



You want to be
happier, healthier and more creative?

Take a vacation!

Influences of a long summer vacation on health,
well-being and creativity!

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Table of context

Introduction	1
Method	11
Design.....	11
Data collection procedure.....	13
Subject / Participants	14
Health and well-being	14
Creativity.....	16
Detachment from work.....	17
Results	18
Health and well-being – Vacation effect, after-effects and development across the vacation	18
Work-related creativity – Vacation effect, after-effects and development across the vacation	22
General creativity – Pre-Post comparison.....	25
Discussion	26
Health and well-being	26
Work-related creativity	29
General creativity	30
Strengths and weaknesses	32
Implications and avenues for future research.....	34
References	

In our daily working live, we face job demands that can induce stress reactions (e.g., accelerated heart rate, fatigue). According to the Effort-Recovery Theory (Meijman & Mulder, 1998) and the Allostatic Load Theory (McEwen, 1998), these stress reactions naturally occur, when we are confronted with workload. When constantly exposed to stressful work characteristics or in case of insufficient recovery, these normal stress reactions can accumulate to more chronic load reactions (e.g. prolonged fatigue, sleep complaints, high blood pressure). Consequently, recovery as a process of psycho-physiological unwinding after working can prevent adverse impacts of workload (Geurts & Sonnentag, 2006).

Recovery is not a one-dimensional concept, but rather there are different types of recovery opportunities. Sluiter, Frings-Dresen, Meijman and Van der Beek (2000) distinguished between four different types of recovery: microrecovery (micropauzes during performing a task), mesorecovery (ten minutes to one hour), metarecovery (one hour to two days) and macrorecovery (more than two days). Especially the impact of mesorecovery and metarecovery, e.g. lunch pauses, evenings or weekends, and how to spend them, has been well established (see for example Sonnentag, 2001; Fritz & Sonnentag, 2005; Van Hooff, Geurts, Kompier, & Taris, 2007; Sonnentag, Binnewies, & Mojza 2008). Yet, little attention has been paid to the research field of macrorecovery.

Therefore, in this study the focus will be on macrorecovery. Macrorecovery might be a major contributor to individual health and well-being of employees and we will center on a prototypical type of macrorecovery: vacation. So far, vacation studies, in which the effects of vacations are investigated, are scarce. This became inevitably clear in the meta-analysis of De Bloom et al. (2009). They carried out a meta-analysis in which (among other things) vacation effects on health and well-being and their duration after work resumption were investigated. The systematic literature search they conducted revealed that there are worldwide only seven studies which examined the effects of a vacation and also had a sound methodology. Therefore this study aims at gathering further insights into vacation effects.

Despite the scarcity of vacation-studies, De Bloom et al. (2009) could find a slight positive effect of vacation on health and well-being in the meta-analysis (Cohen's $d = 0.43$). Moreover, the meta-analysis revealed that this positive effect faded out two to four weeks after work resumption. However, unless this gives us a first impression of the effects a vacation can have on health and well-being, there was one major limitation in almost all the studies included in this meta-analysis: there were no measurements during vacation. As a consequence, a vacation effect was defined as the change in health and well-being after the vacation compared to the measurement before the vacation. But, as De Bloom et al. (2010)

ascertained, this approach is vulnerable for a fallacy of the “post hoc ergo proper hoc”-type. That means someone misinterprets the sequential occurrence of two phenomena as a causal relationship. Thus, a change in health and well-being after vacation can strictly speaking not be causally attributed to the vacation. Following the argumentation of De Bloom et al. (2010), in the present study a vacation effect is defined as a significant change in the dependent variable during vacation compared to the pre-vacation baseline measurement (Pre vs. Inter). In line with the reasoning above, an after-effect of vacation is defined as a significant difference in the dependent variable between the post-vacation measurement and the pre-vacation measurement (Pre vs. Post). Following this definition, the vacation effects found in the meta-analysis of De Bloom et al. (2009), are actually vacation after-effects.

In a recent vacation study of De Bloom et al. (2010), in which the above definition of the vacation effect and its potential after-effects was used, the effect of a vacation on seven indicators of health and well-being (sleep quality, health status, mood, fatigue, tension, energy level, and satisfaction) was examined. The study revealed a positive vacation effect for health and well-being for five out of the seven indicators (health status, mood, tension, energy level, and satisfaction), with a medium effect size ($d = 0.54$). Results regarding the after-effects were less positive: all indicators, for which a positive vacation effect could be found, went back to their baseline level in the first week after the vacation.

However, to investigate the effect of vacation on health and well-being, De Bloom et al. (2010) chose a very special type of vacation: a winter sport vacation. Though this was a well deliberated choice, a winter sport vacation is typically a short vacation (in De Bloom et al. the mean vacation duration was nine days including two travel days) and a very active type of vacation. Accordingly, the participants who took part in the study may represent a specific group of people which makes generalizations of the findings difficult (above-average healthy, active and sporty; De Bloom et al., 2010). Because of these limitations concerning the external validity of the results, the present study aims to give further insights into the vacation effect and its potential after effects by choosing the setting of a summer vacation. Thereby the duration of the vacation will be longer (at least two weeks) and the sample of the participants will presumably be more diverse than in the winter sport study.

Thus, aiming to replicate some aspects of the winter sport study of De Bloom et al. (2010), the first research question in the present study is:

Q 1: Do health and well-being of employees significantly increase while they are on a vacation compared to a working period (vacation effect)?

On account of the previous study of De Bloom et al. (2010) which showed a positive vacation effect, it is expected that in the present study a positive vacation effect will be found as well.

The second research question incorporated in this study deals with the potential after-effects of a vacation:

Q 2: If there is a vacation effect, how long does it last after work resumption (vacation after-effect)?

In the winter sport study of De Bloom et al. (2010), all health and well-being indicators that showed a significant vacation effect went back to baseline level immediately after work resumption. Yet, they wrote themselves "...a short vacation may have fewer and less profound effects on health and well-being than a long vacation period." (De Bloom, 2010, p.211). Accordingly, it is possible that in this long summer vacation after-effects of vacation might be found. Another indication that after-effects exist, can be found in the meta-analysis of de Bloom et al. (2009). As described above, the "vacation effects" in the studies of the meta-analysis were actually vacation after-effects, comparing the post-vacation measurement with the pre-vacation measurement. So, the positive effects found in these studies, could indicate positive vacation after-effects. Yet, due to the fact that three out of seven studies didn't report the duration of the vacation and only two of the seven studies reported a vacation duration of two weeks, no firm conclusion can be made about the relationships between the duration of a vacation and the occurrence of vacation after-effects. However, it is an indication of the existence of vacation after-effects which should be further explored.

By taking this into account and the fact that several studies found that the after-effects fade out after two to four weeks (Fritz & Sonnentag, 2006; Westman & Eden, 1997; Westman & Etzion, 2001), it is expected that health and well-being of the participants will be higher after the vacation compared to the baseline measurement and that these after-effects will fade out within a couple of weeks.

Besides the attempt to replicate some aspects of the study of De Bloom et al. (2010) in a long summer vacation, the change of health and well-being across the vacation period will be examined as well. To this point only very few vacation studies carried out inter-vacation measurements at all (for exceptions see: Westman & Eden, 1997; Fritz & Sonnentag, 2006). Supposedly due to that shortcoming, no research exists which examined the development of health and well-being across a vacation period. Yet, it might be very helpful to get detailed insights into the development of health and well-being across a vacation, because this will make it possible to plan a vacation in the most effective way in terms of positive outcomes for health and well-being. It may for example have a major impact on the decision at what time

an employee should actually go on vacation. Is it better to stay at home for a couple of days in the beginning of the vacation period because it will take some time before the employee can relax? Or should the employee start the days off by going on vacation immediately and spending the last days of the vacation period at home? In order to fill this gap in vacation research, the third research question is:

Q 3: How do health and well-being develop across a vacation period (across the four inter-vacation occasions)?

There are several reasons to assume that it may take some time till the positive effects of a vacation occur. For example, Frankenhaeuser (1981) found that there are so-called after-effects of work which only reveal after several hours after work. That means, strain effects of a stressful work day do not unfold immediately, but later on in the evening hours. It is possible that such after-effects of work do also persist during the first days of vacation. It could be that strain effects of stressful work days, weeks or even months unfold in the beginning of a vacation period. An expression of this carry-over of work strain may be the phenomenon of leisure sickness (Vingerhoets, Huijgevoort, & Van Heck, 2002). People suffering from leisure sickness (at least three percent of the Dutch population), suddenly start to feel ill (headache, cold etc.) in the weekend or during a vacation, while they feel healthy on working days. For the development of health and well-being across a vacation, this would mean that a positive effect of vacation on the outcome variables will not be observable until a few days after the start of the vacation period. It can be assumed that the vacation effect then will unfold to its full extent.

