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Predictors for continued participation of employees in structured outpatient obesity intervention programmes

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ABSTRACT

Background: Overweight, obesity and the conditions resulting from them have become one of the major challenges for health systems all over the world. High dropout rates are particularly common among the participants in outpatient obesity intervention programmes (OIP). Limited research has examined retention in OIP.
Methods: Based on the data of a 24-month Bundeswehr outpatient OIP with a total of 630 participants, predisposing factors (n = 30) for continued participation beyond an early stage (0–3 months) and beyond a later stage (0–6 months) were analysed by means of a logistic regression analysis. In order to correct for multiple-comparison, the p-value was adjusted ($p^* < 0.0017$).
Results: Three hundred out of 630 participants continued to participate beyond an early stage and 205 beyond a later stage. Besides an age between 40 and 50 at the beginning of the outpatient OIP, it was possible to show that knowledge of one’s blood pressure and a positive lifestyle prior to participation in the programme (higher level of sporting activity) were predisposing factors for early dropout (> 3 months) in the intervention programme.
Discussion: The possible predisposing factors examined accounted for about 35% of the variance in a rough estimate. In order to improve long-term participation in workplace outpatient OIP, the study focused on how the motivation of older people and employees with an unfavourable cardiovascular risk profile could be improved.

1. Introduction

The high prevalence of overweight, obesity and associated secondary disorders have become one of the major challenges for health systems all over the world in the past decade (WHO, 2007). The data collected in the representative national survey (GEDA 2014/2015 EHIS) indicate that 43.3% of male Germans and 28.8% of female Germans have overweight (Body-Mass-Index [BMI] ≥ 25 and < 30 kg/m^2) and 18.3% of the men and 18.0% of the women have obesity (BMI ≥ 30 kg/m^2) (Mensink et al., 2012). The proportion of men and women with obesity in particular continues to increase (Mensink et al., 2012; Helmert and Strube, 2004; Prugger and Keil, 2007; Schienkiewitz et al., 2017). The secondary disorders and the increased mortality associated with overweight and obesity (Lenz et al., 2009) are estimated to cost the German health care system 13 billion Euros a year (Knoll and Hauner, 2008).

Both the statutory health insurance funds and commercial providers (Gerwig, 2008; Westenhöfer and Käsebieter, 2008; Berg et al., 2008; Flechtner-Mors, 2009; Rademacher and Oberritter, 2008; Walle and Becker, 2008) are applying a range of preventive intervention strategies in an attempt to reduce overweight and obesity through appropriate weight loss programmes. In addition there are several strategies for workplace intervention programmes (Anderson et al., 2009; Ross and Wing, 2016; Ovbiosa-Akinbosoye and Long, 2011). The results regarding the reduction of body weight or the improvement of laboratory parameters achieved differ considerably. In addition to the intervention strategies (dietary change, meal replacement, exercise, individual and group therapies), the programmes also differ in terms of the costs, which usually have to be borne by the patients themselves.

Individual factors associated with the patients, such as their personal responsibility, also have an impact on the success of an intervention strategy (Ried et al., 2010; Gunnarsdóttir et al., 2010). The majority of patients enrolling in an intervention programme do not complete it (Walle and Becker, 2008; Inelmen et al., 2005; Tsai and Wadden, 2005; Sammito, 2013, 2016). The high dropout rates of 20–80% (Inelmen et al., 2005; de Niet et al., 2011; Roumen et al., 2011; Hemmingsson et al., 2012; Huisman et al., 2010) are influenced by individual factors at the beginning of the programme and by the

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programme itself (Inelmen et al., 2005; Huisman et al., 2010). There are currently few papers (Gunnarsdóttir et al., 2010; de Niet et al., 2011; Huisman et al., 2010; Blane et al., 2017) that deal with the predisposing factors for continued participation in an obesity intervention programme. Knowledge of these factors, however, is a key prerequisite for motivating groups of people without these factors to continue their participation in the intervention programmes for a longer period of time by means of support measures.

