The Effects of Written Goals on Performance

Comparing Written and Unwritten Goals

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Abstract

The purpose of this study was to empirically test the effects that writing down goals has on performance. It has been hypothesized that writing down goals is an important aspect of goal setting and helps improve performance (Weinberg, 2010). This has yet to be empirically supported by a peer reviewed study, so the purpose of this study was to isolate this effect and test it. This study hypothesized that writing down goals would positively affect performance and task-specific practice rate more than setting goals without writing them down. Forty-eight participants were randomly split in two groups, a written goals group and an unwritten goals group. Participants performed a push up task and set themselves a goal they would attempt to reach after four weeks. The results found no difference between the written goals groups and the unwritten goals group. The results were discussed in the context of previous research and directions for future studies suggested.

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The effects of written goals on performance

According to the literature, setting goals is one of the ways to improve performance, with over 50 years of research and more than 1,000 studies conducted (Locke & Latham, 2015; Mitchell & Daniels, 2003). Goal setting has been argued to be most effective when used in a sport setting and has been used to help athletes improve their performance (Kyllo & Landers, 1995; Locke & Latham, 1985; McEwan et al., 2016). Among the benefits of goal setting are increased effort and persistence (Locke & Latham, 2002). Although it is a sure way to improve performance, there are aspects of goal setting that are yet to be studied (Locke & Latham, 2015). One aspect yet to be thoroughly researched is the effectiveness of writing down goals. It has been argued that writing down goals is an effective way to reach them (Ward & Carnes, 2002; Weinberg, 2010). However, with only one peer reviewed study having investigated the topic, it is important to further explore the effectiveness of written goals as well as their relationship with other aspects of goal setting (Weinberg et al., 2019).

Goal Setting Theory

Locke and Latham set forth the Goal Setting Theory in 1990. They gathered research that had been done in the 25 years prior, analyzed it, and came up with the theory that difficult goals improved performance more than easy goals, *do your best* goals or no goals at all. In almost 400 studies, with close to 40,000 participants doing 88 different tasks, over 90% showed the positive effects of goals on performance. The theory recognized some moderating variables in the relationship between goal and performance, such as ability, goal commitment and feedback as well as mediating variables such as effort and strategy (Locke & Latham, 1990).

Goal setting theory states that the relationship between goal difficulty and performance is linear (Locke & Latham, 1990). Taing, Smith, Singla, Johnson and Chang (2013) did a longitudinal

study on students, spanning a semester, which had students set a goal for their grade and found higher goals to predict higher grades. The participants set a goal for their course grade in week 2 of the semester and then every four weeks for the remainder of the semester they got to see their grade and could set a new goal. At any time, current grade could be predicted by the goal they set the previous time (Taing et al., 2013). Meta-analysis has supported the linear model with medium to large effect sizes in the range between d = .52 and d = .82 (Locke & Latham, 1990). The effects of setting specific, difficult goals also effects group performance, as meta-analysis on group performance yielded a medium effect size of d = .80 for specific, difficult goals (Kleingeld, van Mierlo, & Arends, 2011).

One of the most important moderators of the relationship between goals and performance is goal commitment. Locke, Latham and Erez (1988) stated that "if there is no commitment to goals, then goal setting does not work" (p. 23). Commitment refers to the degree to which the individual is attached to the goal, considers it significant or important, is determined to reach it, and keeps it in the face of setbacks and obstacles (Latham & Locke, 1991). Having the athlete share their goal publicly, with teammates and coaches for example, will positively impact performance (Hollenbeck, Williams, & Klein, 1989; Locke, 1968). Hollenbeck et al. (1989) found that goal commitment accounted for 13% of variance in future GPA for college students, after accounting for goal difficulty. Their hypothesis that sharing the goal with others would increase goal commitment, was supported as well. Dishman, Vandenberg, Motl, Wilson and DeJoy's (2009) study suggested that the more difficult the physical activity goals are, and the higher their commitment to those goals, the greater increase they have in weekly physical activity and daily steps.

Another important moderator in goal setting is feedback. Erez (1977) hypothesized that the relationship between performance and goal setting was contingent on feedback. Her study found that when participants got feedback, the relationship between goals and performance was stronger than when participants received no feedback. Strang, Lawrence and Fowler (1978) came to the same conclusion, adding that difficult goals without feedback could have detrimental effects on the performance of a complex task. Recent studies have looked at how goals with feedback affect children's writing and have found them to be very effective (Alitto, Malecki, Coyle, & Santuzzi, 2016; Koenig, Eckert, & Hier, 2016).

Task strategies are a crucial link between goals and performance (Locke & Latham, 1990). Information on how to successfully achieve a goal can increase goal commitment and improve performance (Earley, 1985). Use of an appropriate task strategy is especially important on a task that is complex or the individual lacks experience in (Latham, Seijts, & Slocum, 2016). Use of specific task strategies to reach goals have been used to teach reading, improve academic performance and get cardiac rehabilitation patients to exercise (Morisano, Hirsh, Peterson, Pihl, & Shore, 2010; Shih & Reynolds, 2018; Sniehotta, Scholz, & Schwarzer, 2005).

Since the original theory was published more than 600 studies have been conducted so the theory has expanded (Locke & Latham, 2015). Notable modifications to the theory are the distinction between learning goals and performance goals, the addition of subconscious goals, the use of informative proximal goals to adjust strategies to attain a distal goal, and the use of stretch goals to promote creative thinking (Locke & Latham, 2015).

A stretch goal is a difficult and sometimes unreachable goal (Thompson, Hochwarter, & Mathys, 1997). Stretch goals seem to disprove the linear model of goal difficulty and performance as research on it has found the relationship between goal difficulty and performance to be

curvilinear (Baron, Mueller, & Wolfe, 2016) or non-existent (Gary, Yang, Yetton, & Sterman, 2017). Other research indicates a linear relationship with stretch goals improving performance at least as much as difficult goals (Landers, Bauer, & Callan, 2017). One reason for these inconsistent findings could be task complexity. In Landers et al. (2017) the task was a brainstorming session, where the number of uses for a knife was measured. The Gary et al. (2017) study had the task of managing an airline while Baron et al.'s (2016) field study looked at entrepreneurs managing their businesses, arguably more complex tasks than brainstorming.

