

Decreasing students' stress through time management training: an intervention study

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Abstract The aim of this study was to examine the effects of a time management training program on perceived control of time and perceived stress in the context of higher education. Twenty-three undergraduate students attended a time management training intervention and reported demands, perceived stress and perceived control of time directly before 2 and 4 weeks after training. We used a “non-equivalent dependent variable design” (Cook and Campbell, *Quasi-experimentation: design and analysis for field settings*, p. 118, 1979) with perceived stress and perceived control of time as dependent variables, which should be influenced by the training, and demands as control variable, which should not be changed. As expected, perceived stress decreased and perceived control of time increased after training, whereas demands did not change. Therefore, time management training might be beneficial for undergraduate students' well-being. Nevertheless, more intervention studies in this field are necessary, especially with larger samples, to contribute to more robust results and conclusions.

Keywords Time management · Training · Stress · Student well-being

“The mental health of university students is an area of increasing concern worldwide” (Bayram and Bilgel 2008, p. 667). Bayram and Bilgel (2008) added the provocative question: “How long should the mental health of students, especially the alarming minor signs of depression, anxiety and stress, remain as a neglected public health problem in institutes of higher education?” (p. 671). In a recent study, 75 % of a sample of 212 community college students reported that they perceive at least moderate stress, and 13 % reported that they perceive high stress (Pierceall and Keim 2007). Only the remaining 12 % reported a low stress level (Pierceall and Keim 2007). Bewick et al. (2010) reported increased levels of stress for undergraduate students from all faculties throughout their study times compared to their levels of stress preceding entry. Other studies support the assumption of heightened stress levels for undergraduate students compared to non-student samples (e.g. Adlaf et al. 2001; Cotton et al. 2002). Adlaf et al. (2001), for example, showed higher stress levels for undergraduate students compared with the general population.

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Heightened levels of perceived stress are discussed as reasons for underachievement and dropout (Cotton et al. 2002; Lowe and Cook 2003), long-standing illnesses (Stewart-Brown et al. 2000) and depression (Pengilly and Dowd 2000). Furthermore, in the study of Pierceall and Keim (2007), students reported unhealthy coping strategies to deal with perceived stress such as drinking (39 %), smoking (36 %) and using illegal drugs (15 %). Such findings raise the question, what can be done to deal with high stress levels of students?

Different demands have been examined as reasons for perceived stress among students. Besides social integration (Wilcox et al. 2005), examinations (Abouserie 1994), changes concerning sleeping and eating habits (Ross et al. 1999) and financial concerns (Roberts et al. 2000), current research has shown that time-related demands are a serious problem for many students and associated with higher stress levels (Lowe and Cook 2003; Song et al. 2008; Wilcox et al. 2005). Such time-related demands include high workload, time pressure and the challenge of self-organized learning. Cotton et al. (2002), for example, identified time-related demands as an antecedent of perceived stress for undergraduates. Furthermore, time management seems to be a serious topic for many students (e.g. Lowe and Cook 2003; Maguire et al. 2001; Prescott and Simpson 2004; Van der Meer et al. 2010). Based on data from more than 1,000 undergraduate students, Van der Meer et al. (2010) described time management as “a considerable concern” (p. 781–782).

To successfully deal with time-related demands, time management interventions are recommended as a part of student support programs (Lynch 2008; Maguire et al. 2001; Unsworth and Kauter 2008; Van der Meer et al. 2010). Time management is seen as a coping strategy to deal with stressors and decrease feelings of stress (Adamson et al. 2004; Häfner et al. 2014). Nevertheless, “research concerning the effectiveness of time management training programmes is scarce” (Häfner et al. 2014, p. 3). Consequently, the development and study of time management interventions, especially for students, seem to be a research field, where further studies should be conducted. “It would seem that there is a long way to go before evidence-based time management interventions are available for this group” (Adamson et al. 2004, p. 275).

Adamson et al. (2004) examined the effect of a time management intervention on time management skills among students: The intervention had no effect on time management skills, and stress variables were not included in the study. Goodwin and Califf (2007) found a positive effect of time management training on performance. Stress variables were also not in the scope of their study. In a recent study, Häfner et al. (2014) found a positive effect of time management training on perceived control of time and perceived stress among students. They showed a preventive effect of time management training on perceived stress in a context of increasing external demands. While perceived stress increased in the control group, stress levels in the experimental group remained unchanged. Nevertheless, they did not show a decrease of perceived stress through time management training and focused on a rather short time period of 2 weeks to examine the effects after training. Furthermore, they did not explore the use of the taught time management strategies after training.

