Moderators of Goal Pursuit: An Action Phases Perspective

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“Ich wollte immer gewinnen. Hindernisse überwinden“
– Lukas Podolski

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Abstract

The present thesis investigates a set of hypotheses, which I have derived from the model of action phases (MAP). The research spans three different domains, namely how individuals perceive and take risks, primed and deliberate goal pursuit, and the incorporation of negative feedback.

The first research paper tested the hypothesis that planning out the implementation of a goal has different downstream consequences on risk perception and risk-taking behavior than deliberating the short- and long-term, positive and negative consequences of a change decision. More specifically, participants in an implemental mindset should be more optimistic regarding various negative life events as well as more prone to taking risks. The results of two experiments show that participants in an implemental mindset were more optimistic than both participants in a deliberative mindset or a control condition, and participants in a deliberative mindset were more risk averse when it came to risk-taking behavior than both participants in an implemental mindset and a control condition. Research Paper I’s results therefore suggest that the implemental mindset is associated with increased optimism regarding risks and actually results in more risk taking.

The second research paper investigated two moderators of primed goal pursuit. Experiments 1 and 2 focused on objective self-awareness (OSA) and tested whether inducing the state of OSA moderates primed goal strength in a hand-grip task paradigm. Between experiments, the content of the goal was varied to represent two motivational constructs which were either in line with self-standards or not. Taken together, the results of Experiments 1 and 2 of Research Paper II suggest that OSA moderates primed goal pursuit in boosting goal pursuits which are in line with self-standards (i.e., a primed achievement goal; Experiment 1) but hinders the enacting of goals which are not in line with self-standards (i.e., a primed quitting goal; Experiment 2). Experiments 3 and 4 of Research Paper II were based on the hypothesis derived from MAP that for primed goals to be effective, successful performance in a given task must be of high desirability. Monetary incentives and framing the task as indicative for future academic success were used in Experiments 3 and 4, respectively, to test this idea. However, the results show that primed achievement goals exerted a stronger influence in the absence of any increases in the desirability of good performance in the task at hand; apparently, added incentives
diminished their impact by raising performance levels of the respective control conditions.

Finally, the third research paper investigated the incorporation of negative feedback as a function of learning versus performance goal orientations. In the first experiment of Research Paper III, learning versus performance goal orientations were manipulated similar to the activation of mindsets and the priming of goals in Research Papers I and II, respectively. The results show that a strong learning goal orientation led to the better retaining of feedback information as well as better performances following negative feedback compared to a strong performance goal orientation. Experiment 2 extended this finding by showing that evaluative negative feedback that was threatening to the participants’ self-images led to self-defensive choices of tasks with low difficulty. Giving participants a learning goal helped them to overcome such self-defensiveness (Experiment 3), and furnishing the learning goal with specific if-then plans, so-called implementation intentions, rendered the best results.

Taken together, the findings of the present research papers extend MAP and thereby contribute to a better understanding of individual goal pursuits. In addition, each of the research papers makes a significant contribution to its respective domain. Research Paper I reveals an interesting, motivational intra-individual determinant of dynamic risk perception and risk taking. Research Paper II adds two moderators of primed goal pursuit to the current debate on behavioral priming. Finally, Research Paper III shows that the easily accessible self-regulatory strategy of implementation intentions has enormous potential to reduce self-defensiveness in learning environments. In sum, the present thesis provides novel ideas for research on MAP, and it points to novel ways of how people can improve their goal pursuits.
Zusammenfassung


Der zweite Forschungsartikel untersuchte zwei Moderatoren des gebahnten Zielstrebens. Die Experimente 1 und 2 behandelten dabei das Konzept der objektiven Selbstaufmerksamkeit (OSA) und testeten, ob die Herstellung des Zustands der OSA die Stärke des gebahnten Zielstrebens in einem Handtrainer-Aufgabenparadigma moderiert. Zwischen den Experimenten wurde der Inhalt des Ziels variiert, um zwei verschiedene motivationale Konstrukte abzbilden, welche entweder zu den Selbststandards der Teilnehmenden passten oder nicht. Zusammengenommen implizieren die Ergebnisse der Experimente 1 und 2 des ersten Forschungsartikels, dass OSA das gebahnte Zielstreben moderiert, indem sie Ziele, die mit Selbststandards übereinstimmen fördert (d.h., ein gebahntes Leistungsziel; Experiment 1), Ziele, die nicht mit den Selbststandards übereinstimmen jedoch hemmt (d.h., ein gebahntes Ziel früh aufzugeben; Experiment 2). Die Experimente 3 und 4 des zweiten Forschungsartikels basierten auf der aus MAP abgeleiteten Hypothese, dass gebahnte Ziele nur dann effektiv sind, wenn die Erwünschtheit guter
Leistung in einer Aufgabe hoch ist. Um diese Idee zu testen, wurden finanzielle Anreize sowie die Darstellung der Aufgabe als hinweisend für zukünftigen Erfolg im Studium in den Experimenten 3 beziehungsweise 4 genutzt. Jedoch zeigen die Ergebnisse, dass gebahnte Leistungsziele dann stärker sind, wenn die Erwünschtheit guter Leistungen in einer Aufgabe nicht erhöht wurde; zusätzliche Anreize verringerten den Einfluss gebahnter Leistungsziele indem sie die Leistung der Teilnehmenden in den Kontrollbedingungen erhöhten.


