The effect of a short integrated study skills programme for first-year

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The effect of a short integrated study skills programme for first-year medical students at risk of failure: A randomised controlled trial

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Abstract

Background: There is a need for outcome-based studies on strategies for supporting at-risk medical students that use long-term follow-up and contemporaneous controls.

Aim: To measure the effect of a short integrated study skills programme (SSP) on the study progress of at-risk medical students.

Methods: First-year students identified as at-risk of academic failure at 7 months after enrolment were invited to participate in the randomised controlled trial. Participants were randomly assigned to the SSP group or to a control group receiving standard academic support. Effects of SSP were measured on the short (passed first exam after intervention), medium (obtained enough credits to proceed to second year) and long term (completed first-year curriculum within 2 years).

Results: SSP participants ($n = 43$) more often passed the first exam after the intervention than controls ($n = 41$; 30% versus 12%; $X^2(1) = 4.06$, $p < 0.005$, effect size = 0.22), in particular those who had previously passed at least one exam. No medium or long-term effect was found. Participants who had attended four or five SSP sessions outperformed those who had attended fewer sessions on all outcome measures.

Conclusion: A short, integrated SSP benefited some, but not all students. Our advice is to focus support efforts on at-risk students who have demonstrated commitment and academic potential.

Introduction

Not all students cope successfully with the demands of medical school, and this may result in study delay or dropout. Medical schools that wish to reduce delay or dropout will need to provide timely support for students who are experiencing academic difficulties. Despite the fact that the importance of early intervention is well recognised, little is known about effective strategies for supporting at-risk medical students (Cleland et al. 2005; Yates & James 2006; Hauer et al. 2009). In this study, we explored the efficacy of a short study skills programme (SSP) for first-year medical students who are at risk of failure.

Most medical schools provide some form of academic support (Coles 1993; Saks & Karl 2004), but there appears to be no consensus on the best approach to help underperforming medical students. Moreover, the support provided does not always meet the needs of those seeking assistance (Paul et al. 2009). Recently, several authors have tried to offer guidance on how to support underperforming medical students, based on surveys, literature or the learning sciences. The consensus seems to be that successful support programmes should be focused on both skills development and content boosting (Saks & Karl 2004; Mattick & Knight 2007). However, evidence of the effect of such programmes on medical school performance is scarce (McGrath & McQuail 2004; Saks & Karl 2004; Burch et al. 2007). Winston et al. (2010a) reported positive effects of a mandatory cognitive skills programme for students who had failed and subsequently repeated their first semester. In a follow-up study, they concluded that this programme was successful since it: (1) challenged students' conceptions of learning, (2) had a group-based approach with skilled facilitators and (3) took into account a blend of motivational and cognitive factors and the complex interplay between the student and the learning environment (Winston et al. 2010b). Others suggested that study skills interventions should be content-specific and be focused on the specific problems of individual students (Hattie et al. 1996; Sayer et al. 2002; Prebble et al. 2004; Cleland et al. 2005). According to Hauer et al. (2009), we can learn from the learning sciences that remediation activities should offer

Practice points

- A short, integrated SSP improved short-term performance of at-risk students who had previously passed at least one exam.
- Participants who had attended at least 80% of the SSP sessions outperformed those who had attended fewer sessions on the short, medium and long term.
- Support efforts should be focused on at-risk students who have demonstrated commitment and academic potential.

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opportunities for deliberate practice followed by feedback, in order to gain knowledge and to develop skills.

Despite recent efforts described in the medical education literature, still little is known about the effectiveness of support (Hauer et al. 2009). A first reason is that studies evaluating support efforts often lack long-term follow-up (Hauer et al. 2008, 2009). Hattie et al. (1996) distinguished between study skills interventions aimed at enhancing performances that were either closely related – near transfer – or distantly related to the training task – far transfer. In other words, study skills interventions can be aimed at passing a specific (subsequent) exam, or at acquiring generic study skills in order to enhance performance at future exams. Especially the latter is difficult to achieve, as was recently shown by Pell et al. (2012).