With respect to the scarce research, clear conclusions concerning the effect of time management training on perceived control of time and perceived stress among students cannot be drawn, although the question how to support students to deal with time-related challenges of their studies should be of major interest (Van der Meer et al. 2010): “Although it could be argued that students have the ultimate responsibility to plan their time and study in an effective way, we argue that universities have an important role to play in assisting students to develop the required skills” (p. 788). We found no intervention study presenting a decrease of perceived stress after time management training with a student sample.

The purpose of our study is twofold: (a) We want to extend the scarce research on effects of time management training on perceived control of time and perceived stress among students, and (b) in contrast to former studies (e.g. Häfner et al. 2014), we looked at the stability of the effects with two points of measurement after training.

Effective time management can be described “as a combination of time assessment, goal setting, planning, and monitoring activities” (Häfner and Stock 2010, p. 430). Time management is assumed as a helpful instrument to clarify goals, reduce goal conflicts, develop appropriate strategies to achieve the defined goals, anticipate and overcome obstacles and, as a consequence, foster feelings of control of time (Häfner and Stock 2010; Macan 1994).

So far, perceived control of time has been shown to be related to many indicators of perceived stress (Adams and Jex 1999; Claessens et al. 2004; Macan et al. 1990; Macan 1994; Nonis et al. 1998; Schwäble et al. 2009). The variable perceived control of time can be characterized as having a strong feeling of control over one’s time, being able to keep one’s deadlines, procrastinate little and being able to follow one’s plans (Macan et al. 1990; Häfner and Stock 2010). Perceived control of time has been discussed as a potential mediator between time management behaviour and perceived stress (Macan 1994; Claessens et al. 2004). It is assumed that better time management behaviour leads to increased perceived control of time, which, as a consequence, reduces stress levels (Macan 1994; Claessens et al. 2004). Therefore, perceived control of time can be described as a consequence of time management behaviour and as an antecedent of perceived stress. Perceived control of time is one of the most important outcome variables in time management research (Macan et al. 1990; Häfner and Stock 2010).

Although it is quite clear that more perceived control over one’s time is associated with less perceived stress, empirical research examining the effectiveness of time management behaviour and time management training with respect to perceived control of time as well as perceived stress is scarce (Claessens et al. 2007). Kearns and Gardiner (2007) pointed out: “Despite the high ‘guru-factor’ of time management, few claims have been subjected to empirical investigation” (p. 235). So far, some studies have explored relations between time management behaviour and different indicators of perceived stress with mixed results. Many different variables have been used to measure facets of perceived stress. Among them are as follows: hopelessness, state anxiety, psychological distress, somatic tension, job-induced tension, sorrow and worry.

While Bond and Feather (1988) reported significant correlations between time management behaviour and hopelessness and state anxiety, they found no significant correlation between time management behaviour and psychological distress in a sample of undergraduate students. Macan et al. (1990) found non-significant correlations between time management behaviour and job-induced and somatic tension as outcome variables among students. Kelly (2003) reported non-significant correlations between time management behaviour and sorrow in a sample of undergraduate students. In a recent study, Kearns and Gardiner (2007) found out that time management behaviours were not related to psychological distress for undergraduate and postgraduate students. With some exceptions, the expectation of a positive relationship between time management behaviour and different indicators of perceived stress for students cannot be supported.

Besides the relationship between time management behaviour and perceived stress, the impact of time management training on perceived stress has been explored. In a correlational study, Macan et al. (1990) found non-significant correlations between attendance at time management training and different indicators of perceived stress in a student sample. Häfner et al. (2014) showed a positive effect of time management training on perceived control of time and perceived stress.