# Table of Contents

Acknowledgments

Abstract

Zusammenfassung

Table of Contents

List of Figures

List of Tables

Synopsis

**Goal Pursuit from an Action Phases Perspective**

MAP and the present research

Priming

Research Paper I: Mindsets Affect Risk Perception and Risk-Taking Behavior

Conclusion

Research Paper II: Moderators of Primed and Deliberate Goal Pursuit

OSA

Desirability

Conclusion

Research Paper III: Learning Goal Orientation and Feedback

Conclusion

General Discussion

Implications

Future Directions

Summary and Conclusion

Research Paper I: Mindsets Affect Risk Perception and Risk-Taking Behavior – Illusionary Optimism and the BART

Abstract

Introduction

Mindsets: Deliberative versus Implemental

The Present Research

Experiment 1: Mindsets and Risk Perception

Method
Results 29
Discussion 32

Experiment 2: Mindsets and Risk Taking 34
Method 34
Results 36
Discussion 38

General Discussion 40
Mindsets and Risk Perception 40
Mindsets and Risk Taking 41
Pre- versus Post-Decisional Deliberation 42

Conclusion 43

Research Paper II: Self-Awareness and Desirability as Moderators of Primed and Deliberate Goal Pursuit 45

Abstract 46
Introduction 47
Prime-to-Behavior Effects 47
Moderators of Primed Goal Pursuit 49

The Present Research 52

Experiment 1: Primed and Consciously Set Achievement
Goals and OSA 53
Method 54
Results 57
Discussion 59

Experiment 2: Primed Quitting Goal and OSA 61
Method 62
Results 63
Discussion 64

Experiment 3: Primed Achievement Goal and Monetary Incentives 65
Method 66
Results 68
Discussion 69
Experiment 4: Primed and Consciously Set Achievement Goals and Describing Task Success as Indicative of Future Academic Success

Method 71
Results 72
Discussion 73

General Discussion 74
Implications and Future Directions 77

Conclusion 78


Abstract 80
Introduction 81
Learning versus Performance Goal Orientations 82
Implementation Intentions 84

The Present Research 85

Experiment 1: Manipulating Goal Orientations 86
Method 86
Results and Discussion 89

Experiment 2: Evaluative versus Non-Evaluative Negative Feedback 91
Method 92
Results and Discussion 94

Experiment 3: Learning Goals and Implementation Intentions 96
Method 97
Results and Discussion 98

General Discussion 101
Implications and Future Directions 103

Conclusion 104

References 105

Record of Achievement 124
List of Figures

Figure 1. The succession of action phases as proposed by MAP. .......................... 3

Figure 2. Overview of MAP and which parts are addressed by Research Papers I-III (RPI-III). ................................................................. 4

Figure 3. Experiment 1: Difference between self and average other ratings (illusory optimism) as a function of mindset condition and perceived controllability of negative life events (error bars represent 95%-CIs). .......................................................... 31

Figure 4. Experiment 2: Adjusted average number of pumps and popped balloons as a function of mindset condition (error bars represent 95%-CIs). ......................... 37

Figure 5. Hand-grip performance as a function of goal and mirror condition in Experiment 1. Bars represent standard errors ....................................................... 59

Figure 6. Log-transformed time spent squeezing the hand grip in Experiment 2. Bars represent standard errors ........................................................................... 64

Figure 7. Stanine scores in the FAIR-2 as a function of primed goal orientation (error bars represent standard errors). ......................................................................... 90

Figure 8. Recall of feedback items and the feedback score as a function of primed goal orientation (error bars represent standard errors). ........................................ 91
List of Tables

Table 1. Perceived Controllability of the Eight Risks Used in Experiment 1............27
Table 2. Individual Difference Scores (Illusionary Optimism) for Each Negative Life Event as a Function of Experimental Condition.................................................................32
Table 3. Means of Word Search Performance in Experiment 3 as a Function of Goal and Monetary Reward Condition..........................................................69
Table 4. Means of Word Search Performance in Experiment 4 as a Function of Goal and Desirability Condition.................................................................73
Table 5. Logistic Regression for Experiment 2.........................................................95
Table 6. Proportions of Participants Who Chose Medium-To-Hard Math Problems in Experiments 2 and 3 as a Function of Feedback and Goal Condition, respectively....96
Table 7. Logistic Regression for Experiment 3.......................................................100
Synopsis

What are effects of deliberating the decision to pursue a certain goal versus planning the implementation of it on risk perception and risk-taking behavior? What will happen when goals are activated outside of conscious awareness? How can we make it easier for individuals to incorporate negative feedback on their performance during their goal pursuits?

The present thesis utilizes the model of action phases (MAP; Gollwitzer, 1990, 2012; Heckhausen & Gollwitzer, 1987) as a framework of goal pursuit to combine and answer these questions. In the present selection of experiments, I capitalize on a broad range of methods, samples, and designs to investigate downstream effects of goal-related variables on behavior and evaluations. MAP offers an excellent starting point for generating hypotheses on all aspects of individual goal pursuits as it describes four consecutive action phases which span both motivational aspects (i.e., goal setting and evaluation) and volitional aspects (i.e., goal striving) of why and how we pursue goals, respectively.

In the first line of research, the subtle activation of cognitive procedures, that is, the priming of action-phase-related mindsets and its effects on risk perception and risk-taking behavior are investigated. In a second line of research, two moderators of goal priming effects, namely objective self-awareness (OSA; Duval & Wicklund, 1972) and the desirability associated with goal attainment (e.g., Heckhausen, 1977), are proposed and tested. In a third line of research, two goal orientations (i.e., learning and performance goal orientations), which moderate the incorporation of negative feedback, are examined. Further, a self-regulatory strategy derived from MAP, namely implementation intentions (Gollwitzer, 1999, 2014), is used to ease the incorporation of feedback.

The aim of this synopsis is to combine all three lines of research into the common framework of MAP. To achieve this, I will proceed as follows: First, I will introduce MAP and its suggested action phases in detail. I will present how the present research fits into MAP and addresses questions of goal pursuit. I will then shortly discuss the technique of priming, which is used throughout many of the present experiments but especially for the subconscious activation of goals in Research Paper II. Subsequently, I will give an overview of the three research papers that form the present thesis. And finally, I will close with a general discussion of the
implications for both the understanding of goal pursuit per MAP and other research in relevant domains.

**Goal Pursuit from an Action Phases Perspective**

MAP (Gollwitzer, 1990, 2012) describes goal pursuit as a succession of four phases through which individuals must traverse to attain their goals successfully. Each action phase thereby poses its unique demands and challenges to the individual and overcoming these is facilitated by the activation of a corresponding set of cognitive procedures (i.e., the activation of a specific mindset). The model furthermore distinguishes between motivational (i.e., why we pursue goals) and volitional (i.e., how we pursue goals) phases. Figure 1 depicts the proposed four action phases and the transition points.

