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The effects of a self-talk intervention on a divided attention golf task under conditions of ego-depletion

by

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We the undersigned, certify that this thesis has been approved and that is adequate in scope and methodology for the degree of European Masters in Sport and Exercise Psychology.

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Abstract

Previous research has indicated a negative effect of ego-depletion on various sport performance tasks. However, a recent study using a non-sport attention task indicated that the use of self-talk could partly counteract the negative effects of ego-depletion. The next step in this line of research is to extend the task to a real sport task in a controlled lab environment. Therefore, the aim of this study is to examine the effects of a self-talk intervention on a divided attention golf task under a state of ego-depletion. A mixed between- (experimental vs. control group) and within- (before vs. after manipulation) design was used. Participants completed a baseline performance measure, followed by a training period in which the experimental group practiced using self-talk. Subsequently, both groups received an induction of ego-depletion. Finally, all groups completed a final divided attention golf-task. Results showed that the experimental group significantly increased their performance on the final measurement compared to the baseline measurement while the control group did not increase their performance. The findings suggest that the self-talk intervention successfully counteracted the effects of a state of ego-depletion on this lab-based sport task.

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In order to execute their sport successfully, athletes are often required to manage several different aspects simultaneously. Imagine a football quarterback that has to not only look for an open receiver, but also manage to find space to throw the ball while at the same time keeping an eye on possible defenders. Being able to select and stay focused on the right stimuli is of vital importance. On top of that, in a complex sport task such as the one described above, attention has to be divided between different stimuli simultaneously, which requires more cognitive resources (Fischer & Plessow, 2015). If an athlete does not have enough self-regulation strength to manage all these aspects, his or her performance will most likely suffer (Essig, Janelle, Borgo & Koester, 2014; Baumeister, Vohs & Tice, 2007; Fischer & Plessow, 2015). According to the strength model of self-control, the ability to exert deliberate self-control is powered by one non-specific resource (Baumeister et al., 2007). When an individual calls upon this resource and thereby uses a part of it, there is less self-control left for subsequent tasks until the resource has been replenished, similar to the way a muscle works. A vital part of this theory is that the resource is non-task-specific, so using self-control strength in one task will lead to diminished self-control in all subsequent tasks that require such control.

A diminished state of self-control can lead to impaired functioning (Baumeister et al., 2007) and is referred to as a state of ego-depletion. The effects of a state of ego-depletion have been extensively studied. For instance, a meta-analysis including 83 studies reported a medium to large effect size (ES = .62) of a state of ego-depletion on self-control performance tasks (Hagger, Wood, Stiff & Chatzisarantis, 2010). However, it has been debated whether the strength

of the effect of a state of ego-depletion on performance is that strong or even exists and if the effect sizes that were found in the meta-analysis by Hagger et al. (2010) were inflated due to selection criteria and analysis methods (Carter, Kofler, Forster & McCullough, 2015). Therefore, a more recent extensive multilab study tried to look at this relationship in great detail (Hagger et al., 2016). In this comprehensive study, 23 laboratories in different universities conducted the same study. Every participant completed a two-task design, in which a first self-control depleting task was used to induce a state of ego-depletion. A second and different self-control task was then used to investigate the effects of ego-depletion on performance. The analysis, which incorporated a meta-analysis approach, revealed a small but significant effect size of diminished self-control strength on performance. Overall, literature indicates that a state of ego-depletion will lead to diminished performance in subsequent self-control tasks.

Based on the research into the effects of ego-depletion on general self-control performance, more specific recent studies have looked into the influence of ego-depletion on performance in athletic and sport-related tasks. For instance, several studies have shown that ego-depletion can lead to lowered athletic performance through increased distractibility on task-irrelevant stimuli in high-pressure situations (Englert, Bertrams, Furley & Oudejans, 2015a; Englert, Zwemmer, Bertrams & Oudejans, 2015c; Furley, Bertrams, Englert & Delphia, 2013). Studies looking at exercise routines in athletes also reported lower performance even in routines that were well practiced (Dorris, Power & Kenefick, 2012). Moreover, two studies looked at the effect of ego-depletion on sprint start reaction time in a group of skilled athletics athletes (Englert & Bertrams, 2014) as well as in a group of participants without any track and field experience (Englert, Persaud, Oudejans & Bertrams, 2015b). According to the authors, a state of ego-depletion could either lead to lower reaction times or increased mistakes in participants.