With respect to the potential effects of time management behaviour and time management training on stress, it is also worthwhile to look at the occupational context. Some studies presented evidence for a moderate relationship between time management behaviour and different indicators of stress with samples of employees (Häfner et al. 2009; Jex and Elacqua 1999; Nonis and Sager 2003; Peeters and Rutte 2005). Concerning the effectiveness of time management training, Macan (1994) found non-significant relationships between attendance at time management training and job-induced and somatic tension for employees in a variety of jobs and concluded: “Contrary to popular claims, time management training was not found to be effective” (p. 381). Van Eerde (2003) examined the effects of time management training on different outcome variables with an intervention study in the occupational context and found positive effects of time management training on worry. Macan (1996) reported mixed results in another intervention study with employees: While somatic tension was positively affected by the training, job-induced tension was not. Häfner and Stock (2010) reported positive effects of time management training on stress at work in an intervention study. Overall, intervention studies in the occupational context give some evidence for a positive impact of time management training on stress, which might also exist for students. Nevertheless, clear conclusions cannot be drawn, and there is an apparent lack of intervention studies with student samples. Whereas short deadlines and high workload might be a serious problem for both employees and students, other time-related demands such as self-organized learning might be unique for students. Therefore, conclusions from research in the occupational context should be drawn carefully.

Our research question can be stated as follows: Is it possible to increase perceived control of time and reduce perceived stress through time management training in a student sample? We hypothesize an increase of perceived control of time and a decrease of perceived stress after time management training. Furthermore, we hypothesize that the variable demands should remain unchanged after training. As in a recent time management study by Häfner et al. (2014), we used the variable *tension* (Fliege et al. 2001; Fliege et al. 2005; Levenstein et al. 1993) as indicator of perceived stress, as well as the variable *demands* (Fliege et al. 2001, 2005; Levenstein et al. 1993), and the variable *perceived control of time* (Claessens et al. 2004; Häfner et al. 2014; Macan 1994).

Method

Design

We used the research design “non-equivalent dependent variable design” (Cook and Campbell 1979, p. 118) or “internal referencing strategy” (Haccoun and Hamtieux 1994, p. 593). That means that we trained one single group with time management training and included—besides the dependent variables, we hypothesized to be affected through time management training—another variable, which should not be affected. If there are no changes in this variable between the first (before training) and second (after training) points of measurement, but changes in the expected direction concerning the other dependent variables, these changes can be attributed to the training (Frese et al. 2003).

Frese et al. (2003) discussed the advantages of this research strategy:

The design does not require a control group or a pseudotraining group because it effectively controls for testing and Hawthorne effects ... Because all trainees participate in a real training program, we can effectively rule out nonspecific placebo effects if the

training only leads to changes in the experimental variables but not in the control variables. Further, testing effects can be ruled out as well because both types of variables are tested. This type of evaluation design should be used much more frequently. (p. 675)

Haccoun and Hamtieux (1994) also argued that such a design is not particularly vulnerable to common threats to the internal validity of intervention studies such as testing or history. They recommended the use of variables that belong to the same content domain and are measured with similar formats. We selected perceived control of time and perceived stress as dependent variables that should be affected by the training. Perceived stress was measured with the scale tension of the perceived stress questionnaire and includes aspects of mental fatigue or feelings of nervousness (Fliege et al. 2001, 2005; Levenstein et al. 1993). Perceived control of time should increase and perceived stress decrease when comparing pretest and posttest scores. Furthermore, we measured demands, a variable, that should not be changed through our time management training. In the scale demands, participants were asked, for example, to rate the amount of work that they have to do as well as the amount of external duties that they are confronted with (Fliege et al. 2001, 2005; Levenstein et al. 1993). Whereas the scale tension focused on the internal cognitive-emotional perception of external stressors in particular, the scale demands cover external demands one has to deal with (Fliege et al. 2001.). Therefore, both variables were of the same content domain of stress-related issues, but measuring different constructs (Fliege et al. 2005): On the one hand, a more internal perspective is covered and, on the other hand, a more external one. Fliege et al. (2005) presented empirical evidence for this conclusion and pointed out that the variable demands “represents a specific aspect of perceived environmental stressors” (p. 86), whereas tension can be described as “focusing on perceived stress reactions” (p. 86). Our time management training was developed to deal with such external demands through the use of time management strategies to decrease perceived stress and increase perceived control of time. It was not the focus of our training to help students change external demands. The described design should be appropriate to rule out major threats to the internal validity of intervention studies: testing, history and placebo effects. As another strategy to rule out a placebo effect, we checked whether the trainees actually used the time management strategies after training with a questionnaire covering the taught time management strategies.