In the first phase, the predecisional phase, goal-striving individuals are concerned with setting appropriate goals. Therefore, they must consider both feasibility (i.e., is it possible to attain the goal?) and desirability (i.e., is it worthwhile to attain the goal?) of their options to decide which of the many desires they want to turn into a binding goal. In this motivational phase, the goal-striving individual is focused on the deliberation of pros and cons of each option and whether an attractive option can actually be attained which is facilitated by the activation of a deliberative mindset. The cognitive configuration during the predecisional phase is thus characterized by features of open-mindedness (e.g., Fujita, Gollwitzer, & Oettingen, 2007), broad visual attention (Büttner et al., 2014), and unbiased and realistic judgments of desirability- and feasibility-related information, respectively (e.g., Bayer & Gollwitzer, 2005; Puca, 2001).

Once a decision in favor of a certain option has been made, individuals enter the second phase, the preactional phase. In early versions of MAP and its predecessors (e.g., Heckhausen, 1987; Heckhausen & Gollwitzer, 1987) making this decision was described as crossing the psychological Rubicon that marked a point of no return as states of mind shifted drastically from motivational to volitional cognitive attunements. In this second, volitional phase, individuals move on to identifying both opportunities to act as well as suitable means to attain their set goal. Here, furnishing a goal with specific if-then plans, so-called *implementation intentions* (Gollwitzer, 1999, 2014), has been proven to be very effective as a meta-analytic review across over 8000 participants revealed a medium-to-large effect of $d = 0.65$ of
implementation intentions on goal attainment (Gollwitzer & Sheeran, 2006). Further, the planning of when, where, and how to act is facilitated by the activation of an implemental mindset that is characterized by features of relative closed-mindedness (e.g., Fujita et al., 2007), partial processing of information in favor of the active goal (e.g., Nenkov & Gollwitzer, 2012; Taylor & Gollwitzer, 1995), and illusory control over outcomes (Gollwitzer & Kinney, 1989).

After planning one’s actions, the third task is to initiate goal-directed action in face of opportune situations (Gollwitzer, 2014), to stay on track (e.g., by not slipping back into a motivational state of mind; Hermann & Brandstätter, 2013, 2015), and to shield ongoing goal pursuits from temptations (e.g., Achtziger, Gollwitzer, & Sheeran, 2008; Shah, Friedman, & Kruglanski, 2002). In this second volitional phase, the actional phase, individuals make progress toward their goal, focus on cues that allow them to coordinate their actions and overcome potential obstacles of goal pursuit. This determined and persistent pursuit of goal completion is facilitated by an actional mindset.

Having completed goal-directed action, individuals finally must take a step back to judge their progress. In this fourth and last phase, the postactional phase, individuals must evaluate incoming information regarding whether further striving is necessary or the goal has been attained. In retrospection, the course of goal pursuit and its effects are evaluated. This focus on evaluation in this motivational action phase is facilitated by the activation of an evaluative mindset. After goal attainment, and only then, the goal becomes deactivated and no longer guides behavior.

**Figure 1.** The succession of action phases as proposed by MAP.

**MAP and the present research.** Researchers using MAP to model goal pursuit so far often concentrated on the predecisional and preactional phases (e.g., Armor & Taylor, 2003; Bayer & Gollwitzer, 2005; Gagné & Lydon, 2001). In the present thesis, however, MAP is used to address three research questions that span the
whole process of goal pursuit: a) effects of deliberating versus planning on risk perception and risk taking, b) the initiation of goal-directed action of primed goals as well as its interplay with two potential moderators of goal pursuit, and c) how two naïve beliefs regarding the malleability of personal attributes moderate the handling of negative feedback on one’s performance in the postactional phase. Research Paper I will use task paradigms from health and clinical psychology to model influences of goal setting and planning in individual goal pursuits on health risk perception and risk-taking behavior. It will therefore contribute to the understanding of the first and second action phase. Research Paper II will test if the subconscious activation (i.e., priming) of goals leads to the initiation of goal-directed action and whether manipulating desirability, thought to be essential during goal setting (predecisional phase), has an influence on goal strength in the third, volitional action phase. Research Paper III concludes the succession of action phases by targeting the incorporation and retaining of feedback information in the fourth and last action phase proposed by MAP, the postactional phase. Figure 2 is an extended version of Figure 1 by adding Research Papers I-III and the parts of MAP each research papers addresses and thereby providing an overview over the present research.

**Figure 2.** Overview of MAP and which parts are addressed by Research Papers I-III (RPI-III).

**Priming.** In all three research papers that form the present thesis I use the priming of motivational constructs as an experimental method. The experimental technique of priming refers to the “passive, subtle, and unobtrusive activation of relevant mental representations by external, environmental stimuli, such that people are not and do not become aware of the influence exerted by those stimuli” (Bargh & Huang, 2009, p. 128). It is important to note that it is not a lack of awareness for the prime itself that is necessary to speak of a priming effect (although the subliminal
presentation, i.e., a presentation below the threshold of conscious awareness, is possible; overview by Bargh & Chartrand, 2000). It is the lack of awareness for the links between the prime, the mental representation it has activated, and the corresponding behavior.

In one of the first priming experiments in social psychology (Higgins, Rholes, & Jones, 1977), participants were exposed to a list of various personality traits in an unrelated task and subsequently used applicable traits in their judgment on an ambiguously described person. Since then, many researchers used similar experimental setups to prime social categories (e.g., Dijksterhuis & van Knippenberg, 1998), concepts (e.g., Shariff, Willard, Andersen, & Norenzayan, 2016), or contexts (e.g., Aarts & Dijksterhuis, 2003), and observe their impact on evaluations, judgments, and behavior.

More important to the present thesis, researchers have shown that both the priming of goals (e.g., Bargh, Gollwitzer, Lee-Chai, Banrdollor, & Troetschel, 2001; Latham & Piccolo, 2012; Shantz & Latham, 2009; 2011) as well as procedural priming (i.e., mindset priming; e.g., Mussweiler & Epstude, 2009) is possible. We use the priming of deliberative versus implemental mindsets in Research Paper I, prime achievement as well as quitting goals in Research Paper II, and prime learning versus performance goal orientations in Research Paper III.

**Research Paper I: Mindsets Affect Risk Perception and Risk-Taking Behavior**

The key quality of mindsets to carry over from the cognitive task that has evoked them to other, unrelated tasks is used to investigate their effects in various domains (overview by Gollwitzer & Keller, 2016). For example, Dennehy, Ben-Zeev, and Tanigawa (2014) used the induction of an implemental mindset to shield undergraduates from low socio-economic backgrounds from the maladaptive consequences of stereotype activation.