Learning goals focus on strategy to achieve goals and, thus are better in situations where the intended improvements are in skill and knowledge. Performance goals focus on the outcome of the goal and are more useful in situations that require increased effort and persistence (Seijts & Latham, 2005). Performance goals should be set by those who are skilled and knowledgeable in their field while learning goals should be set by those who lack ability (Latham, 2016). Learning goals have been found to be more effective than performance goals when the task is complex (Gardner, Diesen, Hogg, & Huerta, 2016). Even in the subconscious, learning goals influence performance on a complex task more effectively than performance goals (Chen & Latham, 2014).

Goals can be activated subconsciously and guide subsequent behavior (Bargh, Lee-Chai, Barndollar, Gollwitzer, & Trötschel, 2001). Specific, difficult subconscious goals are more effective than general subconscious goals (Bipp, Kleingeld, van Mierlo, & Kunde, 2017). In a German study, researchers found that participants that were primed with a picture that represented a specific, difficult goal performed better on a test than participants primed with a picture that represented a more general goal (Bipp et al., 2017). Subconscious goals affect motivation and even increase the likelihood of dreaming about one's goals (Bargh et al., 2001; Langens, 2007; Stajkovic, Locke, & Blair, 2006).

Subconscious goals are affected by conscious goals (Itzchakov & Latham, 2018). The effects conscious goals have on subconscious goals have not been consistent though; some studies have found additive effects while others have found conscious goals to undermine the positive effects subconscious goals can have on performance (Ganegoda, Latham, & Folger, 2016; Sitzmann & Bell, 2017). Rewards can also affect subconscious goals, increasing effort for those who set them without them even being aware of it (Aarts, Custers & Marien, 2008).

Types of Goals

Goal Setting Theory recognizes two types of goals which are learning goals and performance goals (Locke & Latham, 2002). In the sport psychology literature however, three types of goals have been identified. They are outcome goals, performance goals, and process goals (Hardy & Jones, 1994; Kingston & Hardy, 1997; Kolovelonis, Goudas, & Dermitzaki, 2011; Weinberg, 2010; Weinberg, 2013; Weinberg & Gould, 2015).

Outcome goals typically focus on the results of a certain event or competition, such as winning a reward or the first place in a competition. These goals often go beyond one's own control (Weinberg, 2010). For example, it could matter how well the opponent is playing or some calls that the referee makes. Performance goals are more under the athlete's own control (Weinberg, 2010). It is independent of the performance of others and more of a comparison with one's own previous performance (Kolovelonis et al., 2011). For example, to increase free throw precision from 75% to 85% in basketball games. Performance goals are said to offer the flexibility and control that outcome goals lack and increase perceived ability, minimize stress and enhance performance (see Burton, 1989). Process goals typically focus on technique or how an athlete executes specific skill (Weinberg, 2010). For example, focusing on bending the knees more and

following through with the hand when shooting a basketball, hence increasing the probability of achieving the performance goal.

Studies have found that process goals and performance goals are more beneficial than outcome goals (Burton, 1989; Zimmerman & Kitsantas, 1997). Outcome goals can be useful however, when a person already has the skill or knowledge for a particular task. But if the task is complex or new to the person, process goals are more effective (Winters & Latham, 1996; Zimmerman & Kitsantas, 1997).

It has been recommended to use combination of process, performance and outcome goal (Weinberg, 2010; Zimmerman and Kitsantas, 1997). For example, shifting from process goals to outcome goals (Zimmerman and Kitsantas, 1997). However, Kolovelonis et.al (2011) argue that it is only more effective if the person knows when and how to strategically shift from process to outcome goals.

Benefits of Goal Setting

The benefits of goal setting are both direct and indirect. The direct benefits of goal setting are twofold. First there is the direction of attention to goal relevant behavior (Locke & Latham, 2002). In his 2012 study, Pazos had students in teams identify problems and make recommendations for improvements for a large company. Goal commitment and conflict management were measured and the relationship between them indicated that commitment to team goals directed attention to goal relevant behavior and away from goal irrelevant behavior (Pazos, 2012). Rothkopf and Billington (1979) measured this effect more directly in a set of experiments. In their study, subjects with learning goals spent more time reading goal relevant text and less time reading incidental material than a control group. They theorized how subjects did this, finding goal

related material through scanning the text, and re-reading it with more attention (Rothkopf & Billington, 1979).

The other way setting goals directly benefits those that do it is through increased effort and persistence (Locke & Latham, 2002). Schwinger, Steinmayr and Spinath (2009) found correlation between setting proximal goals and effort. Bryan and Locke (1967) studied the effect of goals and effort. In their study, unmotivated participants were able to increase effort through goal setting, in that both their perceived effort increased as well as attempted problems on a test. Meanwhile controls with do-best goals had a decrease in perceived effort (Bryan & Locke, 1967). Bandura and Cervone (1983) also found increment of effort simply by setting goals, this time on a physical performance. Subjects with specific goals increased their effort on an assault bike by 85% (Bandura & Cervone, 1983). A study by LaPorte and Nath (1976) showed increased persistence for subjects with specific difficult goals compared to those with specific easy goals, and those with do-best goals.

Wood and Locke (1990) talked about the indirect benefits of goal setting as discovery and/or use of task-relevant strategies and methods (see in Locke & Latham, 2002). Today learning goals specifically focus on this aspect of goal setting. However, performance goals also lead to discovery of task-relevant strategies and methods, especially stretch goals (Gary et al., 2017). One of the benefits of stretch goals is in fact their requirement for innovative strategies (Pina e Cunha, Giustiniano, Rego, & Clegg, 2017).