Time management training

The evaluated training was developed as rather homogeneous intervention focusing on prioritizing, goal setting, strategy development, daily planning and monitoring as major parts. The training consisted of strategies described in the work of Häfner and Stock (2010), who developed a time management training based on psychological theory and empirical findings. The participants learned how to prioritize; how to define concrete, proximal and challenging goals (Latham and Locke 1979, 1991; Locke and Latham 2002); how to develop and mentally simulate their way to goal achievement (Diefendorff and Lord 2003; Earley et al. 1987; Taylor et al. 1998); how to plan their work day, especially with the use of implementation intentions (Gollwitzer 1999) and how to monitor goal progress (Andrasik and Heimberg 1982; Locke and Latham 2002; Luthans and Davis 1979). Häfner and Stock (2010) used the aforementioned psychological findings as a theoretical background for developing a time management training intervention. With respect to process models of time management, the mentioned time management strategies are thought to increase perceived control of time and lead to less perceived stress (Claessens et al. 2004; Macan 1994).

Firstly, students in our study reflected upon their current activities, which included academic tasks as well as extracurricular activities. They noted down these different activities and

reflected their importance for their study goals and tried to define the most important ones. The first was a phase of self-reflection, asking questions such as the following: Which activities are the most important ones? Why are these activities important to me? In the next step, they defined concrete, challenging and proximal goals for their important activities. They asked themselves what they wanted to achieve in detail and defined deadlines. In a third phase, they developed a strategy for achieving their goals. They noted down different steps, set priorities for these steps and planned how to start. They also thought about possible obstacles and what to do to overcome them. In this context, the importance of proximal deadlines for their steps to goal achievement was emphasized. The fourth part of the training focused on daily planning. Trainees decided what they wanted to do and when and developed a concrete schedule for their studies. They asked themselves questions such as follows: Which important tasks should I concentrate on tomorrow? When and where am I going to complete these tasks? How much time should be scheduled for the different tasks? How can I avoid distractions? The last part of the training dealt with monitoring of task completion. Trainees were instructed to monitor their tasks each day to see which they completed and what still has to be done. As self-organized learning, time pressures and high workload are described as major demands for students (Lowe and Cook 2003; Song et al. 2008; Wilcox et al. 2005), the mentioned time management strategies, such as prioritizing and daily planning, should be helpful instruments for students.

Sample and procedure

The sample consisted of 48 local undergraduate students of a medium-sized German university. Students from all faculties were invited to attend the study as extracurricular activity via information boards, newsletters and invitations in seminars. They were invited to take part in a training to improve their time management skills. Students received no incentives for taking part in the study. The dependent variables were measured directly before as well as 2 and 4 weeks after training, including a questionnaire measuring time management behaviour to check training transfer. The training lasted for 4 h. All participants filled in the questionnaires directly before training, 27 trainees filled in all questionnaires 2 weeks after training (for a response rate of 56 %) and 23 another 2 weeks later (for a response rate of 48 %). The dropout rate and sample size are comparable to other time management intervention studies (e.g. Macan 1996). For the main statistical analyses, the data of the 23 participants who filled in all questionnaires were used.

The 23 undergraduate students had a mean age of 23.30 years ($SD=2.80$). Table 1 shows the distribution of the participants over the different semesters (Table 1). They studied different subjects: psychology, medicine, biology, pedagogy, physics, law and computer science. About half of the participants were female (52 %). All participants attended the described time management training in the middle of the semester in groups of about ten students. The training program was held by one trainer with experience in the field of time management.

At the beginning of the training, all participants were informed about the procedure and the treatment of their data. Participation was voluntary, and the confidentiality of responses was assured. The importance of correct and honest responses was emphasized. Before training, we asked students about their learning history concerning time management. Most of the students reported that they had no or little experience concerning the use of time management strategies (Table 2).

We chose 2 weeks as the time interval between the first and second time of measurement and another 2 weeks for the follow-up measurement because we wanted to explore the effects of the training within the ongoing semester. With longer time intervals, the follow-up measurement would have been realized after the end of the semester. We asked participants

Table 1 Semester of trainees ($n=23$)

Semester	Number	Percentage
1	2	8.7
2	0	0.0
3	6	26.1
4	2	8.7
5	3	13.0
6	1	4.3
7	2	8.7
8	0	0.0
9	4	17.4
10	2	8.7
11	0	0.0
12	1	4.3

about the date of their most important exam at the end of the semester to implement the second point of measurement before the mentioned date. We wanted to increase the probability that our dependent variables would not have been influenced by systematic situational changes such as having passed an important examination or vacations after the end of the semester. Therefore, all points of measurement were administered within the same external context.