In Research Paper I, we investigated the downstream consequences of priming deliberative versus implemental mindsets on risk perception (Experiment 1), namely illusionary optimism (reviews by Shepperd, Klein, Waters, & Weinstein, 2013; Sheperd, Waters, Weinstein, & Klein, 2015), and risk taking (Experiment 2), namely risk-taking behavior in the Balloon Analogue Risk Task (BART; Lejuez et al., 2002).

Based on the earlier finding that participants in an implemental mindset exhibit more illusionary control over random outcomes (Gollwitzer & Kinney, 1989),
Taylor and Gollwitzer (1995) found that participants in an implemental mindset also exhibit more illusionary optimism concerning the experience of negative life events compared to participants in a deliberative mindset. Because recent research failed to find a shared factor between risk perceptions and risk-taking behavior as well as the fact that correlations between risk perceptions and risk-taking behavior are far from perfect (e.g., Frey, Pedroni, Mata, Rieskamp, & Hertwig, 2016; Sheeran, Harris, & Epton, 2014), we wondered whether the alterations in illusionary optimism caused by inducing deliberative versus implemental mindsets also translate into alterations in risk taking. In other words, does the predominant mindset induced by unrelated goal pursuits affect both how we see and take risks?

To operationalize risk perceptions in Experiment 1 we used the assessment of comparative illusionary optimism (e.g., Shepperd et al., 2015; Weinstein, 1980). This comparative illusionary optimism captures the widespread phenomenon that people, on average, judge others more likely to experience various negative and less likely to experience various positive life events than themselves (e.g., Arnett, 2000; DeJoy, 1989; Weinstein, 1980). To assess comparative illusionary optimism in our experiment, participants were asked to indicate their risk to encounter a negative life event as well as the risk of an average other of their age and gender. On an aggregate level, the difference between ratings for their own risk and the risk of the average other represents the illusionary optimism of a group.

In Experiment 1, we successfully replicated earlier work on the effect of deliberative versus implemental mindsets on risk perception (Taylor & Gollwitzer, 1995). Participants in an implemental mindset were more optimistic than participants in a deliberative mindset, especially when the negative life event in question was perceived to be controllable. Participants in the control condition were only slightly more optimistic than participants in the deliberative mindset condition. However, participants in the deliberative mindset condition still exhibited illusionary optimism as they rated their risk to experience negative life events on average lower than the risk of the average other; but participants in the deliberative mindset condition did so significantly less than participants in the implemental mindset condition.

To operationalize risk taking in Experiment 2, we used the BART (Lejuez et al., 2002). In the BART, one must decide between going on with pumping up a balloon and thereby increasing the balloon’s monetary worth by every pump or to stop pumping and thereby saving the balloon’s current worth. Critically, balloons can
explode if pumped too far, whereby the current value of the balloon is lost to the participant. As the risk of exploding increases with every subsequent pump, risk-taking behavior in the BART resembles cumulative every-day risks like the risk of skin cancer, which increases with every sunburn (e.g., Vitaliano & Urbach, 1980).

Not surprisingly, the BART excels at the assessment of risk-taking behavior due to its high external validity and intuitive game design (Lejuez, Aklin, Zvolensky, & Pedulla, 2003; Lejuez et al., 2003) compared to other measures (overviews by Charness, Gneezy, & Imas, 2013; Frey et al., 2016).

In Experiment 2, we found differences in risk-taking behavior in the BART as a function of mindset induction. Participants in the implemental mindset condition as well as in the control condition exerted more pumps and let more balloons pop compared to participants in the deliberative mindset condition. This pattern of results mirrors the results of Experiment 1.

**Conclusion.** Across two experiments, Research Paper I shows that the action-phase-related mindset, that is the cognitive procedures associated with deliberation versus planning, may impact how people perceive and take risks unrelated to the task that was used to induce the deliberative versus implemental mindsets. This finding has important theoretical implications for both MAP and risk communication. Compared to participants in a deliberative mindset, participants in an implemental mindset perceived their risks to be lower and were more willing to take risks. In combination with the increased feeling of control in this mindset (Gollwitzer & Kinney, 1989), this increased optimism, although illusory, is in general adaptive to goal pursuit. An individual who sets herself a challenging goal (Locke & Latham, 1990, 2013) must be more willing to take risks to overcome obstacles and attain the set goal than an individual who still deliberates between potential goals she might want to attain. In the latter case, illusorily optimistic judgments may bias the selection of goals toward unfeasible desires and thus prove maladaptive in the end.

The present research shows that the effect of the action-phase-related mindsets of deliberation and planning on risk perceptions and risk taking even carries over to risks not directly related to the task (goal) that was used to induce the respective mindset. In other words, we observed, for example, participants thinking about moving to another apartment to be more risk averse in an incentivized computer game than participants who planned out when, where, and how to move to another
apartment. This intra-individual difference should be kept in mind when it comes to communicating risks to risk-prone individuals as well as the general public.

**Research Paper II: Moderators of Primed and Deliberate Goal Pursuit**

In the second research paper, we investigated how two potential moderators (i.e., OSA and the desirability of a task’s outcomes) may affect primed goal strength.

**OSA.** The state of OSA (Duval & Wicklund, 1972) describes the state of attention being directed to one’s self. Contrasted to the state of subjective self-awareness where individuals direct their attention toward their environment, OSA results in a comparison process where internalized standards and norms are compared to actual behavior, and thus, behavior in line with standards is more likely to be exerted (e.g., Beaman, Klentz, Diener, & Svanum, 1979). In the state of OSA, one perceives the self as an object, which can be evaluated as any other. Based on this comparison process and its outcomes, we hypothesized that primed goals which are in line with internal self-standards (i.e., an achievement goal; Experiment 1) should benefit from the induction of OSA. Primed goals that are not in line with internal self-standards (i.e., a quitting goal; Experiment 2), however, should not benefit from the induction of OSA and therefore not be pursued in these situations.