Another reason for the uncertain outcomes of support programmes is the often less than optimal study design used in intervention studies. Several studies revealed positive outcomes for support programmes; however, they either had small sample sizes (Sayer et al. 2002; Denison et al. 2006), or had to rely on historical controls (Winston et al. 2010a), or were restricted by a retrospective design (Cleland et al. 2010). A recent review on remediation practices across the continuum from medical school to practice yielded surprisingly few studies evaluating remediation efforts and none of these included a contemporaneous control group of low performers who did not receive remediation (Hauer et al. 2009).

Therefore, the main objective of this study was to measure the effect of a short integrated SSP on the study progress of 'students at risk'. This study adds to previous studies by utilising a randomised controlled design to study the short, medium and long-term benefits of an academic support programme for students who were considered most at risk of failure based on their first-semester results.

Method

Context

This study was performed at the Erasmus MC Medical School, Rotterdam, the Netherlands. The integrated and theme-oriented curriculum of this school comprises a 3-year bachelor followed by a 3-year master. The first year of the bachelor of medicine is divided into three thematic blocks of 11–16 weeks and includes nine written examinations. One resit per exam is offered in the summer. Each examination qualifies the candidate for a fixed number of credits under the European Credit Transfer System. One credit equals 28 h of study; 60 credits represent the maximum number achievable in 1 year.

In 2005, Erasmus MC Medical School implemented an Academic Dismissal policy requiring students to make satisfactory study progress (Stegers-Jager et al. 2011). Failure to meet set standards leads first to an academic warning (at 4 and 7 months) or academic probation (at 12 months) and then, if the substandard progress continues, to academic dismissal (at 24 months). Students whose progress is substandard at 7 months – at-risk students – are informed that they have to attend an academic guidance interview with a student counsellor.

Study design

This study was a parallel-group randomised controlled trial (RCT), in which the standard academic support – the academic guidance interview – was compared to a combination of the standard support and a newly developed short integrated SSP.

Participants and procedure

Students of the 2008 and 2009 cohorts who were identified as most at risk of academic dismissal at 7 months after enrolment, were invited to participate in the RCT ($n = 88$ and 57). Students were defined as most at risk when they had failed at least one of the first three exams and also had failed both exams four and five. We chose these two criteria on the basis of data of five preceding cohorts, which showed that students who met both criteria had a chance of 0.63 to fail to meet the standard set at 24 months (Stegers-Jager & Splinter 2008). Trial participants were allocated to the SSP group or a control group by stratified random sampling. Stratification was based on the number of exams passed at 7 months after enrolment (either 0 or 1–2).

Data on academic progress were derived from the university student administration system. The study was carried out in accordance with the Declaration of Helsinki. Participation was voluntarily, written informed consent was obtained from all participants, and anonymity was guaranteed. No plausible harm to participants could arise from our study. According to Dutch law, this study was exempt from ethical approval requirements.

Sample size calculation

Based on results from previous cohorts of first-year students at Erasmus MC Medical School, the expected group size for eligible participants was about 60. In the past years, about 39% of this group of students passed the first-year programme within 2 years. To detect an increase in passing rate of 30% – which is in agreement with the study of Winston et al. (2010a) – with a two-sided 5% significance level and a power of 80%, a sample size of 57 students per group was necessary, given an anticipated dropout rate of 10%. To recruit this number of students, we planned two runs of the trial (each with an expected number of 60 participants), in May/June 2009 and May/June 2010.

Standard academic support

Students in both the SSP and control groups received the standard academic support: they had to attend a 30-min academic guidance interview with a student counsellor. The semi-structured interviews focused on issues such as causes for academic failure and plans for the re-examination period. Students were encouraged to reflect on their current study approaches and to generate a remedial action plan. Where appropriate, students were informed about generic study skills courses, such as dealing with test anxiety or tackling procrastination.