These benefits of goal setting have been found in sports as well. Swann, Piggott, Crust, Keegan and Hemmings (2015) interviewed professional golfers who claimed that performance goals helped them concentrate. Weinberg, Burke and Jackson (1997) found that for youth tennis players focusing attention, problem solving and increasing effort were among the top reasons for

setting goals. Weinberg, Butt, Knight and Perritt (2001) found that collegiate coaches set goals mainly to focus attention and increase motivation, with similar results coming from research on high school coaches (Weinberg, Butt, & Knight, 2001).

Another way goal setting affects performance has been called the "indirect thought-process view" and is goal setting's effect on performance through mediating variables such as confidence and anxiety (Weinberg & Gould, 2015). In their 1997 study on golfers, Kingston and Hardy found that goal setters who saw the biggest improvement in performance also had the largest increase in confidence and the largest decrease in anxiety. Burton (1989) trained swimmers in goal setting and found that this had effect on their confidence, anxiety and concentration even though the goal setting training did not have an effect on performance.

Goal Setting in Sports

Locke and Latham (1985) argued that goal setting should be more effective in sports as "the measurement of an individual's performance – a precondition for the positive effects of goal setting – is typically easier in sports than it is in organizational settings" (p. 206). At first there was skepticism about goal setting theory in sports as research was split on its effectiveness (Boyce, 1994; Hall, Weinberg, & Jackson, 1987; Weinberg, Bruya, Longino, & Jackson, 1988; Weinberg, Fowler, Jackson, Bagnall, & Bruya, 1991; Weinberg, Garland, Bruya, & Jackson, 1990). Kyllo and Landers (1995) offered their explanation for these anomalies, proposing that fewer participants in sport psychology research had led to less statistical power.

Meta-analysis has since been used to evaluate the effects of goal setting in sports. A meta-analysis, using 36 research studies that looked at goal setting in sports, found an effect size of 0.34 for goal setting's effect on performance (Kyllo & Landers, 1995). A later meta-analysis found that 79% of 56 studies on goal setting in sports found it effective in improving performance (Burton &

Naylor, 2002, see in Kingston & Wilson, 2008). A recent meta-analysis that included 45 research studies found a medium effect size of $d = .55$ for goal setting's effects on physical activity, which is comparable to effect sizes found in other fields where the effects of goal setting have been researched (Locke & Latham, 1990; McEwan et al., 2016).

Motivational Aspect of Goal Setting

The main purpose of goal setting is to help the person set the right kind of goal, one that provides direction and increases motivation (Weinberg & Gould, 2015). A motivated individual is moved to do something, he is driven and inspired to act (Ryan & Deci, 2000). However, motivation can vary in level as well having different types of motivation (Goudas, Biddle, & Fox, 1994; Ryan & Deci, 2000). Research has found that different types of goals can affect different types of motivation (Gaudreau & Braaten, 2016; Mossholder, 1980; Selfriz, Duda, & Chi, 1992).

There are two types of motivation that have gotten recognition: intrinsic and extrinsic motivation. Intrinsic motivation is defined as the doing of an activity for its inherent satisfactions and enjoyment (Deci, 1971; Deci & Ryan, 2010; Ryan & Deci, 2000). Research has shown that it predicts increased effort, enjoyment and persistence (Ferrer-Caja & Weiss, 2000). In contrast, extrinsic motivation is doing an activity for its instrumental value (Cerasoli, Nicklin, & Ford, 2014; Ryan & Deci, 2000). Thus, people are motivated extrinsically when they do things in order to earn money, avoid punishment, or comply with social norms (Deci & Ryan, 2010).

Chang and Lorenzi (1983) investigated the effects of participative versus assigned goal setting on intrinsic motivation for interesting and boring tasks. The results indicated no difference between participated and assigned goals on performance if the goal difficulty is held constant. However, there was a difference between assigned goals versus participative goals in relatedness to the task interest. Thus, if participants felt that the task was interesting, they showed higher

intrinsic motivation when they participated in the goal setting. Conversely, if the task was perceived as boring, a higher intrinsic motivation was found when the goal was assigned to them.

Other effects of goal origins have been researched such as its effects on performance and commitment. A subject of dispute between Erez and Latham, the effects of goal origin on performance was put to the test in a joint effort by them, mediated by Locke (Latham, Erez, & Locke, 1988). Their conclusion was that the way instructions are given on assigned goals was the major difference between finding effects of self-determined goals and non-effects. A meta-analysis by Klein, Wesson, Hollenbeck, Wright and DeShon (2001) found self-set goals to have considerably larger effect on commitment than assigned goals. It should be noted that they did not fully control for other variables.

Goal commitment is as important as goals. Thus, simply setting a goal without committing to the goal is not as effective (Moon, Yun, & Beamer, 2017). In their study on written goals, Weinberg et al. (2019) concluded that one possible reason that their participants felt decreased commitment and goal importance from the first to the second measure was that goals were given to the participants instead of them setting goals for themselves. The present study will take into account that letting the participants decide their own goals could increase their goal commitment.

Writing Down Goals

The first attempt to investigate the effectiveness of written goals in sports came from Weinberg et al. (2019). Prior to Weinberg et al.‘s (2019) study there were only two studies that had examined the effects of writing down goals, the Yale study (see Weinberg et al., 2019; MacLeod, 2012) and a study by Matthews (2015). There had been at least one other study that included written goals but it failed to compare them to unwritten goals (Morisano et al., 2010).

The Yale study asked graduate students if they had written goals for their future, three percent of the participants said that they had. After 10 to 20 years they were surveyed again and the results indicated that those three percent were earning on average 10 times more than the rest of the participants (Weinberg et al., 2019; MacLeod, 2012). These results are interesting in many ways, but more interesting is that it has been referenced quite a lot without any evidence that it took place (Morrison, 2015).

Matthews (2015) also conducted a study on written goals, but her study was for an international conference, and was not published in any refereed journal. Matthews' (2015) study investigated partially how goal achievement is influenced by writing down goals. The results showed a positive effect for written goals. Thus, those who wrote their goals accomplished significantly more than those who did not write down their goals.