So far, this paper regards a vacation as the possibility to prevent a deficient state or at least to compensate for it: during the working periods health and well-being of employees' decreases because of job stressors and the adverse affects are compensated by taking a vacation. Another approach examining the effects of a vacation is to study the relationship between a vacation (recovery) and positive outcomes like creativity, enthusiasm or working performance. Like Seligman, a well-known ambassador of positive psychology noticed: "The aim of Positive Psychology is to catalyze a change in psychology from a preoccupation only with repairing the worst things in life to also building the best qualities in life." (Seligman, 2002b, p. 3). In this spirit, this paper will also focus on the positive outcome creativity. Creativity is unlike health and well-being nothing an employee indispensable needs in order to perform well. However, if an employee doesn't want to just perform well but wants to be excellent in his job, creativity might be essential.

The field of creativity research is diverse and complex and therefore it is necessary to start with a definition of creativity. In the field of creativity research, there is much debate about an appropriate definition of creativity. Yet, Hennessy and Amabile (2010) pointed out that, "...most researchers and theorists agree that creativity involves the development of a novel product, idea, or problem solution that is of value to the individual and/or the larger social group..." (p.572).

Beyond that, a distinction is made in the literature between "Big C" and "little c" (Richards, 1990; Richards & Kenney, 1990; mini-c and pro-c creativity were added to this distinction, for further information see Kaufman & Beghetto, 2009). Big C refers to eminent creativity which we for instance can find in outstanding artists like Wolfgang Amadeus Mozart or Pablo Picasso. Little c is the "everyday creativity", that refers to the creativity of an average person in everyday life. This study will focus on the latter one, the little c-creativity, underscoring that creativity is something actually everybody is able to express and not only some very rare and gifted people.

Numerous studies in the field of creativity research have attempted to find the contributors of creativity (for a recent review see Hennessey & Amabile, 2010). In this study we will focus on two factors which are very likely to change in a vacation and that have shown to be associated with creativity: affect and detachment from work.

Regarding affect, there is a great amount of research focussing on the influence of positive and negative affect on creativity (for a recent review see Rank & Frese, 2010). Isen is one of the researchers who has focused on the relation between affect and creativity. In a series of experiments, Isen et al. (1985, 1987, 1992) found that induced positive affect improves the performance on problem solving tasks, requiring creative ingenuity. Isen (1999a, 1999b) proposed a process in which positive affect can have an impact on creativity. In figure 1 this process is presented.

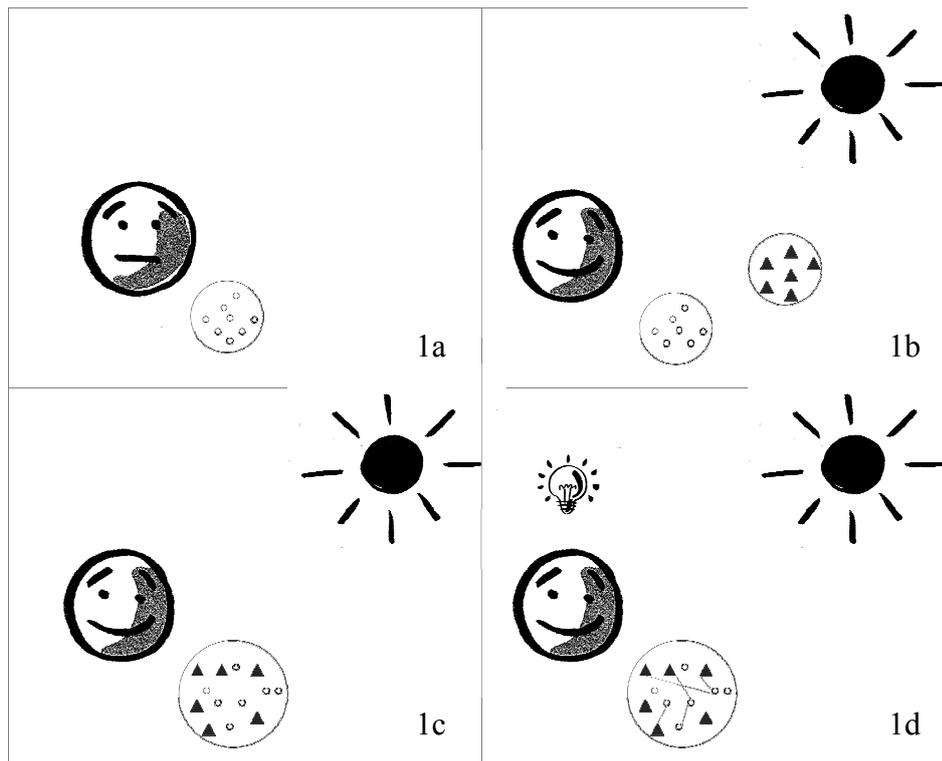


Figure 1a-1d. The relationship between affect and creativity.

First of all, someone is confronted with a problem or a question which needs to be solved. Automatically certain patterns of thought will be activated (figure 1a: big circle with dots = cognitive repertoire automatically activated by a certain stimuli). By getting in a positive mood (figure 1b: shining sun), more cognitive data are available for processing, so that an increasing number of cognitive material can be used for making associations (figure 1b: big circle with triangles = cognitive material not normally activated by a certain stimuli). This greater amount of cognitive data is a precondition for unusual, new thoughts and ideas.

For instance, in one experiment Isen, Johnson, Mertz and Robinson (1985) induced positive affect in people. They found that the participants in comparison to an affect-neutral control group gave more unique associates to a neutral word. Moreover the positive affect group showed a more divers set of associates.

After positive affect made more cognitive material available, it also promotes a defocused attention (figure 1c). Support for this step in the process of creativity comes from Barbara Fredrickson, a well-known representative of Positive Psychology. In Fredrickson's Broaden-and-Build Theory (2001) it is proposed that positive emotions, like joy and contentment, broaden the scope of attention, cognition and action. She conducted several studies on the relationship between affect and the concept of "broadening" and found plenty of support for

the hypothesis that positive affect leads to a broadened scope of attention (Fredrickson & Branigan, 2005; Johnson & Fredrickson 2005). For example in one experiment of Fredrickson and Branigan (2005) the broaden-hypothesis was tested by using a global-local visual processing task (developed by Kimchi & Palmer, 1982). First, a specific emotion was elicited (amusement, contentment, anger, anxiety). Then the participants got to see a picture like in figure 2 and had to decide which of the lower figures is more similar to the standard figure on top.

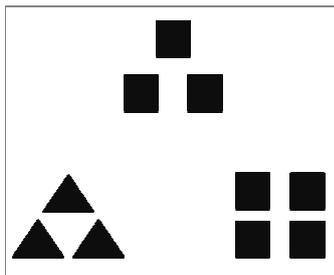


Figure 2. Global-local visual processing task.

If the participants chose the triangle consisting of triangles their choice was based on the global configuration of the standard figure. If the participants chose the square consisting of squares, participants made their choice based on the local details of the elements of the standard figure. In this study of Fredrickson and Branigan (2005), it was discovered that participants in the positive affect condition chose significantly more often the global configuration compared to participants in the neutral condition, providing support for the hypothesis that positive affect broadens the scope of attention.

In the last and vital step of the process to creativity, Isen assumes that positive affect enhances the flexibility of a person to actually make unusual associations (figure 1d). Evidence for this hypothesis was found by Isen, Daubman and Nowicki (1987) using the Duncker's candle task (1945). Again in the first place affect was induced. Then the participants were confronted with a problem-solving task. They got the following instructions: "On the table are a book of matches, a box of tacks, and a candle. Above the table on the wall is a corkboard. Your task is to affix the candle to the corkboard in such a way that it will burn without dripping wax onto the table or the floor beneath. You will be given 10 minutes to work on the problem." (Isen, Daubman, & Nowicki, 1987, p.1123).

The results of this study revealed that participants in the positive affect condition were significantly more often able to solve the task than participants in the neutral condition (positive condition: 75% solved the task; neutral condition: 20% solved the task).

Probably you are now eagerly waiting for me to tell you the solution of the candle-task. Unfortunately I have to disappoint you. The question is: Are you happy enough to successfully solve this riddle yourself?

Based on the previous mentioned evidence for a relationship between creativity and positive affect, and considering that a vacation is meant to be positive and enriching, it seems very likely that a vacation may positively influence creativity.

Another factor that could be related to creativity is detachment from work. Detachment can be defined as the extent to which an employee can mentally distance himself from his work (Etzion, Eden & Lapidot, 1998). Because a vacation should be the time where employees relax, travel and spend time with important others, it definitely is intended to give employees the chance to detach from work.

Until now, there has not been much research on the relationship between detachment and creativity. Nonetheless it makes sense to assume that employees, who are distancing themselves from their job for a few weeks, might come back to their job with fresh ideas and another view on certain situations and problems. This hypothesis is in line with Isen's theory about the relationship between creativity and affect (Isen et al. 1999a, 1999b). As mentioned before, one crucial step in her theory is defocused attention. In order to be creative you need to get out of your normal patterns of thought. This could help you to make new associations and see different aspects of one and the same situation. All of this is especially possible through detachment from your normal surroundings, thus, through detachment from work.