Study skills programme

In both runs, students in the SSP group were divided into two study groups, which met on five Fridays for 1.5 h during the May/June course. Each session began with participants taking a multiple-choice quiz, which contained 10 pre-existing questions on the study material of the past week. In consultation with the teaching staff, the most relevant questions for each study week were selected from an existing item bank, containing items from previous exams. The results on the quizzes were used to structure further content discussion: difficult test items were explained step-by-step to demonstrate good study strategies and to identify any fallacies. This first part of the sessions was mainly aimed at content boosting (i.e. near transfer). The second part of the group sessions was focused on awareness and diagnosis of the individual causes for academic failure and on practicing various study skills, including time management, previewing, creating study guides and test taking. Students were provided with a syllabus, including handouts on study skills and assignments to complete either during the group sessions or at home. This second part of the sessions was aimed more at developing skills (i.e. far transfer). Participants were expected to attend all five sessions; therefore attendance was registered.

Second to fourth-year medical students were recruited as study group leaders. Eligibility criteria included a good grade in the relevant subject area and previous teaching experience. The study group leaders completed a half-day training session which covered relevant study skills and strategies, and programme logistics. They received standard compensation for teaching assistance.

The SSP was carefully designed taking educational experience and multi-disciplinary theory and practice into account. Previous research has shown that a SSP should take place in the first year, be content-specific and tied to the current study subject, be delivered by the instructor(s) involved and focus on the specific problems of individual students (Oosterhuis-Geers 1995; Hattie et al. 1996; Admiraal et al. 1999; Prebble et al. 2004). The use of well-trained senior students as 'role models' can also have positive effects (Prebble et al. 2004). Moreover, a SSP should be of good educational quality, reflect on current study approaches, demonstrate the different steps of a good study strategy, involve practice in diverse contexts and provide adequate feedback (Oosterhuis-Geers 1995). Finally, awareness and diagnosis of the individual causes of academic failure can lead to changes in study behaviour (Oosterhuis-Geers 1995).

Our integrated SSP fitted these guidelines: it was scheduled during the first year, was linked to a specific subject of study (May/June course), supported students in identifying their specific study problem and offered them tips and training focused on this particular problem. A deviation of the guidelines was the use of senior students instead of instructors; nonetheless, the instructors played a crucial role in designing the training material. Moreover, as stated above, a positive effect was expected from the use of well-trained senior students as role models. The syllabus and handouts were partly based on those developed by Winston et al. (2010a).

Baseline characteristics and outcome measures

Baseline characteristics. To enable valid comparisons, the control and SSP groups were contrasted on the baseline characteristics of gender, age, pre-university education grade point average (pu-GPA), and the number of exams passed at 7 months. pu-GPA represented a student's mean grade obtained during the final year of pre-university education. Final grades were based half on school examinations and half on the national examination.

Study progress. The main outcome measure of the study was study progress at the short, medium and long-term. The short-term outcome measure was 'passed the first exam after the intervention', the medium-term outcome measure was 'obtained enough credits to proceed to the second year' and the long-term outcome measure was 'completed the first-year programme within 2 years'. To proceed to the second year, a minimum of 40 credits is required; the complete first-year programme consists of 60 credits. We also explored the effects of the number of exams passed at baseline and of the number of sessions attended.

Statistical analysis

Categorical variables were expressed as percentages and continuous variables as mean ± standard deviation (SD). Differences in percentages were tested using chi-squared tests and differences in means using Student's *t*-test. The Breslow–Day test for homogeneity of odds ratios was used to explore whether there was an interaction between the number of exams passed at baseline and the treatment effect. A $p < 0.05$ was considered statistically significant. Effect sizes (ESs) were calculated directly from chi-squared tests with ES ≈ 0.10 indicating a small effect, ES ≈ 0.30 a medium effect, and ES ≈ 0.50 a large effect (Hojat & Xu 2004).

Results

Characteristics of the participants

In 2009, 57 at-risk students (65%) consented to participate in the study and were allocated to one of the two groups; in 2010, this number was 27 (47%; Figure 1).

