

Collaborative nurse-led self-management support for primary care patients with anxiety, depressive or somatic symptoms: Cluster-randomised controlled trial (findings of the SMADS study)[☆]



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ABSTRACT

Background: Collaborative, nurse-led care is a well-established model of ambulatory care in many healthcare systems. Nurses play a key role in managing patients' conditions as well as in enhancing symptom- and self-management skills.

Objective: The SMADS trial evaluated the effectiveness of a primary care-based, nurse-led, complex intervention to promote self-management in patients with anxiety, depressive or somatic symptoms. Change in self-efficacy 12 months post baseline was used as the primary outcome.

Design: The SMADS trial set up a two-arm, cluster randomised controlled trial in the city of Hamburg, a large metropolitan area in the North West of Germany.

Setting: We randomly allocated participating primary care practices to either the intervention group (IG), implementing a nurse-led collaborative care model, or to the control group (CG), where patients with the above psychosomatic symptoms received routine treatment.

Participants: Patients from 18 to 65 years of age, regularly consulting a participating primary care practice, scoring ≥ 5 on the anxiety, depressive or somatic symptom scales of the Patient Health Questionnaire (PHQ-D), German version.

Methods: A mixed model regression approach was used to analyse the outcome data. Analyses were based on the intention-to-treat population: All enrolled patients were analysed at their follow-up. Additionally, we reported results as effect sizes. The robustness of the results was investigated by performing an observed cases analysis.

Results: 325 participants (IG N = 134, CG N = 191) from ten practices in each study arm consented to take part and completed a baseline assessment. The mean group difference (ITT-LOCF, IG vs. CG) in self-efficacy at the post baseline follow-up (median 406 days) was 1.65 points (95% CI 0.50–2.8) in favour of IG ($p = 0.004$). This amounts to a small Cohen's d effect size of 0.33. An observed cases analysis (168 participants, IG = 56, CG = 105) resulted in a mean difference of 3.13 (95% CI 1.07–5.18, $p = 0.003$) between the groups, amounting to a moderate effect size of $d = 0.51$.

Conclusion: A complex, nurse-led intervention, implemented as a collaborative care model, increased perceived self-efficacy in patients with symptoms of anxiety, depression or somatisation compare to control patients. For the first time in the German healthcare system, the SMADS trial validated the belief that a nurse can successfully complement the work of a general practitioner – particularly in supporting self-management of patients with psychosomatic symptoms and their psychosocial needs.

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[☆] The study is registered at <https://www.clinicaltrials.gov/ct2/show/NCT01726387>.

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What is already known about the topic?

- Complex interventions including patient education, case management by nurses and a better integration of primary and secondary care improve patient outcomes.
- Nurse-led interventions enhance the self-care of patients with chronic conditions including depressive disorders.
- Nurse-led care is established in several health care systems (UK, USA, Australia, Sweden etc.) but not in Germany.
- Self-efficacy is an important prerequisite for successful self-management.

What this paper adds

- Results of the first primary care-based, nurse-led, complex intervention to support self-management of patients with anxiety, depressive or somatic symptoms in Germany.
- Patients in the intervention group reported a significant increase in self-efficacy (primary outcome) compared to the control group (intention-to-treat analysis) at the 12-months follow-up, the reduction of depressive and anxiety symptoms differed significantly among the groups.
- An account of the barriers and difficulties faced by scientifically driven researchers when implementing an innovative healthcare model into a profoundly sceptical professional environment.

1. Introduction

Anxiety, depressive and somatoform disorders (hereafter referred to as ADSom disorders) belong to the most common mental disorders in primary care (Toft et al., 2005). ADSom disorders play a substantial part in the utilisation of the healthcare system (Grabe et al., 2009). Also, ADSom disorders cause significant direct and indirect healthcare costs (Olesen et al., 2012).

Practice nurses play a key role in managing patients' conditions, enhancing clinical and self-management skills and the care intensity (Wagner, 2000). Nurse-led care is a well-established concept, addressing the aforementioned problems. It features a multi-professional approach to patient care, incorporating a structured management plan, follow-up schedules and enhanced inter-professional communication (Gunn et al., 2006). Evidence to support a nurse-led collaborative care model in patients with depressive symptoms has been verified in several systematic reviews. Thota et al. (2012) concluded that nurse-led care improves depressive symptoms, adherence to treatment, response to treatment, recovery from symptoms, quality of life and care satisfaction amongst patients. Ekers et al. (2013) reported a considerable and consistent benefit of nurse-led clinical trials over routine treatment for depressive disorders when summarising the results of fourteen different trials. In a review of different care models for depressive disorders, Christensen et al. (2008) concluded that nurse-delivered care combined with psychological or psychiatric care was effective. Aragonés et al. (2012) and Richards et al. (2013) reported a significant reduction in depressive symptoms in cluster randomised collaborative care studies. Even beyond depression, nurses can make a difference. In a secondary analysis of trial data, Tyrer et al. (2015) compared nurse-delivered care with the treatment offered by assistant psychologists and graduate health workers. Improvement in anxiety and depressive symptoms were twice as likely in the nurse care groups as in those of the other professional groups. Oosterbaan et al. (2013) successfully implemented a collaborative care model for a broad range of common mental disorders. Gilbody et al. (2003) identified

effective strategies in caring for patients with depressive disorders: clinician education, case management through nurses and a greater degree of integration of primary and secondary care.

Types and roles of nursing professionals in primary care vary considerably between healthcare systems (Freund et al., 2015). For example, nurse-led interventions are part of routine, ambulatory care in several healthcare systems (UK, USA, Australia, Netherlands etc.) but not in Germany. Nurses in those countries usually have an academic education and are employed as advanced practice nurses. This kind of professional education is about to emerge in Germany even though legal constraints prevent nurses from any autonomously organised, professional care regularly offered in those aforementioned healthcare systems. Thus, nurse-led interventions in ambulatory healthcare are largely unknown in Germany. We only know of one trial, that has tried to implement a nurse-led intervention (Herber et al., 2009). Nevertheless, patients with ADSom disorders can find many services in the German social security system: helpdesks, helplines, publicly funded self-help groups, non-profit counselling services, community-based social psychiatric support, day clinics, rehabilitation services, re-integration services after long sick leaves, specialist medical care (psychiatrist, psychotherapist). Although these services exist, patients with ADSom disorders have difficulties accessing services. Information has to be collected, paperwork has to be filled out, appointments have to be made and so on, all of which are impeded by their psychiatric symptoms (Thielke et al., 2007). Eventually, there is a lack of coordination amongst these services and the patients' primary care practice as it is beyond the scope of the GPs' daily work to coordinate the different services.

Hence, nurses can make a difference in improving healthcare.

1.1. Objective

The objective of the "Self-Management Support for Anxiety, Depression and Somatoform Disorders in Primary Care" (SMADS) trial was to evaluate the effectiveness of a primary care-based, complex intervention promoting self-management of patients presenting anxiety, depressive or somatic symptoms, the latter denoting unspecific physical complaints, a potential proxy for somatisation and somatoform disorder (Kroenke et al., 2010) The SMADS trial investigated whether a nurse, collaborating with a GP, addressing the psychosocial needs of ADSom patients, could enhance the patients' self-efficacy (a proxy for self-management) compared to receiving only routine care.

Perceived self-efficacy is an important prerequisite for successful self-management (Freund et al., 2013). The concept is theoretically and empirically well founded (Barlow et al., 2005) and was originally developed by Albert Bandura in the 1970s. Self-efficacy comprises one's confidence to carry out behaviour necessary to reach a desired goal. Self-efficacy is enhanced when patients succeed in solving patient-identified problems. Based on improved self-efficacy patients can regain control of their own lives, gaining new confidence in their ability to perform a task, hence increasing self-management (Bodenheimer et al., 2002).