Results showed that the skill of the athlete influences what effect ego-depletion has. The skilled athletes showed delayed reaction times while the non-skilled athletes displayed increased mistakes showing that performance can be influenced in different ways depending on the familiarity with the task. Additionally, a study looking at participants' accuracy and consistency in a dart throwing task concluded that participants in a state of ego-depletion not only showed lower performance compared to their non-ego-depleted baseline, but also compared to the non-ego-depleted control group (McEwan, Ginis, & Bray, 2013). These results imply that the detrimental performance effects of a state of ego-depletion further expand into precision-based sports tasks such as dart throwing. Overall, recent literature has provided evidence that the negative effects of a state of ego-depletion found in large meta-analyses (Hagger et al., 2010; Hagger et al., 2016) translate into a variety of sport-based performance tasks and levels of familiarity with the task and sport.

With the negative effects of a state of ego-depletion in mind, research has started to focus on finding techniques and strategies to counteract the diminished performance outcomes. For instance, active relaxation has been used to eliminate the negative effects (Englert & Bertams, 2016). Another proposed strategy is the use of self-talk while in a state of ego-depletion (Gregerson et al., 2017). A recent meta-analysis looking at the effect of self-talk on performance has found moderate positive effect size of self-talk on performance, meaning it can be a useful tool to increase athletic performance (Hatzigeorgiadis, Zourbanos, Galanis & Theodorakis, 2011). Furthermore, this meta-analysis identified several moderating factors such as training the self-talk cues as well as different effects for novel and familiar tasks (Hatzigeorgiadis et al., 2011). The specific interest in self-talk as a possible strategy to counteract the effects of a lack of self-control strength stems from the proposed mechanism behind the working of self-talk.

According to the prospective model of self-talk mechanisms by Galanis, Hatzigeorgiadis, Zourbanos & Theodorakis (2016), the effects of self-talk can be explained by two mediating clusters: attentional effects and motivational effects. The attentional cluster refers to the ability of self-talk to enhance performance in different attention dimensions through aspects such as decreasing distractibility as well as changing the focus, width and direction of attention. For instance, two studies looking at the effects of self-talk on the amount of interfering thoughts in water polo and swimming respectively found that athletes using self-talk reported a significant decrease in interfering thoughts compared to their baseline scores (Hatzigeorgiadis, Zourbanos & Theodorakis, 2007; Hatzigeorgiadis, Theodorakis & Zourbanos, 2004). As mentioned before, athletes in a state of ego-depletion reported to have higher distractibility (Englert et al., 2015a; Englert et al., 2015c; Furley et al., 2013), therefore the use of self-talk could counteract the increased distractibility and thereby aid performance in a state of diminished self-control strength. A recent review of the self-talk literature confirmed that self-talk can help decrease distractions from both internal and external sources (Hatzigeorgiadis & Galanis, 2017). All these factors indicate that self-talk could be a viable strategy to counteract the effects of a state of ego-depletion.

A study directly looking at self-talk, performance and ego-depletion used two different cognitive tasks to test the effectiveness of self-talk in counteracting the decreased performance in a state of ego-depletion (Gregersen et al., 2017). In this experimental study, participants were asked to perform an audio and visual selective attention baseline test using the Vienna Test System. The self-talk group then received a self-talk training program. During the final session, both groups first completed a cognitive task to induce a state of ego-depletion before taking the audio and visual selective attention test again. Results showed that participants in the

experimental group performed significantly better than the participants in the control group. The researchers argued that self-talk helped the participants in the experimental group to direct attention to task relevant cues even when there was a limited amount of self-control strength. In conclusion, the study mentioned above provides encouraging evidence indicating that self-talk could be a viable strategy to help overcome the detrimental effects of ego-depletion through increasing attentional focus, especially in tasks requiring attentional resources.