There were no significant differences between the SSP and the control groups with respect to gender, mean age at the start of medical school, pu-GPA and the number of exams passed at 7 months after enrolment (Table 1).

Study progress

Significantly, more students in the SSP group than in the control group passed the first exam after the intervention (Table 2). Subgroup analysis revealed that there was an interaction between the number of exams passed at baseline and the effect of SSP: mainly students who had passed at least one exam before taking part in SSP benefited on the short term (Breslow–Day test: χ^2 (1) = 10.32; $p = 0.001$). For this particular group of students, significantly more students in the SSP

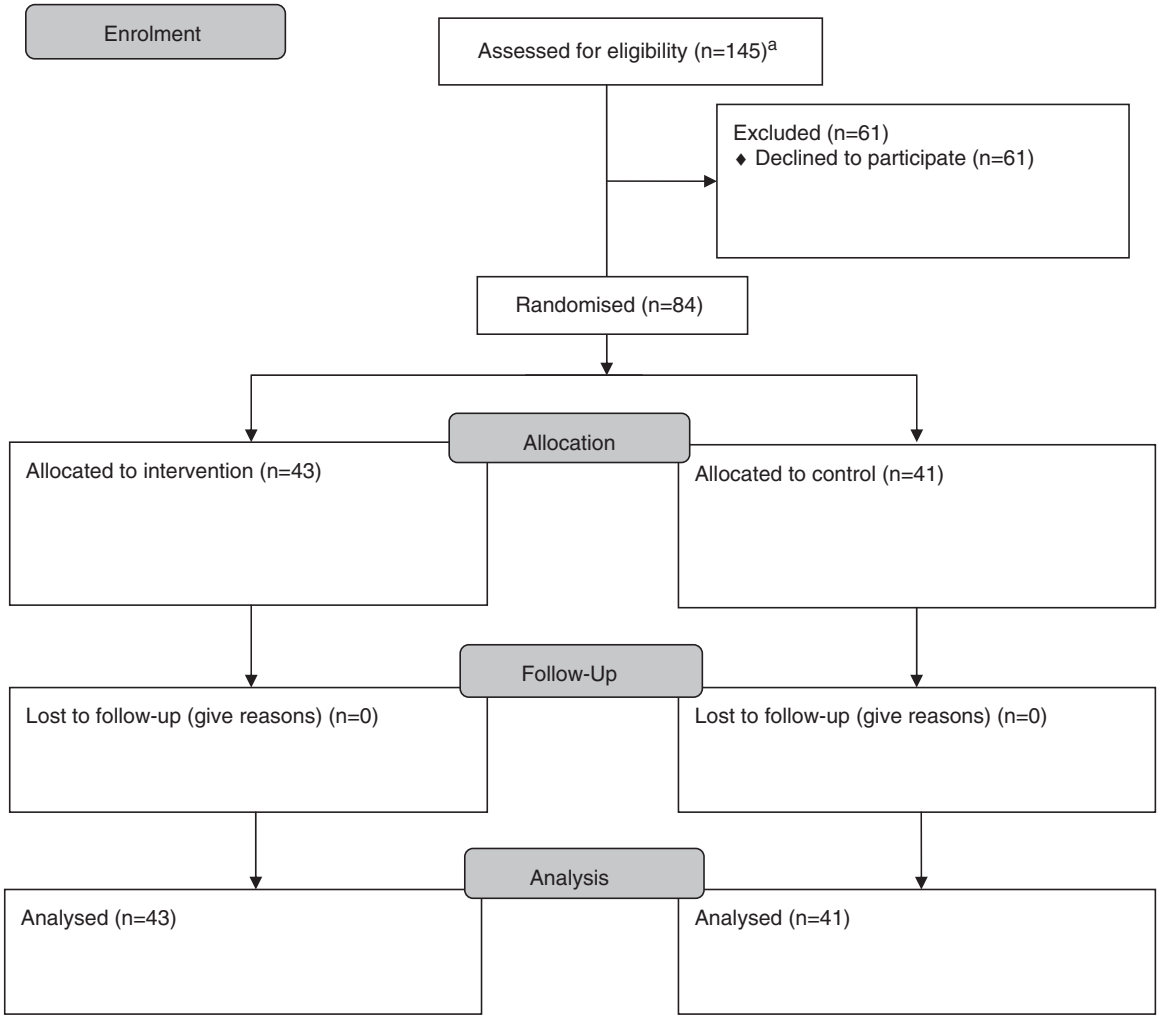

Figure 1. Participant flow.
Note: [a]A total of 18% of all first-year students entering in 2008 ($n=408$) and 2009 ($n=409$).

Table 1. Characteristics of participants by study arm at baseline.

	SSP group ($n=43$)	Control group ($n=41$)	Total	p-value
Mean age (SD), years	19.48 (1.00)	19.58 (1.79)	19.52 (1.45)	NS
Female sex, *n* (%)	26 (60.5)	23 (56.1)	49 (58.3)	NS
Mean pre-university GPA (SD)	6.65 (0.44)	6.62 (0.39)	6.64 (0.42)	NS
Number of exams passed at 7 months, *n* (%)[a]				NS
0	23 (53.5)	19 (46.3)	42 (50.0)	
1–2	20 (46.5)	22 (53.7)	42 (50.0)	

Notes: SSP, study skills programme; SD, standard deviation; GPA, grade point average; NS, not significant.
[a]Maximum number of exams passed at 7 months is 5.

group (12; 60.0%) than in the control group (2; 9.1%) passed the first exam after the intervention (χ^2 (1) = 12.22; $p=0.001$; ES = 0.54). For the students who had failed all exams before taking part in the intervention, the difference between the SSP and control groups was not significant. As to the medium and long-term outcomes, no statistically significant differences were found between the SSP and control groups on the number of students that were allowed to proceed to the second year, or the number of students that completed their first-year programme in time (Table 2).