As we focused on a group of patients presenting three different yet overlapping disorders, we chose self-efficacy as a primary outcome for the SMADS trial to obtain an overarching measure of effectiveness. Furthermore, we investigated if a nurse-led intervention had decreased the patients' symptom load and psychosocial burden and increased their quality of life. After all, we wanted to know whether a nurse-led intervention had any impact on these patients' coping strategies, considered a useful way to reduce stress and psychiatric symptoms.

2. Materials and methods

2.1. Study design

We tested the effectiveness of the nurse-led intervention by setting up an open label, cluster randomised controlled trial in 20 general practitioners' practices in the city of Hamburg (Germany). Nurse-led interventions were performed at the primary care practices. Nurses were assigned to the interventional practices for 12 consecutive months providing services for patients over this period of time. Nurses followed a practice visitation schedule (once a week), according to which they worked at a particular practice. They had their own office room inside the practice at their disposal. At the control practices, the patients received routine GP care. As an incentive, control practices were offered the nurse-led intervention for 12 months after closing the RCT.

More information about the study design, the setting and the intervention is documented in the study protocol (Zimmermann et al., 2014). The trial is registered at <https://www.clinicaltrials.gov/ct2/show/NCT01726387>. Ethics approval was obtained from the ethics committee of the Hamburg Medical Association, approval number PV4106.

2.2. Recruitment and randomisation of primary care practices

The city of Hamburg is a large metropolitan area with a population of 1.8 million. There are about 1000 primary care practices. Almost 80% of them are operated by a single GP and his/her practice assistants, whilst about 20% are run by several GPs sharing the premises and staff. Twenty primary care practices had to be recruited. Letters with study information were mailed to postcode-selected primary care practices in five Hamburg counties (N=449) inviting GPs to partake in this trial, about 45% of the primary care practices in the city of Hamburg.

Inclusion criteria for practices were:

- Willingness to participate in the study regardless of whether the practice was randomised to the interventional part of the study or the control arm,
- the availability of a separate room at the practice for the nurses to conduct the intervention in a protected environment at fixed appointment times,
- no psychotherapeutic treatment within the practice by the GP him/herself nor by any other professional at the practice.

The response rate of the invited GPs was quite low (compare Fig. 1): Only 28 of 449 practices (6.2%) were interested in getting more information on the project. After we had contacted interested GPs, we realised that very few practices were able to provide an additional room for the trial. We started a second round of invitations via personal telephone calls. We removed 34 practices from the list (letter undeliverable, rejection in the first round), which left us with a remaining pool of 415 practices. We telephoned another 184 (44.3%) of the practices, asking them to reconsider participating in the trial, until we reached our final goal of 20 practices. It took 18 months to complete our practice recruitment.

2.3. Randomisation of practices

A biometrician (AD), not involved in the field work, randomly allocated participating general practices with a ratio of 1:1 to either the interventional arm (nurse-led care) or the control arm (routine care) treating ADSom patients.

2.4. Study population and recruitment

We scheduled patient recruitment at the practices on particular screening days with high patient flows. All patients who had a personal appointment with their GP were put on a chart and checked for eligibility criteria.

Eligibility criteria for patients were:

- a) age: 18–65 years old,
- b) literacy (German),
- c) fully able to give consent,
- d) sufficient auditory and visual capabilities,
- e) currently not in psychotherapeutic treatment,
- f) PHQ scoring 5 points or higher.

Eligible patients were informed about the study. Since the SMADS project included an intervention by a nurse, German legislation required the GP to explain the study details, screen the patients and schedule an appointment with the nurse. If the terms were accepted, patients had to give their written informed consent to participate in the study. Patients also had to agree to release their physician from his/her medical confidentiality obligation, allowing the nurses and the GP to exchange information.

Patients were asked to answer the Patient Health Questionnaire – German version (PHQ-D), a well-established instrument with good validity and prognostic capabilities used to screen patients for anxiety, depressive and somatic symptoms (Gräfe et al., 2004). Specifically, we used the:

- 7-item general anxiety disorder scale (GAD-7), using four response categories: “0 = not at all”, “1 = several days”, “2 = more than half the days”, “3 = nearly every day”.
- 9-item depression scale (PHQ-9) whose criteria were also differentiated by the frequency of their occurrence: “0 = not at all”, “1 = several days”, “2 = more than half the days”, “3 = nearly every day”.
- 15-item somatisation scale (PHQ-15), charting somatic symptoms over the past four weeks, using three response categories: “0 = not at all”, “1 = bothered a little”, “2 = bothered a lot”.

The sum of the points was calculated for each scale. Scores between 5 and 9 points were considered “mildly impaired”, while 10–14 points described a “moderate” psychological impairment. A score ≥ 15 indicated clinically significant psychological distress.

The screening procedure targeted patients scoring 5 points or higher on any of the three symptom scales. As psychiatric symptoms may fluctuate daily and overlap significantly between the disorders (Löwe et al., 2008), we expected many patients to score above the cut-off on any of the scales, emphasising the low-threshold approach of our nurse-led care model. Patient flow is displayed in Fig. 1.

2.5. Intervention and control groups

2.5.1. Intervention group: nurse-led care

We implemented the involvement of nurses using case management and counselling techniques to promote self-management for ADSom patients. After GPs had commissioned patients to the trial, the nurses performed an initial assessment, checking patients' perspectives, personal resources and their motivation for change. In cooperation with the patients, they developed specific objectives to be achieved over the course of the trial. Together, they decided on a hierarchy of goals, from smaller to larger ones, consented and recorded in written form (Pauls and Reicherts, 2012).

