

“How Does a Short, Interrupted Recovery Break Affect Performance and How is it Assessed? A Study on Acute Effects”
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Abstract

A recovery process with optimal prerequisites, which is interrupted, is termed disrupted recovery. Whether this process has an influence on performance-related factors needs to be investigated. Therefore, the aim of this study was to examine how a short disturbance of a recovery phase is assessed and whether subsequent repeated sprint performance is affected by it. A quasi-experimental 2x2-factors cross-over design with 34 sport science undergraduate students (age 20.3 ± 2.1) was applied. Factors were the type of intervention (power nap vs. systematic breathing; between-subjects) and the experimental condition (disturbed vs. non-disturbed break; within-subjects). Repeated sprint performance was measured through 6x4 s sprint protocols (with 20 s breaks) before and after a 25 min recovery break on two test days. Subjective evaluation of the interventions was measured through the Short Recovery and Stress Scale and a manipulation check assessing whether participants experienced the recovery phase as efficacious and pleasant. Regarding the objective data, no significant difference between sprint performances in terms of average peak velocity (m/s) on the NMT was found. The manipulation check revealed that disturbed conditions were rated significantly lower than regular conditions in terms of appreciation, $t(31) = 3.09$, $p = .01$. Short disturbances of recovery do not seem to affect subsequent performance; nevertheless, participants assessed disturbed conditions more negative than regular conditions. In essence, the findings indicate a negligible role of short interruptions on an objective level. Subjectively, they affected the performance-related assessment of the participants and should be treated with caution.

Breaks by definition are planned or spontaneous recesses from a task that interrupt the task's flow and continuity (1). Nevertheless, from an organizational (psychological) point of view, a break may provide a period of free time to recover in order to guarantee the resumption of work. Research shows that people need occasional changes in the tempo of work or an oscillation between work and recreation, particularly when they are fatigued (2) or working continuously for an extended period of time (3). Apart from the occupational context, periodic breaks in performance also represent a feature of almost every sport. Fixed and scheduled breaks in sports competition and training serve corresponding functions. They allow athletes to recover psychophysically and allow coaches and staff to provide information (4). Examples of breaks include the time between two training sessions during a training camp (or during regular training situations), the time between the different disciplines of a decathlon, or between runs in alpine skiing (5). Anshel (4) stated that a halftime is a period during which many issues can be addressed. It includes regrouping, adjusting and reviewing plans and strategies, exchanging information, and recovery. Compared to other types of recesses, these kinds of breaks are positively connoted as they may contribute to recreational or rejuvenating processes in fatigued individuals (1). Furthermore, they are a fixed part of the competition and therefore, can be taken into one's considerations, i.e., they can be planned in advance. Another type of break with positive effects is labelled as time-out. During a game such as basketball, these spontaneous breaks are called when players need to refocus. The coaches' intervention may consist of new instructions, substitutions or to facilitate recovery from fatigue or interrupting the opponents' positive performance and consequent psychological advantage (6).

Regardless of whether the interruption/break is seen positively or negatively, many practitioners are not aware of the importance of breaks with regard to the vulnerability of athletes in those periods. Especially regarding the recovery aspects of breaks, athletes are still

not fully aware of its underlying importance. If rest periods in terms of breaks are not carefully planned they could lead to a deficit in recovery. In case preparations do not occur, impaired subsequent performance is a possible scenario (7). Almost three decades ago, research revealed that the vulnerability towards interruptions, irritations, and trouble is considerably increased in recovery periods (8). Already small changes in homeostasis during those recovery periods may have a great impact on performance and well-being of athletes. Consequences can be characterized as *insufficient* or *disturbed recovery* (9). Insufficient recovery is defined as the result of overly short recovery periods, which are lacking the prerequisites for adequate recovery. Disturbed recovery is present if prerequisites for optimal recovery are given; the process though is disrupted by environmental issues (10). For example this might involve a waiting area during a long jump event where no shelter is available during a heavy rain shower. The influence of such incidents could be measured via the scale *Disturbed Break* of the *Recovery-Stress Questionnaire for Athletes* (11,12). However, the issue of disturbed breaks has not been investigated thoroughly, i.e., there is no research available on the consequences of disturbances on the assessment of the breaks itself and on the performances that follow these breaks. Because external and internal interruptions are widespread in sports, the present study focused on those issues and tried to examine how participants perceived the disturbed recovery break compared to a not disturbed break in order to see whether that perception has an influence on subsequent performance. The performances were therefore analyzed as well.