Although students in the SSP group consented to attend all five sessions, only 22 (55%) of them actually attended at least four of the five sessions. Students who attended at least four sessions more often passed the first exam after the intervention than students who attended one to three sessions (Table 3). They were also more often allowed to proceed to the second

Table 2. Academic progress of SSP participants, compared to controls.

	Group						
	SSP ($n = 43$)		Control ($n = 41$)		Statistics		
	n	Percent	*n*	Percent	X^2	*p*-value	ES
Short term							
Passed first exam	13	30.2	5	12.2	4.06	<0.05	0.22
Medium long term							
Proceeded to second year	10	23.3	10	24.4	0.02	NS	
Long term							
First year completion ≤2 years	21	48.8	20	48.8	0.00	NS	

Note: SSP, study skills programme; ES, effect size; NS, not significant.

Table 3. Academic progress of SSP participants, by attendance.

	Attendance SSP						
	0–3 ($n = 21$)		4–5 ($n = 22$)		Statistics		
	n	Percent	*n*	Percent	X^2	*p*-value	ES
Short term							
Passed first exam	2	9.5	11	50.0	8.35	<0.01	0.44
Medium long term							
Proceeded to second year	2	9.5	8	36.4	4.34	<0.05	0.32
Long term							
First year completion ≤2 years	6	28.6	15	68.2	6.75	<0.01	0.39

Note: SSP, study skills programme; ES, effect size.

year, and more often completed their first-year programme in time.

Discussion

This RCT indicates that the addition of a short integrated SSP to the standard academic support shows short-term gains for a subgroup of at-risk students. More specifically, SSP participants who had passed at least one exam before the intervention benefited in the short term compared to controls. Participants who attended at least 80% of the SSP sessions outperformed those who attended fewer sessions on the short, medium and long term.