Despite the current literature examining the use of self-talk in several situations, most of these studies focused on cognitive tasks. Therefore, it would be a good approach to advance research by testing these ideas in a fine sport task requiring attention while still in a controlled laboratory environment. In the current study, a divided attention task was chosen. A divided attention task requires participants to focus on two or more stimuli at the same time or in rapid succession (Galanis et al., 2016). This type of task was chosen for several reasons. Firstly, research should start to focus on more real sport scenarios in order to extend knowledge with higher ecological validity. In the current task, a simulation of a real sport factor (wind) was used to mimic such a real sport situation. Secondly, Hardy, Oliver and Tod (2009) suggested that self-talk can benefit in shifting attentional focus, which is a vital part of completing a divided attention task successfully. Evidence for this statement has been found in different situations such as in tennis, athletics and golf (for a review, see Hatzigeorgiadis & Galanis, 2017). Lastly, divided attention tasks require more cognitive resources and therefore the effects of ego-depletion could be greater (Shiffrin & Schneider, 1977; Fischer & Plessow, 2015).

The increased cognitive demand of divided attention tasks is based on the theory of serial processing (Fischer & Plessow, 2015). This theory explaining divided attention and multitasking stems from cognitive psychology and neuroscience, and has certain assumptions that were

adopted in this study. First of all, there is a limited amount of cognitive resources available, an assumption that is also shared in the strength model of self-control (Baumeister et al., 2008). The second assumption is that there is only one processing channel available in the brain to execute a task and therefore when an individual is tasked with focusing on multiple tasks, the processing of these tasks will happen sequentially. Thirdly, only the performance in the second task is affected by limited resources while the performance in the first task is unaffected. Lastly, the temporal proximity of the two task determines how much the performance in the second task is affected.

Based on all the factors mentioned above, the aim of the current study was to examine the effect of a self-talk intervention on performance in a divided attention golf task under a state of ego-depletion. The study adopted a mixed between- (experimental vs. control group) and within- (before vs. after manipulation) subject design. It was hypothesized that performance of the control group would decrease under conditions of ego-depletion, whereas performance of the self-talk group would not be influenced.

Methods

Participants

A total of 54 (27 male and 27 female) physical education and sport science students participated in the experiment. The participants' mean age was 19.91 (SD = 2.81) years. Participants had no prior golf experience. In return for completing the experiment, participants received class credit.

Procedure and intervention

At the start of the meeting, each participant was asked to fill out an informed consent form along with demographics information. Subsequently, they received basic instructions about the golf task and the required technique to complete the task, such as how to hold the club and hit the ball. The performance task was a simple golf putting task. During the entire experiment, participants in both groups were asked to try to putt a golf ball from a set distance. Between the participants and the hole was small hill to increase the difficulty of the task. The participants were only tasked with putting the ball, while a research assistant placed the balls in the right spot for each putt, cleared the course of obstructing balls and retrieved the balls in between sets. Participants started off with 20 shots to familiarize themselves with the task. Scores were not recorded during this phase. Participants then moved on to the baseline performance measure consisting of 2 sets of 10 attempts from a distance of 2 meters, with scores being recorded. Following this, participants engaged in a training period which consisted of 6 sets of 5 attempts at different distances (2 sets at a distance of 2,5 meters, 2 sets at 3 meters and 2 more sets at 2 meters). During this training phase, the experimental group received self-talk training whereas the control group just practiced the task while receiving general instructions about golf. The self-talk training consisted of three cues that were provided to participants to practice at different stages of the training phase. Participants were informed that the cues could be said either internally or externally to their liking and that the meaning of the cues was that they were ready and confident for their next shot. Participants used the cue "let's go" during the sets at 2,5m distance, "in" at 3m and "ready" at 2m. After this phase, the self-talk self-report was administered in the experimental group in order to check whether the cues had been used during the training phase. Subsequently, both groups completed the visual divided attention test, which