The German Armed Forces (Bundeswehr) is also challenged by the increasing ratio of young recruits with overweight and obesity and active-duty personnel. For this reason, the Bundeswehr has been providing a conservative outpatient obesity intervention programme (OIP) free of charge for service personnel since 2003 in an occupational setting. The OIP is being held at the Bundeswehr Centre of Sports Medicine in Warendorf near Münster. The medical program focuses on changing diets, on increasing the daily amount of exercise taken, and on intensifying sporting activity. After a first outpatient contact the participants got follow-up appointments after 3, 6, 9, 12, 18 and 24 months. A detailed description of intervention measures has been provided elsewhere (Sammito, 2012a, 2012b). The entry criteria for the OIP is: BMI $> 30\ kg/m^2$ or a BMI $> 27.5\ kg/m^2$ in combination with further cardiovascular risk factors (such as hypertension, smoking, hypercholesterolaemia, etc.). At the beginning of the individual program and during follow-ups (after 3, 6, 9, 12, 18, and 24 months, Fig. 1), the participants underwent medical examination by a preventive physician. Biometrics (eg, body weight, height, and waist circumference) and blood analysis (eg. liver indices, cholesterol, low-density lipoprotein, high-density lipoprotein, triglyceride, uric acid, and hemoglobin A1c) were carried out. During the first examination and after 6, 12, 18, and 24 months, the physical capacity on a bicycle ergometer, including electrocardiogram and lactate diagnostic, were examined. On the basis of these data, individualized advice for more physical activity in daily life and for an optimal sporting activity with heart rate ranges were developed. The aim of this intervention was to motivate the participants toward a more physical daily routine with 3–4 days of sport activities for minimum 45 min. Endurance sports such as Nordic walking, swimming, and cycling, and running for those participants with overweight were favored.

At the follow-up date after 3 and 9 months, the diet was analysed by a nutritionist, and if necessary the advice was given on the basis of the recommendation of the German Society of Nutrition (Gesellschaft, 2012). Goals of the recommendations were the reduction of daily fat intake to less than 30% of the daily energy intake, enhanced consumption of fruits and vegetables ("five times a day"), and scheduled meals with breakfast, lunch, and dinner. Both the increase in activity and optimized nutrition were controlled at the next follow-up visits of the participant and, if necessary, counseling was repeated.

A previous analysis shows a significant weight reduction achieved in the OIP: 3.1 kg after 24 months (Sammito, 2013). However, the participation rates after 24 months was only 5.0% (Gunnarsdóttir et al., 2010).

The aim of the present study is therefore to analyse factors predisposing to continued participation beyond the early stage (the first 3 months) and beyond a later stage (more than 6 months) in the Bundeswehr outpatient OIP. Predisposing factors included those linked to unhealthy lifestyle (e.g. BMI, fitness, laboratory parameters) and circumstances that might influence the motivation of taking part in the OIP (e.g. distance to drive for an outpatient contact).

2. Methods

For the dropout analysis, the data of the participants in the Bundeswehr outpatient OIP (2003 to July 2011) were examined with regard to predisposing factors for continued participation at a very early stage (no dropout within the first 3 months) and at a later stage (no dropout within the first 6 months). Another analysis conducted was a logistic regression analysis comprising the variables age, measured anthropometric data (BMI, waist circumference), travel distance to the Bundeswehr Centre of Sports Medicine (categories: [< 120 km, ≥120 and < 240 km, > 240 km]), relative output on the bicycle ergometer (in relation to body weight), blood pressure (separated into systolic and diastolic blood pressure), laboratory parameters (high-density lipoprotein [HDL], low-density lipoprotein [LDL], triglycerides, uric acid, glutamic oxaloacetic transaminase [GOT], glutamate pyruvate transaminase [GPT], γ-glutamyltranspeptidase [γ-GT], Hemoglobin A_{1c} [HBA_{1c}]), number of cardiovascular risk factors (CVRF) and further data concerning occupational and non-occupational mental stress, sleep disorders, participant statements concerning their sporting activity and knowledge of their own blood pressure, cholesterol and blood glucose levels (yes/no selection for each point). The laboratory parameters were categorised into a group with pathological laboratory parameters (based on the limits of the local laboratory) and into a group with normal laboratory parameters (standards for GOT and GPT ≤ 50 U/l, γ-GT < 66 U/l). As regards the number of CVRFs, the presence of hypertension, diabetes mellitus, coronary heart disease or the condition after a myocardial infarction, active smoker status, hypercholesterolaemia and hypertriglyceridemia were taken into consideration. Hypercholesterolaemia and hypertension were considered to be risk factors if either a relevant laboratory parameter was found (LDL-cholesterol ≥ 3.38 mmol/l) (Gesellschaft, 2009; Gohlke et al., 2007) or the blood pressure was classified as increased (resting blood pressure, systolic ≥ 140 mm Hg or diastolic ≥ 95 mm Hg) (Gohlke et al., 2007; Pocket, 2013) or the patient was receiving an cholesterol-lowering or anti-hypertensive therapy in their medical history.