The short-term gains found for our SSP support the findings of previous studies that did not use a randomised and controlled design (Sawyer et al. 1996; Cleland et al. 2010; Winston et al. 2010a). Despite the evidence for near transfer, our SSP failed to achieve far transfer. A possible explanation is that the participants were not able to use the knowledge and skills acquired during SSP in later subjects. Such transfer of knowledge and skills to new contexts is generally known to be difficult to achieve (Norman 2009). The challenge remains to find a good balance between teaching study skills in context, which is known to enhance performance, and enabling transfer of learned knowledge and skills to other contexts.

An additional explanation for the absence of medium and long-term effects – despite a positive short-term effect – might be that, rather than causing students to adopt new study skills, the intervention successfully restructured the learning environment by giving students frequent tasks and deadlines. Frequent tasks and deadlines make it easier for students to self-regulate their learning and increase their extrinsic motivation (Tuckman & Schouwenburg 2004). Especially, weekly quizzes have been suggested to be successful in 'forcing' students to seriously study on a timely basis. As time management is one of the main problems for medical students (Paul et al. 2009), future efforts should be aimed at exploring how this positive effect can be maintained beyond the duration of the intervention.

A final possible explanation for the lack of medium and long-term effects refers to the duration and the timing of the programme. It might be that our programme was too short to change study skills that students had previously acquired, usually over many years of education. Nevertheless, feedback from individual SSP participants revealed that in some cases, the five sessions were sufficient. We deliberately offered the programme later in the year in order to be able to identify students who were most at risk of failure and ensure sufficient time for the need for help to become manifest. However, others have claimed that interventions should be offered as early as possible (Burns 2006; Devoe et al. 2007). We agree with Winston et al. (2010a), that further research is needed into the duration and timing of study skills interventions. As suggested by Saxena et al. (2009), multiple types of support are probably required to effectively address the variety of at-risk students' needs.

Our study revealed that SSP participants who had passed at least one exam before the intervention benefited in the short term, while those who had not passed any exam did not. Possibly, a certain basic level of knowledge and skills is needed on which the programme can build. An implication of this finding is, that medical schools should consider carefully whom to invite for study skills interventions. Should the attention be focused on the most academically needy students – those who have failed all exams – or should it be shifted to students who have demonstrated academic potential – by passing at least one exam – who are more likely to benefit from limited support? The trend to shift the attention to more capable students – in the 1990s suggested by Muraskin (1997) – appears to become more widespread in educational practice, since these students are likely to be able to use limited resources available to greatest advantage.

In line with the results of earlier studies (Muraskin 1997; Winston et al. 2010a), increased attendance in the support programme was correlated with improved performance, both in the short and longer term. Although it might be tempting to enforce participation, or at least to strongly encourage participation, we are not totally convinced that this will yield the desired result. So far, mandatory SSPs have shown

conflicting results (Devoe et al. 2007; Winston et al. 2010a). It may be that, rather than the high attendance itself, student characteristics that lead to this high attendance cause the improved outcomes. As an example, it might be that students who succeed in attending all five sessions are better in time management or more committed to the medical course than those who fail to attend all sessions. Previous research has found strong relationships between participation in scheduled learning activities, motivational beliefs, learning strategies and first-year performance (Stegers-Jager et al. 2012). Future studies may want to investigate the relationship between attendance in support programmes and self-regulated learning skills.

The small sample size and the modest adherence to the intervention protocol may limit the conclusions on the utility of the intervention. The nature of the intervention also made it impossible to blind participants. Finally, there was inevitable risk of contamination in this trial. Although control group students were not allowed to attend the SSP sessions, we do not know to what extent the SSP group students shared SSP material with their fellow students. On the other hand, in this study the previously reported methodological limitations were overcome by using a randomised and controlled protocol rather than historical controls, and by considering short, medium and long-term effects. Moreover, the trial was run twice in order to obtain an acceptable sample size.

Conclusion

We used a RCT to determine the effect of a short integrated SSP on the study progress of 'students at risk'. The results of our study suggest that offering a short, integrated SSP to at-risk students benefits some, but not all students. The advice for medical schools is to focus support efforts on at-risk students who have demonstrated commitment and academic potential on the medical course.

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