Yet, in the only study which could be found, investigating the relationships between detachment from work and creativity, it was found that cognitive detachment was not related to any changes in creativity (Spoor, de Jonge & Hamers, 2010). However, in this study participant's time-span to detach from work was limited to the evening-hours or the weekend. Thus, in the differentiation of Sluiter et al. (2000) they only focused on metarecovery. This leaves room for the suggestion that the effects of detachment from work need more time to occur and can only unfold if employees are off the job for a longer time (more than two days of recovery). This is in line with the findings of Frankenhaeuser (1981) who found that after-effects of work just occur several hours after finishing time. Thus, especially when an employee gets the chance to fully unwind from the demands of the job (Geurts & Sonnentag, 2006) and is able to excess the normal patterns of thoughts (Fredrickson, 2001), creative thoughts and behaviour can occur.

Thus, in order to examine the relationship between creativity and vacation, the fourth research question is:

Q 4: Does a vacation increase employee creativity?

To get a detailed picture of the relationship between creativity and vacation, the concept of creativity was divided into two aspects: work-related creativity and general creativity. Work-related creativity refers to creative thoughts or behaviours one might use on the job: this may be a problem on the job that has to be solved or an idea that might contribute to the improvement of an aspect of one's work (George & Zhou, 2001).

In this paper the following research questions will be investigated:

Q 4.1: Does work-related creativity of employees significantly increase while they are on a vacation compared to a working period (vacation effect)?

Q 4.2: If there is a vacation effect on creativity, how long does it last after work resumption (vacation after-effect)?

In order to find the underlying process through which a vacation may contribute to work-related creativity, it will be tested whether positive affect or detachment from work during the vacation are accountable for the potential positive effects of a vacation on work-related creativity.

Because work-related creativity can be measured very easily during the vacation, it is possible to investigate the development during the vacation as well. The corresponding research question is:

Q 4.3: How does work-related creativity develop across a vacation period (across the four inter-vacation occasions)?

Due to the fact that the development of work-related creativity across a vacation has never been investigated before, no firm hypothesis can be made. However, because of the negative after-effects work can have (Frankenhaeuser, 1981), it is assumable that the expected positive effect of a vacation on work-related creativity may take some time to occur.

General creativity covers a broader concept of creativity and is not directly linked to a work-problem or a working situation. That is why it will be too complex to measure it during the vacation and only a pre-post comparison of general creativity will be possible:

Q 4.4: Is general creativity of employees significantly higher after they were on a vacation compared to a working period before the vacation (after-effect)?

As with work-related creativity, it will be investigated which role positive affect and detachment from work play in the relationship between a vacation and creativity.

This study on the effects of a vacation on health and well-being and creativity will expand the knowledge in the field of recovery; especially in the context of a vacation. It will be possible to determine if a long summer vacation actually has positive effects on health and

well-being, how these effects develop across the vacation and how long these effects last after work resumption. Moreover, the focus of this paper won't just be on the prevention-effects a vacation can have. This paper will also shed light on a positive outcome a vacation possibly has: creativity. By splitting up the concept of creativity into work-related and general creativity, detailed conclusions about the effects of a vacation on the two concepts of creativity can be made. Above that it will be possible to determine whether positive affect and / or detachment from work are key variables in the relationship between vacation and creativity.

Method

Design

The data were collected on twelve measurement occasions, including one general questionnaire (GQ). In this general questionnaire, the participants were, among other things, asked about basic job information such as their functional status or work hours per week, and about demographic information like their marital status. This questionnaire was used to describe the sample appropriately, but was not included in the analyses.

The pre-measurements were conducted two weeks before vacation, on Tuesday and Thursday. There were four inter-measurement occasions: on the fourth, eighth and twelfth day. If the participants were on vacation more than fifteen days, there was another measurement on the sixteenth day as well. In the first week of work resumption two post-measurements were conducted. The Post 1 measurement took place on the first day of work resumption. The second post-measurement occasion took place on the last day of the first week of work resumption. If this was a Friday, the measurement took place one day earlier, because a measurement on Friday could be biased by the pleasant anticipation of the weekend. These led to measurements on either Monday and Thursday, Tuesday and Thursday or Wednesday and Thursday. If the first day of work resumption was on Thursday, the second post-measurement took place on Friday. The other three post-measurements were conducted in the second, third and fourth week after work resumption on Tuesday. Figure 1 illustrates the design of this study in detail.

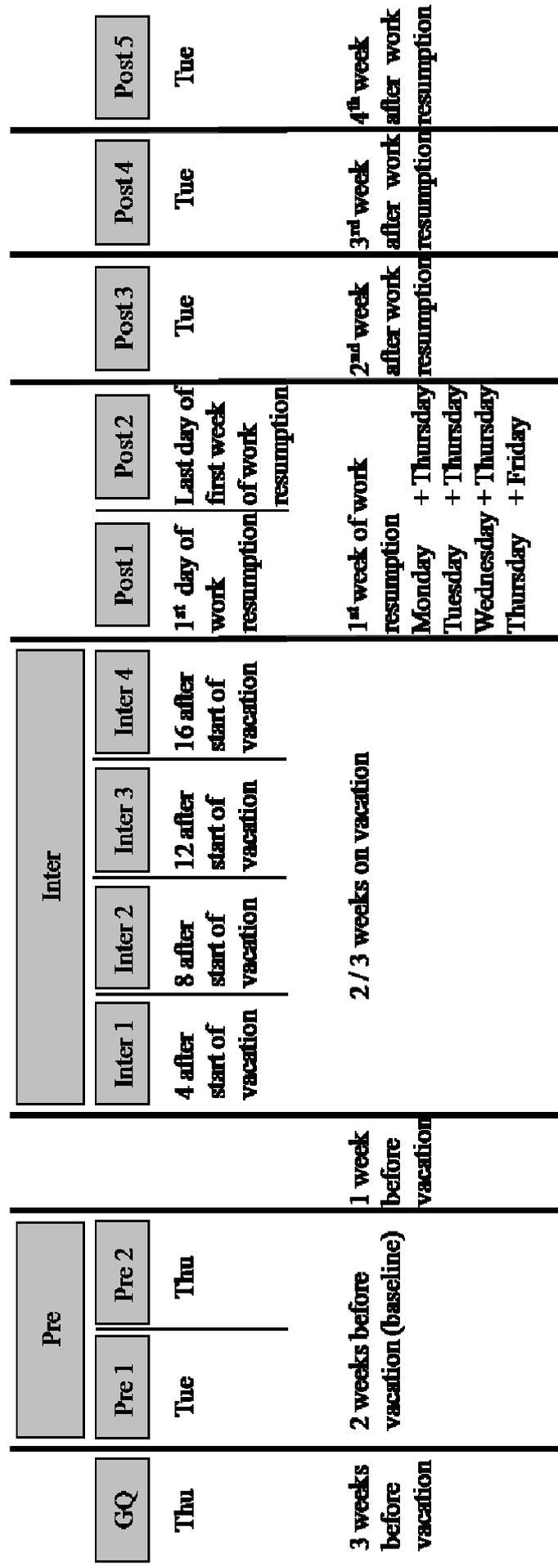


Figure 1. Research design for the summer vacation study.

Data collection procedure

Our longitudinal field study was carried out during a summer vacation period and covered a time span of ten weeks maximum. The participants were recruited by handing out flyers around the location of Nijmegen and by putting adverts in local newspapers (“Zondagkrant” and “De Brug”). In order to encourage participation, three lottery prizes were announced: the first prize was a one week vacation in Austria, the second prize was a weekend vacation in the Netherlands and the third prize was an 100€ cheque.

The people who decided to react on the recruitment activities, could fill in a questionnaire on the website vakantiestudie.nl, in which the main criteria for this study were checked. Inclusion criteria for this study were, among others: ability to speak and understand Dutch, at least 24 hours paid work a week, internet and e-mail access at home, no objections getting called during the vacation (at least three times for approximately 15 minutes), and a vacation period of at least two weeks within the time span of June 15th and August 22nd.

The people who met these requirements and decided to participate in this study, got detailed information about what the study entails and what exactly his or her duties are. Moreover, they got a time schedule of their individual measurement occasions. Above that, in the weeks before the vacation, the participants received a cell phone with an International prepaid SIM-card from the university, so they won't have any costs when called during their vacation. Moreover the participants received another envelope which they were only supposed to open upon request. This envelope contained four paper versions of the questionnaire which was conducted during the inter-vacation measurements. If the participants had any technical problems so that it could not be spoken to them on the phone, the participants got a text message on their own cell phone wherein they were asked to open the envelope and fill in one of the questionnaires.

To fill in the questionnaires before and after the vacation, thus during the working periods, the participants received an e-mail on the day they should fill in the form, with an individual log-in code and a link to a digital diary. They were asked to fill in the questionnaires right before going to bed. To ensure that the participants filled in the digital diaries, they received a reminder-SMS on each measurement day around four o'clock.

During the vacation, the participants were called by one of the researchers between five p.m. and eight p.m. on the cell-phones from the university. To make sure that the cell-phone of the university is activated and the batteries are charged, the participants received a reminder-SMS on their own cell-phones in the morning of the day of the measurement.