was used to induce a state of ego-depletion, in a separate computer room. The visual divided attention test (WAF-G) of the Vienna Test System test battery was used. In this test, participants sit in front of a computer screen, with a green button in front of them. On the screen, they see two dark grey shapes: a circle and a square. These shapes occasionally turn a lighter shade of grey. Participants are instructed to press the green button as fast as possible when one of the shapes turns lighter two times in a row. Both the number of mistakes as well as the average reaction time are recorded. The duration of the depletion task was 15 minutes and it was completed without the presence of the researchers. An ego-depletion manipulation check was administered before and after the Vienna Test to check if participants were indeed ego-depleted after the test. Finally, both groups completed the post-manipulation divided attention golf performance task. Similar to the baseline measurement, this task consisted of 2 sets of 10 attempts at a distance of 2 meters. However, different from the baseline measurement was the introduction of the divided attention feature: a simulated wind factor. A flag and a fan were placed at the end of the course to the side. Participants were able to see the flag in their peripheral vision. The fan made the flag wave and not wave in a cycle of 8 seconds on (waving) and 8 seconds off (not waving). Participants were instructed to only putt the ball if the flag was not waving, forcing them to pay attention to two different stimuli and thus turning the task into a divided attention task. The interval length was chosen after pilot testing to allow the participants enough time to make one shot per cycle, forcing them to shift their attention back to the flag after every shot. For the self-talk use, participants in the experimental group were asked to select one of the three cues they had practiced during the training phase of the research and use it before every shot. Additionally, participants in the experimental group received another self-talk cue in the form of the word “flag” and were instructed to use this cue before the other self-talk cue. The

meaning of this cue was to check whether the flag was down and therefore the shot could be taken. During this phase, both the golf performance and the number of mistakes with the flag aspect of the task were recorded. After the completion of the final test, participants of both groups were asked to complete a standard self-talk manipulation check. The total time from the beginning to the end of the experiment was about 50 minutes.

Measurements

Golf Performance Golf performance was measured through the amount of balls that ended up in the hole at the end of the golf-course. One point was awarded if a participant successfully putted a ball directly from the starting position into the hole.

Flag Mistakes Participants received instructions regarding the wind during the final measurement in order to introduce a divided attention aspect. In order to assess whether the participants were able to execute this instruction, the number of mistakes regarding the flag was measured. A mistake was noted if the participant clearly attempted a shot while the flag was waving.

Ego-depletion manipulation To assess whether the cognitive task induced a state of ego-depletion, a four item ego-depletion manipulation check was used (Englert et al., 2015c; e.g., "How depleted do you feel at the moment?"). Participants' responses were given on a 7-point scale from 1 (*not at all*) to 7 (*very much*).

Self-talk self-report The manipulation check protocol from Hatzigeorgiadis et al. (2009) was used. Participants of the experimental group were asked (a) if they used the cue-words they had selected, and (b) if yes, to which extent they used them from 1 (*not at all)* to 10 (*all the time*). Participants from the control group were asked (a) to report if they were consistently using cue

words or phrases during the putting, (b) if yes, what were they telling themselves, and (c) to which extent from 1 (*not at all)* to 10 (*all the time*).

Results

Manipulation check: ego-depletion

Two-way analysis of variance with one repeated factor (time: pre-, post-induction of ego-depletion) and one independent factor (group: control, experimental) was performed to test for differences in ego-depletion before and after the Vienna test between the two groups. The analysis yielded a significant time effect, $F(1,52) = 52.91$, $p<.001$, and a non-significant time by group interaction, $F(1,52) = 3.74$, $p =.59$, showing that ego-depletion increased for both groups following the Vienna test, but that no differences were identified between the two groups. The mean scores for ego-depletion are presented in Table 1.