To investigate the interplay between the effects of goal activation through priming on persistence and OSA, participants had to engage in a strenuous, unpleasant task: squeezing a hand grip (e.g., Muraven, Tice, & Baumeister, 1998). Participants in the primed goal conditions of Experiments 1 and 2 were primed by putting respective words into a word-search task (e.g., Bargh et al., 2001; Engeser, Wendland, & Rheinberg, 2006; Engeser, 2009). In both experiments, we further manipulated OSA by varying the presence versus absence of a mirror in front of which participants had to squeeze the hand grip. Across the two experiments, we used goals with different content to test the idea that OSA should help to bring out goals that are in line with self-standards but hinder the pursuit of goals that are not in line with self-standards. In Experiment 1, we compared the behavioral effects of the primed achievement goal to a consciously set achievement goal (i.e., as an upper boundary of performance) as well as a no-goal control condition (i.e., as a lower boundary of performance). In Experiment 2, we compared the behavioral effects of a primed quitting goal to a no-goal control condition.
Experiments 1 and 2 show the effects of OSA on primed goal strength to be dependent on the content of the goal. In Experiment 1, only the squeezing times of participants with a primed achievement goal differed between mirror conditions. When the mirror was absent (i.e., OSA was not induced), participants with a primed achievement goal stopped squeezing as early as the hypothesized lower boundary of performance (i.e., set by participants in the no goal control conditions). The presence of a mirror (i.e., OSA was induced), however, led to longer squeezing times for participants with a primed achievement goal which were approaching the upper boundary of performance (i.e., set by the consciously set achievement goal conditions). In Experiment 2, the use of a goal of opposite direction reversed the direction of the effect of OSA. When primed with a quitting goal, participants in the absence of a mirror performed worse (i.e., showed a reduced squeezing time) than participants in the control condition. When the mirror was present, however, squeezing times of participants with a primed quitting goal no longer deteriorated in comparison to participants in a control condition.

**Desirability.** High desirability of a task’s outcomes is described as a precondition of goal selection in many motivational theories (e.g., Heckhausen, 1977). For instance, MAP describes the deliberating individual in the predecisional action phase to consider feasibility as well as desirability of each option to reach a conclusion on which goal is worth striving for. Based on this, we hypothesized that increasing the desirability of good performance in a task should benefit the initiation of goal-directed action following the priming of an achievement goal in an effort-based task. We were furthermore interested in whether an increase in desirability caused by introducing monetary incentives for good performance has the same consequences as an increase in desirability caused by a more meaningful, subjective incentive: good performance is known to be indicative for future academic success.

To investigate the interplay between the effects of goal activation through achievement priming and any increases in the desirability associated with good performances in a task, we conducted Experiments 3 and 4. In both experiments, participants engaged in an effort-based word-search task and participants in the primed achievement goal conditions were primed using respective words in a scrambled sentence task (Srull & Wyer, 1979). We further manipulated monetary incentives (Experiment 3) and whether we described the task as indicative of future academic success (Experiment 4). In Experiment 3, we used three levels of monetary
incentives to test the hypothesis that goal strength will increase in line with increases in desirability. In Experiment 4, we contrasted the primed achievement goal with an explicit, consciously set achievement goal and tested the hypothesis that both profit from an increase in the desirability of good performance in a task.

Experiments 3 and 4 show that increased desirability of a task’s outcomes does not seem to be a precondition for the effects of primed achievement goals. In Experiment 3, only participants with no information about a potential monetary reward benefitted from the primed achievement goal when compared to the control condition. In the other two monetary reward conditions, no significant differences between the primed goal and the control conditions were found. Moreover, participants who had the chance to win 5€ performed as well as participants who had the chance to win 50€, and both outperformed participants who had no information about a potential reward in both primed achievement goal and no goal control conditions. In Experiment 4, announcing that the task is indicative of future academic success (vs. not) led to worse performances overall, but especially for participants with a consciously set achievement goal. Participants with a primed achievement goal reliably outperformed participants in the no goal control and consciously set achievement goal condition.

**Conclusion.** Across four experiments, Research Paper II highlights the importance of searching for moderators of primed goal pursuit. Thereby, it contributes to the recent debate on the replicability of priming effects outside of the activation of semantic concepts or visual fluency (e.g., Neely, 1977), the priming of behavior or so-called “social priming” (e.g., Cesario, 2014). Across all three experiments using an achievement goal prime (Experiments 1, 3, and 4; \( N = 444 \)), we find a meta-analytic \( d \) of 0.27 (95%-CI [0.08-0.45], \( z = 2.77, p = .006 \)) for the difference between primed achievement goal and the no goal control condition (ignoring other manipulations entirely). This is comparable to the \( d \) of 0.35 found in a recent meta-analysis on 133 experiments (Weingarten et al., 2016)\(^1\) investigating the effects of the incidental presentation of words on subsequent behavior.

Furthermore, the present research offers interesting insights regarding the (dis)similarities between primed and deliberate goal pursuit (Gollwitzer, Parks-

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\(^1\)Note that the results of Experiments 1 and 2 of Research Paper II were part of the meta-analysis reported by Weingarten et al. (2016).
Stamm, & Oettingen, 2009). Our observations that the effect of OSA induction on primed goal strength depended on the goal’s desirability (i.e., whether it is in line with self-standards), whereas primed goals did not seem to benefit from increases in the desirability of a task’s outcome point to differences between primed and deliberate goal pursuit. The differences in behavioral outcomes between primed and deliberate goal conditions in our research (see Experiments 1 and 4) further corroborate this line of thought. Regarding OSA, our research suggests that primed goals are subject to the comparison processes induced by the induction of OSA. The fact that the quitting goal used in Experiment 2 was applied only in the absence of OSA implies that OSA does not constitute a necessary (but sometimes beneficial) factor for primed goal pursuit. Regarding the latter two experiments and their implication for MAP and other models of goal pursuit, our findings suggest that feasibility and desirability seem to be crucial factors when it comes to setting goals (cf. Gollwitzer, 1990). However, once a goal has been set, either by explicit instructions (i.e., our consciously set achievement goal conditions) or by priming (see also Latham, Brcic, & Steinhauer, 2017), desirability concerns are no longer the key determinant for goal strength. However, one must note that the results of our third experiment indicate that monetary incentives might render an additional primed achievement goal dispensable.

Research Paper III: Learning Goal Orientation and Feedback

In the third research paper, we investigated how two conflicting naïve theories about the malleability of one’s abilities shape the incorporation of negative feedback on one’s performance in the postactional phase. A self-regulatory strategy (implementation intentions; Gollwitzer, 1999, 2014) derived from MAP, as well as the priming of one set of beliefs was furthermore used to improve participants’ reactions to the negative feedback.