Unpredictable events and changes of conditions are likely to occur, either during recovery from competition or during recovery between competitions. These modifications of situations could stem from internal or external sources, i.e., variability in the environmental conditions (e.g., noise, heat, rain delay, or problems with facilities), self-related issues such as nervousness, rumination, or even domestic issues (e.g., family problems, extra workload)

with serious consequences for the affected athlete (7). The onset of such an extra activity requires immediate attention thereby interrupting a person on a current task (13). Such an incidence may cause frustration, helplessness, or a change in task strategies (14). Interruptions tend to have a negative connotation as they are associated with time consuming stops leaving people with insufficient time to accomplish goals (1). An additional factor is that those interruptions occur mostly unexpected and interrupt a person's state of total involvement in a task (15).

Thus, the question remains what happens when a break that aimed at inducing recovery and preparing athletes for subsequent performances is interrupted? During these moments of deep concentration and attempted relaxation, any disturbance could be experienced as a stressor. Despite those highly relevant concerns, almost no research on those issues in sports context exists. Other disciplines within psychology already focused on that field a few decades ago. A study by Roy (16) showed that workers with scheduled breaks during their working days managed to focus their attention during the day and even experienced enjoyment. However, when those breaks were interrupted, workdays became almost intolerable. Based on those findings, the aim of the study was to examine whether an interruption of a recovery break negatively influences subsequent sports performance. In addition, we wanted to assess if those interruptions influence the subjective perception of a recovery break and the subjective evaluation of one's own recovery/stress state.

Therefore, the hypotheses were as follows. (1) A disturbed break leads to a drop in performance compared to performance followed by a not disturbed break. (2) Disturbed breaks are subjectively assessed as being less relaxing, efficacious, and appreciating and more stressful compared to regular breaks. (3) Participants' mean heart rate will be increased during the disturbed break in comparison to the regular condition.

Methods

Subjects

Thirty-four sport science undergraduate students (age 18 to 27 yr, 20.26 ± 2.08) volunteered for the study. The sample (23 males, 11 females) engaged in a total of seven different sport types, from which soccer was most prominent with 35.5% participants active. All of the sports included repeated sprint ability as one of their key factors (handball, basketball, volleyball, tennis, American football, track and field). After a detailed explanation of the benefits and risks of the study, all participants gave their informed consent. The ethics committee of the local faculty of psychology approved the study according to the principles of the Declaration of Helsinki.

Design and Methodology

A quasi-experimental 2x2-factors cross-over design was applied. The between-subject factor was the type of intervention (power nap, $n = 18$ vs. systematic breathing, $n = 16$) whereas the experimental condition (disturbed vs. regular recovery; see Figure 1) formed the within-subject factor. To guarantee for an equal gender distribution, male and female participants were separately assigned to one type of intervention; however, within the gender groups, the assignment to the experimental condition was conducted randomly. Participants completed two testing days, with one of them randomly chosen to be disturbed in the recovery break (counterbalanced order). These days were scheduled with a one-week wash-out period in between to eliminate impressions of the experimental condition. A week before their first experimental session, all participants completed a habituation session during which they were introduced to the facilities and practiced the sprint protocols. The design followed the procedure of a study by Pelka et al. (17) who found supportive effects for recovery of systematic breathing and power napping between intermittent sprint sessions. Both strategies

improved sprinting performance significantly compared to a control group. Based upon these results, only breathing regulation and power naps were included as recovery strategies in the present study. A control group was not included, as Pelka et al. already revealed the significant difference between those two intervention strategies and control conditions. Hence, the present study relied on the abovementioned results and used the research design to take a more detailed look at systematic breathing and power napping, thereby focusing on interruptions of the recovery break. During a test day, participants were asked to perform in two repeated sprint sessions, intermitted by a 25 min recovery break (Figure 1). The procedure was identical for both testing days, except for the experimental condition (disturbed/regular recovery break).