Table 1. Descriptive statistics for ego-depletion and golf performance

	Experimental				control			
	pre		post		pre		post	
	M	SD	M	SD	M	SD	M	SD
Ego-depletion	2.13	1.01	3.46	1.53	2.48	1.03	3.24	1.46
Golf putting	7.26	3.43	8.93	2.82	7.89	3.26	7.30	3.79

Manipulation check: use of self-talk

The use of self-talk was measured in several different parts of the experiment in both groups. Since the delivery of self-talk in this study was an intervention, no restriction on self-talk use in the control group was used. This resulted in 18 out of 27 participants (66%) in the control group using some kind of self-talk as well as 8 participants in the experimental group using self-talk cues that were not included in the intervention. Further investigation of the cues used by participants in the control group showed that 2 participants used similar cues to the ones used in

the experimental group.[1] Mean scores for the frequency of the cues were calculated. Analysis showed that self-talk use frequency in both the control group and the experimental group was relatively frequent (M = 6.78, SD = 2.13 for the control group and M = 6.25, SD = 2.19 for the experimental group).

Regarding the self-talk intervention in the experimental group, the use of self-talk both during the training phase as well as during the final task were measured. All (N = 27) participants indicated that they used self-talk during both the training and the final measurement. Mean scores were calculated to examine the frequency of the usage of the self-talk cues. Analysis showed that the use of self-talk was high for the training (M = 8.93, SD = 1.14) and the final measurement (M = 9.11, SD = .97), suggesting that the implementation of the self-talk intervention was successful.

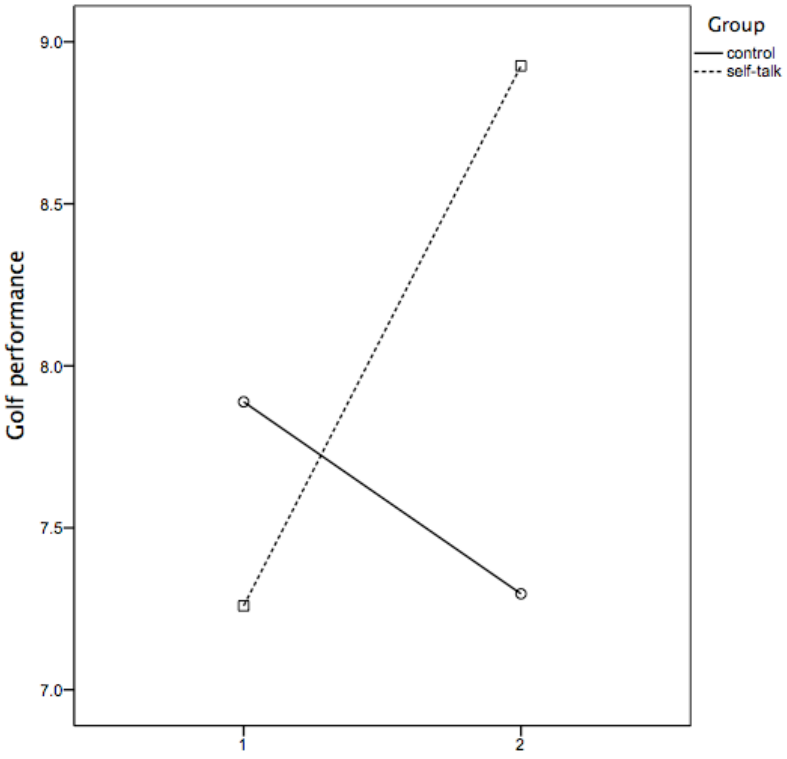
Golf performance

Two-way analysis of variance with one repeated factor (time: baseline and final golf measurement) and one independent factor (group: control, experimental) was performed to test for differences in performance on the baseline and final golf tasks between the two groups. Firstly, the homogeneity assumption had to be tested using the Levene's test. Results showed that the null-hypothesis was not violated in both the baseline, $F(1,52) = .04$, $p = .85$ and final measurement, $F(1,52) = 3.53$, $p = .06$. The ANOVA analysis revealed a significant group by time interaction effect, $F(1,52) = 5.07$, $p<.05$, partial $\eta^2 = .09$. Examination of the pairwise comparisons showed that (a) no differences existed at baseline between the groups ($p= .66$) and that (b) performance of the experimental group improved in the final assessment

[1] Analysis was repeated excluding the 2 participants that used these cues. Since the results did not differ upon excluding the participants, both were included in the sample.