Measures

Time management behaviour

We used a scale consisting of 18 items to explore time management behaviour (Oberst 2008). Participants judged the use of different time management behaviours such as prioritizing, setting clear goals and monitoring. The scale ranged from 1 (*nearly never*) to 5 (*nearly always*).

Perceived stress (tension)

The scale tension of the perceived stress questionnaire was used to measure perceived stress (Fliege et al. 2001; Levenstein et al. 1993). The scale contains aspects of mental fatigue, trouble relaxing and feelings of nervousness, all of which should be affected by the intervention. The scale consisted of five items. As a minor modification of the original scale, we used a range from 1 (*never*) to 5 (*always*), instead of 1 (*hardly ever*) to 4 (*usually*).

Table 2 Experience concerning time management before training ($n=23$)

Self-ratings	Number	Percentage
No experience	7	30.4
Little experience	7	30.4
Moderate experience	8	34.8
Some more experience	1	4.4
Quite a lot experience	0	0.0

Perceived control of time

Perceived control of time was measured with an adaptation of the corresponding scale of the Time Management Behavior Scale (Macan et al. 1990), as it has been used in other time management studies (Häfner and Stock 2010; Häfner et al. 2014). The scale consisted of ten items. The construct contains aspects such as feeling in control of one's time, correctly estimating the time it will take to accomplish tasks and avoiding procrastination. The scale ranged from 1 (nearly never) to 5 (nearly always).

Demands

As a control variable, we used the scale demands of the perceived stress questionnaire (Fliege et al. 2001; Levenstein et al. 1993). The scale demands consisted of five items. The scale covers aspects such as the amount of work one has to do or external duties one is confronted with. As a minor modification of the original scale, we used a range from 1 (never) to 5 (always), instead of 1 (hardly ever) to 4 (usually).

Results

Table 3 contains the correlations between the study variables at time 1 as well as alpha coefficients for all study variables (Table 3). Table 4 shows the average scores and standard deviations of all study variables at all three points of measurement. There were no significant differences between the trainees who dropped out and the trainees who answered all questionnaires with respect to the four study variables as well as the demographic variables age, number of semester and sex at time 1 (Table 4).

We examined the transfer of the taught time management strategies after training comparing the reported use 2 and 4 weeks after training with the use directly before training. Trainees reported a significant increase between the first and third points of measurement, $t(22)=2.67$, $p<0.01$ (one-tailed), $\varepsilon'=0.79$, as well as a nearly significant increase between the first and second points of measurement, $t(22)=1.62$, $p=0.060$ (one-tailed), $\varepsilon'=0.48$.

In a next step, we conducted a repeated-measurement MANOVA with time of measurement (pretest and posttest 1) as a within-subject factor and perceived stress as well as perceived control of time as dependent variables, which were hypothesized to be affected by the training. The results are given in Table 5, which shows a significant overall time effect and a significant time effect for perceived stress (Table 5).

Trainees reported significantly less stress 2 weeks after training compared to the pretest. We also found a tendency in the expected direction concerning perceived control of time. Table 5 also shows the results of the repeated-measurement MANOVA with perceived stress and

Table 3 Zero-order correlations and Cronbach's alpha coefficients at time 1 ($n=48$)

Variable	1	2	3	4
1. Time management behaviour	(0.92)			
2. Perceived control of time	0.31*	(0.79)		
3. Stress (tension)	-0.06	-0.44**	(0.82)	
4. Demands	-0.07	-0.55**	0.66**	(0.81)

* $p<0.05$; ** $p<0.01$ (two-tailed)

Table 4 Means and standard deviations of time management behaviour, perceived control of time, stress and demands at the three measurement points ($n=23$)

Variable	Time 1		Time 2		Time 3	
	M	SD	M	SD	M	SD
Time management behaviour	3.01	0.55	3.19	0.48	3.31	0.55
Perceived control of time	2.75	0.57	2.89	0.51	3.05	0.52
Stress (tension)	3.30	0.57	2.96	0.71	3.03	0.72
Demands	3.59	0.69	3.35	0.69	3.46	0.61

perceived control of time as dependent variables for the comparison of the pretest with the follow-up measurement (posttest 2) 4 weeks after training. As can be seen, a significant overall time effect resulted as well as significant time effects for perceived stress and perceived control of time. Four weeks after training, the participants reported less perceived stress and more perceived control of time, compared to the measurement directly before training.