Recovery

As previously proven to be supportive in those settings a guided systematic breathing protocol and a power nap were selected as recovery strategies (17). The setting of the recovery interventions consisted of a quiet and darkened room. Participants had to lie down and were guided through the pre-recorded audio instructions of the systematic breathing or were instructed to engage in a power nap. One of the two testing days was randomly chosen to be experimentally manipulated by disturbing the participant's recovery phase. The experimenter entered the room once in the middle of the recovery break and interrupted the participants by checking their heart rate (HR) monitor while pretending that the instrument showed malfunction. None of the participants indicated to having noticed this deception, which was revealed to them after finishing the study.

Performance and physiological data

Performance was measured on a non-motorized treadmill (NMT, Woodway) through 6x4 s sprint protocols (with 20 s breaks) before and after the 25 min recovery breaks (Figure

1). Both sprint sessions were preceded by a warm-up protocol and stretching phase. To guarantee fatigue, another four 4 s sprints were scheduled as a proof to ensure participants were on a high level of physical strain after the first 6x4 s sprints (17). The *Average Peak Velocity* (in m/s) served as the main performance parameter. In addition, three Countermovement Jumps (CMJ) each had to be executed after the first warm-up, the first sprint protocol and the second warm-up on a contact platform (Haynl Elektronik, Germany). CMJs assessed the physical strain level via jump height through flight time. Participants' HR was recorded during a 5 min rest before the start of the experiment, during the sprint sessions and during the recovery period.

Subjective ratings

Subjective evaluation of the interventions was measured through the *Short Recovery and Stress Scale* (SRSS; 18) and a manipulation check that focused on the efficacy and appreciation of the intervention. The SRSS was completed on four occasions during a test day, i.e. at the start, after the first sprint protocol, after the recovery break, and after the second sprint protocol (Figure 1). It consists of eight items (19,20), further classified into four recovery-related (*Physical Performance Capability*, *Mental Performance Capability*, *Emotional Balance*, and *Overall Recovery*) and four stress-related items (*Muscular Stress*, *Lack of Activation*, *Negative Emotional State*, and *Overall Stress*). All items are scored independently and were not used to create overall recovery and/or stress scores. Responses had to be stated on a 7-point Likert scale, ranging from *does not apply at all* (0) to *fully applies* (6). The manipulation check was completed at the end of both test days. It consists of two questions regarding the efficacy (“how effective do you think the recovery break was?”) and appreciation (“how much did you like the recovery break?”) of the recovery phase.

Answers had to be indicated on a 7-point Likert scale ranging from 0 (“not at all”) to 6 (“very much”) as well.

Statistical Analysis

Statistical analyses were conducted using SPSS 22 (IBM, 2012) and involved repeated measures analyses of variance (RM-ANOVA) in order to identify effects of the type of recovery intervention and of their implementation on stress and recovery. If assumptions of sphericity were violated in one of the RM-ANOVA, Greenhouse-Geisser corrections were used. If significant results ($p \leq .05$) were obtained, significance and mode of the effect were further analyzed via Bonferroni corrected post-hoc tests if appropriate. Following Cohen’s (21) argumentation on manipulated variables effect sizes were reported using partial eta squared (η_p^2). Values can be evaluated as small (0-0.029), medium (0.03-0.159), and large (0.16-0.35) (22).