Dweck (1996, 1999) classified two naïve theories about one’s own abilities, attitudes, or traits. For instance, some people think of their physical abilities as a fixed entity which can barely be improved by exercise and training. They exhibit a performance goal orientation, meaning that they focus on tasks and challenges where they can show their skills and talents to others. Other people, in contrast, may think of their physical abilities as fluid and incrementally changeable through challenges and training. They exhibit a learning goal orientation, meaning that they focus on opportunities to grow and are more likely to choose challenging but diagnostic tasks.
These beliefs about the malleability of one’s abilities affect performance in school contexts (e.g., Ahmavaara & Houston, 2007; Ames & Archer, 1988), which feedback people prefer (e.g., Butler, 1993), as well as moderate how individuals interpret positive feedback (e.g., Butler, 1987; Mueller & Dweck, 1998) as well as negative feedback (e.g., Hong, Chiu, Dweck, Lin, & Wan, 1999).

To investigate the moderating influence of naïve theories on the processing and incorporation of feedback from an action phase perspective, we directly manipulated the naïve beliefs by priming either a learning goal orientation or a performance goal orientation. After priming and then performing an intelligence test, participants received bogus negative feedback about their performance in the intelligence test. The feedback furthermore made suggestions which traits (e.g., concentration, endurance, to learn from failure) they could improve. They then moved on to a task measuring concentration, attention, and processing speed. Afterward, participants were asked to recall the information presented in the negative feedback. The results of Experiment 1 show that compared to participants with a primed performance goal orientation, participants with a primed learning goal orientation were more careful and accurate in the concentration-task. They were also more likely to recall the presented feedback score correctly as well as remembered on average 3.2 traits described as improvable compared to the average of 2.4 traits of participants with a primed performance goal orientation.

In a second experiment, we proposed that in the absence of a goal orientation manipulation, some forms of negative feedback threaten one’s self-image and lead to self-defensive choices of task-difficulty. Participants had to solve math problems and received evaluative negative feedback (i.e., negative feedback that puts one’s performance in relation to the performances of others) or non-evaluative negative feedback, which lacked information about the performance of others. Critically, all participants received bogus feedback, which indicated they had solved the exact same amount of math problems throughout both feedback conditions. Afterward, they were asked to solve a second set of math problems but were free to choose the difficulty of the math problems themselves. Because of the negative feedback, participants with a learning goal orientation should prefer to choose diagnostic math problems to improve their skills. Participants with a performance goal orientation, however, should be more likely to choose easy math problems, as those do not pose the threat of having to experience negative feedback again. The evaluative negative feedback
should exacerbate these differences. The results of Experiment 2 show that participants who receive evaluative feedback were subsequently more likely to choose easy problems. Participants who receive non-evaluative feedback were almost three times more likely to choose diagnostic problems of medium-to-hard difficulty. Surprisingly, the preexisting goal orientations of the participants (i.e., their chronic learning vs. performance orientation) did not influence these findings.

In Experiment 3, we used the same experimental setup except for giving all participants evaluative negative feedback as well as giving participants instructions to set themselves learning goals. In addition, half of the participants were asked to utilize the self-regulatory strategy of implementation intentions. We hypothesized that participants with a learning goal should be eager to choose challenging, diagnostic task difficulties but due to the threatening impact of the evaluative negative feedback should still be inclined to self-defensively choose easy task difficulties. Because implementation intentions have been shown to be able to counter both self-defensive tendencies (e.g., Thürmer, McCrea, & Gollwitzer, 2013) as well as protect goal pursuits from unwanted but tempting, antagonistic influences (e.g., Gollwitzer, Sheeran, Trötschel, & Webb, 2011; Wieber, Gollwitzer, & Sheeran, 2014), we hypothesized that furnishing the learning goal with implementation intentions to learn from negative feedback should lead to a more productive reaction to receiving evaluative negative feedback (i.e., a very high proportion of participants choosing challenging, diagnostic task difficulties). The results of Experiment 3 confirm this hypothesis. Whereas approximately 40% of participants with only a learning goal chose math problems of easy difficulty, 75% of participants who furnished their learning goal with implementation intentions chose math problems of medium or hard difficulty.

Descriptively comparing the results of the three experiments it appeared that participants of Experiment 3 who received evaluative feedback but furnished their learning goal with an implementation intention were most likely to choose medium-to-hard task difficulties. Participants of Experiment 3 who formed a learning goal did not choose medium-to-hard task difficulties as often as participants of Experiment 1 who received non-evaluative feedback. Being the least likely to choose medium-to-hard task difficulties were participants of Experiment 2 who received evaluative feedback but were not asked explicitly to set themselves a learning goal.
Conclusion. Taken together, the three experiments of the third research paper address how inter-individual differences (i.e., the predominant goal orientation; Experiment 1) as well as external influences (i.e., the form of the feedback, evaluative vs. non-evaluative; Experiment 2) moderate the incorporation of feedback on one’s performance in the postactional phase of MAP. Participants who received evaluative feedback were more likely to react self-defensively to the feedback. Likewise, participants with a primed performance goal orientation were less likely to recall the feedback information correctly. However, not all is lost, as Experiment 3 shows that utilizing the self-regulatory strategy of implementation intentions can improve the way in which individuals react to negative feedback. Of all participants of Experiments 2 and 3, participants of Experiment 3 who furnished their learning goal with respective implementation intentions to incorporate negative feedback were the most likely to choose tasks of medium-to-hard difficulty though having received threatening, evaluative negative feedback.

The experiments of this third research paper highlight the sensitivity of individuals to their learning environments. Giving participants more detailed feedback by adding the information of where one’s performance stands in relation to the performance of others subsequently led to drastically altered choices regarding task difficulty. Similarly, by priming a learning goal orientation, participants were more likely to retain feedback information as well as, critically, show better performances in a task related to the feedback information. This is in line with both the suggestion that feedback should be emphasizing the malleability of abilities as well as the hypothesis that performance goal oriented individuals exhibit worse performance after facing failure (Dweck, 1999).