For this analysis the medical data (measured anthropometric data, blood parameters from venous blood sampling, output on the bicycle ergometer, blood pressure) was used from the first outpatient contact. Historic data was collected with a paper–pencil survey. Travel distance was calculated with Google® Maps for each patient for driving a car to reach the Bundeswehr Centre of Sport Medicine in Warendorf from their unit address.

In addition to descriptive statistics with an arithmetic mean and standard deviation using IBM® SPSS® Statistics 24 in a first step, a logistic regression analysis was conducted for all the parameters both

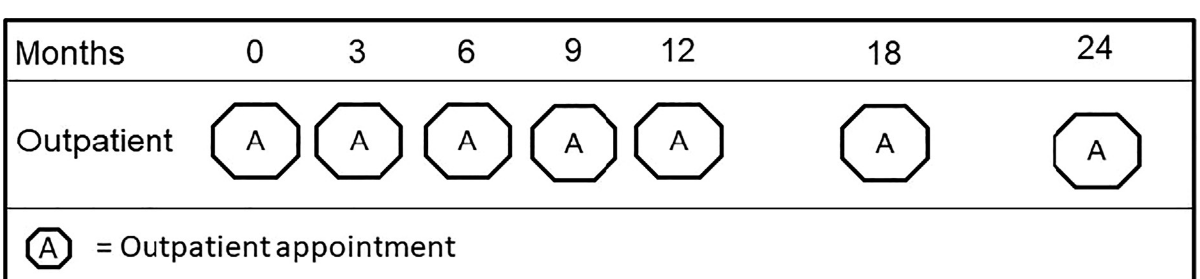

Fig. 1. Schematic diagram of the distribution of outpatient appointments at the Bundeswehr Centre of Sports Medicine for the outpatient branch of the obesity intervention programme.

Table 1
Anthropometric data, fitness and laboratory parameters of the participating participants during baseline examination (first outpatient contact), Mw = average, SD = standard deviation, only males, n = 630.

	Mw ± SD	N (%)
Age [years]	40.7 ± 9.2	
≤ 30 years		119 (18.9%)
> 30 and ≤ 40 years		143 (22.7%)
> 40 and ≤ 50 years		278 (44.1%)
> 50 and ≤ 60 years		90 (14.3%)
Number of outpatient appointments	2.9 ± 1.8	
1 outpatient appointment		200 (31.8%)
2 outpatient appointments		130 (20.6%)
3 outpatient appointments		95 (15.1%)
4 + outpatient appointments		205 (32.5%)
Body weight [kg]	110.7 ± 16.2	
Body height [cm]	180.8 ± 7.1	
Body Mass Index (BMI) [kg/m^2]	33.8 ± 4.2	
With overweight (BMI ≥ 25		99 (15.7%)
and < 30 kg/m^2)		531 (84.3%)
With obesity (BMI ≥ 30 kg/m^2)		
Waist circumference [cm]	112.5 ± 11.1	
Distance [km] to the intervention centre	235.4 ± 136.1	
< 120 km		93 (14.8%)
≥120 km and < 240 km		339 (53.8%)
≥240 km		198 (31.4%)
Absolute ergometer output [W]	227.5 ± 48.2	
Relative ergometer output [W/kg body weight]	2.1 ± 0.5	
Systolic blood pressure (mm Hg)	140.9 ± 16.2	
Diastolic blood pressure (mm Hg)	89.8 ± 10.3	
Total cholesterol [mmol/l]	5.43 ± 1.07	
HDL cholesterol [mmol/l]	1.16 ± 0.24	
LDL cholesterol [mmol/l]	3.31 ± 0.94	
Triglycerides [mmol/l]	2.14 ± 1.54	
Uric acid [µmol/l]	408.4 ± 74.5	
GOT [U/l]	31.8 ± 12.0	
GOT ≤ 50 U/l		585 (92.9%)
GOT > 50 U/l		45 (7.1%)
GPT [U/l]GPT ≤ 50 U/l	49.9 ± 27.2	
GPT > 50 U/l		396 (62.9%)
		234 (37.1%)
γ-GT [U/l]	46.4 ± 34.3	
γ-GT ≤ 65 U/l		526 (83.5%)
γ-GT > 65 U/l		
		104 (16.5%)
HBA1c [%]	5.66 ± 0.53	
HBA1c < 6%		497 (78.9%)
HBA1c ≥ 6%		133 (21.1%)
Number of cardiovascular risk factors (CVRF)	0.9 ± 1.0	
0–1		459 (72.9%)
2+		
		171 (27.1%)
Smokers		139 (22.1%)
Positive family history		148 (23.5%)
Pre-existing conditions		
- Hypertension		178 (28.3%)
- Diabetes mellitus		25 (4.0%)
- Hypercholesterolaemia		
- Coronary heart disease		56 (8.9%)
		25 (4.0%)
Occupational mental stress		130 (20.6%)
Non-occupational mental stress		69 (11.0%)
Sleep disorders		87 (13.8%)
Sporting activity		233 (37.0%)
Knowledge of blood pressure		117 (18.6%)
Knowledge of cholesterol level		38 (6.0%)
Knowledge of blood glucose level		24 (3.8%)
Regular consumption of alcoholic beverages		55 (8.7%)