Results

Performance and physiological data

Sprint output

Regarding the performance data, no significant difference between sprint performances in terms of average peak velocity (m/s) on the NMT was found through 2x2x2 RM-ANOVA (manipulation x intervention x sprint) between the two manipulation conditions (disturbed vs. regular recovery), $F(1,30) = .46$, $p = .50$, $\eta_p^2 = .02$ (see Table 1 for means, standard deviations, and 95% confidence intervals). Additionally, no significant differences between the first and second sprint session of a test day occurred, $F(1,30) = .12$, $p = .73$, $\eta_p^2 = .01$. The same applies for the interaction between manipulation conditions and measurement times, $F(1,30) = .43$, $p = .52$, $\eta_p^2 = .02$. Finally, the type of intervention (power nap vs. breathing) did not affect the results significantly.

Countermovement Jumps

The results of a second 2x2x3 RM-ANOVA (manipulation x intervention x jump) on the CMJ data revealed a significant effect on jump height throughout the three measurement points, $F(2,64) = 37.41, p < .001, \eta_p^2 = .54$. Table 2 shows that CMJs were lower after the sprints compared to both CMJs before sprint session 1 and before sprint session 2. There was no further significant difference between manipulation conditions, $F(1,32) = 2.07, p = .16, \eta_p^2 = .06$, or an interaction effect, $F(2,64) = .33, p = .72, \eta_p^2 = .01$. As for the sprint output, the type of intervention did not influence the performance.

Heart rate

Regarding the analysis of the mean HR (2x2x4 RM-ANOVA; manipulation x intervention x recording time) it can be stated that there was a significant difference between measurement points over time, $F(3,90) = 980.75, p < .001, \eta_p^2 = .97$. Additionally, no differences were found between manipulations, $F(1,30) = .09, p = .77, \eta_p^2 = .01$, or an interaction effect, $F(3,90) = .73, p = .53, \eta_p^2 = .02$. Exact means, standard deviations, and 95% confidence intervals are presented in Table 3. Considering the peak HR during the recovery break, a significant difference between manipulation conditions during the recovery break was obtained, $t(30) = -4.20, p < .001, 95\% \text{ CI}[-14.72; -5.09]$ ($M_{not\ disturbed} = 119.42 \pm 12.66$; $M_{disturbed} = 129.32 \pm 14.94$). A significant interaction effect for manipulation x time in a RM ANOVA was found before post-hoc tests were performed, $F(1.74, 48.62) = 4.33, p < .02, \eta_p^2 = .13$.

Subjective ratings

Analyses of the SRSS scales (2x2x4 RM-ANOVA; manipulation x intervention x time of completion) revealed that the values of *Overall Stress* and *Overall Recovery* differed significantly over time, $F(3,81) = 39.67, p < .001, \eta_p^2 = .60$ (*Overall Recovery*); $F(3,81) =$

34.42, $p < .001$, $\eta_p^2 = .58$ (*Overall Stress*). For both scales, manipulation conditions and interactions effects did not become significant; respective 95% confidence intervals can be found in Table 4. The same pattern was evident for the other six scales as well, i.e. changes over time were significant and differences between manipulation conditions and interactions were not. Regarding the manipulation check, experienced appreciation was significantly different between disturbed and regular recovery conditions. Disturbed conditions were rated significantly lower (i.e., less appreciated) than non-disturbed conditions, $t(31) = 3.09$, $p = .01$, $d = .40$. The efficacy of the recovery breaks was rated marginally different, $t(31) = 1.76$, $p = .08$, $d = .25$. Participants rated the disturbed condition lower (i.e., less efficacious) than the regular recovery condition (see Table 5). Furthermore, the data for appreciation showed that male participants experienced the disturbed conditions significantly worse, i.e., more negative, than females $F(1,30) = 9.24$, $p = .01$, $\eta_p^2 = .24$. Both SRSS and manipulation check, were not significantly influenced by intervention conditions.