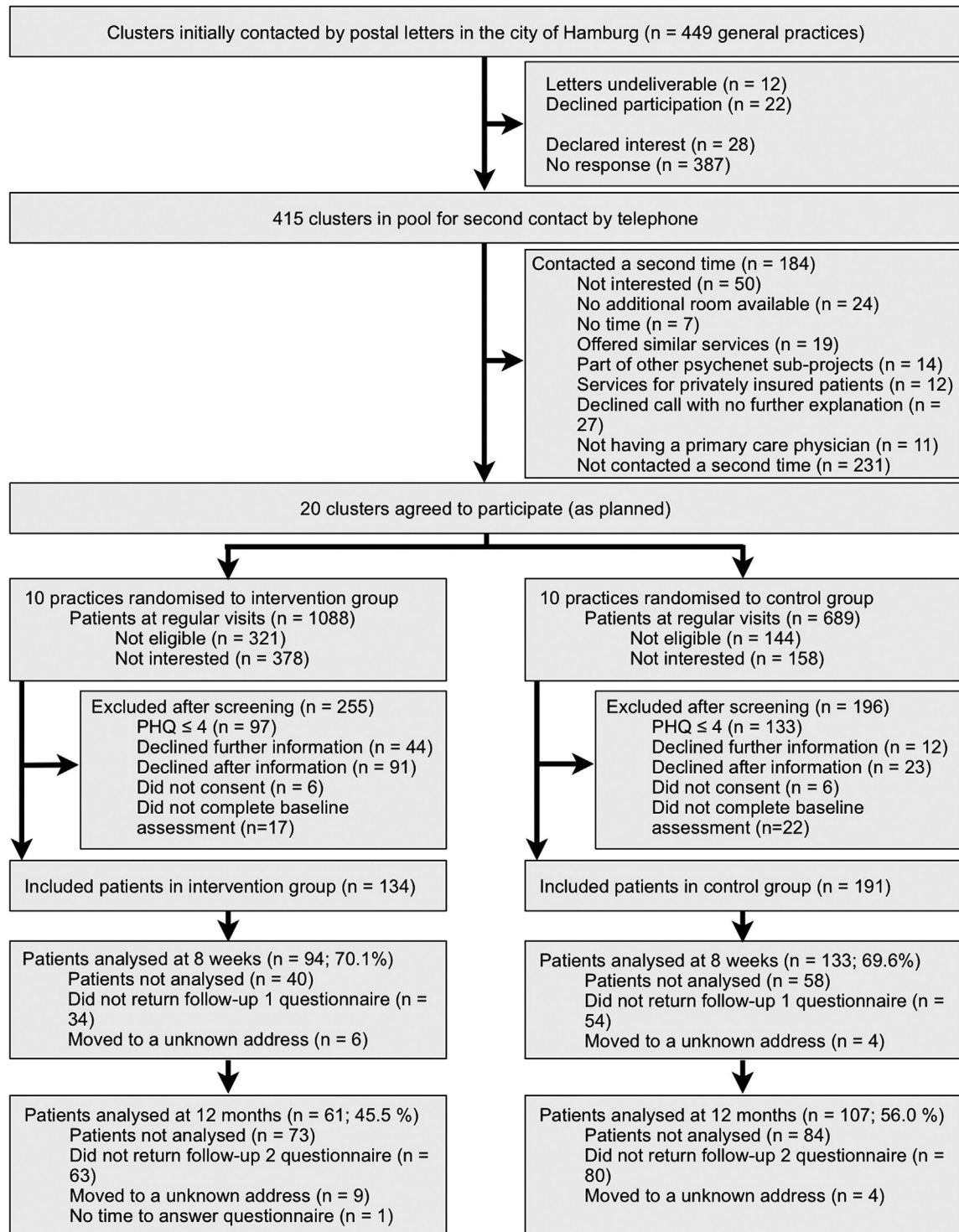


Fig. 1. CONSORT flowchart for the recruitment of primary care practices and patients.

Subsequently, the nurses and the patients developed strategies on how to achieve these goals. The planning of the measures and concrete self-management support took place in close consultation with the GPs. After reaching an agreement at the first session, further appointments were scheduled. Over the course of the trial, nurses could use the following nine modules of intervention to support their patients (Fig. 2).

Due to many overlapping symptoms in the field of anxiety, depressive and somatoform disorders (Löwe et al., 2008), disorder-

overlapping modules were developed. We followed the German treatment guidelines for anxiety, depression and non-specific, functional and somatoform physical complaints (<http://www.awmf.de>), particularly those referring to non-medical recommendations:

- Honouring the patients' treatment preferences, promoting the patients' cooperation, building a working relationship,

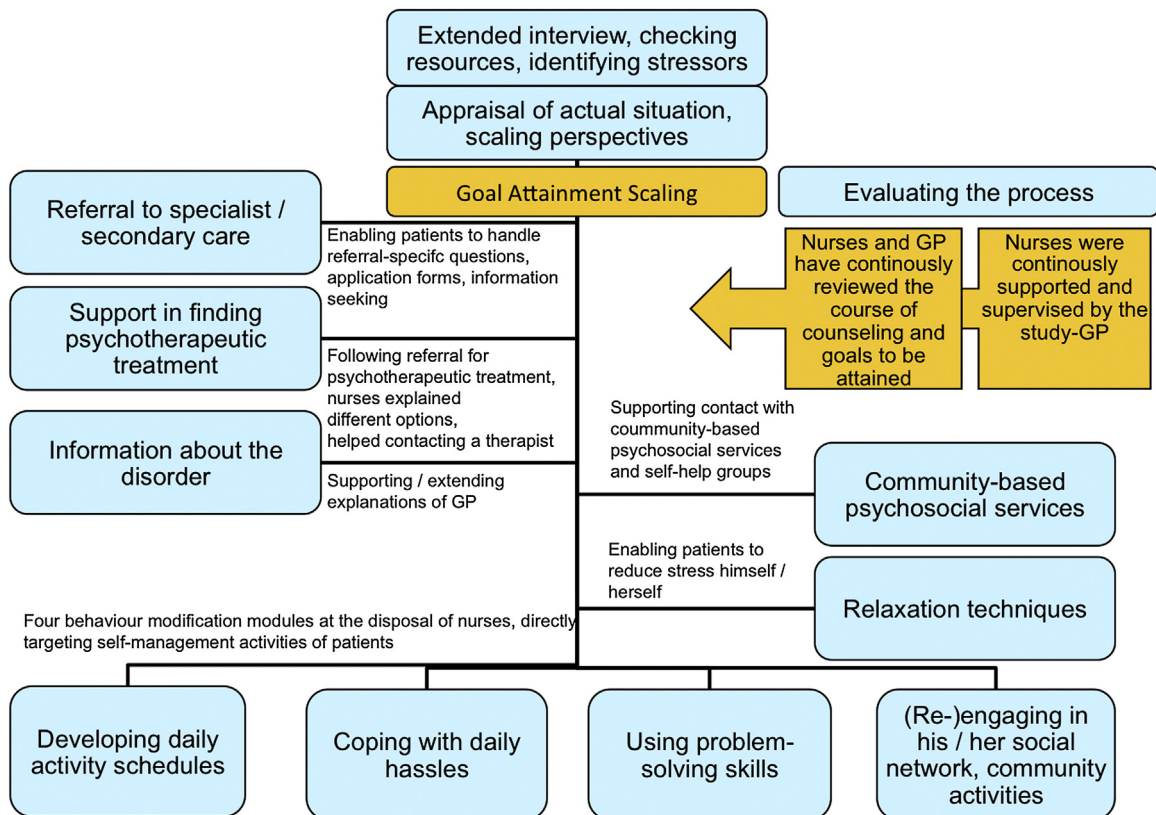


Fig. 2. Modules of the complex intervention.

explaining the symptoms, developing a biopsychosocial model of the disease

- Considering previous treatments, severity of illness, co-morbid disorders, suicide risk
- Considering substance abuse (nicotine, alcohol, medications, drugs), impairment in daily life, avoidance behaviour, persistent chronic stressors
- Offering psycho-educational counselling, integration into the social network, physical and social activation
- Checking availability of treatment options in the patients' local vicinity, their economic resources, costs of treatments, patients' time to access services, particularly if they are not on sick leave (schedule appointments and travel time).

Thus, the modules were intended to implement case management elements in counselling. Just as it was essential to offer low-threshold, behavioural modules: problem-solving techniques, relaxation exercises or strengthening self-confidence activities – all promoting better self-care, i.e. improving self-management.

The counselling process ended with a final interview in order to get patients' feedback, check goal attainment and preview further developments. The consultation process was supplemented by the following measures:

- Case conferences with the GP
- Nurses regularly met with the study GP (EP; GP and psychotherapist) for joint discussions (supervision)

2.5.2. Control group: routine care

Patients in the routine care arm of the trial were treated by their GPs according to general clinical practice for ADSom patients,

including medications and referral for other treatments as well as psychotherapy.

Patients in both, the intervention and control groups were reassessed 8 weeks and 12 months post baseline at all outcome measures in order to collect information on the course of symptoms and the sustainability of the intervention.

2.6. Practice nurses

Our nurse-led trial was designed to employ nurses as health service providers in primary care. Due to the complexity of the intervention and our expectations regarding clinical training and experience, we opted for (external) nurses and against the assignment of (internal) practice assistants even though working at an ambulatory practice is rather uncommon for nurses in Germany (Freund et al., 2015).

The SMADS project eventually hired four field nurses, two of them with a bachelor of science in nursing, one with a master's in health sciences, the fourth with a basic nursing education. Thoroughly instructed by the study GP (EP), the nurses went through a manualised program, comprising written documentation and practical training. In order to be prepared for their work at specific primary care practices, the nurses had to collect information about any (psychosocial) services in close vicinity of their practices. Full-time employed nurses were rotating between up to four different practices throughout the city of Hamburg.