independently and age-adjusted at a significance level of 0.05. In order to adjust for multiple comparisons, a Bonferroni correction was used. A corrected $p^* < 0.0017$ (0.05/30) for within group differences (n = 30 factors) were considered statistically significant and further interpreted.

3. Results

In total, data of 665 participants in the Bundeswehr outpatient OIP were evaluated. 630 (94.7%) of the participants were male (average age: 40.7 ± 9.2 years, BMI 33.8 ± 4.2 kg/m^2) and 35 were female (average age: 28.0 ± 4.9 years, BMI 33.7 ± 4.0 kg/m^2). In proportion to the overall group of participants, the female share is 5.3%. This represents the typical gender distribution in the Armed Forces in Germany. Due to of the small number of female participants, they were excluded in the further analysis of this study. Table 1 shows selected characteristics of the male study population.

3.1. No dropout at an early stage

Of the 630 male participants, n = 300 (47.6%) continued to participate in the Bundeswehr outpatient OIP beyond the initial or second appointment (=after 3 months). A higher age (> 40 and ≤50 years old) and the diagnosis of hypertension were positive predictive factors ($p < 0.05$) for prolonged participation in the programme. In contrast, higher triglyceride, a pathological y-GT level > 65 U/l, an active smoking status, a positive family history regarding cardiovascular diseases, a higher level of sporting activity and the knowledge of onés blood pressure were associated with early dropout ($p < 0.05$) (Table 2).

After age adjustment the diagnosis of hypertension were associated with continued participation in the intervention programme ($p < 0.05$). In contrast, higher triglyceride, a pathological y-GT level, an active smoking status, a positive family history regarding cardiovascular diseases, a higher level of sporting activity and the knowledge of one's blood pressure were associated with early dropout ($p < 0.05$).

After age adjustment 2 or more CVRF's were associated with early dropout but there could be found no significant associations for active smoking status, while the remaining factors revealed themselves to be factors for prolonged participation or early dropout in the Bundeswehr outpatient OIP. After correction for multiple testing, only a higher level of sporting activity and the knowledge of one's blood pressure remained significant predictor for dropout at an early stage in the programme (with and without age adjustment, $p^* < 0.0017$) (Table 2).

If all of the potential predisposing factors examined (n = 30) are included in the logistic model simultaneously, 434.7% of the variance could be roughly accounted for (Nagelkerke's pseudo coefficient of determination $R^2 = 0.347$).