Discussion

The benefit of breaks in sport (e.g., half-time, time-out) is the psychophysical regeneration of athletes. Interruptions that disturb these breaks unexpectedly are perceived negatively as they are associated with increased physiological arousal and negative affect. Based on these assumptions, the present study aimed at assessing the acute effects of an interruption of a fixed break on subsequent performance together with the subjective evaluation of the break. Our results indicate that short interruptions of recovery breaks do not affect subsequent repeated sprinting performance. However, the interruption partly affected the assessment of the recovery break, as participants evaluated the interrupted recovery break as being less pleasing than the regular break. Moreover, our analyses revealed greater male aversion towards the interruption compared to females. Regarding the validity of the study,

the results of the CMJ, HR, and SRSS data underline the need for recovery, as all those measures reacted sensitively in accordance to the demands of the sprinting task and the stress and recovery experienced. For example, the scores on the stress-related items of the SRSS went up after the sprints and down after the recovery period. Reversely, the scores of the recovery-related items decreased after the sprints and increased after recovery. CMJ's performance was better after the recovery period compared to the performance after the sprints. The two manipulation conditions (disturbed vs. regular recovery) as well as the two intervention conditions (systematic breathing vs. power nap) showed similar patterns over time on CMJ, HR, and SRSS measures.

A set of repeated sprints is highly demanding for an athlete and induces fatigue on multiple parameters (23). Firstly, focusing on performance-related variables, fatigue is operationalized through a reduction in speed or maximal power output (23). Secondly, concerning the autonomic nervous system, parasympathetic reactivation is highly impaired after repeated sprinting (24) and therefore the organism is not capable of conserving energy. Thirdly, as a response to physiological stress, hormone (e.g., cortisol) and cytokine (e.g., interleukin-6) secretion is increased and results in a heightened inflammatory response (25). To support the recovery process and to enhance subsequent performance between two repeated sprint bouts, two recovery strategies were implemented in the recovery break between those two bouts in the present study. Previous research has shown that the strategies implemented in the present study, systematic breathing and napping, have been proven to be supportive and performance-enhancing (17,26). Specifically, systematic breathing is known to increase parasympathetic nervous system activity and lower sympathetic nervous system activity (27,28) in terms of an increase in respiratory functioning, exercise tolerance or a decrease of dyspnea (27). Napping (less than 30min) has been shown to improve motor and sprinting performance (17,26) and also to influence hormone (e.g., cortisol distribution) and

cytokine secretion (e.g., interleukin-6 suppression) (29,30). Vgontzas et al. (30) reported that cortisol levels dropped significantly compared to a control group during naps and increased significantly different during the post-nap phase. This specific behaviour of cortisol concentrations is associated with an increased energy supply after the recovery break, which could lead to improved performance. A second contributor to improved performance was the suppression of interleukin-6 secretion during and after naps (30). Through those physiological and hormonal changes an increase in alertness/readiness can be explained and post-nap performance potentially predicted.

Hypothetically, those regeneration processes should have been interrupted by the disturbance during the recovery break. It was expected that the interruption should have explicitly led to a heightened autonomic nervous system response and increased feelings of stress (31). These responses can be operationalized via various parameters, e.g., HR, skin conductance levels breathing rate, and peripheral vasoconstriction. Regarding these psychophysiological reactions, the present study used HR as a measure, but differences in mean HR between the manipulation conditions during the recovery break could not be detected. However, a significant difference in peak HR (maximal HR that was measured during the specific time frame) was measured, i.e., the peak HR in the disturbed recovery condition was nine beats per minute higher compared to the regular recovery condition. Thus, even though acute physiological changes during the recovery periods were found, the overall (average) recovery period was not affected.

