

Effectiveness of Working Time Restriction in the Treatment of Procrastination

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Keywords

Procrastination · Delay · Time restriction · Working disorder

Summary

Background: Pathological delay (procrastination) is a clinically relevant disorder of self-control, which is particularly well known in counselling services and psychotherapeutic outpatient clinics serving universities. Nevertheless, systematically evaluated interventions are lacking so far. In this study we investigated the effectiveness of the method of working time restriction in the treatment of procrastination. **Patients and Methods:** The participants were 116 students who had asked for help in our psychotherapeutic outpatient clinic because they suffered from procrastination. The method of working time restriction is based on the idea to make working time more precious by restricting it. Participants are allowed to work only within specific ‘time windows’, which also helps to distinguish between working time and leisure time. Only if a predefined percentage of the planned working time is used efficiently, the participants are allowed additional working time. Dependent variables were self-reports of state and trait procrastination, planning, time management and the arrangement of the working environment, and daily on-line reported working behavior (‘Münsteraner Arbeitstagebuch’). Questionnaire reports were collected 4 times throughout the training. **Results:** Significant improvements were found on all measures. State procrastination (Academic Procrastination State Inventory (APSI)) improved with an effect size of 2.24 and trait procrastination (Aitken Procrastination Scale (APS)) with an effect size of 1.30. **Conclusion:** The method of working time restriction is a promising approach to treat procrastination.

Schlüsselwörter

Prokrastination · Aufschieben · Zeitrestriktion · Arbeitsstörung

Zusammenfassung

Hintergrund: Pathologisches Aufschieben (Prokrastination) ist eine klinisch bedeutsame Störung der Selbststeuerung, die besonders in Beratungs- und Psychotherapieeinrichtungen an Universitäten gut bekannt ist. Trotzdem gibt es bisher kaum systematisch evaluierte Behandlungsmethoden. In der vorliegenden Studie wird die Wirksamkeit der Methode der Arbeitszeitrestriktion in der Prokrastinationsbehandlung dargestellt. **Patienten und Methoden:** Untersucht wurden 116 Studierende, die unter Prokrastination litten und deshalb in der Psychotherapie-Ambulanz des Instituts für Psychologie der Universität Münster vorstellig wurden. Die Arbeitszeitrestriktion beruht auf der Idee, die Arbeitszeit zu verknappen und dadurch kostbar zu machen. Betroffene dürfen nur noch zu bestimmten Zeiten arbeiten; auf diese Weise wird die Trennung von Arbeitszeit und Freizeit wiederhergestellt. Erst wenn ein definierter Anteil der vorgesehenen Arbeitszeit effektiv genutzt wurde, darf zusätzliche Arbeitszeit geplant werden. Neben Fragebogendaten zu State- und Trait-Prokrastination, Planung, Zeitmanagement und Gestaltung der Lernumgebung wurden Verhaltensmaße in Form von täglich im «Münsteraner Arbeitstagebuch» protokolliertem Arbeitsverhalten erhoben. Die Fragebogendaten wurden zu 4 Messzeitpunkten erhoben. **Ergebnisse:** Alle selbstberichteten Maße und das täglich protokollierte Arbeitsverhalten verbesserten sich signifikant. Die State-Prokrastination (Academic Procrastination State Inventory (APSI)) verbesserte sich mit einer Effektstärke von 2,24 und die Trait-Prokrastination (Aitken Procrastination Scale (APS)) mit einer Effektstärke von 1,30. **Schlussfolgerung:** Die Arbeitszeitrestriktion ist ein vielversprechender Ansatz zur Behandlung von Prokrastination.