After the completion of the data collection, the participants received an e-mail in which they were thanked for their participation, the lottery winners were announced and they got information about when the first results of the study are expected.

Subject / Participants

Of the 65 participants who met the inclusion criteria, 58 eventually decided to take part in this study. During the study, four participants changed their minds and forego their participation because of personal reasons. This resulted in a response rate of 83%.

The mean age of the participants was 42.5 years (SD = 10.60) and exactly one half of them was female. Further, 53.1% of the sample held a college or university degree, 33.3% were medium educated (senior general secondary and university preparation education), and 13% were lower educated (lower secondary or junior secondary education). Based on the International Standard Classification of Occupation (International Labour Organisation, 2007), the participants were classified per vocation. The majority of the sample were technicians and associate professionals (28%, e.g., nurse and webmaster), 22% were legislators, senior officers and managers (e.g. project manager and branch manager), 22% worked as professionals (e.g., doctor and consultant), 11% as clerical support workers (e.g. secretary and receptionist), 11% were service and sales workers (e.g. sales employee and call-center agent) , and the remaining 6% worked in other occupations. The participants worked on average 35.2 hours per week (SD = 7,2), varying from 24 to 60 hours.

The average vacation duration (including weekends) was 22 days (SD = 4.4) with a minimum of 14 days of vacation and a maximum of 33 days. The majority of the sample spent their vacation in France (24%), 13% in the Netherlands, 9% of the vacationers went to Austria, 7% to Germany and the same percentage of participants was in Italy. The remaining 40% of the participants spent their vacation in other countries.

Health and well-being

In order to incorporate an extensive picture of health and well-being in this study, six indicators of health and well-being were included: health status, affect, fatigue, tension, energy level and satisfaction. As shown in Elo, Leppänen and Jahkola (2003), longer scales measuring for example psychological stress can be replaced by single-item questions because the shorter versions still have satisfactory content, criterion and construct validity. Therefore and in order to reduce the length of the questionnaire and to lower the time needed to

complete the questionnaire, all six indicators of health and well-being were measured with one single-item question.

Because participants were familiar with the widely used Dutch rating system, the basic Dutch grade notation system ranging from 1 (extremely low/negative) to 10 (extremely high/positive) was adopted. The first and the last grade were always anchored.

Health status was measured by asking “How healthy did you feel today?” (1 = very unhealthy, 10 = very healthy). To measure the affective state of the participants, the item “How was your mood today?” was used (1 = very bad, 10 = very good). In order to measure how fatigued the participants felt on the given day, they were asked “How fatigued did you feel today?” (1 = not fatigued at all, 10 = very fatigued). In addition, tension was measured by the item “How tensed did you feel today?” (1 = very calm, 10 = very tense). To investigate the energy level, participants were asked “How energetic did you feel today?” (1 = not energetic at all, 10 = very energetic). In order to get to know the participants satisfaction level, they were asked “How satisfied do you feel about this day?” (1 = not satisfied at all, 10 = very satisfied).

To find out if there is one underlying construct for the six indicators of health and well-being, a Principal Component Analysis was performed using a Varimax rotation and in order to determine the factor structure, parallel analysis and scree tests were used. As Hayton, Allen and Scarpello (2004) point out, parallel analysis is more accurate as factor retention criterion than the Kaiser or eigenmin greater than 1 criterion (K1) because it overcomes the overestimation of matrix ranks due to sampling errors of the K1 criterion (Glorfeld, 1995). However, if the sample size is small, it is possible that a parallel analysis underfactors (Turner, 1998). Therefore, it is advisable to use the parallel analysis in conjunction with other methods such as the scree test (Hayton, Allen, & Scarpello, 2004). This is what was done in this study. The parallel analysis was done with 50 repetitions (Lautenschlager, G. J., 1989) and revealed that there was a one-factor solution for the six health and well-being indicators at almost all measurement occasions (only on measurement occasion Pre 2, a two-factor solution was found). The scree tests confirmed the results of the parallel analysis. The Cronbach’s α of health and well-being ranged over the eleven measurement occasions between .76 and .90 (*Pre 1 = .90 / Pre 2 = .77 / Inter 1 = .76 / Inter 2 = .83 / Inter 3 = .80 / Inter 4 = .90 / Post 1 = .81 / Post 2 = .82 / Post 3 = .84 / Post 4 = .84 / Post 5 = .79*).

Creativity

For the purpose of this study, there were two measurements of creativity included: one that taps general aspects of creativity (restructuring / re-encoding; Schooler & Melcher, 1995) and one that focuses on the work-related aspects of creativity (George & Zhou, 2001).

General Creativity. To measure general creativity, the Guilford's Alternative Uses Task (1967) was incorporated in this study. Participants were asked to write down all creative uses they could come up with for a brick or for a newspaper within two minutes. The participants had to do this task only on the pre-vacation measurement and on the first post-vacation measurement, because it would have been very difficult to administer this task during the vacation on the phone. First, it would have cost too much time and therefore the phone calls could have been an unpleasant interruption during the vacation which could have had a negative effect on health and well-being of the participants (one of the dependent variables of this study). Second, the participants would have had to tell their ideas to one of the researchers (in contrast to just write it down), which may have inhibited some responses and which may have led to socially accepted answers instead of *all* the ideas the participants could come up with. Therefore it was decided to conduct this test only on the second pre- and the first post-vacation measurement occasions.

In order to avoid any effect of the order of the stimuli ("newspaper" / "brick"), they were counterbalanced: participants, who answered the brick question on the pre-vacation occasion, received the newspaper question on the post-vacation occasion and vice versa. The answers of the participants were scored considering two different aspects of creativity: fluency and cognitive flexibility. Fluency reflected the amount of ideas a participant could come up with. In order to obtain reliable results, the amount of ideas was scored by three raters. One of them was the author and the two other raters were blind for the design of the study, its research questions and hypotheses. The inter-rater reliability of fluency was $r = .98$ for the pre-vacation measurement and $r = .96$ for the post-vacation measurement.

Because the computation of fluency did not take into account the category in which each idea belongs, the answers were also scored in terms of cognitive flexibility. Thus, if a participant only came up with ideas of building something with a brick, all ideas fell into one category and his score was one. However, a participant who wrote down that one could build a house with a brick or use it as paperweight, would attain two points, because of the two different categories his ideas covered. To obtain a reliable result of cognitive flexibility, the answers of the participants were again scored by the three raters described above. Before the rating of cognitive flexibility started, the rater-group first defined the concept of a category to

obviate differences in the ratings due to different understandings of the concept “category”. Moreover the raters were asked to first read the full list of answers of the participants to get an overall impression of the answers that were given. Just when they had read all answers, they started to rate. The inter-rater reliability of flexibility was found to be $r = .97$ for the pre-vacation measurement and $r = .95$ for the post-vacation measurement.

Work-related creativity. In order to measure the work-related aspects of creativity, three items of the scale measuring creative thoughts were adapted from George and Zhou (2001): “My head is full of creative and innovative ideas that are related to my work.” / “My head is full of creative solutions for problems at work.” / “My head is full of ideas to solve tasks at work in a new way.” The participants could indicate on a 10-point Likert-scale, how much they agreed with these statements (1 = totally disagree, 10 = totally agree). In order to investigate if these three items had one underlying construct, a factor-analysis was conducted. A Principal Component Analysis with Varimax rotation was performed using parallel analysis and scree plots in order to determine the factor structure. Both methods revealed that there was one underlying construct for the three items measuring work-related creativity. The reliability of work-related creativity ranged between .82 and .95 over the eleven measurement occasions (*Pre 1* = .94 / *Pre 2* = .91 / *Inter 1* = .95 / *Inter 2* = .92 / *Inter 3* = .92 / *Inter 4* = .82 / *Post 1* = .91 / *Post 2* = .94 / *Post 3* = .95 / *Post 4* = .95 / *Post 5* = .95). Therefore the three item-scores were averaged into one overall work-related creativity score.

Detachment from work

To measure detachment from work the following three items of the Recovery Experience Questionnaire (Sonnentag & Fritz, 2007) were used: “During this vacation I don’t think about my work at all.” / “During this vacation I distance myself from my work.” / “During this vacation I get a break from the demands of work.”. The participants could indicate on a 5 point Likert-scale how much they agreed with these statements (1 = totally disagree, 10 = totally agree). On the second pre-vacation measurement (*Pre 2*) the item “During this vacation I distance myself from my work” admixed with another item of the questionnaire out of technical reasons. Therefore only the other two items were used in the analyses.

A Principal Component Analysis with Varimax rotation was performed using parallel analysis and scree plots to determine the factor structure. The results of the parallel analysis and the scree tests revealed that there was one underlying factor for the three items (exception: *Pre 2* – two items). The Cronbach’s α of detachment from work ranged between .71 and .84 over the eleven measurements occasions (*Pre 1* = .71 / *Pre 2* = .75 / *Inter 1* = .76 /

Inter 2 = .81 / Inter 3 = .72 / Inter 4 = .77 / Post 1 = .77 / Post 2 = .80 / Post 3 = .84 / Post 4 = .84 / Post 5 = .83).