As can be seen in Table 6, the training effect is much stronger for students with no or little experience compared to students with moderate and some experience. With respect to the measurement 4 weeks after training, the effect sizes for those students who had no or little experience were more than twice as strong ($\varepsilon'=0.78$ for perceived control of time and $\varepsilon'=0.64$ for perceived stress) than for those who had moderate or some experience ($\varepsilon'=0.34$ for perceived control of time and $\varepsilon'=0.13$ for perceived stress).

Furthermore, we analyzed the difference between the pretest und posttest for demands, the variable that should not be influenced, and found no significant changes between the measurement before training and 2 weeks after training, $t(22)=1.68$, $p=0.107$ (two-tailed), as well as 4 weeks after training, $t(22)=1.19$, $p=0.251$ (two-tailed).

Discussion

As hypothesized, trainees reported less stress 2 and 4 weeks after time management training compared to the pretest before training. Perceived control of time increased during the weeks after training, but with a time lag. Two weeks after training, no significant increase could be found, only a moderate tendency in the expected direction. However, 2 weeks later, trainees

Table 5 Multivariate analysis of variance for repeated measurement

Variable	<i>df</i>	<i>F</i>	Partial η^2	<i>p</i> value
Pretest-posttest 1				
Overall time effect	2, 21	4.09*	0.28	0.03
Perceived control of time	1, 22	3.38	0.13	0.08
Stress (tension)	1, 22	8.22**	0.27	< 0.01
Pretest-posttest 2				
Overall time effect	2, 21	6.01**	0.36	< 0.01
Perceived control of time	1, 22	11.62**	0.35	< 0.01
Stress (tension)	1, 22	5.75*	0.21	0.03

* $p<0.05$; ** $p<0.01$

Table 6 Means and standard deviations of time management behaviour, perceived control of time, stress and demands at the three measurement points categorized by experience ($n=14$ for no or little experience; $n=9$ for moderate or some experience)

Variable	Time 1				Time 2				Time 3			
	No experience or little experience		Moderate or some experience		No experience or little experience		Moderate or some experience		No experience or little experience		Moderate or some experience	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Time management behaviour	2.83	0.50	3.29	0.53	3.08	0.44	3.36	0.52	3.17	0.52	3.54	0.53
Perceived control of time	2.66	0.44	2.89	0.73	2.88	0.46	2.91	0.62	2.99	0.41	3.13	0.68
Stress (tension)	3.45	0.51	3.07	0.60	3.06	0.73	2.80	0.69	3.06	0.70	2.98	0.78
Demands	3.68	0.61	3.44	0.82	3.43	0.53	3.22	0.91	3.42	0.45	3.51	0.84

reported a significant increase of perceived control of time. Furthermore, the trainees reported no changes concerning demands.

Taken together, the reported effects for the intended variables, on the one hand, and no change for the control variable, on the other, support the conclusion that the training led to a decrease of perceived stress and an increase of perceived control of time. The effects can be judged as very strong, underlining the practical relevance of time management interventions. The training lasted for 4 h, which meant a rather short intervention, compared to other time management interventions (e.g. Macan 1996; Van Eerde 2003). The training had a positive impact in a mixed sample of students from different subjects and years of study time. Overall, they had little experience concerning time management strategies and, therefore, probably could profit from training. Table 6 adds some evidence to this idea. As can be seen, students with no or little experience seem to profit more from training than students with moderate or more experience, especially with respect to perceived stress. Consequently, further studies should concentrate on students with minimal experience concerning time management.