Introduction

The word ‘procrastination’ (pathological delaying) derives from the Latin verb ‘procrastinare’ (to postpone to the next day). Procrastination means the clinically relevant, repeated and unnecessary postponement beyond the designated time of activities that are necessary or considered important, even though enough time was available to complete these tasks [Höcker et al., 2008]. Occasional postponement of undesirable activities can be considered normal [Schouwenburg, 2004], but extreme delaying behavior and the often agonizing ‘guilty conscience’ that goes along with it impair psychological well-being and lead to even worse performance [Beck et al., 2000; Tice and Baumeister, 1997]. An indication of this is the clear relationship between procrastination and depression [Deters, 2006]. Patients who visit our outpatient procrastination clinic report repeatedly that they had serious occupational and personal consequences, as well as excessive preoccupation with the delayed task. They complain of a lack of separation between their work and leisure time, so that often positive activities are reduced or are no longer experienced as pleasant. In cross-sectional surveys [Rist et al., 2006; Krumm et al., 2011] of students at the University of Münster, we found that 7–14% of the participating students had higher scores on the Aitken Procrastination Scale (APS) [Helmke and Schrader, 2000; Patzelt and Opitz, 2005a] than the students who were being treated for procrastination at our outpatient psychotherapy clinic.

Procrastination creates a discrepancy between intended action and actual behavior [Ferrari et al., 1995], such that procrastination can be described as a disorder of self-control [Rist et al., 2006]. Tasks that are unpleasant, boring, or potentially threatening to self-esteem are especially likely to be postponed, such as studying for exams, preparing a tax return, or writing scientific papers [Blunt and Pychyl, 2000]. Procrastinators substitute activities that are directly reinforced or that are easier to deal with [Boice, 1996; Rist et al., 2006]. This postponement temporarily reduces the discomfort, aversion, tension, or fear of failure caused by the anticipation of aversive tasks, leading to negative reinforcement.

The literature on treatment of procrastination has hitherto mostly described broad-spectrum programs with various different components: e.g., relaxation, goal-setting, clarification of causes of procrastination, ordering of tasks by importance and urgency, cognitive restructuring, psychoeducation, discrimination from new tasks, self-observation, alignment of work with biorhythms, or time management [cf. Boice, 1996; Ferrari et al., 1995; Pychyl and Binder, 2004; van Eerde, 2003; van Horebeek et al., 2004]. Which of these components are effective has not yet been clarified in detail [Schouwenburg, 2004]. Many of these intervention studies also have had methodological problems, such as in the selection of the dependent variables, small samples, or therapy taking place alongside the intervention.

The theoretical background of our proposed intervention is based, *inter alia*, on Kuhl and Beckmann’s [1994] concepts of longitudinal and cross-sectional competition, which can make clear the functionality of procrastination in the process of realizing or not realizing one’s intentions. Cross-sectional competition means competition among different tasks at a given point in time, while longitudinal competition designates competition among different points in time at which an activity could be performed. By reducing the time available, we attempt here to decrease longitudinal competition by precluding attempts to do the work at a later point. Working time becomes more precious, since there is less of it. Boice [1989] showed that academics can benefit from regular short units of scientific writing: Compared with a control group, academics wrote more if they had regular short writing sessions, averaging 30 min.

The principle of restriction treatment was first identified by Spielman et al. [1987], who used it to treat sleep disorders. The work of Müller and Paterok [1999] on sleep restriction gave us ideas about applying the restriction principle to increase the likelihood of desired behavior. The theoretical considerations and practical procedures of the intervention are presented in more detail in a separate article [Engberding et al., 2011].

In the present study, we demonstrate the efficacy of a group intervention based on the concept of working time restriction. The intervention was developed and first conducted at the procrastination outpatient clinic of the Westphalian Wilhelms University of Münster [Jaensch, 2007; Krumm, 2007; Nieroba, 2006; Wildt, 2006]. The following section briefly describes the process of intervention and the principle of restricting study time. A more detailed presentation of the intervention can be found in Engberding et al. [2011].

Hypotheses

- 1) Working time restriction improves the self-reported procrastination state (using the Academic Procrastination State Inventory, APSI); [Helmke and Schrader, 2000; Patzelt and Opitz, 2005b] and trait procrastination [APS; Helmke and Schrader, 2000; Patzelt and Opitz, 2005a], as well as scores on the scales of planning, learning environment, and time management of the inventory for the assessment of Learning Strategies at the University [LIST; Wild and Schiefele, 1994].
- 2) Working time restriction improves working behavior, as logged daily in an online work diary.