3.2. Continuation of participation at a late stage

A total of n = 205 (32.5%) continued their participation in the OIP after the first 6 months (participation even after the third outpatient appointment). In contrast to continuation beyond an early stage, higher triglyceride, γ-GT, active smoking status and the presence of 2 or more CVRFs no longer had an influence on the participation in the OIP ($p > 0.05$). Higher age (> 40 and ≤50 years old) and the diagnosis of hypertension were predisposing factors for continued participation in the OIP ($p < 0.05$). Higher uric acid levels, a positive family history regarding cardiovascular diseases, a higher level of sporting activity and the knowledge of onés blood pressure were, however, predisposing factors for dropout at a later stage ($p < 0.05$) (Table 2). This influence was shown to have nothing to do with age. After correction for multiple testing and after age adjustment, only a higher level of sporting activity remained a significant factor for dropout at a later stage ($p^* < 0.0017$) (Table 2).

If all of the potential predisposing factors examined (n = 30) are included in the logistic model simultaneously, 36.3% of the variance could be roughly accounted for (Nagelkerke's pseudo coefficient of determination $R^2 = 0.363$).

Table 2
Logistic regression analysis for all the parameters, independently and adjusted, with age being the linear factor (p* < 0.0017 (0.05/30) due to multiple-testing), bold = OR with 95% CI out of 1 or p < 0.0017.

	Continued participation at an early state (longer than 3 months)				Continued participation at a later state (longer than 6 months)			
	OR	95% CI	p*	p* (age-adjusted)	OR	95% CI	p*	p* (age-adjusted)
Age [years]								
≤30	1		0.003	–	1		**< 0.001**	–
> 30 and ≤ 40	1.08	(0.66–1.78)			0.72	(0.78–2.47)		
> 40 and ≤ 50	2.00	**(1.29–3.10)**			2.13	**(1.32–3.41)**		
> 50 and ≤ 60	1.33	(0.76–2.31)			1.15	(0.63–2.13)		
BMI [kg/m^2]								
< 30	1		0.975	0.834	1		0.854	0.994
≥30	1.01	(0.66–1.55)			0.96	(0.61–1.51)		
Waist circumference [cm]								
< 104	1		0.677	0.558	1		0.394	0.304
≥104	1.08	(0.75–1.58)			1.19	(0.80–1.79)		
Travel distance [km]								
< 120	1		0.716	0.681	1		0.715	0.678
≥120 and < 240	**1.69**	**(1.06–2.70)**			1.45	(0.87–2.42)		
≥240	1.29	(0.78–2.14)			1.24	(0.72–2.15)		
Relative power output on the bicycle ergometer [W/kg body weight]								
1. Quartil	1		0.663	0.502	1		0.862	0.688
2. Quartil	1.08	(0.69–1.69)			1.19	(0.74–1.92)		
3. Quartil	1.07	(0.68–1.67)			1.15	(0.71–1.85)		
4. Quartil	1.31	(0.84–2.05)			1.21	(0.75–1.94)		
Systolic blood pressure [mmHg]								
< 140	1		0.168	0.187	1		0.983	0.934
≥140	1.26	(0.91–1.73)			1.00	(0.71–1.40)		
Diastolic blood pressure [mmHg]								
< 95	1		0.801	0.708	1		0.149	0.119
≥95	0.95	(0.66–1.38)			0.75	(0.50–1.11)		
HDL [mmol/l]								
≥0.91	1		0.598	0.821	1		0.915	0.672
< 0.91	0.89	(0.57–1.39)			1.03	(0.64–1.65)		
LDL [mmol/l]								
< 3.38	1		0.389	0.659	1		0.384	0.650
≥3.38	1.15	(0.84–1.58)			1.16	(0.83–1.62)		
Triglycerides [mmol/l]								
< 1.71	1		0.015	0.018	1		0.746	0.820
≥1.71	**0.68**	**(0.49–0.93)**			0.95	(0.68–1.32)		
Uric acid [µmol/l]								
< 505.75	1		0.193	0.224	1		0.035	0.042
≥505.75	0.69	(0.39–1.21)			**0.48**	**(0.24–0.95)**		
GOT [U/l]								
≤50	1		0.290	0.450	1		0.558	0.818
> 50	0.72	(0.39–1.33)			0.83	(0.43–1.62)		
GPT [U/l]								
≤50	1		0.370	0.635	1		0.366	0.634
> 50	0.86	(0.62–1.19)			0.85	(0.60–1.21)		
y-GT [U/l]								
≤65	1		0.042	0.038	1		0.268	0.253
> 65	**0.64**	**(0.42–0.98)**			0.77	(0.48–1.23)		
HB_{A1c}								
< 6%	1		0.948	0.600	1		0.720	0.920
≥6%	0.99	(0.67–1.45)			1.08	(0.72–1.62)		
Number of CVRF								
0 or 1	1		0.062	0.010	1		0.375	0.117
≥21	0.71	(0.50–1.02)			0.84	(0.5811.23)		
Smoking								
Non-smoker	1		0.023	0.067	1		0.069	0.126
Ex-smoker	1.22	(0.85–1.74)			1.06	(0.73–1.55)		
Active smoker	**0.66**	**(0.44–0.99)**			**0.62**	**(0.39–0.98)**		
Positive family history								
No	1		0.019	0.005	1		0.026	0.007
Yes	**0.64**	**(0.44–0.93)**			**0.62**	**(0.41–0.95)**		
Pre-existing conditions: Hypertension								
No	1		0.002	0.029	1		**0.001**	0.011
Yes	**1.75**	**(1.23–2.50)**			**1.87**	**(1.30–2.69)**		
Pre-existing conditions: Diabetes mellitus								
No	1		0.407	0.227	1		0.468	0.702
Yes	0.71	(0.31–1.60)			1.36	(0.60–3.07)		
Pre-existing conditions: Hypercholesterolaemia								
No	1		0.991	0.449	1		0.195	0.535
Yes	1.00	(0.58–1.74)			1.45	(0.83–2.54)		
Pre-existing conditions: Coronary heart disease								
No	1		0.984	0.558	1		0.257	0.523