Because of the clear factor structure and the satisfactory Cronbach's α , the three item-scores of detachment from work were averaged to one overall score of detachment from work for every occasion (for Pre 2 only the two items were averaged).

Results

Health and well-being – Vacation effect, after-effects and development across the vacation

The means, standard deviations, amounts of observations and the correlations of the health and well-being (H&W) indicator are presented in Table 1.

In the first step it was investigated if there was a vacation effect on health and well-being and how long potential after-effects lasted after work-resumption (*Question 1 and 2*). Because the factor-analysis revealed that there was one underlying construct for the six indicators of health and well-being on almost all measurement occasions, the scores were averaged to one overall health and well-being indicator for every occasion. This indicator will be used in the analyses attempting to answer research question one and two. Moreover the four inter-measurements (Inter 1, Inter 2, Inter 3, and Inter 4) were averaged to one inter-measurement score and the two pre-measurements were averaged to one pre-measurement score.

To investigate if there was an effect of vacation on health and well-being, a 7 (Occasion: seven occasions) x 1 (H&W: one H&W-indicator) repeated measures ANOVA was conducted. The results revealed a main effect across time ($F(6) = 9.62, p \leq .000$), meaning that the mean scores of the seven occasions significantly differed from each other. Further, to investigate the vacation effect and its potential after-effects, t-tests were used to prevent as much missing data as possible.

Vacation effect. To examine whether there is a vacation effect, the pre-vacation measurement was compared to the inter-vacation measurement by conducting a t-test. With $t(51) = -7.16, p \leq .000$ a vacation effect for health and well-being could be found. As can be seen from table 1, the participants felt better when they were on vacation than before the vacation. According to Cohen (1988), the effect size for this difference is large ($d = 1.00$).

Vacation after-effects. Whether there are vacation after-effects was investigated by comparing the post-vacation measurements (Post 1 to Post 5) with the pre-vacation measurement by conducting t-tests for each pre-post difference. The data revealed that all of

the t-tests were significant, meaning that the participants had higher scores on health and well-being after the vacation than before the vacation (Pre vs. Post 1: $t(50) = -2.85$, $p = .006$ / Pre vs. Post 2: $t(50) = -2.63$, $p = .011$ / Pre vs. Post 3: $t(51) = -2.44$, $p = .018$ / Pre vs. Post 4: $t(48) = -3.48$, $p = .001$ / Pre vs. Post 5: $t(48) = -2.24$, $p = .030$). The effects sizes for the five post-measurement occasions were respectively: $d = 0.38$ / $d = 0.38$ / $d = 0.34$ / $d = 0.57$ / $d = 0.36$.

Development across the vacation. To come to a deeper understanding of the vacation effect the development of health and well-being across the vacation period was examined (*Question 3*). In order to get to know if levels of health and well-being were constantly high or if there was a peak of health and well-being during the vacation, the four inter-vacation measurements were inspected separately. Therefore, a 4 (Occasion: four inter-measurements) x 1 (H&W: one H&W-indicator) repeated measures ANOVA was conducted. Analysis of variance exhibited a marginal significant p-value of $F(41) = 2.57$, $p = .072$. Suggesting that the four inter-measurements probably differ from each other. To compare the four inter-vacation measurements with each other, Fisher's LSDs were calculated. The data showed that the difference between Inter 1 and Inter 2 and the difference between Inter 2 and Inter 4 was significant (respectively: Mean Difference = -0.49 , $p = .014$ and Mean Difference = 0.39 , $p = .05$). The difference between Inter 1 and Inter 3 was marginally significant (Mean Difference = -0.31 , $p = .058$). The effect sizes for these three differences were respectively $d = 0.42$, $d = -0.25$ and $d = 0.28$. Following the categorization of Cohen (1988), all the effect sizes were small. In order to illustrate the development, the scores of health and well-being during the vacation are visualized in Figure 2.

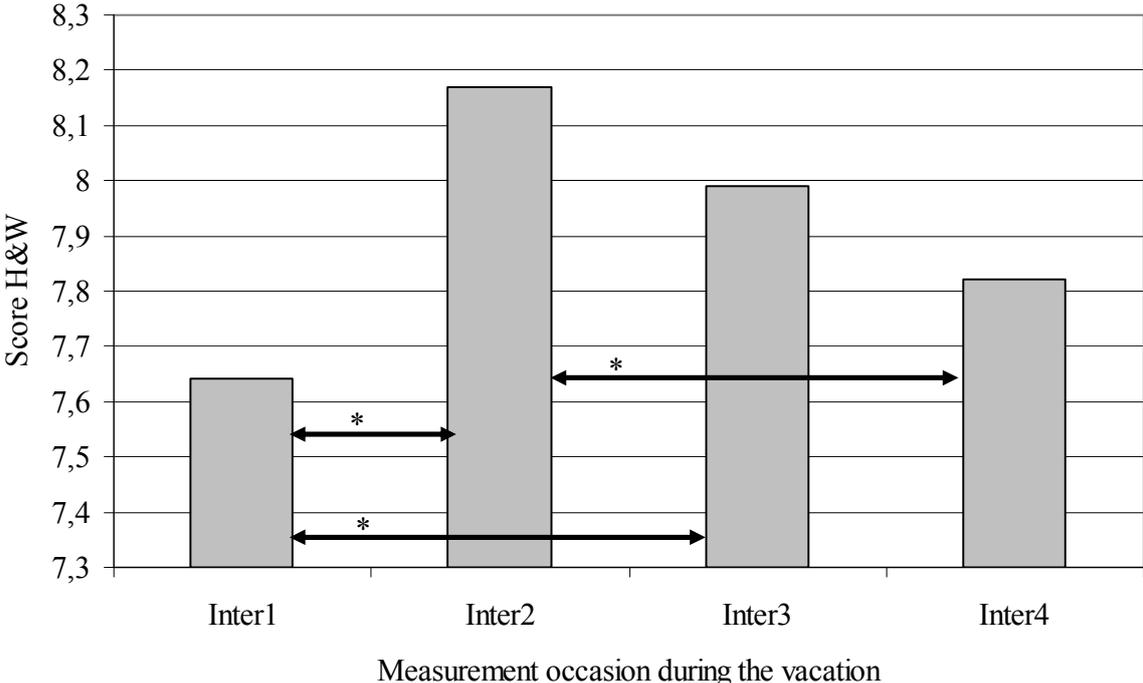


Figure 2. Development of health and well-being across the vacation period.

Note. The four inter-measurement occasions are presented with the piles indicating significant differences.

* $p \leq .01$

Table 1

Means, Standard Deviations, and Zero-Order Correlations between the indicator of H&W on the different measurement occasions.

Variables	Means	SD	N	1	2	3	4	5	6	7	8	9	10	11
1 H&W Pre	6.79	1.26	53											
2 H&W Inter 1	7.64	1.21	53	.368**										
3 H&W Inter 2	8.17	1.20	52	.442**	.458**									
4 H&W Inter 3	7.99	1.18	52	.456**	.539**	.643**								
5 H&W Inter 4	7.82	1.50	45	.511**	.452**	.545**	.341*							
6 H&W Inter1-4	7.88	1.04	53	.559**	.776**	.835**	.799**	.793**						
7 H&W Post 1	7.22	1.23	52	.588**	.476**	.406**	.497**	.484**	.601**					
8 H&W Post 2	7.28	1.36	52	.504**	.437**	.614**	.514**	.535**	.673**	.651**				
9 H&W Post 3	7.19	1.33	53	.590**	.491**	.401**	.359**	.479**	.563**	.549**	.539**			
10 H&W Post 4	7.30	1.34	49	.766**	.250	.429**	.375**	.528**	.504**	.454**	.386**	.611**		
11 H&W Post 5	7.18	1.19	50	.600**	.492**	.438**	.403**	.572**	.615**	.708**	.549**	.567**	.546**	

* p ≤ .05

** p ≤ .01

Work-related creativity – Vacation effect, after-effects and development across the vacation

Further it was examined whether work-related creativity of employees significantly increases while they were on a vacation (*Question 4.1*). Above that it was analyzed how long a potential increase in work-related creativity lasted after work resumption (*Question 4.2*). For this purposes, the four inter-measurement occasions (Inter 1, Inter 2, Inter 3, and Inter 4) were averaged to one inter-measurement score and the two pre-measurements were averaged into one pre-measurement score.

Due to the fact that participants only answered questions about work-related creativity during vacation, if they thought about their work during the vacation, the N for work-related creativity was smaller during the vacation than before and after the vacation (see Table 2). In order to prevent as much missing data as possible, it was chosen to conduct t-tests to investigate if there was a vacation effect on work-related creativity and if there were vacation after-effects. To examine if there was a vacation effect, the pre-vacation measurement was compared to the inter-vacation measurement. A significant difference between the pre-measurement occasion and the inter-measurement occasion could be found ($t(38) = 2.69$, $p \leq 0.05$) with a medium effect size of $d = -.52$. As can be seen from Table 2, this indicates that work-related creativity is lower during the vacation than before the vacation.