Method

The Intervention

The Principle of Working Time Restriction

The principle of working time restriction refers to a reduction of working hours to precisely defined time windows per day (‘study windows’ or

DAY 1	Self-observation in online diary	t1 measurement 'pre-baseline'	
DAY 8		t2 measurement 'pre'	session 1: working time restriction
DAY 15			session 2: working time restriction
DAY 22			session 3: working time restriction & self-reinforcement
DAY 29			session 4: working time restriction & arrangement of workplace/coping with distractions
DAY 36			t3 measurement 'post'
...			
...			
...			
DAY 120		t4 measurement 'follow-up'	12 weeks after t3

Fig. 1. Procedure for the intervention and the study.

'work windows'). The limitation on working time is intended to increase motivation to take greater advantage of the time available and to restore the separation between working hours and leisure time. Only after an improvement in work efficiency, i.e., the achievement of a good, clearly defined use of planned working time, may the participants increase their working time. The actual working time – as established the week before the first session (the 'baseline') by daily self-observations recorded in an online study and work diary – is used to set fixed times for starting and ending the session during which the subject may study. 2 work windows of at least 20 min are set per workday. It is recommended that the subjects schedule 1–2 days off per week. Outside these work windows, work is prohibited for the duration of the intervention.

Procedure of the Group Intervention

The group intervention consists of 5 weekly sessions of 90 min each in groups of 5–7 participants. Daily entries are made in the Münster Study and Work Diary throughout the training program. This is an online diary to which only same-day work units can be added, thus preventing cumulative entries for several days being added just before the group sessions. The participants are given an anonymous login at the preliminary meeting. Participants are instructed to begin self-observation a week before the first session, to check the effects of logging in the diary on the self-reported procrastination and to get a baseline for the behavioral data. The group intervention consists of 5 sessions: The core of the first 4 sessions is the individual use of the method of working time restriction; in the 3rd and 4th sessions this is combined with brief psychoeducational elements. The 5th meeting serves primarily as a concluding session (fig. 1).

The method of working time restriction is the main content of the first two sessions and is both explained conceptually and introduced practically. In sessions 3 and 4, the implementation of working time restriction remains the key component of the sessions, but increased familiarity with the process means that less time is needed to discuss the experiences and to calculate work efficiency and the new work window. The remaining time in sessions 3 and 4 is therefore devoted to brief psychoeducational elements on condition management: The topic of self-reinforcement is discussed in the 3rd session; the participants receive information on 'workplace design' and 'coping with disruptions' in the 4th session. In the concluding session (session 5), work efficiency is recalculated and the work window is set for the last time. There is also a review of the participants' progress and, taking into account potential obstacles, how that progress can be maintained.

Structure of the Study

Recruitment of Participants

The offer of participation was directed to students who repeatedly and unnecessarily delay studying for exams or writing scientific papers, and whose suffering on that account was clinically relevant. Recruitment was done via the homepage of the outpatient psychotherapy clinic of the Department of Psychology at the Westphalian Wilhelms University of Münster, on posters at the university, and in a note at the end of a questionnaire on procrastination that was sent by e-mail to students at 10 departments at the University of Münster. Those who wished to participate could get in touch by telephone and undergo a standardized telephone screening, which determined whether they had to study for an exam or write a scientific paper during the baseline and training periods. This was a prerequisite for participation in the study, so that procrastination could be assessed. Another prerequisite was that the subjects should not be undergoing psychotherapeutic treatment at the same time, so as not to inflate the effects of the intervention. If these conditions were met, the participants were invited to a preliminary meeting at which they received more information about the training program and the research study and gave their written consent for participation. The Patient Health Questionnaire [PHQ-D; Löwe et al., 2002] was used to perform a standardized depression screening. People with a depression score on the PHQ-D ≥ 15 (which suggests a moderate depressive episode) were not included in the study, but instead were informed about the possibility of a diagnostic evaluation and an alternative psychotherapeutic treatment. 116 students began treatment, and 14 participants (12.07%) withdrew during the intervention due to illness, lack of time, or for other reasons. 17 participants (14.66%) did not reply to the questionnaires at the post measurement point, although they took part in the entire intervention. After the testing of the first group (36 participants) revealed how promising the intervention was, we set up a follow-up study to test the stability of the effects. All 80 participants who had started the training program in January 2007 were invited to take part in a follow-up study.