(*continued on next page*)

Table 2 (*continued*)

	Continued participation at an early state (longer than 3 months)				Continued participation at a later state (longer than 6 months)			
	OR	95% CI	p*	p* (age-adjusted)	OR	95% CI	p*	p* (age-adjusted)
Yes	0.99	(0.45–2.21)			1.60	(0.71–3.59)		
Occupational mental stress								
No	1		0.102	0.064	1		0.932	0.715
Yes	0.64	(0.38–1.09)			0.97	(0.52–1.82)		
Non-occupational mental stress								
No	1		0.757	0.829	1		0.481	0.562
Yes	1.10	(0.60–2.03)			1.29	(0.63–2.64)		
Sleep disorders								
No	1		0.147	0.254	1		0.046	0.121
Yes	1.51	(0.87–2.65)			**1.93**	**(1.01–3.70)**		
Sporting activity								
No	1		< **0.001**	< **0.001**	1		< **0.001**	< **0.001**
Yes	**0.32**	**(0.23–0.45)**			**0.31**	**(0.21–0.46)**		
Knowledge of blood pressure								
No	1		**0.001**	< **0.001**	1		0.016	0.006
Yes	**0.48**	**(0.32–0.74)**			**0.57**	**(0.35–0.90)**		
Knowledge of cholesterol level								
No	1		0.781	0.644	1		0.177	0.269
Yes	0.90	(0.42–1.91)			1.73	(0.78–3.85)		
Knowledge of blood glucose level								
No	1		0.124	0.106	1		0.820	0.739
Yes	0.42	(0.14–1.27)			0.88	(0.29–2.69)		
Regular consumption of alcoholic beverages								
No	1		0.184	0.281	1		0.718	0.993
Yes	1.52	(0.82–2.82)			1.15	(0.54–2.42)		

4. Discussion

The present study was conducted on the basis of the data obtained from a free of charge OIP for male Bundeswehr service personnel and containing information on a broad range of potential predictors. Taking the multiple comparisons problem into account, higher levels of sporting activity and knowledge of one's blood pressure were significant predictors for early drop-out (> 3 months) in the programme. Higher levels of sporting activity also predicted dropout at a later stage.

There are currently few studies that deal with the predisposing factors for early dropout from an OIP (Gunnarsdóttir et al., 2010; de Niet et al., 2011; Huisman et al., 2010; Blane et al., 2017). This is all the more astonishing as the dropout rates for OIP are as high as 80%, depending on the duration of the programmes (Inelmen et al., 2005; Sammito, 2016; de Niet et al., 2011; Roumen et al., 2011; Hemmingsson et al., 2012; Huisman et al., 2010), and can be even higher in the case of longer programmes (Sammito, 2013). In a study on 114 participants participating in an 8-week intervention programme (Gunnarsdóttir et al., 2010), the only differences found between those who continued participation and those who dropped out concerned the consumption of soft drinks and the use of antidepressants. A higher consumption of soft drinks and the use of antidepressants were associated with a higher dropout rate.