To investigate if there were any vacation after-effects on work-related creativity, all post-vacation measurements (Post 1 to Post 5) were compared to the pre-vacation measurement by conducting a t-test for every pre-post difference. The data revealed that none of the pre-post differences were significant (Pre vs. Post 1: $t(51) = -1.97$, $p = .055$ / Pre vs. Post 2: $t(51) = -1.55$, $p = .127$ / Pre vs. Post 3: $t(52) = -1.90$, $p = .064$ / Pre vs. Post 4: $t(49) = -1.51$, $p = .139$ / Pre vs. Post 5: $t(49) = -1.21$, $p = .231$). This indicates that the levels of work-related creativity before and after the vacation were the same.

Further, to examine whether the decrease in work-related creativity during the vacation was related to any changes in detachment from work or affect, two hierarchical regression analyses were performed. In both analyses the dependent variable was work-related creativity during the vacation and in the first block age and gender were inserted as control variables. Moreover, because the vacation effect was defined as the difference between the inter-measurement and the pre-measurement, work-related creativity before the vacation was entered in the second block. In the last step, either detachment from work or affect during the vacation was entered. The analysis revealed that except work-related creativity before the vacation which respectively explained 44.1 % ($p = .009$) and 51.9% ($p = .002$) of the variance, none of the other variables contributed to the prediction of the decrease in work-

related creativity during the vacation. Thus, the changes in work-related creativity during the vacation can for a great amount be attributed to work-related creativity before the vacation. All the other variables taken into account in the analyses do not influence the level of work-related creativity during the vacation.

In order to investigate how work-related creativity developed during the vacation (*Question 4.3*), the inter-measurements of work-related creativity were split up and examined separately. A 4 (Occasion: four occasions) x 1 (Work-related creativity) repeated measures ANOVA was conducted. The results showed that there was no difference between the four inter-measurements occasions ($F(10) = 0.24$, $p = .866$). Meaning that work-related creativity stayed the same across the vacation.

Table 2

Means, Standard Deviations, and Zero-Order Correlations of work-related creativity (WRC) on the different measurement occasions.

Variables	M	SD	N	1	2	3	4	5	6	7	8	9	10	11
1 WRC Pre	5.39	1.83	53											
2 WRC Inter 1	4.09	2.57	31	.114										
3 WRC Inter 2	3.90	2.19	23	.494*	.620**									
4 WRC Inter 3	4.97	2.22	23	.576**	.348	.835**								
5 WRC Inter 4	4.76	1.88	23	.493*	.439	.821**	.667**							
6 WRC Inter1-4	4.28	2.28	39	.459**	.858**	.955**	.875**	.885**						
7 WRC Post 1	4.83	2.07	52	.570**	.686**	.654**	.639**	.771**	.775**					
8 WRC Post 2	4.91	2.00	52	.542**	.638**	.609**	.526**	.601**	.668**	.836**				
9 WRC Post 3	4.89	2.15	53	.549**	.482**	.455*	.386	.643**	.629**	.784**	.847**			
10 WRC Post 4	4.93	2.30	49	.581**	.377	.487*	.594**	.530*	.567**	.741**	.740**	.772**		
11 WRC Post 5	4.98	2.16	50	.316*	.459*	.361	.387	.235	.428**	.651**	.759**	.802**	.750**	

* $p \leq .05$ ** $p \leq .01$

General creativity – Pre-Post comparison

In order to get to know whether general creativity of employees significantly decreased after the participants were on a vacation compared to a working period before the vacation (*Question 4.4*), the pre- and post-measurement scores of general creativity were compared. First the pre- and the post-measurement scores of fluency were compared by using a paired samples t-test. The results revealed that there was no difference between the two measurement occasions in terms of fluency ($t(44) = -0.49$, $p = .627$). After that, the pre- and post-measurement scores of cognitive flexibility were compared, again using a paired samples t-test. The results showed that there was a significant difference between the two measurement occasions of cognitive flexibility ($t(44) = -2.140$, $p \leq .05$) with a small effect size of $d = 0.33$. The data indicate that the participants showed more cognitive flexibility after the vacation ($M = 4.45$, $SD = 1.21$) than before the vacation ($M = 3.89$, $SD = 1.66$).

Because of this significant difference found for cognitive flexibility between the pre- and post-measurement occasion, additionally two hierarchical regression analyses were conducted. In both analyses cognitive flexibility after the vacation was used as dependent variable and in the first step the control variables age and gender were entered. In the second step cognitive flexibility before the vacation was inserted. In the last step either affect or detachment from work during the vacation was entered. It appeared that in the first hierarchical regression analysis (affect entered in the last step) only gender significantly contributed to the variance in cognitive flexibility (33.9%). Thus, there is a positive relationship between being female and the changes in cognitive flexibility. None of the other variables are accountable for the changes in cognitive flexibility. In the second hierarchical regression analysis (detachment from work entered in the last step) again gender significantly contributed to the prediction of cognitive flexibility after the vacation, meaning that being women was positively related to changes in cognitive flexibility after the vacation. Age did not contribute to the prediction of cognitive flexibility. The results showed that cognitive flexibility Pre had a significant positive correlation with cognitive flexibility after the vacation. Meaning, that participants who showed cognitive flexibility before the vacation also showed this after the vacation. Finally the results revealed that detachment from work during the vacation was significantly negatively related to cognitive flexibility after the vacation. This means that participants who were less detached from work during the vacation, showed more cognitive flexibility after the vacation. The results obtained from the second hierarchical regression analysis are presented in Table 3.

Table 3

Results of the hierarchical regression analysis with Cognitive flexibility Post as dependent variable.

Variable	Cognitive flexibility <i>Post</i>		
	β	Sig.	ΔR^2
Age	.20	.15	.08
Gender	.33	.02*	
Cognitive flexibility Pre	.28	.04*	.13
Detachment from work during the vacation	-.28	.04*	.08
Total R ²			.28

* $p \leq .05$

Discussion

The present study was designed to determine the effects of a long summer vacation (at least two weeks) on employees' health, well-being and creativity. Measurements were taken before, during and after the vacation.

In the following the results of this study, its strengths and weaknesses will be discussed. Then the implications of the findings and suggestions for future research will be depicted.

Health and well-being

With regard to the first research question, analyses showed that participants felt healthier and had a higher well-being during the vacation compared to their constitution before the vacation. This finding is consistent with the results of De Bloom et al. (2010) and De Bloom, Geurts and Kompier (2010), who found a vacation effect in moderately long winter sport vacations and in short vacations.

However, regarding the after-effects of a vacation on health and well-being, the findings of the present study differ from the results of the study of De Bloom et al. (2010) and De Bloom, Geurts and Kompier (2010). In the winter sport vacation, participants felt not any healthier or better after the vacation than before the vacation. The increase in health and well-

being decreased to baseline levels within the first week (De Bloom et al., 2010). The same picture could be found for short vacations (De Bloom, Geurts & Kompier, 2010). In contrast, in the present study, small vacation after-effects could be found which lasted till the fourth week after work resumption. This means, that participants had a better health and well-being even a few weeks after the vacation.

Accordingly, this indicates that the duration of the vacation may play a major role for the occurrence of after-effects of a vacation. It seems that longer vacations (\geq fourteen days) may have positive effects on health and well-being even after work resumption, in contrast to moderately long (\leq nine days) and short vacations (\leq five days).

However, these data must be interpreted with caution. There might be restrictions regarding the baseline-measurement of health and well-being, especially regarding the second pre-measurement occasion. First of all, it should be mentioned that the baseline measurement in both studies of De Bloom and colleagues (De Bloom et al., 2010; De Bloom, Geurts, & Kompier, 2010) were approximately the same. This indicates that there might be some kind of “standard value” at which health and well-being levels off during working periods. However, in the current study, a baseline-value lower than this “standard value” was found. In closer examination it became clear that this lower baseline-level could be ascribed to the second pre-measurement (1st pre-measurement $M = 7.04$; 2nd pre-measurement $M = 6.71$). Thus, maybe there are only after-effects of a vacation due to the lower second pre-measurement. Because three pre-measurements were found with almost the same level of health and well-being before the vacation (De Bloom, Geurts, & Kompier, 2010; De Bloom et al., 2010; current study first pre-measurement), it is very likely that the second pre-measurement in this study is the outlier. Actually, this goes along with the second restriction regarding the second pre-measurement. The factor analysis of the second pre-measurement of health and well-being revealed certain inconsistency in the answers of the participants. Eventually this inconsistency can be associated with the fact that the pre-measurements took place on a Tuesday and a Thursday within one week. It is possible that there might be systematic differences between health and well-being on a Tuesday and a Thursday. Walkowiak and Zijlstra (in press) for example discovered that participants experienced high fatigue on Mondays which then significantly decreased on Tuesdays. On Wednesday and Tuesday participants were as fatigued as on Mondays. Moreover, Stone, Smyth, Pickering and Schwartz (1996) found that mood is already influenced by the time of the day. Therefore it seems possible that the day on which mood and other subjective evaluated states of health and well-being are measured, will influence the rating as well. For future research this would mean that the baseline of health

and well-being should ideally be composed of measurements of each day of a working week. Yet, this would be an unreasonable demand for every participant. Given the fact that it already is difficult to find people who are willing to participate in a study with only two pre-measurements, it does not seem feasible to get a baseline measurement composed of each day of a working week. A third limitation which is in line with the previous mentioned problems of the second pre-measurement occasion is the limited comparability of it with the measurements after vacation. The majority of the measurements after vacation took place on Tuesdays. The second pre-measurement took place on a Thursday. So, the after-effects of a vacation found in this study might simply be due to a natural occurring variability of health and well-being during a working week.