In contrast to the sports context, the effects of interrupted breaks have already been of interest in industrial and organizational psychology (7,14,16). Fisher (14) assumes that interruptions would be more irritating if they were very frequent, the task has been enjoyed, or they were uncontrollable. Two of those could be applied to the experimental condition of the present study as participants firstly had no control over the interruption and secondly

appreciated the recovery break (a mean of 4.5 points on a scale ranging up to 6 in the manipulation check). As the recovery break was only interrupted once during the present study Fisher’s first assumption may explain why participants were not irritated sufficiently in order to influence performance. Beyond acute effects on performance, considering potential long-term effects of disturbed breaks on well-being, Laux et al. (32) found that acute stress in combination with occurrence of disturbed breaks may contribute to injury risk. Their study revealed a direct and significant relationship between heightened injury risk and disturbed breaks, as they implemented the *Recovery-Stress Questionnaire for Athletes* throughout an entire season in a professional football club (32). Following these authors, breaks have to be monitored as well as training and competition. They concluded that it may even be that the individual perception of recovery rather than the objective length is the crucial variable (32).

Practical applications and limitations of the study

Although ecological validity is higher for high performance sports when examining such effects with Olympic or elite athletes, our aim was to identify basic mechanisms. Therefore, we chose a sport student sample in a lab-based experiment to control variables of interest, i.e. break length and performance execution. However, as conclusions for sports practice should be drawn from the present and subsequent studies, environmental factors need to be taken into account more thoroughly for research on a professional and international sport level. A variety of interruptions such as background noise, rain delays, or conversations of others might interrupt concentration and recovery (33); yet, they might be perceived differently and trigger different reactions in a laboratory context compared to the European Championship or Olympic finals. During the latter situations, more is at stake for the individual and demands are higher. Therefore, generalizing from one situation to others might not be suitable and needs to be investigated, both quantitatively and qualitatively.

One critical aspect that needs to be addressed is the fact that we were not able to fully ensure that participants actually followed the instructions of the respective condition. One of the study's main goals was to keep the conditions as natural as possible; therefore, we did not attach more than a HR monitor to the participants. Consequently, based on HR data alone, it is not possible to draw conclusions as accurate as if they were based on EEG and/or biofeedback systems. A second factor contributing to the natural character of the recovery break was that participants were left alone in the testing room. This was a major difference compared to Pelka et al.'s (17) study who reported using personally supervised instructions. Thirdly, in the present study pre-recorded audio instructions were used in the systematic breathing condition. This was administered particularly to keep the situation as normal as possible by not disturbing participants with an unfamiliar person. Using audio instructions is standard practice and the majority of research reports its usage (34,35). In addition, to preempt this issue, the authors conducted a pre-study in which a supervised breathing condition was compared with an audio condition in exactly the same research design. This study revealed no significant performance differences after audio or supervised personal instructions. However, when comparing Pelka et al.'s results with the data of the present study, the mean HR values during the recovery break in the present study were ten bpm higher on average. This finding might indicate that recovery was not sufficient enough to affect subsequent sprinting performance.

Similar to the systematic breathing condition, it is not confirmed whether participants slept during their recovery break. However, following previous research, it was suggested that healthy subjects are able to sleep in a relatively short period of time when appropriate conditions have been created (36). It was further expected that a 25 min break would allow approximately 10-20 min of sleep to be achieved (37). In line with these findings, available data on nap efficacy report benefits from naps of 10-15 min length (38). If those durations

were not achieved, the lack of sleep during the recovery break could have influenced the effectiveness of the power nap condition. This might explain the stagnated performance after the power nap condition. Hayashi et al. (39) proposed that three minutes of stage 2 sleep have recuperative effects; whereas these effects are limited following only stage 1 sleep and non-existing if participants did not sleep at all. Subjective alertness and performance in a visual detection task increased only after stage 2 phase was experienced. Sleep including only stage 1 sleep and not napping led to significantly worse performance. To provide an in-depth view in this regard, follow-up studies need to consider physiological and hormonal changes thoroughly. Additional physiological data need to be gathered to allow for more accurate conclusions. Except for the HR data, we did not measure more physiological parameters of the participants. This has to be established while keeping the experimental conditions as natural as possible in order to obtain ecologically valid data.