2.7. Primary outcome measure

2.7.1. General self-efficacy (GSE scale)

We used the GSE scale (Schwarzer and Jerusalem, 1995), a questionnaire consisting of 10 items ranging from 1 = not at all true, 2 = hardly true, 3 = moderately true and 4 = exactly true, to assess

self-efficacy. The GSE is a valid, theoretically driven, globally utilised tool for assessing self-efficacy and has been translated into 31 languages. It measures a patient's general sense of perceived self-efficacy – the belief in one's own capabilities. It predicts the patient's ability to cope with everyday life, as well as his/her ability to adapt to new situations after experiencing all kinds of stressful life events (Scholz et al., 2002).

2.8. Secondary outcome measures

2.8.1. Patient health questionnaire (PHQ-D)

For statistical reasons, we decided against the use of the PHQ-D as the primary outcome even though we used it as a screening tool to include patients. As every PHQ-D scale is a single measure, not an overall symptom load, it would have been necessary to do a power calculation for every single scale, resulting in some infeasible patient numbers. Besides, this strategy was justified by the supreme goal of the study: Supporting self-management, measured indirectly, using self-efficacy as a proxy. Therefore, we used the results of the PHQ-D symptom scales as secondary outcomes.

2.8.2. EQ-5D quality of life

Due to the joint research project “psychnet – Hamburg Network for Mental Health” (<http://www.psychnet.de/en.html> – see funding section) we were asked to assess the patients' health-related quality of life using the EQ-5D questionnaire. The EQ-5D, a 5-item questionnaire developed by the EuroQoL Group (<http://www.euroqol.org>) with satisfying psychometric properties comprised five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Due to publications with reference values for the German general population (Hinz et al., 2006), we were able to calculate a country-specific index indicating a high quality of life if the index was 1 and a very low quality of life if the index approached 0.

2.8.3. Freiburg questionnaire of coping with illness (FQCI)

Coping strategies were assessed using the “Freiburg Questionnaire of Coping with Illness” (Muthny, 1989), an instrument based on the transactional coping concept of Lazarus and Folkman. It assessed a broad range of cognitive, behavioural and emotional aspects of coping with an illness. Investigators used the short, self-rating version, consisting of 35 items. It covered a broad range of cognitive, behavioural and emotional aspects of coping with an illness, clustered in five subscales: “depressive coping”, “active, problem-oriented coping”, “distraction”, “quest for meaning/religion” and “trivialising”. Patients were asked how many of the items applied to his or her situation last week: “not at all”, “little”, “moderately”, “much”, “very much”. Higher values indicated a stronger presence of the respective coping strategy.

2.9. Power calculation and sample size

We calculated a sample size of 220 patients based on an expected difference between the intervention and the control group of 2.7 points and a common standard deviation of 5.4 points on the General Self-Efficacy scale as the primary outcome 12 months post baseline. In order to achieve a sufficient study power of 80%, we had to take an intra-cluster correlation of 0.05 into consideration. Therefore we needed a minimum of 20 randomised clusters with an average cluster size of 11 patients. Anticipating a dropout rate of 33% on the patient level, we had to recruit 340 patients (on average 17 patients per cluster). The numbers and the patient flow are shown in Fig. 1.

2.10. Statistical analysis

A descriptive analysis of baseline characteristics was performed. For the primary outcome GSE, a linear mixed model with an adjustment for clusters, was calculated for the difference between the intervention and control groups after 12 months. Intraclass coefficients (ICC) will be reported. The variable “group” (IG vs. CG) was considered a fixed effect, while the practice was considered a random effect under the control of the baseline covariates (baseline values of GSE and other confounders such as the PHQ-D and patient's age, gender, education, and utilisation of the healthcare system, as well as GP's age, gender and status of practice (single or group)). The two-sided α -level was set to 0.05.

The analyses of the primary outcome were based on an intention-to-treat (ITT) analysis: All patients enrolled in the study, who had fully completed the baseline assessment, were assessed again at week 8 post baseline and 12 months post baseline. If patients did not answer the invitation for assessment or could not be reached at all (i.e. if they dropped out before these assessments), their last available values were used, their last observation was carried forward (LOCF method) for the ITT-analysis. We reported the results as adjusted mean differences with their 95% confidence intervals and effect sizes using Cohen's *d* as parameter. ICC will also be reported.

In further analyses, we calculated several analogous linear mixed models with repeated measurements of the GSE as primary outcome, and of the PHQ-D, EQ-5D and FQCI as secondary outcomes. We calculated the interaction between “group” (IG vs. CG) and “time” (8 weeks post baseline, 12 months post baseline).

In a sensitivity analysis, we calculated results of the observed cases (OC) for the primary outcome. This analysis will include only those patients who did not drop out and completed their final assessment. In a second sensitivity analysis, we replaced missing values using a multiple imputation approach (N = 100 imputations). Analyses were done using Stata 14.

3. Results

3.1. Patient flow and retention

325 patients fully completed the baseline assessment. 134 patients were enrolled in the intervention group (IG), 191 in the control group (CG) (Fig. 1). As of follow-up (median 69 days post baseline), 94 IG patients (70.1%) and 133 CG patients (69.3%) completed the assessment. Follow-up 2 (median 406 days post baseline) was completed by 61 IG patients (45.5% of baseline population) and 107 CG patients (56.0%). Dropouts did not differ in gender, education, employment or any of the primary or secondary outcomes at baseline. Only age was highly significant regarding withdrawing from or completing the trial (N = 157 dropouts, mean age 36.2, 95% CI 34.2–38.2; N = 168 completers, mean age 44.0, 95% CI 42.1–45.8; $p < 0.001$).

3.2. Utilisation of nurse-led care

Four nurses (2.5 full-time equivalents) provided self-management support for 125 of the 134 (93.3%) patients in the intervention group, who met a nurse for at least one scheduled appointment. On average, nurses provided care for 31.2 (range 16–41) patients, generally, each nurse offered 133.8 sessions (standard deviation 31.8; range 71–171). Overall, patients had four sessions (standard deviation 2.8; range 1–17), with a mean of 53.8 min at their disposal. 84.0% of the patients had two or more sessions, 21.6% had five or more sessions.

Table 1
Sample characteristics at baseline.

Variable	Intervention group (IG)	Control group (CG)
Number of patients	134	191
Age in years (mean \pm SD)	39.5 \pm 13.2	40.7 \pm 13.1
Gender (female) in % (95% CI)	66.4 (58.3–74.5)	67.0 (60.3–73.7)
Level of education – CASMIN classification in % (95% CI)		
Low	26.1 (18.6–33.6)	22.5 (16.5–28.5)
Middle	56.7 (48.2–65.2)	59.2 (52.1–66.2)
High	17.2 (10.7–23.6)	18.3 (12.8–23.8)
Employment situation in % (95% CI)		
Without occupation (incl. unemployed)	27.6 (19.9–35.3)	31.9 (25.3–28.6)
Minor occupation	5.2 (1.4–9.0)	7.3 (3.6–11.0)
Part-time occupation	18.7 (11.9–25.9)	15.2 (10.0–20.3)
Full-time occupation	47.0 (38.4–53.6)	44.0 (36.9–51.1)
No response	1.5 (0–3.6)	1.6 (0–3.3)

SD: Standard Deviation; CI: Confidence Interval; CASMIN Comparative Analysis of Social Mobility in Industrial Nations.

3.3. Baseline characteristics of study population

Baseline characteristics are displayed in Table 1. Age, gender, formal school education according to the “Comparative Analysis of Social Mobility in Industrial Nations”- (CASMIN) classification (Brauns and Steinmann, 1999) and occupational status were equally distributed between IG and CG at baseline.

3.4. Primary outcome

The between-group difference (IG vs. CG) for the primary outcome (self-efficacy) increased from the baseline by 1.65 points (95% CI 0.52 to 2.78) in favour of the intervention group ($p=0.004$) when applying the last observation carried forward imputation strategy. This amounted to a small Cohen's d effect size of 0.33. We found a significant interaction of time and group in the repeated measurement model, indicating a growing effect over time (Cohen's $d=0.44$) in favour of the intervention (see Table 2). This effect is plotted in Fig. 3.