Nevertheless, it was decided to make use of the data of the second pre-measurement occasion due to three reasons. First of all, the internal validity on this measurement occasion was acceptable ($\alpha = 0.77$). Moreover, due to the fact that previous studies had major limitations regarding the reliability of the baseline measurement (Etzion, 2003; Gilbert & Abdullah, 2004), it was a concern of the author to use a reliable baseline-measurement with more than one day of a working week. Thirdly, the lower baseline measurement could also reflect reality. There might be differences between employees going on a summer vacation and those going on a winter sport vacation or a long weekend / midweek vacation. Employees who are waiting the whole year for their annual vacation may be more exhausted, especially at the end of a working week, than people who can afford the luxury to go on a winter sport vacation or a short vacation. For all these reasons it seemed sensible and justifiable to use both measurements before the vacation as baseline. Taken together, the findings regarding the vacation effect and the after-effects of a vacation underscore the importance of a summer vacation for health and well-being of employees.

Regarding the development of health and well-being across the vacation, a fluctuation could be found across the four measurement occasions. It started with a level of health and well-being which was significantly higher than before vacation. Yet, it was not until the second measurement occasion, thus eight days after the vacation period started, when health and well-being arrived at its peak. This finding supports the presumed idea of Frankenhaeuser (1981), that there are after-effects of work which occur several hours after work. These after-effects of work may have inhibited the full expansion of the positive effects of the vacation in the first few vacation days. As earlier mentioned, one expression of these delayed effects of work may be the phenomenon of leisure sickness (Vingerhoets, Van Huijgevoort, & Van Heck, 2002).

After its peak on the second measurement occasion during the vacation, health and well-being levels decreased on the third measurement occasion. Still, it was significantly higher than the first measurement occasion during the vacation. On the last measurement occasion health and well-being levels decreased to the level of the first measurement occasion during the vacation. This decrease in health and well-being levels from the second inter-measurement to the last inter-measurement indicates that besides after-effects of work, there might be “pre-effects” of work as well. This is in line with the findings of Walkowiak and Zijlstra (in press) and Rook and Zijlstra (2006). Both examined sleeping quality of employees during working weeks and in the weekend. It was found that participants’ sleeping quality was lowest on Sunday. This finding was explained by negative anticipations of work which employees may have on Sunday. So, maybe the participants thought about the work demands of the coming workweek and started worrying about all the things they have to do. The same mechanism may occur during vacation. In the last weeks of the vacation, the participants possibly anticipate more and more their work and related stressors. Therefore health and well-being decreases at the end of the vacation period.

Work-related creativity

Regarding the effects of a vacation on work-related creativity, it was hypothesized that a vacation would positively influence work-related creativity. However, contrary to the expectations, it was found that participants were *less* creative during the vacation than they were before vacation in a regular working week. This reduction in work-related creativity remained on the same level during the whole vacation period.

Because it was expected that changes in creativity occur due to changes in affect or detachment from work, it was tested whether those variables could explain the changes in work-related creativity. It was found that neither affect nor detachment from work are accountable for the decrease in work-related creativity during vacation.

These rather surprising results could possibly be explained by the findings of a study of De Dreu, Baas and Nijstad (2008) who examined the relationship between affect and creativity. They differentiated between deactivating moods like sadness, relaxation, depression, serenity and activating moods like anger, fear, happiness and elation. It was found that people who were in an activating emotional state were more creative than people who were in a deactivating emotional state. This finding was independent from the tone of affect (positive / negative). In the present study, it is assumed that affect alters due to the vacation. A vacation is initially meant to give an employee the opportunity to recover from work and to

relax. Accordingly, it is likely that especially deactivating, positive moods are present during a vacation. Thus, although somewhat speculative, a possible explanation for the results of the present study may be that participants are mainly in a positive, but deactivating emotional state like relaxation during their vacation. This in turn resulted in a decrease of work-related creativity instead of in the expected increase. That no relation between this decrease and affect could be found might be accountable to the question used in the present study to assess affect: "How was your mood today?". This question does not capture any activation levels connected to a specific mood. If this explanation would be true, the level of general creativity should stay the same before and after the vacation as well. However, the results revealed that cognitive flexibility, one expression of general creativity, increased after the vacation. Therefore another reason for the decrease in work-related creativity might be more likely.

It is possible that the kind of questions used to assess work-related creativity is responsible for the decrease of work-related creativity during the vacation. All of the questions implicated a certain problem or task at work that need to be solved. Thus, the questions implied that all participants felt the urge to change something at work. Yet, it is questionable if participants think about problems of work at all. Even if they think about a problem from work, they might just be happy that they are not confronted with it at the moment. It seems unlikely that they ruminate about the solution of a problem at work. This is in line with the assumption of Amabile and Mueller (2007) that a certain amount of demands on the individual might be useful to elicit creative thoughts and / or behavior. Basically this explanation is connected to the previous argumentation about deactivating and activating affective states. In both approaches a deactivating aspect or rather non-activating aspect could be responsible for a decrease in work-related creativity.

Another finding concerning work-related creativity is that the decrease in work-related creativity is not permanent. On the first day of work resumption, the level of work-related creativity went back to its baseline level.

Thus, unless the fact that a vacation does have a negative influence on work-related creativity during the vacation, it seems as if it has no long lasting consequences for work-related creativity.

General creativity

In order to get a comprehensive picture of general creativity, two different aspects of it were measured and analyzed: fluency and cognitive flexibility.

In this paper, fluency refers to the amount of ideas a participant could come up with in the Guilford's Alternative Uses Task (1967). The results revealed that participants were not able to produce more ideas after the vacation compared to a regular working week before the vacation. So, in terms of fluency, participants were just as creative after vacation than before vacation.

The second aspect, cognitive flexibility, does not take into account the amount of ideas a participant could come up with, but the amount of categories the produced ideas belong to – thus, the breadth of the ideas. The present study showed that cognitive flexibility significantly increased after the vacation. Again, because it was expected that changes in creativity occur because of changes in affect and / or detachment from work during the vacation, it was tested whether those two variables are accountable for the increase in cognitive flexibility. It was found that detachment from work during the vacation can be linked to the change in cognitive flexibility. Surprisingly the findings are contrary to the expectations: Participants who were *less* detached from work during the vacation showed *more* cognitive flexibility after the vacation. Thus, it seems, staying attached to work during a vacation is beneficial for cognitive flexibility and thus for creativity.

Based on the expectations from the beginning of this paper concerning the relationship between detachment from work and creativity, it is difficult to explain why a converse relationship was found. Yet, a study of Spoor, De Jonge and Hamers (2010) may shed some light on the finding. They conducted a study to investigate the relationship between detachment and creativity. It was found, that in case of high emotional demands it was beneficial for creativity when the participants stayed emotionally attached to work during their off-job time. They explained this finding by the possibility that staying attached to work must not necessarily mean that employees ruminate about their job, but rather that they positively reflect on their work during the off-job time. For example it may be a strain for nurses to deal with suffering people all day. Yet in their off-job times they realize that the tasks they did all day long are very valuable. This in turn would lead to positive feelings which are beneficial for creativity. Thus, following the argumentation of Spoor, De Jonge and Hamers (2010), staying attached to the job during a vacation may lead to an increase in creativity via an increase in positive affect.

Unfortunately, the results of the present study revealed that changes in cognitive flexibility cannot be attributed to affect during the vacation. However, as previously explained, the measurement of affect incorporated in this study did not take into account the activation level of affect. Thus, it might be possible that a relationship between affect and

cognitive flexibility could be found if affect was measured in terms of joy or some other activating positive emotional state. Possibly then the assumptions of Spoor, De Jonge and Hamers (2010) could be supported.

There might also be another explanation for the fact that staying attached to work is conducive to an increase in cognitive flexibility after the vacation. In the first place certain brain areas which are connected to work related aspects stay active during the vacation. Above that new brain areas which are stimulated by the new impressions employees gather during vacation become active. Thus, taken together, holding work related aspects active plus new impressions from vacation could make it possible that more ideas can be associated with each other because more brain areas are active. This could contribute to a higher cognitive flexibility after the vacation. Despite the fact that it will be difficult to conduct studies measuring brain activity during the vacation, the results of such a study would be a major contribution to the field of vacation research.