Conclusions

In conclusion, a short interruption of a recovery break between two repeated sprint sessions did not affect objective variables associated with the sprint performance. Furthermore, no effects for the subjective outcomes (in terms of the SRSS) could be demonstrated in this study. Although, participants recognized the difference between the manipulation conditions and rated the not disturbed condition as being more pleasant, they did not perceive a difference in efficacy. Changes in the design of the recovery interruption as well as different levels of athletes should be considered in future studies to investigate the issue of disturbed breaks in more detail.

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Contributors

MP conceived, designed, and conducted the study. MK supervised the study. MP drafted the manuscript. MP, AF, TM, MP, and MK critically revised the manuscript for important intellectual content. All authors approved the final version of the manuscript. Furthermore, we would like to thank Birte Thissen for her input and support during the experimental and data preparation phase.

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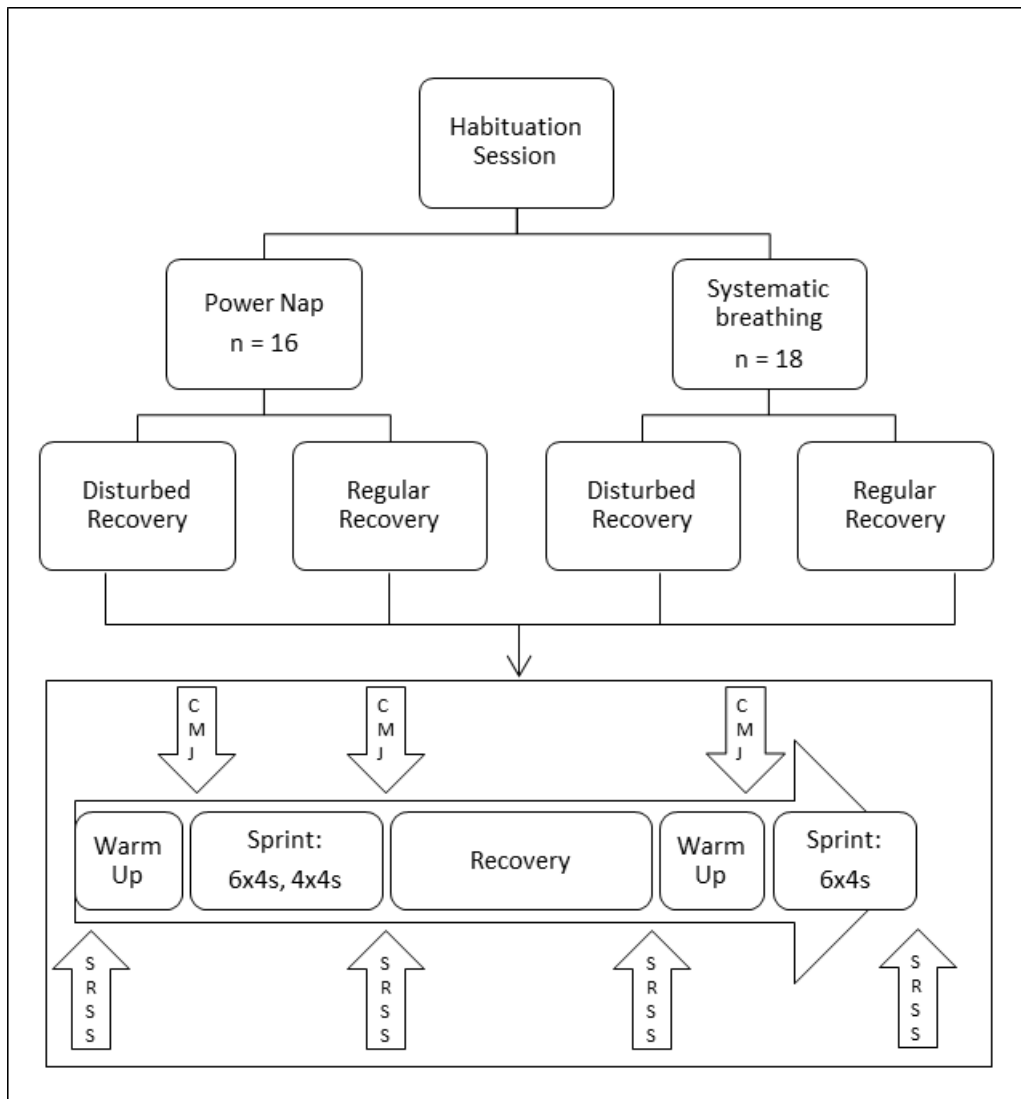