Weinberg et al. (2019) researched the effectiveness of written goals compared to unwritten goals. The purpose was to find out whether writing down goals, as well as posting them, would produce significantly better performance than simply setting a goal or having no goal at all. In the study 57 college students, who played amateur basketball, were randomly divided into four groups. One group was given no goals, the second had unwritten goals, the third got written goals, and the last group got written goals and was told to post them privately. Each participant completed three different basketball tasks and a questionnaire based on the tasks. Next, the participants in the last two groups received specific goals they would try to reach when they came back in three to four weeks. The goals were set by the experimenter and were carefully selected based on advice from experts in basketball.

The results did not show that writing down goals or that writing down goals and posting them improved performance more than having a goal. There was, however, a connection between

looking at the goal and increased practice time, but this did not improve performance. Weinberg and his colleagues (2019) concluded that this showed a positive effect of looking at goals. Thus, writing down goals and looking at them regularly helped change behavior, although performance did not improve.

Weinberg et al. (2019) concluded that though the study did not support the effectiveness of writing down goals and displaying them, it is possible that some factors might have limited their effectiveness. One limitation concerns some of the questionnaire findings. The results showed decreased perception of goal commitment and goal importance from Time 1 to Time 2. There are two plausible reasons given for these results. First is the lack of specific practice times and a place to practice might be a factor. Second is the use of experimenter-set goals instead of self-set goals. Those two reasons might have reduced goal commitment and importance for the participants. Weinberg et al. (2019) recommends future researchers to focus on a specific group of athletes who might be more committed to achieving their goals.

Writing down goals has been said to be an effective way to reach goals (Coeshott, 2013; Monsma, 2014; Ward & Carnes, 2002; Weinberg, 2010). However, the effectiveness of written goals has yet to be supported by peer reviewed studies. Weinberg et al.'s (2019) study was the first attempt to investigate the topic in a sport setting. Maybe, if the focus was more on self-set goals and specific groups of athletes who were more willing to reach their goals, the effect of writing goals down could be found.

Research Question

The research question of this study is whether written goals improve performance more than unwritten goals. Here it is hypothesized that writing down goals will positively affect performance more than setting goals without writing them down. This has been hypothesized by

sport psychologists as well as being advised by industrial psychologists (Coeshott, 2013; Locke & Latham, 1990; Monsma, 2014; Weinberg & Gould, 2015). It is also hypothesized that writing down goals related to frequency of task-specific practices will increase likelihood of training for the task. Additional factors that will be looked at are reasons for training, where written down goals are kept and the experience of the athlete, both in goal setting and in their sport.

Method

Participants

Participants who agreed to partake in the experiment were 48 practitioners of CrossFit or comparable training regimen. Of these, 20 were female and 28 were male. The average age of participants who participated in this study was 26 years. Participants were measured in their training facility twice over a four-week period. The initial dropout rate was 14.5%. One participant had to be removed from the study due to his goal being null, he intended not to improve in any aspect. Two more participants had to be removed because they had written down their goals but when asked about it they claimed to not have done so. Additionally, three participants from the unwritten goals group were removed since they spontaneously wrote down their goals. Thus, overall 13 participants dropped out (a dropout rate of 27.1%).

Participants were split into two groups based on randomization of their participation number. The written goals group wrote down their goals while the unwritten goals group set the goals in the same fashion but did not write them down. Three training facilities provided participants and to ensure the facility would not become a confounding variable, half of the participants from each facility went in the written goals group and the other half in the unwritten goals group. Participants were asked to sign an informed consent paper prior to participation (see Appendix C).

Measures

Measures were number of pushups and goal setting experience and goal setting behavior. A box was used to standardize the push-ups participants did along with instructions from researchers. It was circular shaped, with height of 8 cm and diameter of 17 cm. A timer was used for time constraint, each participant had 90 seconds to do as many push-ups as possible. Researchers and the experts agreed that this time limitation was enough time for variation in number of push-ups between participants. Its purpose was to limit participants in taking a long time to do only a few additional push-ups. Since most participants came right before their scheduled practice, time with each one was restricted.

The first questionnaire (see Appendix A) was used to establish the subject's experience in the sport, their experience with goal setting, their training behavior, and their reasons for training. All the questions were answered on a 5-point Likert scale, except two. One was a yes or no question that established whether the subject had experience with goal setting. In the other participants were asked to rate their reasons for training on a scale of 1 to 5, with 1 being their main reason for training and 5 being the least reason they train. They also had an open slot to write down a reason they felt more accurately described why they train than the ones provided by the researchers.

The second questionnaire was used to establish measurements for behavior during the training period. It contained open questions about participants' age, how often they trained push-ups outside of practice, whether they wrote down their goals and if so, where they kept them.

Research Design

The research used independent groups design in the experiment.

Procedure

Before the study began, researchers sought two experts, a strength and conditioning coach, and a CrossFit gym owner and coach. The strength and conditioning coach helped researchers establish what kind of goals would be realistic but challenging based on participants' ability. The CrossFit expert helped researchers ascertain that push-ups were an exercise that would motivate participants.

Next, three gyms, two of them CrossFit and the other using comparable exercise regimen, gave access to their members and facilities. Each gym provided a space where there would be no disturbance and participants would not be influenced by outside distractions. Gym members were informed of the study; it's time and place, and the general nature of the task expected of them. Details of the task were not shared however, to prevent participants' expectations. Although a few people came to participate, most participants were asked on the spot.

During the first measure, at the beginning of the study, participants were asked to answer questionnaire 1. Once they had done so they were shown a standardized way to do push-ups. Elbows were to be locked between push-ups, chest to touch the Tupperware box on the floor and feet were to remain together. Participants were informed they had 90 seconds to do as many push-ups as they could but were not required to use the whole time. They were told that once their knees went to the floor the task was over. Once participants had finished the push-ups, they were asked to set goals for the next measure. It was important that participants set the goals themselves to minimize the chance of motivation and ability being confounding factors. These self-set goals were regarding how many push-ups they would do and how often a week they would train push-ups outside of practice. The participants in the written goals group were then asked to write their goals down.