3.5. Secondary outcomes

We found no interaction between time and group in the repeated measurement model for any of the secondary outcome measurements (see Table 2). At follow-up 2, the mean change in

somatic symptoms between the groups did not differ significantly (BL – T2 mean change 0.98 (–0.11 to 2.07); $p=0.078$; Cohen's $d=0.20$). Depressive symptoms differed significantly between the groups (BL – T2 mean change 1.05; 95% CI 0.01 to 2.08); $p=0.046$; Cohen's $d=0.23$). The anxiety scale showed an adjusted mean difference between groups of 1.28 points in symptom reduction (95% CI 0.36 to 2.21), significantly in favour of the IG ($p=0.006$; Cohen's $d=0.32$).

The adjusted mean group difference for the EQ-5D quality of life score did not show a significant change between the groups at follow-up 2. All pre-post group comparisons for the FQCI showed marginal but significant changes from baseline in “depressive coping” and “problem-oriented coping”. The effect size for “depressive coping” was 0.24 ($p=0.04$), for “active, problem-oriented coping” 0.28 ($p=0.012$). We could not find a substantial impact of the intervention in the other scales of the FQCI (compare Table 2).

3.6. Sensitivity analysis

Compliant with the study protocol, we investigated the robustness of the intention-to-treat results and the plausibility of our imputation strategy. Firstly, we calculated the results of all patients who completed the trial (observed cases). Secondly, we analysed the SMADS trial data using multiple imputation techniques.

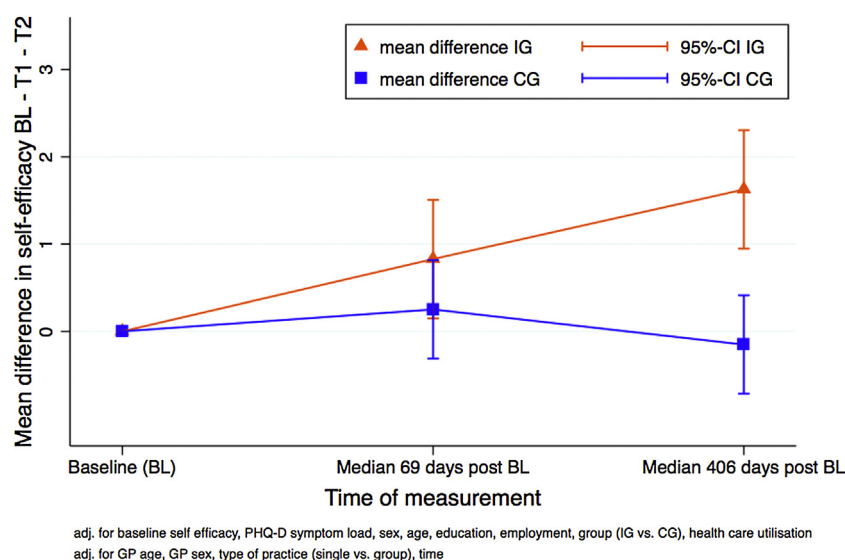


Fig. 3. Mean changes from baseline to follow-up 2 for the primary outcome self-efficacy (ITT-LOCF population, repeated measurement model).

Table 2
Effects of nurse-led intervention vs. routine care on primary and secondary outcomes.

Primary outcome	Intervention group		Control group		Between-group difference		Interaction group × time p-value	Effect size Cohen's d	ICC in %
	Unadjusted mean (SD); [N]	Change from baseline (ITT-LOCF) Adjusted mean difference (95% CI); [N]; p-value (BL – T1) (BL – T2)	Unadjusted mean (SD); [N]	Change from baseline (ITT-LOCF) Adjusted mean difference (95% CI); [N]; p-value (BL – T1) (BL – T2)	(IG vs. CG) (ITT-LOCF) Adjusted mean difference (95% CI); [N]; p-value (BL – T1) (BL – T2)				
Self-efficacy BL – T2									
GSE BL	25.3 (5.6); [134]	1.54 (0.70–2.38); [134]; ***	28.6 (5.8); [191]	–0.11 (–0.82 to 0.60); [191]; #	1.65 (0.52 to 2.78); [325]; **	n/a	0.33	11.3	
GSE T2	29.1 (6.1); [56]		28.1 (6.6); [105]						
Self-efficacy – repeated measurement model (BL – T1; BL – T2)									
GSE BL	25.3 (5.6); [134]		28.6 (5.8); [191]						
GSE T1	26.8 (6.1); [91]	0.83 (0.15–1.51); [134]; **	28.2 (6.1); [129]	0.25 (–0.31 to 0.82); [191]; #	–0.58 (–1.48 to 0.33); [325]; #	***	0.14	7.9	
GSE T2	29.1 (6.1); [56]	1.63 (0.95–2.31); [134]; ***	28.1 (6.6); [105]	–0.15 (–0.71 to 0.41); [191]; #	1.78 (0.87 to 2.68); [325]; ***		0.44		
Secondary outcomes – repeated measurement model (BL – T1; BL – T2)									
PHQ									
PHQ somatoform symptoms BL	12.1 (4.9); [134]		10.7 (5.0); [191]						
PHQ somatoform symptoms T1	9.1 (5.2); [94]	–1.98 (–2.78 to –1.17); [134]; ***	9.4 (5.9); [132]	–1.28 (–1.97 to –0.58); [191]; ***	0.70 (–0.39 to 1.79); [325]; #	#	0.15	13.8	
PHQ somatoform symptoms T2	7.8 (4.7); [59]	–2.67 (–3.48 to –1.86); [134]; ***	8.6 (5.2); [105]	–1.69 (–2.38 to –1.00); [191]; ***	0.98 (–0.11 to 2.07); [325]; #		0.20		
PHQ depressive symptoms BL	11.7 (5.5); [134]		8.7 (5.4); [191]						
PHQ depressive symptoms T1	8.2 (5.4); [94]	–1.81 (–2.58 to –1.04); [134]; ***	7.9 (5.9); [132]	–1.07 (–1.72 to –0.42); [191]; ***	0.74 (–0.29 to 1.78); [325]; #	#	0.16	11.5	
PHQ depressive symptoms T2	7.2 (5.2); [59]	–2.42 (–3.19 to –1.66); [134]; ***	7.5 (5.6); [105]	–1.38 (–2.03 to –0.72); [191]; ***	1.05 (0.01–2.08); [325]; *		0.23		
PHQ anxiety symptoms BL	9.6 (5.4); [134]		7.0 (5.3); [191]						
PHQ anxiety symptoms T1	6.7 (5.2); [94]	–1.55 (–2.24 to –0.86); [134]; ***	6.5 (5.3); [132]	–0.69 (–1.26 to –0.12); [191]; *	0.86 (–0.06 to 1.79); [325]; #	#	0.21	3.6	
PHQ anxiety symptoms T2	5.7 (4.9); [59]	–1.96 (–2.65 to –1.26); [134]; ***	6.5 (5.0); [105]	–0.67 (–1.24 to –0.10); [191]; *	1.28 (0.36–2.21); [325]; **		0.32		
EQ-5D – QoL									
EQ5D Index BL	0.8 (0.21); [133]		0.78 (0.25); [189]						
EQ5D Index T1	0.83 (0.21); [94]	0.03 (0.01–0.06); [133]; *	0.82 (0.24); [131]	0.03 (0.01–0.05); [189]; *	0 (–0.04 to 0.3); [322]; #	#	0.02	6.6	
EQ5D Index T2	0.85 (0.21); [53]	0.03 (0.0–0.06); [133]; *	0.79 (0.25); [94]	0.01 (–0.01 to 0.04); [189]; #	–0.02 (–0.05 to 0.02); [322]; #		0.10		
FQCI									
Depressive coping BL	2.9 (0.84); [127]		2.6 (0.81); [185]						
Depressive coping T1	2.5 (0.91); [89]	–0.24 (–0.34 to –0.14); [127]; ***	2.4 (0.88); [126]	–0.17 (–0.25 to –0.08); [185]; ***	0.07 (–0.07 to 0.21); [312]; #	#	0.12	5.4	
Depressive coping T2	2.3 (0.85); [53]	–0.29 (–0.39 to –0.18); [127]; ***	2.4 (0.9); [90]	–0.15 (–0.23 to –0.06); [185]; ***	0.14 (0.28); [312]; *		0.24		
Active, problem-oriented coping BL	3.1 (0.8); [127]		3.1 (0.8); [187]						
Active, problem-oriented coping T1	3.2 (0.78); [90]	0.03 (–0.08 to 0.15); [127]; #	3.1 (0.83); [125]	–0.10 (–0.19 to –0.01); [187]; *	–0.13 (–0.29 to 0.02); [314]; #	#	0.20	9.3	
Active, problem-oriented coping T2	3.2 (0.75); [53]	0.09 (–0.02 to 0.21); [127]; #	3.1 (0.74); [89]	–0.10 (–0.19 to –0.01); [187]; *	–0.19 (–0.35 to –0.04); [314]; *		0.28		
Distraction BL	3.0 (0.71); [130]		3.0 (0.7); [189]						
Distraction T1	3.0 (0.64); [92]	0.02 (–0.07 to 0.12); [130]; #	2.9 (0.78); [130]	–0.05 (–0.13 to 0.03); [189]; #	–0.08 (–0.21 to 0.06); [319]; #	#	0.13	<1	
Distraction T2	3.0 (0.79); [53]	0 (–0.10 to 0.09); [130]; #	3.1 (0.68); [91]	0.01 (–0.06 to 0.09); [189]; #	0.02 (–0.11 to 0.15); [319]; #		0.03		
Quest for meaning/religion BL	2.5 (0.71); [128]		2.5 (0.75); [184]						
Quest for meaning/religion T1	2.4 (0.68); [89]	–0.08 (–0.16 to 0); [128]; 0.053	2.2 (0.78); [127]	–0.07 (–0.13 to 0); [184]; *	0.01 (–0.09 to 0.12); [312]; #	#	0.03	4.0	
Quest for meaning/religion T2	2.3 (0.68); [52]	–0.08 (–0.17 to 0); [128]; 0.048	2.4 (0.71); [90]	–0.04 (–0.11 to 0.03); [184]; #	0.04 (–0.07 to 0.16); [312]; #		0.09		
Trivialising BL	2.8 (1.0); [125]		2.4 (0.84); [183]						
Trivialising T1	2.4 (1.0); [90]	–0.23 (–0.41 to –0.06); [125]; **	2.2 (0.99); [129]	–0.17 (–0.32 to –0.02); [183]; *	0.06 (–0.17 to 0.39); [308]; #	#	0.06	17.5	
Trivialising T2	2.3 (0.93); [55]	–0.34 (–0.51 to –0.16); [125]; ***	2.3 (0.99); [95]	–0.13 (–0.28 to 0.02); [183]; #	0.21 (–0.03 to 0.44); [308]; #		0.20		