Figure 1. Study design and course of testing day

Table 1. Average peak velocity in m/s during both sprint sessions. As there were no significant differences between intervention groups, Tables 1-5 focus on the experimental condition (disturbed vs. regular recovery)

Manipulation	Sprint 1	95% CI	Sprint 2	95% CI
Disturbed recovery	5.06 ± .65	[4.84, 5.29]	5.03 ± .65	[4.81, 5.26]
Regular recovery	5.10 ± .63	[4.89, 5.33]	5.13 ± .61	[4.92, 5.35]

Table 2. Countermovement Jumps in cm before and after sprint and recovery sessions.

Manipulation	Before sprint 1	95% CI	Before recovery	95% CI	After recovery	95% CI
Disturbed recovery	34.74 ± 5.62	[32.77, 36.70]	32.65 ± 4.74	[30.99, 34.30]	34.96 ± 5.14	[33.17, 36.75]
Regular recovery	35.79 ± 5.14	[33.72, 37.87]	33.27 ± 5.47	[31.36, 35.18]	35.50 ± 6.41	[33.27, 37.74]

Table 3. Heart rate in b/pm during sprints and recovery.

Manipulation	Rest HR	95% CI	Sprint 1	95% CI	Recovery	95% CI	Sprint 2	95% CI
Disturbed recovery	71.42 ± 12.97	[66.75, 76.10]	161.11 ± 13.73	[156.16, 166.06]	98.37 ± 16.78	[92.32, 104.42]	165.39 ± 11.43	[161.27, 169.51]
Regular recovery	73.58 ± 18.15	[67.04, 80.13]	160.65 ± 12.59	[156.11, 165.19]	96.05 ± 13.45	[91.20, 100.89]	164.47 ± 10.93	[160.53, 168.41]

Table 4. Short Recovery and Stress Scale throughout the course of a testing day, differentiating between disturbed and regular recovery sessions.

	Before sprint 1	95% CI	Before recovery	95% CI	After recovery	95% CI	After sprint 2	95% CI
<i>Overall Recovery</i>								
Disturbed recovery	3.64 ± 1.47	[3.07, 4.21]	1.43 ± 1.07	[1.01, 1.84]	3.64 ± 1.06	[3.23, 4.06]	1.86 ± 1.08	[1.44, 2.28]
Regular recovery	3.61 ± 1.17	[3.16, 4.06]	1.61 ± .99	[1.22, 1.99]	3.36 ± .87	[3.02, 3.69]	1.82 ± 1.12	[1.39, 2.26]
<i>Overall Stress</i>								
Disturbed recovery	1.65 ± 1.52	[1.04, 2.27]	3.58 ± 1.55	[2.95, 4.20]	2.85 ± 1.22	[2.35, 3.34]	3.81 ± 1.44	[3.23, 4.39]
Regular recovery	1.92 ± 1.09	[1.48, 2.36]	4.08 ± 1.12	[3.59, 4.56]	2.54 ± 1.07	[2.11, 2.97]	3.85 ± 1.32	[3.31, 4.38]

Table 5. Manipulation check after disturbed and regular recovery testing days.

Manipulation	Efficacy	95% CI	Appreciation	95% CI
Disturbed recovery	4.16 ± 1.14	[3.75, 4.57]	4.09 ± 1.12	[3.69, 4.50]
Regular recovery	4.41 ± .88	[4.09, 4.72]	4.53 ± 1.08	[4.14, 4.92]