Measuring Instruments

Self-assessment instruments were used to gather data on procrastination state (APSI) and trait procrastination (APS), planning and time management, and organization of an appropriate study environment (LIST);

daily study behavior was recorded using the standardized online work diary. The questionnaire data were collected at 4 measurement points (fig. 1).

Questionnaires Used

Academic Procrastination State Inventory

The APSI [Patzelt and Opitz, 2005b] is an originally English-language instrument [Schouwenburg, 1995], which was translated into German by Helmke and Schrader [2000]. It is used to detect current procrastination. The assessment has 23 items which ascertain the frequency of problem-specific behaviors and thoughts within the past week, with 5 response alternatives (ranging from 'never' to 'always'). By analyzing the APSI [Patzelt and Opitz, 2005b], 3 factors were identified: 'state procrastination in the narrow sense', 'fear and insecurity', and 'aversion' (Cronbach's $\alpha \geq 0.82$). To describe the extent of self-reported state procrastination, the mean of the first factor is specified below, rather than a mean of all the factors. This gives us 'state procrastination in the narrow sense', i.e., the criterion that the present study is actually seeking.

Aitken Procrastination Scale

The APS [Aitken, 1982; Patzelt and Opitz, 2005a] is another instrument, originally in English, which was translated by Helmke and Schrader [2000], and which surveys trait procrastination with no time limit. The scale consists of 19 items with 5 response options ('not at all true' to 'very true'). An analysis of the APS [Patzelt and Opitz, 2005a] identified 3 factors: 'central trait procrastination', 'lack of foresight', and 'lack of punctuality'. The items and evaluation notes are presented in Höcker et al. [2008]. Also here, the mean of the first factor (Cronbach's $\alpha = 0.91$) is better suitable for assessment of self-reported procrastination than a total score for all factors.

Planning, Time Management, and Learning Environment: Scales of the Questionnaire for Assessment of Learning Strategies at the University

The LIST was developed by Wild and Schiefele [1994]. It covers the use of different learning strategies: 'cognitive strategies', 'metacognitive strategies', and 'resource-based strategies', which break down into further subscales. In the present study, we used the 'planning' subscales (4 items, Cronbach's $\alpha = 0.64$ for the higher scale of 'metacognitive strategies'), 'learning environment' (6 items, Cronbach's $\alpha = 0.71$), 'time management' (4 items, Cronbach's $\alpha = 0.83$), each with 5 possible answers ('very seldom' to 'very often'). The 'planning' subscale covers choosing study materials and planning individual study steps. The 'learning environment' scale covers whether an environment is created which allows for concentrated work. The 'time management' subscale covers the frequency of use of time management strategies.

Patient Health Questionnaire (PHQ-D)

The depression scale of the PHQ [Löwe et al., 2002] was used for assessment of depressive symptoms; it was developed as a screening method for diagnostics by general practitioners. The depression scale includes 9 items for the symptoms of major depression according to the Diagnostic and Statistic Manual of Mental Disorders (DSM)-IV. Using a 4-point rating scale ('not at all' to 'almost every day'), it records the frequency of relevant symptoms in the past 2 weeks. Several studies confirm the reliability (Cronbach's $\alpha = 0.88$) and validity of the PHQ-D [Löwe et al., 2002, 2004].