In the beginning of the second measure, participants did push-ups again in the same standardized way. Then they were asked to answer questionnaire 2. Finally, participants were debriefed on the intended purpose of the study and any questions they had were answered.

Statistical Analysis

An independent samples *t*-test was used to test for significance in the difference between groups. Additionally, a two-way repeated measures ANOVA was used to test the effects of time.

As well as calculating the numerical improvements in performance and training, proportional improvements were calculated by dividing achieved improvements by intended improvements. This was done to minimize the effects of ability.

Achieved improvements were calculated by subtracting the amount of push-ups or training the participant did at the first measure from the amount of the same variable in the second measure. Intended improvements were calculated by subtracting the amount of push-ups or training the participant did at the first measure from the amount of the same variable they set as a goal.

Results

Of the 35 participants included in the analysis, 17 had written down their goals and the remaining 18 had not. Table 1 displays descriptive statistics for push-ups, number of practices and extra push-up practices by groups. These measures have been split in to three categories: Pre-test, goals and post-test.

A two-way repeated measures ANOVA was conducted that examined the effects of time and group on number of push-ups. The main effect for time was significant, $F(1, 33) = 47.30$, $p < .001$. There was no significant main effect for groups, $F(1, 33) = 0.62$, $p = .437$. There was no

Table 1

Descriptive statistics

	Written goals	Unwritten goals
	M (SD)	M (SD)
Baseline		
Push-ups	35.90 (16.81)	33.33 (19.61)
Goal for		
Push-ups	47.25 (19.24)	43.44 (21.81)
Rate of push-up training outside of practice	3.25 (1.33)	2.94 (1.30)
Post intervention		
Push-ups	41.45 (16.14)	37.72 (21.50)
Rate of push-up training outside of practice	1.38 (1.09)	1.22 (1.59)
Proportional improvements		
Push-ups	61.7% (47.03)	47.6% (46.67)

interaction effect either, $F(1,33) = 1.14$, $p = .294$.

The number of weekly push-up practices was measured post intervention and a *t*-test was conducted to determine if there was a significant difference between the means of the groups. The difference between groups in number of weekly push-up practices was 0.14 and was not significant, $t(33) = 0.28$, $p = .392$.

Other factors that were examined in the beginning of the study were for how long participants had trained, their experience with goal-setting and why they train. While no between-group differences were found, these factors gave researchers a better understanding of the sample. Participants' experience within their sport is shown in Figure 1. Sixty percent of the participants had been training for over a year while 40% had been training for over two years.

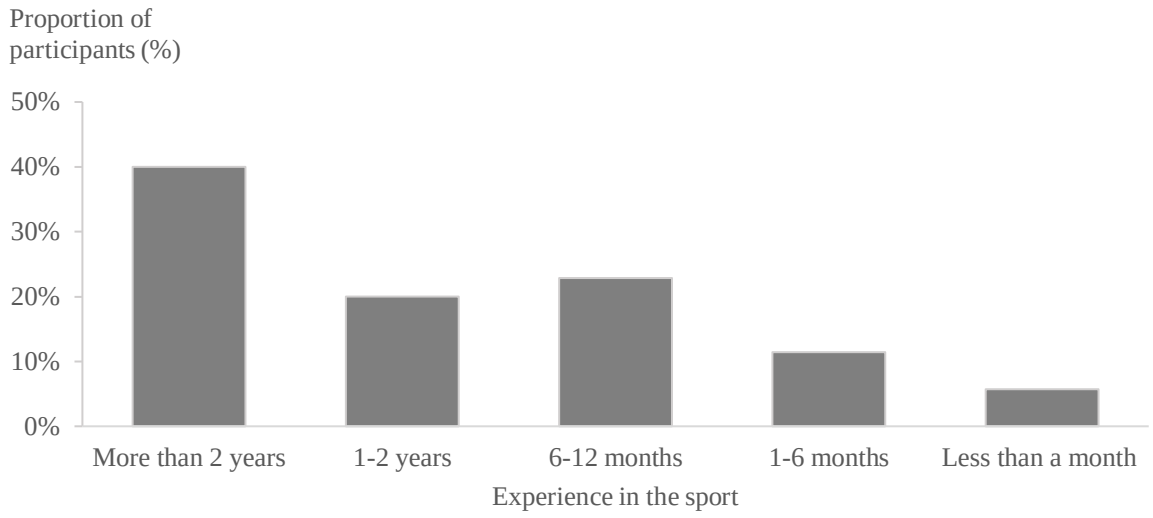

Figure 1. *The experience of the sample in their sport and the proportion of participants with that experience.*

When asked about their experience with goal setting, over 85% said that they had experience with setting practice goals. Three quarters of the sample believed their goal setting experience to be average or above average.

The reasons participants practice their sport was then ascertained to get more insight into the sample. Participants were given five possible reasons and asked to rate them on a scale from one to five, with one being the main reason they train and five having the least to do with why they train. The results displayed that for more than half of the participants, exercising was their main reason for training. Improving their craft was the second most popular reason for training with over half choosing that as their number one or two reasons for training. The third most popular reason for training was for social life, with most participants ranking it between two and four. Interestingly, looking good was found to be a more popular reason for training than