Besides the practical relevance, the current findings give further evidence for theoretical assumptions concerning time management behaviour as a predictor of perceived control of time and perceived stress (Macan 1994; Claessens et al. 2004). There are different possible explanations for the reported effects on perceived stress and perceived control of time. Prioritizing, goal setting and strategy development as important aspects of time management training might give more orientation in one's studies: Which goals do I have? Which tasks are really important? What to do to achieve the goals step by step? Consequently, more orientation might reduce stress and foster perceived control of time (Kearns and Gardiner 2007). Daily planning might be helpful for initiating goal-oriented behaviour without much effort and, therefore, increase perceived control of time and diminish stress (Häfner and Stock 2010; Macan 1994). Additionally, monitoring shows clearly which tasks have been successfully completed: A process generating reinforcing information that might have a positive impact on stress.

Some methodological aspects and limitations of our study should be discussed. The influence of common threats to the internal validity of intervention studies such as testing, history and placebo effects is expected to be equal for different variables of the same content domain (Haccoun and Hamtieux 1994). Such threats should influence the intended variables as

well as the control variable (Haccoun and Hamtieux 1994). Therefore, the reported results were probably caused by time management training. Nevertheless, the use of an experimental design with a control group and especially the application of pseudo-training groups, comparing time management training with neutral interventions, would be a methodological alternative and improvement (Haccoun and Hamtieux 1994).

After training, trainees reported more frequent use of the taught time management strategies than before training. We found a significant increase between the baseline and the measurement 4 weeks after training. Therefore, time management training had a positive impact on time management behaviour. Trainees transferred the training content to their daily work at least to some extent: a result giving some evidence that the reported changes concerning the outcome variables were caused by the special training content and related changes in behaviour and not a placebo effect.

We used a rather homogeneous intervention, a decision which we see as methodological advantage. Former evaluation studies in the occupational context included other parts like relaxation exercises (Macan 1996) or assertiveness training (Van Eerde 2003), which makes it more complicated to draw clear conclusions about which particular aspects of the training caused the reported effects. Macan (1996) pointed out that more homogeneous time management interventions should be evaluated.

With respect to our small sample size, our study should be seen as a preliminary study that shows some effect of time management training, which should be examined in more depth with larger samples of students. Furthermore, there are no meta-analyses in the field of time management research. More intervention studies with larger samples might contribute to robust meta-analyses in this field of research. About half of the students left our study before the second point of measurement. Although such dropout rates are quite common (e.g. Macan 1996), studies with some kind of obligation or incentive for participants have lower dropout rates (e.g. Häfner et al. 2014).

An important step for future research might be the comparison of time management training with other interventions, designed to decrease perceived stress, to generate more knowledge about how effective and efficient time management training really is. An example might be comparisons with stress management interventions with a focus on social support, exercise, relaxation or meditation (e.g. Richardson and Rothstein 2008). Additionally, future research should address the question of persistence of training outcomes as well as potential positive performance outcomes of time management training in the context of higher education (Häfner et al. 2014). Some correlational studies have been conducted in the last decades and presented some evidence for a positive relationship between time management and performance for students (e.g. Britton and Tesser 1991; Macan et al. 1990; Trueman and Hartley 1996). Britton and Tesser (1991) for example reported a moderate positive correlation between short-range planning and grade point average. Studies with experimental designs should be realized to explore the causal effects of time management on performance.

As discussed, more studies are necessary to allow clear practical implications. Nevertheless, some practical ideas could be discussed. Prioritizing their different tasks; setting clear, challenging and proximal goals with deadlines; planning and scheduling their work day and monitoring goal progress might be good advice for students to increase perceived control of time and decrease stress. Such strategies might be taught in different ways at institutions of higher education. Time management trainings for freshmen or including time management instructions in other courses, especially where long-lasting projects such as writing a paper or preparing for an exam have to be realized, might be two examples. Future research should examine such interventions to build more evidence concerning the effects of time management interventions for students and allow robust practical implications.

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Effectiveness of time management training programs, procrastination, and stress prevention.

Most relevant publications in the field of Psychology of Education:

- Häfner, A., Stock, A., Pinneker, L., & Ströhle, S. (2014). Stress prevention through a time management training intervention: an experimental study. *Educational Psychology*, *34*, 403–416.
- Häfner, A., Oberst, V., & Stock, A. (2014). Avoiding procrastination through time management: an experimental intervention study. *Educational Studies*, *40*, 352–360.

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Current themes of research:

Effectiveness of time management training programs. Different fields in sports psychology.

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