Daily Logging of Work Behavior: The Münster Study and Work Diary

Logging began 1 week before the start of the intervention, thus providing a baseline measurement; it continued for 4 weeks as the intervention proceeded. Problem-related variables were recorded, such as planned and actually accomplished units of work, punctuality of getting started, and

percentage of planned work that was actually accomplished. A PDF version of the Münster Study and Work Diary is generally available at www.psy.uni-muenster.de/pta/downloads/index.html.

Statistical Analysis

The analysis of questionnaire data was done both conventionally for the $N = 85$ participants with questionnaire data for all measurement points, as well as by an intent-to-treat (ITT) analysis in which missing data for the post measurement point were imputed, according to Mazumdar's (1999) last-observation-carried-forward method. The latter approach is based on the assumption that the scores for participants who withdrew did not improve any further after they left the program. For the participants who had no measured value at the post measurement point, we used the last available measurement point at which they were still participating in the study. For this we also used measurements from an intermediate point between assessments, on the day of the 3rd session (after t2 but before t3), which will not be discussed further here for space reasons. Parametric analysis methods (t-test, analysis of variance (ANOVA)) were used for the approximately normally distributed questionnaire measures. The parameters of the logged daily working behavior were not normally distributed and were therefore checked with the Wilcoxon Rank Test and the Mann-Whitney U-Test.

Results

Sample

The average age of participants was 26.79 years (standard deviation (SD) = 3.9; range = 20–43). On average, they were in the 9th semester of their studies (SD = 5.3). The gender ratio was balanced (59 women and 57 men). The participants scored a mean value of 2.59 (SD = 0.51) on the APSI scale for the first factor, 'procrastination state in the strict sense'. The mean value of the first subscale of the APS, 'central trait procrastination', was 2.97 (SD = 0.42).

Analysis of Dropouts

The dropouts did not differ in descriptive data, or in their depressive symptoms on the PHQ-D, or in the dependent variables of self-reported working behavior (e.g., APS: $F = 0.018$, $p = 0.893$; APSI: $F = 0.048$, $p = 0.827$) from the participants who completed the intervention. They differed significantly, however, in variables of the daily recorded work behavior: The dropouts delayed significantly less, according to their entries to the online work diary in the first week ($U = 897.5$; $p = 0.027$), and were more satisfied with their punctuality ($U = 361.5$; $p = 0.041$).

In the subsample of the 80 participants who were invited for the follow-up assessment, there were no significant differences in the dependent variables before the intervention, except on the scale of 'arrangement of the study environment'. There, the participants who also took part in the follow-up assessment ($M = 3.07$) had significantly better values before the intervention than those who did not participate ($M = 2.72$; $F = 5.255$; $p = 0.025$; $d = 0.51$).

Tab. 1. Means, standard deviations before beginning of baseline (t1), after baseline (t2), and at end of training program (t3), test statistics and effect sizes for comparison of measurement points pre-post (t1t3), post-baseline post (t2t3), and pre follow-up (t1t4)

Measurement points	t1 (pre)		t2 (post-baseline)		t3 (post)		t4 (follow-up)		
	M _{t1}	SD _{t1}	M _{t2}	SD _{t2}	M _{t3}	SD _{t3}	M _{t4}	SD _{t4}	
APS	2.97	0.44	2.98	0.48	2.40	0.62	2.35	0.72	
APSI	2.60	0.49	2.37	0.59	1.50	0.55	1.82	0.89	
LIST time management	2.40	0.65	2.59	0.68	3.83	0.61	3.05	0.99	
LIST planning	3.41	0.74	3.48	0.65	3.94	0.61	3.17	0.90	
LIST study environment	2.94	0.65	3.03	0.62	3.67	0.53	3.90	0.89	
Comparisons	pre-post (t1t3) ^a , N = 85			post-baseline post (t2t3) ^a , N = 85			pre follow-up (t1t4) ^b , N = 42		
	F	p	d _{t1-t3}	F	p	d _{t2-t3}	F	p	d _{t1-t4}
APS	81.59	≤ 0.001	1.30	90.00	≤ 0.001	1.21	41.45	≤ 0.001	1.58
APSI	288.07	≤ 0.001	2.24	143.17	≤ 0.001	1.47	31.56	≤ 0.001	1.29
LIST time management	313.02	≤ 0.001	-2.20	261.59	≤ 0.001	-1.82	20.83	≤ 0.001	-0.93
LIST planning	63.65	≤ 0.001	-0.72	68.33	≤ 0.001	-0.71	0.14	≤ 0.714	-0.07
LIST study environment	172.26	≤ 0.001	-1.12	111.67	≤ 0.001	-1.03	84.86	≤ 0.001	-1.71

