, maintained even three months after the program's conclusion.

In this context, it should be pointed out that the program does not only lead to a reduction of body weight and BMI and to changes in the dietary and exercise behavior, but also to improved physical performance and subjective health, e.g., the BMI drops by almost one point, endurance and flexibility also improve, the participants feel healthier and are more physically active. In the course of 14 weeks, the participants lose on average 2.58 kg being 3.04 % of the mean initial body weight which remains constant even three months later.

Exceptions include the exercise and nutrition related expectations of consequences as well as the exercise-related self-efficacy (table 1) and the coordination measured with physical motor tests (table 2) showing no significant improvement.

**Table 3**

Nutritional and exercise-related health behavior as well as subjective health in relation to the three measurements (t<sub>1</sub> = start, t<sub>2</sub> = end, t<sub>3</sub> = follow-up); ANOVA: \*\* p<0.01, \*\*\* p<0.001; significant pairwise comparisons (PC): a = t<sub>1</sub>-t<sub>2</sub>, b = t<sub>2</sub>-t<sub>3</sub>, c = t<sub>1</sub>-t<sub>3</sub>; n = 66.

Health behavior and subjective health	t <sub>1</sub> M ± SD	t <sub>2</sub> M ± SD	t <sub>3</sub> M ± SD	η <sup>2</sup>	PC
<b>Nutrition behavior</b>					
Dietary recommendations	1.75 ± 0.44	1.82 ± 0.45	1.89 ± 0.40	.05	–
Eating habits	2.87 ± 0.79	3.45 ± 0.56	3.36 ± 0.70***	.35	a, c
Level of intention	3.59 ± 0.81	4.37 ± 0.73	4.29 ± 0.74***	.35	a, c
<b>Physical activity behavior</b>					
Habitual physical activity					
Work	2.52 ± 0.58	2.57 ± 0.60	2.62 ± 0.61	.06	–
Sport	3.19 ± 0.72	3.58 ± 0.54	3.70 ± 0.58***	.31	a, c
Leisure	2.97 ± 0.56	3.23 ± 0.46	3.07 ± 0.60**	.10	a
Level of intention	3.71 ± 1.06	4.31 ± 1.00	4.27 ± 1.04***	.15	a, c
<b>Subjective health</b>					
Physical health	46.95 ± 8.54	50.98 ± 6.64	46.79 ± 9.28***	.15	a, b
Mental health	46.36 ± 10.09	45.31 ± 10.36	50.62 ± 8.76**	.10	b, c

Improved pace during the 2km walking test (table 2) and enhanced exercise-related practical knowledge (table 1) are characterized by large effect sizes.

## Discussion

The detailed evaluation in view of a biopsychosocial model of health demonstrates the positive effects of M.O.B.I.L.L.I.S. light over the medium-term concerning the health and fitness core objectives as well as the associated diet and exercise-related health behavior and subjective health. The results obtained are therefore comparable to those reported by the one year intervention program M.O.B.I.L.L.I.S. for obese people (BMI  $\geq$  30) (1, 6, 8, 9). The absence of positive effects in some variables can be interpreted as indication of insufficient training of these aspects due to the program's short duration. For instance, for the consequential expectations and exercise related self-efficacy it should be accepted that weighing up the pros and cons of a diet and exercise-related behavioral change as well as the evaluation of remaining physically active despite internal and external obstacles, should be dealt with explicitly and should be supported, for example, by corresponding coping plans (13).

From a methodological point of view, however, the absence of a control group and the self-selection of the participants should be critically evaluated. In view of the above, effects of develop-

ment and time as an alternative explanation cannot be excluded.

However, the analysis of the confounding variables shows no systematic influence.

Concerning the self-selection, it can be assumed that participants of the health and fitness program need a certain degree of personal initiative, motivation and health awareness.

In addition, the sample composition shows a shift common in exercise, namely towards middle-aged female employees, whereas men, workers and younger people are in the minority.

Overall, the methodological limitations of the evaluation should be taken into consideration, but due to the specific effects proved in detail, the positive impact of M.O.B.I.L.L.I.S. light is fairly certain. The sustainability of the health and fitness program could certainly be improved in the future by offering follow-on courses in sports clubs, especially in view of maintaining diet and exercise behavior on a qualitatively higher level.

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