The present study thus contributes to closing the gap in scientific literature between predisposing factors for dropout from a workplace OIP. It is generally evident that having a favourable lifestyle at the beginning of participation in an OIP is associated with a higher probability of a subject completing a programme. In contrast to this a higher level of sporting activity was associated with an early and later dropout. A higher age (> 40 and ≤50 years old) was also associated with a higher probability of a programme being completed. Due to correlation between the potential predictors (multicollinearity) and the sample size, the dropout-analysis was not designed to answer questions discriminating direct and indirect effects.

This study, however, has both limitations and strengths: Participation in the programme was voluntary and free of charge. It can be assumed that some of the participants who enrolled in this programme dropped out quite quickly because the entry threshold was relatively low due to their not having to make a financial contribution towards it. Although this makes it difficult to compare the programme with commercial programmes for which fees are charged, it can be assumed that at least no bias was shown – in the sense of a preselection being made. The fact that it was possible to participate in this intervention programme in an occupational health setting during working hours might also have contributed to a lowering of possible entry thresholds. The provision of central support for the whole of Germany at one location is, on the one hand, a quality feature of constant support, but, on the other, often means that some participants have to travel a very long way to get there. The costs incurred by the participants, however, are covered by the employer. Contrary to expectations, the distance participants had to travel to get to the outpatient intervention centre did not have any influence on their further participation.

The effectiveness of the OIP with regard to the final objective of "weight loss" has already been shown (Sammito, 2013). Since only 5% of the service personnel have completed the full two-year programme and the weight loss process could not be monitored among those who dropped out, no statement can be made as to whether dropout is automatically associated with a worse outcome. In total, the dropout rate (95%) is very high compared to another OIP (Inelmen et al., 2005; de Niet et al., 2011; Roumen et al., 2011; Hemmingsson et al., 2012; Huisman et al., 2010). May be the long periods between the individual contact in the medical centre (every 3 months in the first year and every 6 months in the second year) could be a reason for the high dropout rate. Other preventive programs, e.g. a Finnish prevention of type 2 diabetes mellitus have more outpatient contacts and the duration between every contact is smaller (seven sessions during the first year and every three month during the second year) (Diabetes Prevention Program Research Group, 2009; Lindström et al., 2003).

On the other hand, the fact that the participating service personnel did not have to expect any disadvantages as a result of their dropping out constitutes a strength of the present analysis, as no bias – in the sense of participants merely participating passively in the intervention programme – was created due to their fear of experiencing disadvantages. The number of female service personnel participating in the OIP was, however, so small that we were not able to analyse them.

Summing up, it can be said that the present analysis showed predisposing factors for continued participation in or dropout from a conservative workplace OIP. It notably showed that certain cardiovascular risk factors had both a positive influence on a subject's continued participation in the programme (higher age, diagnosis of hypertension) and a negative one (higher level of triglyceride, uric acid or y-GT, positive family history). In addition to age, the statement made by participants that they engaged in sporting activity and the knowledge of onés blood pressure were associated with participants dropout in the programme. May be the focus on increasing the level of sporting activity in the programme beside the improving of diet habits has led to the dropout of this participants, because they have decided that a longer participation has no more improvement for themselves. This result should be considerate for development of a new OIP or for an adaption of an ongoing OIP to improve the success of this programs. The communication and discussion of medical results, e.g. of laboratory parameters or blood pressure measurement, is an important part of the treatment of or obese patients with overweight or obesity. In addition in order to improve the long-term participation in workplace outpatient OIP, a study should be conducted into how the motivation of older people and employees with an unfavourable cardiovascular risk profile can be improved.

5. Authors' contributions to the study

Sammito has primary wrote the article, all author's have made the statistical analysis, all authors have discussed the results and wrote/corrected the article.

6. Compliance with ethical standards

This study received no external funding.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. For this type of study formal consent is not required.

Declaration of Competing Interest

Sammito is an active Bundeswehr Medical Service officer and works for the Federal Ministry of Defence. The other authors are not affected by conflicts of interest.

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