SD: Standard Deviation; N: Numbers; ITT-LOCF: Intention-To-Treat Analysis Last Observation Carried Forward; CI: Confidence Interval; BL: Baseline; T1: median 69 days post baseline; T2: median 406 days post baseline; GSE: General Self-Efficacy Scale; PHQ: Patient Health Questionnaire; EQ-5D QoL: Euroqol-5D Quality of Life Scale; FQCI: Freiburg Questionnaire for Coping with Illness; ICC: Intraclass Coefficient, variance explained by cluster; data adjusted for patient's gender, age, education, utilisation of health care system, baseline measures, age of general practitioner, type of practice (single or group), gender of general practitioner; symbols for p-values: * p < 0.05; ** p < 0.01 *** p < 0.001 # p > 0.05; n/a not applicable

Table 3

Comparison of ITT-LOCF, OC and MI strategy to handle missing data in primary outcome self-efficacy calculations.

Primary outcome	Intervention group		Control group		Between-group difference (intervention vs. control)	Effect size Cohen's d
	Unadjusted mean (SD); [N]	Change from baseline Adjusted mean difference (95% CI); [N]; p-value	Unadjusted mean (SD); [N]	Change from baseline Adjusted mean difference (95% CI); [N]; p-value		
Self-efficacy T0 – T2 (ITT-LOCF)						
GSE BL	25.3 (5.6); [134]	1.54 (0.7–2.38); [134]; ***	28.6 (5.8); [191]	–0.11 (–0.82 to 0.6); [191]; #	1.65 (0.52–2.78); [325]; **	0.33
GSE T2	29.1 (6.1); [56]		28.1 (6.6); [105]			
Self-efficacy T0 –T2 (Observed cases analysis)						
GSE BL	25.3 (5.6); [134]		28.6 (5.8); [191]			0.51
GSE T2	29.1 (6.1); [56]	2.68 (1.09–4.27), [56]; ***	28.1 (6.6); [105]	–0.45 (–1.65 to 0.75); [105]; #	3.13 (1.07–5.18); [161]; **	
Self-efficacy T0 –T2 (Multiple imputation, N= 100 imputations)						
GSE BL	25.3 (5.6); [134]		28.6 (5.8); [191]			0.15
GSE T2	29.1 (6.1); [56]	1.39 (–0.10 to 2.88); [134]; #	28.1 (6.6); [105]	0.06 (–1.14 to 1.26); [191]; #	1.33 (–0.45 to 3.12); [325]; #	

SD: Standard Deviation; N: Numbers; ITT-LOCF: Intention-To-Treat Analysis Last Observation Carried Forward; CI: Confidence Interval; OC Observed Cases; MI Multiple Imputation; BL: Baseline; T2: median 406 days post baseline; GSE: General Self-Efficacy Scale; data adjusted for patient's sex, age, education, utilisation of health care system, GSE at baseline, age of general practitioner, type of practice (single or group), sex of general practitioner; symbols for p-values: * p < 0.05; ** p < 0.01; *** p < 0.001; # p > 0.05

For the primary outcome variable, self-efficacy, the complete cases analysis confirmed the results of the ITT-LOCF analysis (see Table 3). IG members who fully completed the assessments, reported that they had increased their self-efficacy by 3.13 (95% CI 1.07 to 5.18; p=0.004; Cohen's d=0.51) compared to the CG members who also had fully completed the assessments.

Multiple imputations (N= 100 imputations) showed a similar magnitude of increase in self-efficacy in favour of the IG as in the ITT-LOCF approach – although it remained insignificant (mean change 1.33 points; 95% CI –0.45 to 3.12; p=0.147).

4. Discussion

This paper reports the results of the SMADS trial, the first nurse-led interventional study for patients with anxiety, depressive or somatic symptoms, implemented as a collaborative care model in primary care in Germany. Findings of this randomised controlled study indicate an increase in self-efficacy (used as a proxy for self-management) over a period of 12 months compared to patients in the control group. These results fit quite well into the growing body of research confirming the important role of nurses in primary care (Christensen et al. 2008; Thota et al., 2012; Archer et al., 2012). Thus, nurses do improve patients' self-management skills as they utilise low threshold strategies, are at eye level with their patients, pass on information and enhance patients' self-care.

An extended program to support self-management in patients with psychological symptoms in primary care enhanced their self-efficacy – a result explained primarily through the broad range of options our nurses were able to choose from in the modularised, complex intervention (Zimmermann et al., 2015a).

In order to facilitate the intervention, it is useful to evaluate a patient's motivation to change prior to the onset of the intervention (Zimmermann et al., 2015b). It may help to judge a patient's commitment to an intervention as well as to the goals to be attained in the time to come. Low motivation to change is associated with a very disproportionate conviction of a patient's self-efficacy, which can certainly uphold and eventually exacerbate anxious, depressive or somatic symptoms.