Regarding MAP, the present experiments suggest that the postactional phase is shaped by the predominant goal orientations of participants. This means that although considered a motivational phase of open-mindedness and impartiality after two volitional closed-minded and partial phases (i.e., the preactional and actional phases), this research paper suggests that self-defensive tendencies can very well evince in face of negative feedback that is potentially threatening to the self-image. Additionally, the third research paper provides evidence for implementation intentions being able to overcome these self-defensive tendencies.
General Discussion

The three research papers reported in the present thesis demonstrate that the subtle, unobtrusive activation of motivational and volitional constructs has downstream consequences on judgments, behavior, and decision-making. In the following, I will discuss implications for MAP and its interplay with risk perception and risk-taking behavior, goal priming effects, and the incorporation of negative feedback. I will close by outlining future directions for this research.

Implications

Many of the implications of the presented research are already outlined in the research papers. In this section, I will thus concentrate on implications for the theoretical advancement of MAP.

Starting with Research Paper 1, the investigation of mindset effects on risk perception and risk-taking behavior adds to the further understanding of the characteristics of the predecisional and preactional action phases. In line with the increased confidence in having control over external outcomes (Gollwitzer & Kinney, 1989), we observed increased optimism in the preactional action phase, and this pattern of results also pertained to risk-taking behavior. As outlined above, this increased risk taking can be beneficial for overcoming obstacles of goal pursuit and thus be beneficial, as long as the goal-striving individual is not wasting effort on futile goal pursuits. Indeed, in the task paradigm used in Experiment 2 of Research Paper I participants in an implemental mindset (i.e., the mindset predominant in the preactional action phase) pocketed higher payoffs than did participants in a deliberative mindset (i.e., the mindset predominant in the predecisional action phase). The increase in risk taking in the implemental mindset produced on average higher payoffs, given the incentive structure of the task at hand. Obviously, an implemental mindset promoted smart risk taking in our experiment.

It remains open whether the choice of another task paradigm would have allowed excessive risk taking for participants in an implemental mindset, and whether participants would have chosen to do so. In related research investigating the effects of deliberative versus implemental mindset on a ring-toss game (Rahn, Jaudas, & Achtziger, in press), however, participants in an implemental mindset were also taking risks in consideration. They increased the distance to the target, which increased the monetary reward for hitting it but maintained their hit rate throughout
the experiment, which again allowed them to pocket higher payoffs. The authors interpret their findings as another example of smart risk-taking behavior in the implemental mindset.

Research Paper II on the one hand investigated whether goal-directed action is initiated in the actional phase when the goal has been activated outside of conscious awareness (i.e., primed). This was done by considering the role of two moderators, OSA and desirability. On the other hand, Research Paper II addressed the question of whether high desirability of an outcome constitutes a necessary factor of primed goal pursuit. Per MAP, wishes are chosen to be turned into binding, consciously set goals in accordance to their feasibility and desirability in the predecisional action phase. This means that increasing the desirability of an outcome of a goal should lead to higher willingness for individuals to set themselves this goal and in turn to an increased goal strength (compared to when the desirability is low). However, in our experiments, the increase in desirability did not affect primed goal strength in the hypothesized way. This could be because the priming of goals skips the predecisional action phase and thereby the process of goal setting. The strength of primed goals would then be determined by other factors which are not currently formulated in MAP. As MAP constitutes a model for deliberate goal pursuit, this further speaks for the importance of research on the differences between primed and deliberate goal pursuit (Gollwitzer et al., 2009).

Research Paper III addressed how goal orientations moderate the incorporation of negative feedback in the postactional phase. Thereby, it renders empirical support to the assertion that predominant goal orientations (i.e., learning vs. performance goal orientations; Dweck, 1996, 1999) moderate the effectiveness of goal pursuits modeled by MAP. A learning goal orientation, achieved by either the subtle priming thereof or the assignment of a learning goal, led to a better processing of feedback information and overcoming of self-defensive tendencies. Furthermore, implementation intentions turned out to be capable of supporting learning goals by easing the incorporation of negative feedback even further. The results of the last experiment of Research Paper III and the respective effect size of implementation intentions (comparable in size to the effect of a learning goal orientation) further corroborate the effectiveness of implementation intentions as a strategy to overcome various obstacles in goal pursuit such as self-defensive or impulsive tendencies.
Future Directions

The present research papers span a wide range of goal-pursuit-related phenomena while relying on MAP as a common framework to understand human goal pursuits. Consequently, the variety of future directions is abundant. I will therefore focus on three avenues for future directions, which I find the most exciting and fruitful. The first one is about the effects of deliberation on decisions to adopt a protective behavior or to continue taking risks especially if the decision has already been made. The second one is about utilizing implementation intentions to shape naïve theories on the malleability of abilities. The third one is the identification of a shortcoming in research on MAP.

First, the findings of Research Paper I suggest that the induction of an implemental mindset through planning the implementation of an unrelated goal may promote risk taking in some cases, whereas the induction of a deliberative mindset by pondering over the pros and cons of making a change may lead to more realistic judgments. A question that remains open is how deliberating a risk-related decision, for instance, the adoption of a protective behavior such as wearing a bike helmet affects the risk perception for related negative life events such as traffic accidents. In research on risk perceptions, adopting a protective behavior led to reduced risk perceptions after some time has passed (e.g., Brewer, Weinstein, Cuite, & Herrington, 2004). At the time of adoption, individuals were pessimistic concerning their risk which led them to adopt a protective behavior but this pessimism decreased over time. Having to redeliberate the decision to adopt the protective behavior, however, could also induce defensiveness and bring back the reasons for the original adoption and thereby increase pessimism again. Conversely, imagine the adolescent who is asked by a guardian whether it is really worthwhile to smoke or drink. Having already decided in favor of doing so, the repeated prompt to ponder over it may only lead to an increased commitment to continue risk taking (see also Gagné & Lydon, 2001; Nenkov & Gollwitzer, 2012).

Second, our finding that implementation intentions worked in stimulating the incorporation of feedback (see above) combined with the finding that implementation intentions help people to reduce introversion (one of the Big Five personality traits; Hudson & Fraley, 2015), allow for the idea that the formulation of implementation intentions regarding how to think about failures and setbacks may help people to alter predominant goal orientations over time. For example, a plan like “and if I receive
negative feedback on my performance, then I will see this as an opportunity to grow” and its successful application over time may establish a learning goal orientation that is stable over time and situational contexts.