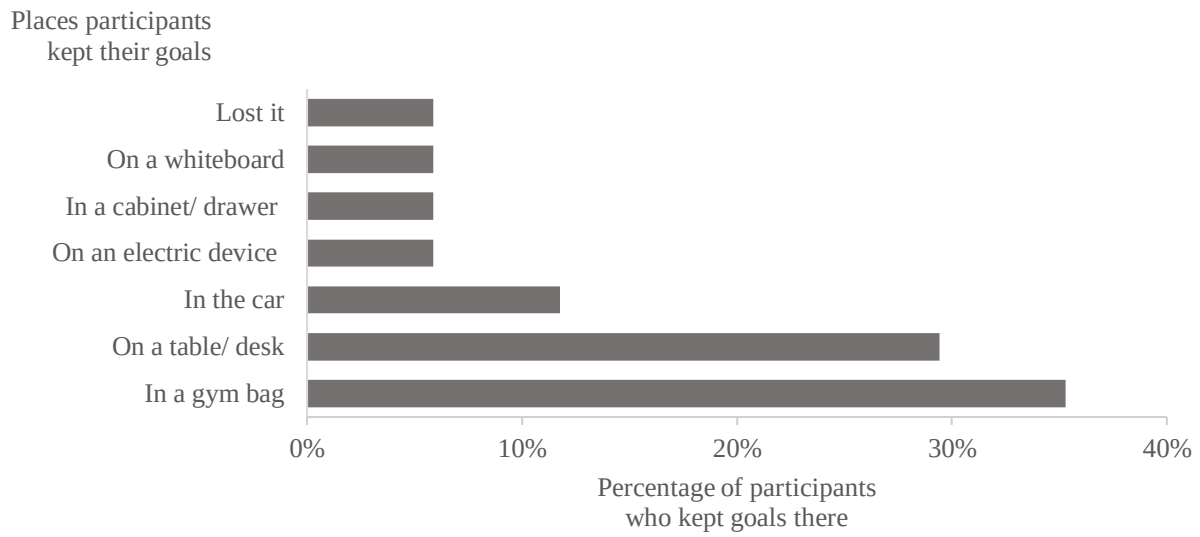

Figure 2. Places participants kept their goals and the proportion of participants who kept them there.

competing, but both were by far preferred the least. Finally, there was a line open for suggestion. Reasons for training suggested by participants were improving mental health and having fun.

At the end of the study, participants who wrote down their goals were asked where they had kept their goals. The places participants kept their goals along with the proportion of participants who kept them there can be found in train. The results displayed that for more than half of the participants, exercising was their main reason for training. Improving their craft was the second most popular reason for training with over half choosing that as their number one or two reason for training. The third most popular reason for training was social life, with most participants ranking it between two and four. Interestingly, looking good was found to be a more popular reason for training than Figure 2.

Discussion

The purpose of this study was to test empirically whether writing down goals impacts one's performance, as well as written goals' effects on number of practices per week. Additionally, factors such as goal setting experience, experience with the participants' sport, reasons for training and where participants kept their goals were inquired.

This study did not support the hypothesis that written goals would positively affect performance and number of weekly task-specific practices more than unwritten goals. This is partly in line with the results of Weinberg et al. (2019). Since there are now at least two studies that do not support the written goals hypothesis, one interpretation is that it does not matter whether an athlete writes his goals down or not. Another interpretation is that other factors, or lack thereof, limit the effectiveness of written goals. A third interpretation is that limitations in both studies hindered the effects of written goals.

A possible reason for the results that could explain both null results is the time spent viewing the goals. Weinberg et al.'s (2019) study found correlation between time spent looking at their goals and practice time. Seeing the goals might prime the individuals, which could add to the motivational effects of the goals, especially if they are specific and difficult (Bargh et al., 2001; Stajkovic et al., 2006). Increased practice time would lead to better performance if the person is motivated (Ericsson, 2006).

If the time spent looking at the goals is causing more practice time, then perhaps participants who wrote down their goals in the current study did not spend as much time viewing their goals as in Weinberg et al.'s (2019) study. The lack of group difference in number of practices in the current study, as well as difference in placement of goals between the two studies would seem to indicate this. In Weinberg et al.'s (2019) study, participants most often had their goals on

the bathroom mirror, the refrigerator or taped to a dresser. In the current study participants most often had their goals in their gym bags, in a cabinet or a drawer, or on an electric device. These are all places where the goals are not as noticeable. Lack of perception of goal importance and commitment to the goal may have led to the goals being kept in less than optimal places.

Another explanation for these results could be an interaction between task interest, self-set goals and motivational factors. If the task was perceived boring then participative goal setting had no impact on intrinsic motivation, unless the goal was assigned (Chang & Lorenzi, 1983). If that was the case, that could mean that the results had been different if the goals were assigned to them as Ferrer-Caja and Weiss (2000) found that intrinsic motivation predicts increased effort and persistence. The purpose of goal setting is finding the right kind of goal that fits an individual´s ambition (Weinberg & Gould, 2015). That could mean that the effectiveness of written goals will only be found if they are used under the right conditions. Thus, knowing how to use a written goal might be a useful tool for a person to enhance their performance even more. If the task did not enhance the participants' motivation in the current study, then maybe the tool that was given to them did not come in handy. What is the use of a hammer if a person does not know how to use it?

Another factor that might have affected motivation was the fact that most participants were asked in person and on the spot whether they wanted to participate in a research. On top of that, even those who knew about the research did not know what the task was before they performed. Maybe they only participated for extrinsic reasons, such as complying with social norms as in participating because they were asked to, rather than intrinsic reasons. Intrinsic motivation predicts increased effort, enjoyment and persistence (Ferrer-Caja & Weiss, 2000), which could impact the effectiveness of written goals. Future researchers are recommended to explore these ideas. For

example, ask participants the day before if they want to participate in a research. That could change the reason why they participate, and maybe they will do so for more intrinsic reasons.

One possible explanation for the results could be the type of goal that was used and how it was used. The participants set themselves a performance goal, thus the focus was on improving their own performance (Weinberg, 2010). In addition, a goal for practice rate was set to help them achieve their goal, such as to practice push-ups twice a week. Combining more than one type of goal has been said to be more effective than using only one (Zimmerman & Kitsantas, 1997). However, if a person does not know how to strategically use two goals together, then they are not more effective than one (Kolovelonis et al., 2011). Thus, if process goals had been used strategically with the performance goals then the results might have been different. Writing down the strategy on how one will reach the goal could have more impact than using an unwritten strategy. As strategies are more important on complex tasks, writing down goals might work better on them as well (Latham, Seijts, & Slocum, 2016; Locke & Latham, 1990). Lastly, a possible explanation could be limitations in the study. The lack of measures such as time spent looking at goals and goal commitment, as well as the way the sample was collected and a ceiling effect due to the athlete's experience within their sport are all possible reasons for these null results.