APS = Aitken Procrastination Scale; APSI = Academic Procrastination State Inventory; LIST = planning, time management, and study environment: scales of the inventory for the assessment of Learning Strategies at the University.
Polarity: On the APS and APSI, decreased values indicate improvement (i.e., positive effect size = improvement); on the LIST scale, higher values indicate improvement (i.e., negative effect size = improvement).
^aThe data of N = 85 participants are used as the basis for comparison of t1 and t3, and of t2 and t3.
^bThe comparisons of t1 and t4 (the follow-up study) included only the pre values of the 42 participants who participated in the follow-up study; therefore, the pre values used in the t1t4 analysis differ from the pre values listed in this table.

Self-Reported Working Behavior

Effects of the Whole Intervention (t1-t3)

The comparison of post values (t3) with the values that were compiled before the start of the baseline period (t1) showed a significant reduction in procrastination state on the APSI, with an effect size of $d = 2.24$, and a significant reduction of trait procrastination on the APS, with an effect size of $d = 1.30$. All the reported effect sizes were calculated using the following formula: $(M_{\text{pre test}} - M_{\text{post test}}) / SD_{\text{pre test}}$ [cf. recommendation of Maier-Riehle and Zwingmann, 2000]. The values on the LIST scales ‘time management’, ‘arrangement of the study environment’, and ‘planning’ also improved significantly (table 1).

Effects of the Intervention Excluding the Baseline Effects (t2t3)

Comparison of the post values (t3) with the values compiled after the baseline assessment (t2) yielded significant but smaller improvements for all variables. The procrastination scores decreased significantly, with effect sizes of $d = 1.47$ for the APSI ($F = 143.17$; $p < 0.001$) and $d = 1.21$ for the APS ($F = 90.00$, $p < 0.001$). As expected, the values also improved significantly on the LIST scales for ‘time management’ ($d = -1.82$), ‘arrangement of the study environment’ ($d = -0.71$), and ‘planning’ ($d = -1.03$) (table 1).

Results of Follow-Up Study

The subgroup of the sample who took part in the intervention starting in January 2007 was offered a follow-up study after 12

weeks (time point t4), in which procrastination state and trait procrastination were assessed, as well as planning, arrangement of the study environment, and time management. 80 participants were invited for the follow-up assessment, and 42 took part. Comparing the values before the intervention with the values 3 months after the end of the intervention showed that all dependent variables had improved significantly except for ‘planning’ on the LIST scale (e.g., APS: $d = 1.58$; APSI: $d = 1.29$; table 1).

ITT Analysis by the Last-Observation-Carried-Forward Method

Even using the very conservative ITT analysis, with Mazumdar’s [1999] last-observation-carried-forward method, in which the missing data were replaced by the most recent available measurements of the participants, there were significant effects in the pre-post comparison for all dependent variables (table 2). The effect sizes in this analysis are, as expected, slightly lower (e.g., SDP: $d = 1.10$; APSI: $d = 1.92$; table 2).