(p<.05), whereas that of the control group did not change significantly (p = .72). The mean scores for golf-performance are presented in Table 1.

Figure 1: Golf performance scores



Number of mistakes with flag

Examination of the descriptive statistics regarding the number of mistakes with the flag clearly showed that participants did not have any problem managing this part of the task. Two participants of the control group made one mistake each, whereas none of the participants of the experimental group made any mistakes.

Discussion

The aim of the current research was to examine the effects of a self-talk intervention on a divided attention golf task under the influence of ego-depletion. After a baseline assessment, participants in the experimental group practiced using self-talk cues. A final divided attention golf task was completed under the influence of ego-depletion to examine the effectiveness of the self-talk intervention. Overall, results showed that the intervention had a positive influence on golf performance.

Several manipulation checks to safeguard the design of the study were used. Firstly, regarding the implementation of the self-talk intervention, results clearly showed that the participants in the experimental group used the self-talk cues that were given to them consistently, both during the training phase when they were reminded to use the self-talk before every shot as well as during the final measurement when they were not reminded to use the cues. This result is important since training self-talk has been identified as a moderating factor that improves the effect of self-talk on performance (Hatzigeorgiadis et al., 2011). Secondly, the low number of mistakes made by participants in both groups showed that it was possible for the participants to successfully complete the task. Lastly, results showed a significant increase in ego-depletion scores after the divided attention Vienna test compared to before that test. Additionally, comparing the post-Vienna ego-depletion scores with previous research shows that besides this significant increase in the self-reported state of ego-depletion, the scores displayed very similar levels to previous research (Gregerson et al., 2017; Englert & Bertrams, 2014; Englert et al., 2015a), which further indicates that the introduction of a state of ego-depletion was successful in the current study. Overall, the manipulation checks show that the design was successfully implemented in the current study.

At the baseline measurement, the two groups did not differ in their performance on the golf task. However, the experimental group showed significantly increased performance compared to the baseline, while the control group did not. Although it was hypothesized that the control group would show decreased performance and the experimental group would display similar scores compared to their baseline measurement, these results are still in line with the hypothesis. The results may be explained by a learning effect introduced during the baseline assessment and the training that participants received. In particular, participants had 30 shots to practice the skill between the baseline and final measurements. Therefore, participants had the chance to become more familiar with the task, which under non-depleted conditions may have increased their scores. Thus, the learning effect caused the control group's score to remain unchanged and the experimental group to increase their score despite the depletion effect. The low amount of errors regarding the flag committed by participants was expected since the task was relatively simple to understand. However, participants were still required to monitor this aspect in order to completed it successfully, which could have led to lower putting performance.

Comparing the present results to previous research shows that the current data partly concurs with and partly differs from previous findings. Most importantly, similar to the study by Gregerson et al. (2017), self-talk had a positive effect on performance in a state of ego-depletion. However, in that particular study, the participants in the experimental group performed significantly better than the control group in the final measurement. This result was not replicated in the current study. Additionally, comparing the effect size of self-talk on sport performance of the current study with previous research shows more similarities. A self-talk meta-analysis (Hatzigeorgiadis et al., 2011) showed that the average effect size of self-talk on sport performance is .67 in fine tasks and .73 in novel tasks. The effect size of this study was .66

and is therefore in line with previous self-talk research. Furthermore, several studies have found a negative effect of ego-depletion on sport-related performance (Englert et al., 2015a; Englert et al., 2015c; Furley et al., 2013; Englert & Bertrams, 2014; Englert et al., 2015b; McEwan et al., 2013). However, the present study did not find a significant negative impact of ego-depletion on the performance of the control group. As argued above, this difference with previous research can be attributed to the learning effect, as both groups received a very similar training period, which probably caused this effect. This learning effect counteracted the negative effect of a state of ego-depletion in the control group.