Goal setting experience and experience within the sport were measured mainly to exclude those variables as confounding, as well as to inquire whether some sort of a ceiling effect might have affected the results. Most participants believed their goal setting experience to be average. There was no difference between groups. This indicated that goal setting experience was not a confounding factor and that no ceiling effect should be expected based on goal setting experience. When it came to experience within the participant's sport the most popular answer was *more than 2 years*, indicating that the sample was made up of athletes in good shape. No between group

difference was found indicating that the participant's experience within his/her sport was not a confounding factor. Almost half of the sample being so experienced in their sport, might however have created a ceiling effect.

The participants' reason for training was ranked. For most their number one reason for training was maintaining a healthy lifestyle, while competing was the least popular reason for training. This indicates that the sample in this study was composed of mainly non-competitive athletes. Which begs the question, how important was the push-up task to them.

Limitations and Benefits

Albeit the results were null there may be indications as to where improvements, that could facilitate further research, are to be made. First off, the time spent viewing goals was not measured. Since the only significant result from Weinberg et al.'s (2019) research was that the more time participants spent looking at their goals the more they practiced, replication of these measures would have provided better insight to the benefits of writing down goals.

Secondly, since almost half of the participants in this study had been training for over two years, there could also have been a ceiling effect, where improvements were not possible for one group beyond those that were possible for the other. Using a more novice sample could have left more room for improvements.

Third, it should be reconsidered how the participants are collected. High percentage of the participants were asked in person if they wanted to participate in a research right at that moment. Perhaps many of them only said yes because they did not want to seem rude, wanted to be helpful or they did not have the guts to say no. That could mean that the participants only said yes because

of extrinsic reasons (Deci & Ryan, 2010). It might have been different having participants that had the time to think about whether they wanted to participate or not and did it freely by choice.

Finally, goal commitment was not measured, unlike in Weinberg et al.'s (2019) study. There is no way to know for sure whether the participants lacked commitment, or if it decreased or increased between time 1 and 2. Push-ups might not have been challenging enough to motivate participants enough to strive for improvement. Another factor that could have negatively affected goal commitment was that participants were asked not to share the goal they set. The result could have been different if every participant had to tell someone about the goal, as studies have shown that telling a friend, or a coach about the goal will impact commitment as well as performance (Hollenbeck et al., 1989).

While improving the limitations of the current study is important for future researches, there were also some benefits that future researchers should keep in mind. Weinberg et al. (2019) concluded that the decrease in commitment to their goals could be the fact that participants did not set the goal themselves. This was one thing researchers improved upon in the current study. Although researchers differ on the effects of goal origins on commitment, having participants setting their own goals is a simple way to ensure high commitment (Klein et al., 2001; Latham et al., 1988). Participants were asked to make sure the goals were challenging since self-set goals are "often lower than a goal that is assigned or set participatively" (Latham et al., 2016, p. 272). The consultation of a CrossFit expert indicated that the task assigned would be of interest to participants. This coupled with the fact that participants set the goals themselves should have led to higher intrinsic motivation (Chang & Lorenzi, 1983). Studies have shown how effective intrinsic motivation can be on performance (Ferrer-Caja & Weiss, 2000).

Another thing recommended by Weinberg et al. (2019) was focusing on specific athletes who might be more committed than their sample. Thus, researchers looked to find athletes who would be committed to increase their push-ups. In CrossFit, athletes are often measured in practice and records kept, so improvement would be noticed. This was considered to be likely to motivate participants.

Using an easily standardized, popular exercise eased the process of finding a large enough sample that was not required to have a lot of experience. Push-ups are easy to perform and train, either before going to sleep at night, as you wake up in the morning, or before or after practice. Most people are capable of doing some number of push-ups and almost everybody can improve their output of push-ups. In the current research, time limitations could have put a cap on a few participants but those who were able to use all the 90 seconds for the push-ups rested, which shows they had some room for improvement.

Viewing the isolated effects of writing down goals is one of the biggest contributions of the current study to the research of goal setting. The effects on performance have not yet been found in sport setting, neither using simple task as in this study nor using a more complex one as in Weinberg et al. (2019). Thus, the benefits of written goals might be contingent on other factors, such as use of multiple types of goals, certain motivation or a strategy on how to achieve the goal. The consideration of experience with goal setting and experience in the athlete's sport were helpful as well, to rule out these variables as confounding. Lastly, the use of experts in the field of exercise as well as in the sport of CrossFit was highly beneficial to the research.

Future Research

Researchers who wish to further inspect the effects of writing down goals should make sure to measure the effect of time spent looking at the goals. The benefits and limits of this study

should be noted and improved upon, preferably with a larger sample. Provided that time is not a constraint, a sample should be sought from a population that is motivated to improve in the task used in the experiment. It should be related to the participants' sport and they should have enough room for improvement to see a difference between groups. This requires some thought be put into the sample. Consideration to ensure goal commitment is of utter importance as well, as goal commitment is a mediator in the impact of goal setting on performance (Locke et al., 1988).

Perhaps writing down goals is not enough to change behavior. Studies have shown how effective motivation can be (Gaudreau & Braaten, 2016; Mossholder, 1980; Selfriz, Duda & Chi, 1992). A possible explanation is that without motivation, written goals do not differ from unwritten goals. Future studies should explore motivational factors in line with written goals, such as intrinsic motivation versus extrinsic. Also, explore the difference between motivated person with written goals versus unwritten. The aim should be understanding why and how written goals differ from unwritten, rather than hoping that written goals will change everything for the better.