Nevertheless, a reduction in the PHQ symptom scores was observed in IG as well as in CG. The IG showed a higher symptom reduction as patients had higher baseline scores. The mean symptom reduction between groups showed small effects for

depressive and anxiety symptoms. This finding was much weaker than the results of other nurse-led, collaborative care interventions (Aragones et al., 2012; Oosterbaan et al., 2013; Richards et al., 2013), studies that were tailored to reduce depressive symptoms. But symptom reduction was just a secondary outcome of this intervention. One other reason for the lack of symptom reduction might have been the very low inclusion criterion of a minimum of 5 points on any of the PHQ-D (anxiety or depressive or somatic symptoms) scales, leading to a lower average impairment as in any of the above mentioned studies.

4.1. Limitations of the study

We successfully implemented a collaborative care model in ten ambulatory healthcare practices in Germany. However, we had to tackle a broad range of problems. We faced enormous difficulties recruiting practices as it was completely foreign to German healthcare providers and German GPs to have a nurse do collaborative care. Practices needed to be personally convinced to take part, sometimes requiring up to five phone calls just to contact the GPs, who privately own and run their practices and are responsible for their commercial success. Nevertheless, there was a need for more healthcare research in the primary care setting in Germany. Yet, we had one question to consider: Would it be possible to integrate German primary care practices into a research infrastructure (Hammers-Pradier et al., 2012)? The problems and barriers we had to face as we set up the trial were similar to those of the only other trial that had employed nurses in the German ambulatory practice setting (Herber et al., 2009).

After we had recruited the necessary number of practices, more problems had to be solved. In Germany, recruiting patients for an interventional study where a nurse provided patient services could only be done after a GP had delegated medicinal work to the nurse. Thus, patients were screened using the PHQ-D, but it were the GPs who decided whom of the patients they were going to ask to take part in the interventional study. This selection bias could not be appropriately addressed in an open label trial.

As shown in the results section (Table 2), the selection bias led to differing baseline values of primary and secondary outcomes between the intervention and the control group. In order to evaluate the impact of these differences, we applied Bland-Altman-Plots (Bland and Altman, 1995; Bland and Altman, 2010) to

our data to observe whether or not the groups were comparable over time. We used these plots to check if we could compare the different baseline values of IG and CG. The plots (not shown, but available from the authors) put the arithmetic mean of the two groups on the x-axis and the mean group difference on the y axis, casting their respective regression lines. As these lines did not cross each other, the baseline and follow-up values of both groups were comparable even though the baseline values differed significantly. We plotted graphs for all outcomes and found no crossing regression lines.

Additionally, the attrition bias was an important limitation of the SMADS study. Firstly, we did not reach the number of patients we needed to recruit according to the power calculation. Secondly, we intended to achieve an 80% power for the trial, but we failed to reach the target as we lost too many patients to follow-up. Thirdly, our ICCs showed a high variation, most of them being greater than the expected 0.05. Fourthly, the issue of handling missing endpoint values complicated the data interpretation: There is little evidence on how much missing data can be adequately handled by any method, ITT-LOCF or multiple imputations. In a simulation study, [Unnebrink and Windeler \(2001\)](#) found imputation methods suitable for dropout rates of less than twenty per cent and similar courses of disorders. The authors could not give recommendations for larger dropout rates. In our study, 45.5% of patients in the intervention and 56.0% of patients in the control group had dropped out before follow-up 2. We reported our ITT-results using the last available values of the patients (LOCF method). We tested the robustness of our results, using an observed cases analysis and a multiple imputation analysis. Results of the observed cases supported the trend of our results, an increased self-efficacy in the IG, multiple imputation did not.

Finally, we deliberately did not evaluate any economic outcome. Implementation and organisational costs greatly outweighed any possible economic benefit. Only a much larger study over a much longer period of observation, documenting any utilisation of the healthcare system in cooperation with statutory health insurance companies, might meet these targets.

4.2. Strengths of the study

Nonetheless, against all odds, we set up the SMADS trial in a very sceptical healthcare environment. We recruited a reasonable number of patients to broaden the scope of patients in need: patients usually not properly provided with optimal care. Although dropout rates were high, and the resulting study power was insufficient, LOCF-ITT data showed a significant increase in self-efficacy. The IG showed a significantly lower self-efficacy at baseline compared to the CG. But the IG patients' self-efficacy noticeably increased at 12 months post baseline, now scoring significantly better than the CG at that time.

We were the first to introduce a nurse to work collaboratively with a GP in Germany's healthcare system, to improve healthcare for patients with anxiety, depressive or somatic symptoms. We implemented a complex interventional study and showed the study to be feasible. The SMADS trial recruited patients with low and high psychological impairment, using a low cut-off for inclusion. In doing so, we wanted to cover several aspects of prevention, hoping that our efforts to offer patients early support would prevent aggravating, chronic psychosomatic impairment later on in their lives.

5. Conclusion

A low threshold, nurse-led intervention, implemented as a collaborative care model in ten primary care practices in Germany, increased self-efficacy in patients with anxiety, depression or

somatic symptoms compared to patients of ten control practices. For the first time in the German healthcare system, the SMADS trial validated the belief that a nurse could successfully complement the work of a general practitioner by introducing new case management elements into primary care. This was especially true when it came to self-management support for patients with psychosomatic symptoms, targeting their psychosocial needs. Nevertheless, results need to be confirmed through further research by more powerful trials, while taking the specific situation of primary care in Germany into account.

Conflicts of interest

None.

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References

- Aragones, E., Pinol, J.L., Caballero, A., Lopez-Cortacans, G., Casasa, P., Hernandez, J.M., Badia, W., Folch, S., 2012. Effectiveness of a multi-component programme for managing depression in primary care: a cluster randomized trial. *The INDI project. J. Affect. Disord.* 142 (1–3), 297–305.
- Archer, J., Bower, P., Gilbody, S., Lovell, K., Richards, D., Gask, L., Dickens, C., Coventry, P., 2012. Collaborative care for depression and anxiety problems. *Cochrane Database Syst. Rev.* 10, CD006525.
- Barlow, J.H., Ellard, D.R., Hainsworth, J.M., Jones, F.R., Fisher, A., 2005. A review of self-management interventions for panic disorders, phobias and obsessive-compulsive disorders. *Acta Psychiatr. Scand.* 111 (4), 272–285.
- Bland, J.M., Altman, D.G., 1995. Comparing methods of measurement: why plotting difference against standard method is misleading. *Lancet* 346 (8982), 1085–1087.
- Bland, J.M., Altman, D.G., 2010. Statistical methods for assessing agreement between two methods of clinical measurement. *Int. J. Nurs. Stud.* 47, 931–936.
- Bodenheimer, T., Lorig, K., Holman, H., Grumbach, K., 2002. Patient self-management of chronic disease in primary care. *JAMA* 288 (19), 2469–2475.