Daily Logged Working Behavior

Work Efficiency

The ratio of planned to actual study time within the work window, following the formula ‘work efficiency = actual work time within the work window/planned work × 100’, improved

Tab. 2. Means, standard deviations from beginning of baseline (t1), after baseline (t2), and end of training program (t3) after replacement of missing data according to the last-observation-carried-forward method, test statistics and effect sizes for comparison of measurement points pre-post (t1t3) and post-baseline post (t2t3), as well as after replacement of all missing data according to the last-observation-carried-forward method (N = 116)

Measurement points	t1 (pre)		t2 (post-baseline)		t3 (post)	
	M _{t1}	SD _{t1}	M _{t2}	SD _{t2}	M _{t3}	SD _{t3}
APS	2.97	0.42	3.00	0.46	2.51	0.60
APSI	2.59	0.51	2.41	0.61	1.61	0.66
LIST time management	2.42	0.69	2.61	0.77	3.65	0.74
LIST planning	3.36	0.75	3.41	0.69	3.81	0.70
LIST study environment	2.93	0.68	2.99	0.66	3.52	0.64
Comparisons	pre-post (t1t3)			post-baseline post (t2t3)		
	F	p	d _{t1-t3}	F	p	d _{t2-t3}
APS	74.10	≤ 0.001	1.10	96.91	≤ 0.001	1.07
APSI	239.01	≤ 0.001	1.92	152.12	≤ 0.001	1.31
LIST time management	260.36	≤ 0.001	-1.78	194.00	≤ 0.001	-1.35
LIST planning	59.03	≤ 0.001	-0.60	67.06	≤ 0.001	-0,58
LIST study environment	114.16	≤ 0.001	-0.87	98.34	≤ 0.001	-0,80

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Polarity: On the APS and APSI, decreased values indicate improvement (i.e., positive effect size = improvement); on the LIST scale, higher values indicate improvement (i.e., negative effect size = improvement).

significantly ($Z = -6.086$, $p < 0.001$; $d = -1.55$) from 42.3% (SD 27.72) in the baseline week to 85.25% (SD 14.16) in the last week of the intervention.

Postponement

The postponement of beginning work, as recorded daily in the diary by the participants, declined significantly during the training period from $M = 127.42$ min (SD = 143.21) to $M = 10.85$ min (SD = 15.79). This reduction ($Z = -5.174$; $p < 0.001$) corresponds to an effect size of $d = 1.04$.

Percent of the Workload Accomplished

According to the daily logging by the participants, at the end of training they had completed significantly more of their workload or the study material they had set out for themselves, than at the beginning ($Z = -3.040$; $p = 0.002$; $d = -0.70$). At baseline, the participants reported that they had done 52.90% (SD = 26.26; minimum (min) = 0; maximum (max) = 94) of what they had set out for themselves for the work unit; in the last week of training, the figure was 71.35% (SD = 20.96; min = 4; max = 125).

Daily Logged Satisfaction with One's Work Behavior

The daily logged satisfaction with one's own concentration, with the result of the work unit, and with the punctuality of beginning work – during the baseline week and during the last week of training – were compared using the Wilcoxon Rank Test. Compared to the baseline, all ratings of satisfaction improved significantly, with effect sizes of $d = -0.97$ for satisfaction with concentration ($Z = -3.287$; $p = 0.001$), $d = -0.77$

for satisfaction with the result of the work unit ($Z = -4.020$; $p < 0.001$), and $d = -1.20$ for satisfaction with punctuality ($Z = -4.310$, $p < 0.001$).

Discussion

This article describes an intervention for the reduction of procrastination by the method of working time restriction. Although the intervention involves only 5 sessions of 90 min each, evaluation of the pre-post changes yields significant effects in self-reported and recorded daily logging of work behavior.

Postponement was reduced significantly in both the self-assessment measures and in study behaviors that were logged on a daily basis. In our primary outcome measure, the factor 'central state procrastination' of the APSI [Helmke and Schrader, 2000; Patzelt and Opitz, 2005b], we found an impressive effect size of 2.24 in the pre-post comparison; on the trait scale 'central procrastination' of the APS, the effect size was 1.30. The brief group intervention described thus has significant effects relevant to daily life, both on self-reported procrastination and on the daily logging of working behavior on the online work diary. The results of the 3-month follow-up indicate that the effects could be described as stable. Thus working time restriction may be considered the currently best evaluated method for the treatment of procrastination.