In this study, participants set themselves a performance goal and goals on practice rate (Weinberg, 2010). The goals were decided a moment after they completed the push-ups. One reason that practice rate goals were used was because it has been recommended to use a combination of performance, process and/or outcome goals as it can be more effective than only using one type of goal (Weinberg, 2010; Zimmerman & Kitsantas, 1997). But in hindsight, how can one know if practicing push-ups, for an example, twice a week will help reaching the goal. Kolovelonis et.al (2011) state that if person does not know how to strategically use two or more goals together, then it will not be more effective than the use of only one goal. Future studies could investigate how a written goal differs from unwritten by exploring the difference between strategically using two goals together versus one at a time. For example, to use process goals that

lead to performance goals. Maybe written goals can help athletes understand the way to achieve a goal by giving a clear strategy towards it instead of there being a fuzzy idea on how to reach it.

Written goals may be helpful when different types of goals are used. They could help with formulating a strategy, but also with reconsideration based on feedback. Use of informative subgoals would give feedback to the person, which could then help the person reconsider whether the goal is appropriate (Locke & Latham, 2015). This might in fact be necessary on complex tasks as difficult goals on such tasks without feedback can be detrimental (Strang et al., 1978).

Another field that should be investigated is the mix of written goals with primed goals. Since subconscious goals are affected by conscious goals, perhaps the addition of a primed general goal will further improve performance, or there might be an interaction effect between primed and written goals (Ganegoda et al., 2016; Itzchakov & Latham, 2018). Another possibility is that written goals are primed through viewing them, in which case the addition of rewards should increase persistence and effort (Aarts, Custers & Marien, 2008).

One variable that has only been looked at categorically is where the goal setter keeps the goals. Testing whether placement of written goals affects the viewing of them would help sport psychologists and others in the field of goal setting give more precise instructions on how to maximize the benefits of writing down goals. It would, for example, be interesting to see whether keeping the goals on an electronic device, that would remind participants of their goals on specific times, could help improve practice time beyond what a goal kept on the fridge would. Or if seeing the goal every time the participant goes to the fridge would be more effective.

In conclusion, goal setting is one of the most effective ways an athlete can improve his performance. While most aspects of goal setting have been explored quite thoroughly, the effects of writing down goals have not. This study suggests that writing down goals does not guarantee

improved performance. This does not indicate that writing down goals cannot be used as a helpful tool along with goal setting. The aim for future research should be to understand how and why written goals can enhance performance. That will benefit athletes, and everyone who are trying to improve performance. Hopefully this field of research will continue to prosper and bring to light new findings.

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Appendix A - Questionnaire 1

Vinsamlegast settu x við þann valkost sem á best við þig

Hvað ertu búinn að æfa lengi á þessum stað?

_ Minna en einn mánuð _ 1-6 mánuði _ 6-12 mánuði _ 1-2 ár _ Meira en 2 ár

Hvað ertu búinn að vera að æfa þessa íþrótt lengi?

_ Minna en einn mánuð _ 1-6 mánuði _ 6-12 mánuði _ 1-2 ár _ Meira en 2 ár

Hefurðu sett þér markmið sem sneri að þinni íþróttaiðkun?

_ Já _ Nei

Ef svarið við síðustu spurningu var já, hversu mikla reynslu telurðu þig hafa af markmiðasetningu?

_ Enga _ Litla _ Meðal _ Mikla _ Mjög mikla

Hver er ástæða þess að þú iðkar þessa íþrótt?

_ Fá hreyfingu _ Keppa _ Verða betri _ Félagsskapur _ Líta vel út

Appendix B, Second Questionnaire

Aldur:_____

Hversu oft í viku æfðiru armbeygjur utan æfinga að meðaltali á meðan rannsókninni stóð?

_____

Skrifaðirðu niður markmiðin þín?

_ Já _ Nei

Ef þú skrifaðir markmiðin þín niður, hvar geymdirðu blaðið?

_____

Appendix C - Informed Consent Paper

Upplýst samþykki um þátttöku í rannsókn

Tilgangur rannsóknarinnar: Tilgangur þessarar rannsóknar er að skoða hvaða þættir hafa áhrif á að bæta frammistöðu.

Lengd rannsóknar: Rannsóknin tekur 4 vikur, en felst í raun aðeins í því að hitta rannsakendur tvisvar sinnum. Hvort skipti ætti að taka um það bil 5 mínútur.

Framkvæmd: Framkvæmd rannsóknarinnar fer þannig fram að þátttakendur hitta rannsakendur, svara spurningalista og gera eins margar armbeygjur og þeir geta á 90 sekúndum. Þátttakendur setja sér þá markmið sem snúa að æfingum og armbeygjum. Þá hefur þátttakandi 4 vikur til að vinna að sínum markmiðum og hittir þá rannsakendur aftur. Þá svari þeir aftur spurningalista og gera eins margar armbeygjur og þeir geta á 90 sekúndum.

Hugsanlegur ávinningur þátttöku: Rannsóknarefnið er mikilvægt innlegg í þær rannsóknir sem meta hvaða aðferðir hjálpa fólki að ná bættari árangri.

Laun fyrir þátttöku: Engin laun eru fyrir þátttöku.

Hvernig haldið verður utan um skrár: Við óskum eftir að fá netfang, símanúmer og nafn þátttakenda. Engar persónugreinalegar upplýsingar verða birtar. Allar upplýsingar verða geymdar í læstri skrá sem verður eytt 30 dögum eftir að upplýsingunum er safnað.

Þú getur hætt við þátttöku í þessari rannsókn hvenær sem er án nokkura afleiðinga

Rannsakendur: Brynjólfur Ingvarsson og Tómas Daði Bessason, BSc nemendur í sálfræði.

Leiðbeinandi: Hallur Hallsson, MSc í íþróttasálfræði.

Hafirðu spurningar um rannsóknina hvetjum við þig til að hafa samband með því að senda tölvupóst á: bri9@hi.is eða tdb5@hi.is

Ég, undirrituð/undirritaður, hef lesið alla skilmála og samþykki að taka þátt í þessari rannsókn:

_____