A possible interpretation of the current results can be found in the combination of increased distractibility in a state of ego-depletion and the opposite effect of self-talk. Several conceptual models (Galanis et al., 2016; Hardy et al., 2009) argued that self-talk increases the ability to display selective attention in a task. As mentioned before, a state of ego-depletion has been found to increase distractibility on task-irrelevant stimuli (Englert et al., 2015a; Englert et al., 2015c; Furley, et al., 2013) indicating a lower ability to direct attention successfully. This would hinder participants from focusing on the stimuli that are relevant in order to complete the task (the flag and the putting). On the other hand, in line with the theory by Hardy et al. (2009), self-talk has been found to decrease distractibility on task-irrelevant stimuli (Hatzigeorgiadis et al., 2007; Hatzigeorgiadis et al., 2004) which would counteract the effect of ego-depletion. Although no conclusive evidence was presented to confirm or deny this mechanism, the current results are in line with this interpretation and further strengthen the proposed model explaining the effect of self-talk.

An additional feature of the current study was the use of a divided attention task. In the introduction, several reasons for choosing such as task were mentioned. One of these reasons

was that a divided attention task requires more cognitive resources compared to tasks containing only one stimuli. As mentioned before, this statement is based on the assumption of serial processing (Fischer & Plessow, 2015), and some of the results can be explained through this theory. For instance, the theory states that there is only one processing channel available in the brain to execute a task. Therefore, when an individual is tasked with focusing on multiple tasks, the processing of these tasks will happen sequentially. In the current research, this would mean that participants were not able to focus on the golf putting until they completed processing the flag stimulus. Additionally, since the interval in which a ball could be putted was only 8 seconds, limited time was available for the participants to make a shot. It is therefore possible that participants in the control group were rushed into making their shots. On the other hand, participants in the experimental group used self-talk, which has been found to help with shifting attentional focus (Hatzigeorgiadis & Galanis, 2017). It is possible that this allowed them to have more time to make their shot, and consequently improve their performance. Another aspect of serial processing is that only the performance on the second task, in this case the golf putting, is affected while the performance on the first task, the flag, is unaffected. This could explain why participants did not make any mistakes with the flag, but a change in performance in the golf task did occur. Lastly, the temporal proximity of the two tasks determines how much the performance in the second task is affected. In this research, the time between the two tasks was very short and therefore the negative effect would be relatively big. It is clear that several parts of the results are in line with and can be explained through the assumptions behind sequential processing.

Some limitations regarding this study have to be considered. First of all, the absence of a non-ego-depletion control group means that it is not possible to establish the size of the learning effect and therefore the exact effect of a state of ego-depletion on the golf performance cannot be

determined. This limits the conclusions that can be drawn from the research. Therefore, the explanation of the results is purely based on the assumption that a state of ego-depletion negatively effects performance, which was demonstrated in previous research. Although there is plenty of research that confirms this hypothesis, there has been some debate about this topic as well, as mentioned in the introduction. It is therefore important to keep investigating the effects of a state of ego-depletion in order to gain a more complete understanding of this topic. Additionally, it has to be noted that the current setting was still a controlled lab environment and therefore these results cannot be generalized into the field.

The current study helps adding data and results to the self-talk theory, especially regarding the effects of directed self-talk. This research is part of a relatively new direction in self-talk research looking at its effects under a state of ego-depletion. Since previous research mostly focused on either cognitive tasks or simple sport tasks, the current study adds a more real sport scenario and works towards investigating this line of research with higher ecological validity. Future research should therefore focus on extending the current line of study, proceed to test more real sport situations and ultimately work towards a field intervention study to prove the applicability of self-talk under a state of ego-depletion. Additionally, other strategies to counteract the negative effects of a lack of self-control strength should be investigated to provide a wide variety of strategies that can be used by athletes, coaches and sport psychology practitioners in an applied setting.

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