Summing up, the present study could not find any effect of a vacation on creativity in terms of fluency. However, we showed that cognitive flexibility increases after a vacation and that this change can be attributed to low levels of detachment from work. In order to get further insights into the negative relationship between detachment and cognitive flexibility and to get to know the underlying processes through which less detachment brings about an increase in creativity, further research will be needed.

Strengths and weaknesses

Before identifying avenues for future research, in the following, the strength and weaknesses of this study will be discussed. One limitation of this research is that it exclusively made use of electronic questionnaires. Unless this had major advantages regarding the collection, consolidation and analysis of the data, there is a chance that this may have automatically excluded some sections of the population like poorer or elderly employees. Figures from the statistical agency of the Netherlands (CBS) indeed indicate that the higher the economic status, the more likely it is that a person has access to a personal computer and to the internet at home. Yet, even 87% of the poorest people in the Netherlands have access to a personal computer and internet. A similar picture can be found regarding the age structure. To the age of 45, approximately everyone has access to a personal computer and internet. Above that age, people have indeed less access. However, till the age of 65, more than 90% have access to a personal computer and internet. Thus, though access to pc

and internet may not be the same for every section of the population, the before mentioned figures justify the use of electronic questionnaire.

Another shortcoming of this study is the great diversity of vacation types. There were people who were on a beach holiday in France, others bicycled through Austria and again others stayed at home. Therefore, it is not possible to determine which *type* of a vacation contributes to health and well-being or creativity. It would for example be possible that there are certain types of a vacation which have only small positive, no or even detrimental effects on the outcome variables. Probably this would not be visible in the results of this study because of the strong positive effects of other vacation types. Thus, in order to further specify which type of vacation has the most positive influences on the outcome variables, it would be desirable to keep the type of a vacation constant for a larger sample. Unfortunately, this might be very difficult to realize because of organizational and financial restrictions. In this study it was tried to get an overview over the type of vacation participants went to. They could indicate if they go on a family vacation, a sight-seeing tour, an active vacation or other types of vacation. However, participants did not chose one type of vacation, but most of the time a composition of at least two types of vacation. So, as became apparent, it is very difficult to make a clear distinction between different types of a vacation. The only clear differentiation that can be made is that of people who stay at home during their vacation and those who go on a vacation. This could be a starting point for future research.

Finally, another aspect which could be criticized is that the sample of this study only consists of Western, Educated, Industrialized, Rich and Democratic, short WEIRD, people (Henrich, Heine, & Norenzayan, 2010). Thus, the generalizability of the results is limited to this population. In order to make universal valid statements about the effects of a vacation, it would be necessary to assess the effect of a vacation with samples consisting of people from different countries and different cultures. Yet, this WEIRD-people problem does not only apply to the present study, but to the majority of studies in psychology research (Henrich, Heine, & Norenzayan, 2010). Moreover, the examination of the effects of a vacation which lasts longer than two weeks might be a “luxury problem”. For example in the United States only twelve vacation days are legally required. Not to mention developing countries.

Besides the previous mentioned weaknesses, this study has a couple of strengths as well. The first strong point is the research design with multiple repeated measures before, after and even across vacation. Besides the studies of de Bloom and colleagues (De Bloom, Geurts, & Kompier, 2010; De Bloom et al., 2010) the present study is one of the few researches’ which

carried out inter-vacation measurements. As our results indicate, on-vacation measurements essentially contribute to our understanding of recovery and of after-/pre-effects of work.

Further, despite the fact that in total twelve measurement occasions took place, the process was evaluated very positively by the participants. This can be ascribed to the use of electronic questionnaires which could easily be completed on the internet at home. Moreover, in order to arrange the questionnaire in the user-friendliest manner possible, the number of questions was restricted to a minimum, especially during the vacation. That participants experienced the data collection procedure very positively, is also reflected in the few missing data of this research.

Another strength of this study is the reliable measurement of creativity in a vacation study. On the one hand it was possible to measure general creativity before and after the vacation. And on the other hand we even succeeded in assessing work-related creativity before, after and across the vacation. To our knowledge this has never been done before. Thus, the results of the present study give us a first impression of the relationship between vacation and creativity. This might be a starting point for future research.

Implications and avenues for future research

The vacation effect of a long summer vacation on health and well-being found in this study underscores the importance of a vacation as an excellent opportunity to recover from work. Due to the fact that this vacation effect also occurred in a winter sport vacation with a mean duration of nine days (De Bloom et al., 2010) and in a short vacation of approximately four days (De Bloom, Geurts, & Kompier, 2010), this phenomenon seems rather robust. A first cautious conclusion therefore may be that independent of the duration, a vacation contributes to health and well-being of employees. Of course, to make firm conclusions about the existence of a vacation effect on health and well-being independent of the duration, it will be necessary to verify this finding in diverse samples and with different vacation types.

Further, indications of positive after-effects of a vacation could be found in this long summer vacation. This finding may have major implications regarding the importance of the duration of a vacation. So far, the studies of a moderately long vacation and a short vacation (De Bloom, Geurts, & Kompier, 2010; De Bloom et al., 2010) found positive vacation effects, but were not able to verify the existence of after-effects of a vacation. Therefore the question rose whether it pays off to spend time and money on a long vacation or if it would be reasonable to schedule more short vacations across a year (De Bloom, Geurts, & Kompier, 2010). Though it is not possible to make firm conclusions regarding the positive after-effects of a long vacation, the current findings at least indicate that it may be advisable to go on a

longer vacation. In order to gain deeper insights into the relationship between the vacation duration and potential after-effects, further research in diverse samples and different vacation types will be needed.

The present study is the first, ever investigating the development of health and well-being during a long summer vacation. It was found that the positive change in health and well-being reached its peak eight days after the beginning of the vacation period. After that, health and well-being again decreased. In order to spend the “best days” of a vacation period on holiday, one implication of these findings could be to plan the start of the vacation a few days *after* the beginning of the vacation period. Then the holiday could be used to its full capacity.

Regarding the development of health and well-being during the vacation, future research has a lot to establish. One issue will be to explore whether the same pattern of development (perhaps in a compromised form) can be found in moderately long and short vacations. Another issue will be the examination of the phenomenon “leisure sickness”. It would for example be interesting whether physical complaints increase during the first days of a vacation period. Further, the focus of future research should also be on the occurrence of pre-effects of work. It will be of great importance to investigate which factors can weaken the occurrence of pre-effects of work, in order to be able to use recovery time to its full extension. Moreover, further research should concentrate on the factors which are responsible for the peak of health and well-being during the vacation. If we could get insights in those factors, it may be possible to prolong the peak of health and well-being to almost the end of the vacation or even longer.

Regarding the results of work-related creativity, the finding that work-related creativity decreases during the vacation supports the idea of De Dreu, Baas and Nijstad (2008). The relationship between affect and creativity is more complex than the assumption that positive affect solely is good for creativity and negative affect has per se detrimental effects on creativity. Rather, the activation level of the affective state may play a major role in this relationship. In order to investigate which specific emotions are elicited by a vacation and which effects that may have on work-related creativity, a vacation study which incorporates measurements of all possible combinations of the tone of affect and activation level would be necessary. Only then it would be possible to determine how affect exactly is influenced by a vacation and which influences this would have on work-related creativity in turn.

One of the most interesting findings of this study might be the evidence for an increase in cognitive flexibility after vacation. This means that a person becomes more capable to make associations among ideas and can detect more relations among stimuli after vacation. At first

glance this finding seems to conflict with the results concerning work-related creativity. Yet, as previously explained, the decrease in work-related creativity during the vacation might be due to the problem-focused questions which were used to assess work-related creativity. Thus, one implication of the finding that cognitive flexibility increases after the vacation may be that this increase in turn leads to a better performance on the job. Therefore an interesting aspect for future vacation research could be the effect of a vacation performance of employees.

Despite the finding that staying attached to work contributes to the change in cognitive flexibility, it did not become clear what the underlying processes are. Therefore, future research should repeat the measurements conducted in this study with another sample, to rule out the possibility of artefacts. Furthermore, as well as with work-related creativity, it would be interesting to get deeper insights into the relationship between cognitive flexibility, affect and activation levels. Despite the fact that in the present study no relationship could be found between those two variables, it is possible that by taking into account the activation level of affect, a relationship may reveal.

In conclusion, the present paper further contributes to the field of recovery research by highlighting the positive effects of a vacation on health and well-being during and after vacation. Furthermore we were able to gather insights into the underlying processes which take place during the vacation. Future research should try to shed more light on these processes. This may be the key to detect mechanisms which prolong the positive effects of a vacation on health and well-being.

Moreover, we extended the scope of vacation studies and included creativity. Despite the fact that we could find a decrease in work-related creativity (which presumably can be attributed to the kind of questions which assessed work-related creativity), a positive influence of vacation on cognitive flexibility after vacation could be found. In future research possible changes in different aspects of creativity due to a vacation should be investigated. Especially possible underlying processes like the activation level of affect and detachment from work should be incorporated.

In view of the results and closing this paper it can be stated: If you want to be happier, healthier and more creative, go on a vacation!

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