- Brauns, H., Steinmann, S., 1999. Educational reform in France, west-Germany, the United Kingdom and Hungary: updating the CASMIN educational classification. *ZUMA Nachrichten* 23, 7–44.
- Christensen, H., Griffiths, K.M., Gulliver, A., Clack, D., Kljakovic, M., Wells, L., 2008. Models in the delivery of depression care: a systematic review of randomised and controlled intervention trials. *BMC Fam. Pract.* 9, 25.
- Ekers, D., Murphy, R., Archer, J., Ebenezer, C., Kemp, D., Gilbody, S., 2013. Nurse-delivered collaborative care for depression and long-term physical conditions: a systematic review and meta-analysis. *J. Affect. Disord.* 149 (1–3), 14–22.
- Freund, T., Gensichen, J., Goetz, K., Szecsenyi, J., Mahler, C., 2013. Evaluating self-efficacy for managing chronic disease: psychometric properties of the six-item self-efficacy scale in Germany. *J. Eval. Clin. Pract.* 19 (1), 39–43.
- Freund, T., Everett, C., Griffiths, P., Hudon, C., Naccarella, L., Laurant, M., 2015. Skill mix, roles and remuneration in the primary care workforce: who are the healthcare professionals in the primary care teams across the world? *Int. J. Nurs. Stud.* 52 (3), 727–743.
- Gilbody, S., Whitty, P., Grimshaw, J., Thomas, R., 2003. Educational and organizational interventions to improve the management of depression in primary care: a systematic review. *JAMA* 289 (23), 3145–3151.
- Gräfe, K., Zipfel, S., Herzog, W., Löwe, B., 2004. Screening for psychiatric disorders with the Patient Health Questionnaire (PHQ). Results from the German validation study. *Diagnostica* 4, 171–181.
- Grabe, H.J., Baumeister, S.E., John, U., Freyberger, H.J., Volzke, H., 2009. Association of mental distress with health care utilization and costs: a 5-year observation in a general population. *Soc. Psychiatry Psychiatr. Epidemiol.* 44 (10), 835–844.
- Gunn, J., Diggins, J., Hegarty, K., Blashki, G., 2006. A systematic review of complex system interventions designed to increase recovery from depression in primary care. *BMC Health Serv. Res.* 6, 88.
- Härter, M., Kentgens, M., Brandes, A., Bock, T., Dirmaier, J., Erzberger, M., Fürstenberg, W., Hillebrandt, B., Karow, A., von dem Knesebeck, O., König, H. H., Löwe, B., Meyer, H.J., Romer, G., Rouhiainen, T., Scherer, M., Thomasius, R., Watzke, B., Wegscheider, K., Lambert, M., 2012. Rationale and content of psychenet: the Hamburg network for mental health. *Eur. Arch. Psychiatr. Clin. Neurosci.* 262 (Suppl. 2), 57–63.
- Herber, O.R., Schnepf, W., Rieger, M.A., 2009. Recruitment rates and reasons for community physicians' non-participation in an interdisciplinary intervention study on leg ulceration. *BMC Med. Res. Meth.* 9, 61.
- Hinz, A., Klaiberg, A., Brähler, E., König, H.H., 2006. The quality of life questionnaire EQ-5D: modelling and norm values for the general population. *Psychother. Psych. Med.* 56, 42–48.
- Hummers-Pradier, E., Bleidorn, J., Schmiemann, G., Joos, S., Becker, A., Altiner, A., Chenot, J.F., Scherer, M., 2012. General practice-based clinical trials in Germany – a problem analysis. *Trials* 13, 205.
- Kroenke, K., Spitzer, R.L., Williams, J.B., Löwe, B., 2010. The patient health questionnaire somatic, anxiety, and depressive symptom scales: a systematic review. *Gen. Hosp. Psychiatry* 32 (4), 345–359.
- Löwe, B., Spitzer, R.L., Williams, J.B., Mussell, M., Schellberg, D., Kroenke, K., 2008. Depression, anxiety and somatization in primary care: syndrome overlap and functional impairment. *Gen. Hosp. Psychiatry* 30 (3), 191–199.
- Muthny, F.A., 1989. Freiburg Questionnaire on Coping with Illness – Manual. Beltz Test GmbH, Weinheim.
- Olesen, J., Gustavsson, A., Svensson, M., Wittchen, H.U., Jonsson, B., 2012. The economic cost of brain disorders in Europe. *Eur. J. Neurol.* 19 (1), 155–162.
- Oosterbaan, D.B., Verbraak, M.J., Terluin, B., Hoogendoorn, A.W., Peyrot, W.J., Muntingh, A., van Balkom, A.J., 2013. Collaborative stepped care v. care as usual for common mental disorders: 8-month, cluster randomised controlled trial. *Br. J. Psychiatry* 203 (2), 132–139.
- Pauls, H., Reicherts, M., 2012. Goal Orientation and Goal Achievement Analysis in Psychosocial Case Management. A Working Tool for Counselling, Social Work, Socio- und Psychotherapy. ZKS-Publishing: Coburg; IPSCG, Weitraamsdorf.
- Richards, D.A., Hill, J.J., Gask, L., Lovell, K., Chew-Graham, C., Bower, P., Cape, J., Pilling, S., Araya, R., Kessler, D., Bland, J.M., Green, C., Gilbody, S., Lewis, G., Manning, C., Hughes-Morley, A., Barkham, M., 2013. Clinical effectiveness of collaborative care for depression in UK primary care (CADET): cluster randomised controlled trial. *BMJ* 347, f4913.
- Scholz, U., Gutiérrez-Doña, B., Sud, S., Schwarzer, R., 2002. Is general self-efficacy a universal construct? Psychometric findings from 25 countries. *Eur. J. Psychol. Assess.* 18 (3), 242–251.
- Schwarzer, R., Jerusalem, M., 1995. Generalized self-efficacy scale. In: Weinman, J., Wright, S., Johnston, M. (Eds.), *Measures in Health Psychology: A User's Portfolio. Causal and Control Beliefs*. NFER-Nelson, Windsor, UK, pp. 35–37.
- Thielke, S., Vannoy, S., Unutzer, J., 2007. Integrating mental health and primary care. *Prim. Care Clin. Office Pract.* 34 (3), 571–592.
- Thota, A.B., Sipe, T.A., Byard, G.J., Zometa, C.S., Hahn, R.A., McKnight-Eily, L.R., Chapman, D.P., Abraido-Lanza, A.F., Pearson, J.L., Anderson, C.W., Gelenberg, A.J., Hennessy, K.D., Duffy, F.F., Vernon-Smile, M.E., Nease Jr., D.E., Williams, S.P., 2012. Collaborative care to improve the management of depressive disorders: a community guide systematic review and meta-analysis. *Am. J. Prev. Med.* 42 (5), 525–538.
- Toft, T., Fink, P., Oerboel, E., Christensen, K., Frostholm, L., Olesen, F., 2005. Mental disorders in primary care: prevalence and co-morbidity among disorders. Results from the functional illness in primary care (FIP) study. *Psychol. Med.* 35 (8), 1175–1184.
- Tyrer, H., Tyrer, P., Lisseman-Stones, Y., McAllister, S., Cooper, S., Salkovskis, P., Crawford, M.J., Dupont, S., Green, J., Murphy, D., Wang, D., 2015. Therapist differences in a randomised trial of the outcome of cognitive behaviour therapy for health anxiety in medical patients. *Int. J. Nurs. Stud.* 52 (3), 686–694.
- Unnebrink, K., Windeler, J., 2001. Intention-to-treat: methods for dealing with missing values in clinical trials of progressively deteriorating diseases. *Stat. Med.* 20 (24), 3931–3946.
- Wagner, E.H., 2000. The role of patient care teams in chronic disease management. *BMJ* 320 (7234), 569–572.
- Zimmermann, T., Puschmann, E., Ebersbach, M., Daubmann, A., Steinmann, S., Scherer, M., 2014. Effectiveness of a primary care based complex intervention to promote self-management in patients presenting psychiatric symptoms: study protocol of a cluster-randomized controlled trial. *BMC Psychiatry* 14, 2.
- Zimmermann, T., Puschmann, E., Porzelt, S., Ebersbach, M., Ernst, A., Thomsen, T., Scherer, M., 2015a. Self-management support in primary care. Program for a low-threshold, complex, psychosocial, nurse-led intervention in the general practice. *Z. Allgemeinmed.* 91 (11), 456–462.
- Zimmermann, T., Puschmann, E., Porzelt, S., Ebersbach, M., Ernst, A., Thomsen, P., Scherer, M., 2015b. Promoting self-management in primary care – the association of motivation for change, self-efficacy and psychological distress prior to the onset of intervention. *Psychiatr. Praxis.* 42 (Suppl. 1), S44–48.