The brevity of the intervention also suggests that it could be a component in more comprehensive individual or group therapy. There has also been positive experience in the use of the intervention modules in the individual therapeutic setting.

The indication for intervention is, however, limited in one respect: It is not suitable if those affected are seeking help under great time pressure, very close to exams or deadlines. With less than 5 weeks remaining before an exam or the deadline for completion of a task, there is hardly enough opportunity to build up the amount of working time required. In this case, there are other brief cognitive-behavioral interventions, such as the 'start on Time' and 'Plan Realistically' modules that were also developed and evaluated by our working group [Höcker et al, 2008, 2009].

The structure of the intervention poses a problem for evaluation. At the beginning we had contrasted our problem-specific approach with the traditional broad-spectrum treatments of procrastination. Working time restriction does require multiple sessions over a longer period of time, so that participants can practice the effective use of the planned working time within the widening time windows, while building up enough working time to get the job done. To use the meeting time in a satisfactory way, however, sessions 3 and 4 also convey psychoeducational elements. Although working time restriction remains the central element of the intervention, our outcome measures do not assess its pure effect, but the efficacy of both its components. Even with the conservative ITT analyses, using imputations for the last-observation-carried-forward method, we obtained large effect sizes (table 2).

A methodological limitation of the study is the low response rate in the follow-up study (about 50%). Here one suspects that participants who have particularly benefited may be the ones who take part in the follow-up. However, comparing the scores of participants who took part in the follow-up with those of participants who did not, we found no significant differences between the groups, except on the scale of 'arrangement of the study environment' (see analysis of dropouts). The effects obtained are thus not the outcome of a systematic selection of favorable processes. This is supported by another result: People who quit during the treatment differed neither in demographic variables nor in self-reporting from those who completed the treatment. The dropouts, however, according to their entries in the online work diary, quit significantly less in the first week, and were significantly more satisfied with their punctuality. It seems that less stressed participants were more likely not to continue the treatment to the end. Maybe they thought that their less severe problem with self-control

meant that it was not so essential to adhere strictly to the restrictive, and initially reactance-causing, conditions.

A general problem in the evaluation of intervention methods for procrastination is that usually only self-reported procrastination is recorded. Even if the daily logged work behavior in this study allows a different and probably more accurate measure of work behavior, it is still a self-report – even though these objective data are asked for right after the work unit (planning with beginning and end, implementation from beginning to end, interruptions, substitute activities) and these data are used to calculate indices relevant to the disorder, such as postponement in min, study efficiency (ratio of planned and actual study time), etc. It would be interesting to assess external variables in further evaluations.

From the previous treatment studies that had at least an N of 10 participants, the highest effect sizes in the treatment of procrastination were found in the studies by van Eerde [2003] and van Essen et al. [2004]. Van Eerde reported, for a 1.5-day commercial broad-spectrum program for procrastinating employees, that there were improvements in self-reported avoidance, self-reported worry, and self-reported time management, with an average effect size of 0.92 in the pre-post comparison. The extent of procrastination was not determined. Van Essen et al. compared a 21-h combination program, which also used rational-emotive methods ($d = 1.11$), with a combined program of the same length without rational-emotive elements ($d = 1.09$). In a study of our own of a group cognitive-behavioral therapy intervention (5 sessions of 90 min), we found effect sizes of $d = 1.37$ on the APSI and $d = 0.82$ on the APS [Höcker et al., 2008]. With the exception of one study with a very small sample [Karas and Spada, 2009], all the other treatment studies described in the literature had lower effect sizes than ours [see Ferrari et al., 1995; Höcker et al., 2008; Schouwenburg et al., 2004; van Eerde, 2003]. A comparison of the intervention with comparison or control groups is indispensable for further evaluation of time restriction as a treatment method for procrastination. Such an investigation is currently underway (Höcker et al., in preparation).

Disclosure Statement

The authors declare no conflict of interest.

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