Third and finally, the present research spared the actional and evaluative mindsets predominant in the actional and postactional action phases, respectively (see Figure 2). These two mindsets are generally understudied compared to the deliberative and implemental mindsets. Future research could therefore focus on the effects of these two mindsets, as interesting applications are widespread. For example, participants in an evaluative mindset should consider more desirability-related compared to feasibility-related information when evaluating their goal striving. Applying this to attitudes, individuals in a postactional phase may be more extreme in their ratings of valence as this is their primary focus.

**Summary and Conclusion**

The present research investigated a set of predictions derived from the model of action phases in goal pursuit. In Research Paper I, we observed an implemental mindset to promote optimistic risk perceptions as well as risk taking in an incentivized behavioral risk-taking measure. In Research Paper II, we saw that while OSA can moderate primed goal pursuit, increasing the desirability of the outcomes of a set goal does not increase primed goal strength in the actional phase. In Research Paper III, we found that using the self-regulatory strategy of implementation intentions, which is derived from MAP, helped individuals to overcome self-defensive tendencies and helped them to incorporate negative feedback in the postactional phase. Taken together, these results suggest that the predominant action phase, the consciously set or primed goal, and the person’s goal orientation have important downstream consequences on behavior and learning. Furthermore, the presented research generated novel ideas for future research on MAP.
Research Paper I
Mindsets Affect Risk Perception and Risk-Taking Behavior – Illusionary Optimism and the BART

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Abstract
In two experiments, we investigated the downstream consequences of activating deliberative versus implemental mindsets on risk perception (Experiment 1) and risk-taking behavior (Experiment 2). We hypothesized that participants in an implemental versus deliberative mindset arrive at more optimistic judgments about their own risks of experiencing negative life events, compared to other peoples’ risks. The results of Experiment 1 confirm this hypothesis and reveal perceived controllability as an important moderator. Experiment 2 further augments these findings by demonstrating that participants in a deliberative mindset show less risk-taking behavior than participants in an implemental mindset using a behavioral risk task (BART; Lejuez et al., 2002). Implications for research on mindset theory and mindset-dependent effects on risk perception and risk-taking behavior are discussed.
**Introduction**

Mindsets Affect Risk Perception and Risk-Taking Behavior – Illusionary Optimism and the BART

People tend to be unrealistically optimistic about their own future as compared to the future of others. When Weinstein (1980) asked college students about their likelihood as well as the likelihood of an average peer to encounter various events, students saw their chances to encounter positive events as above average but their risk to encounter negative events as below average. This illusory optimism has been shown to be affected by the current phase of unrelated goal pursuit (Taylor & Gollwitzer, 1995). When deliberating between potential options, participants are more realistic and rate themselves to be more at risk compared to when planning the implementation of a chosen goal. However, changes in risk perception do not always translate into changes in risk taking (Sheeran, Harris, & Epton, 2014). In the present research, we test whether the current action phase of an individual evoked by an unrelated goal pursuit has similar downstream consequences on both risk perception and risk-taking behavior. Therefore, we will first introduce mindset theory of action phases (Gollwitzer, 1990; 2012), followed by research on its interplay with risk perceptions, and, thereafter, research on its interplay with risk-taking behavior building up to the present research.

**Mindsets: Deliberative versus Implemental**

The psychological states targeted in the present research are deliberative and implemental mindsets. These mindsets are associated with deliberating a decision to be made and planning out the implementation of a chosen project, respectively. Gollwitzer and Kinney (1989) found that asking participants to deliberate on the pros and cons of moving forward with an unresolved personal problem versus asking people to plan the implementation of a chosen project lead to reduced feelings of control over an, in fact, random and thus uncontrollable outcome in a subsequent unrelated contingency learning task. In this task, participants were asked to produce the onset of a target light by either pressing a button or abstaining from pressing it. Unbeknownst to the participants, target light onset was independent of their button pressing action (i.e., whether or not they pressed the button), as the target light’s onset was linked with the same likelihood to pressing and not pressing the button. However, in one condition target light onset was frequent (i.e., 75% after pressing as well as non-pressing responses) and infrequent in the other condition (25% after pressing as
well as non-pressing responses). The authors observed that participants who had deliberated the pros and cons of an unresolved personal problem (e.g., shall I move to a different city) were more realistic as compared to participants who had planned out the implementation of a chosen project (e.g., moving to a different city); In the frequent target light onset condition, implemental mindset participants showed a stronger illusionary control as compared to the infrequent target light onset condition. Deliberative mindset participants, in contrast, generally showed low confidence of having produced the target light onset by their way of pressing or not-pressing the critical button; in other words, frequent target light onset did not produce an illusion of control.

Why does deliberating versus planning out one’s decisions have these consequences on the perceived degree of control? Mindset theory of action phases (i.e., MAP; Gollwitzer, 1990; 2012) suggests that in the course of goal pursuit, individuals traverse through several successive but distinct action phases, each posing unique challenges or task demands, which are best met by matching mindsets (i.e., the activation of the needed cognitive procedures). Given that individuals commonly entertain many wishes but possess only limited resources like time or applicable effort, they are forced to decide which wishes are actually worth pursuing. Thus, before making a decision to turn a given wish into a goal to be pursued, people commonly deliberate the pros and cons of moving forward with one of their many wishes. This evokes a mindset (i.e., the deliberative mindset) which is characterized by features of open-mindedness (e.g., even peripheral, incidental information is processed; Büttner et al., 2014; Fujita, Gollwitzer, & Oettingen, 2007), impartial processing of desirability-related information (e.g., pros and cons are given equal weight; Bayer & Gollwitzer, 2005; Taylor & Gollwitzer, 1995), and realistic judgments of feasibility (e.g., more cautious estimates of probabilities of success; Puca, 2001).

Once the decision to pursue a certain wish has been made (i.e., one has set a goal), however, the next step toward goal attainment is planning out when, where, and how to implement the chosen goal, which leads to the activation of the implemental mindset. This mindset is characterized by just the opposite features of the deliberative mindset (e.g., Armor & Taylor, 2003; Brandstätter & Frank, 2002). Participants in an implemental mindset evince closed-mindedness (e.g., peripheral information is ignored; Bayer & Gollwitzer, 2005; Büttner et al., 2014; Fujita et al., 2007), partial
processing of desirability-related information (e.g., pros receive more weight than cons; Taylor & Gollwitzer, 1995, Study 3), and optimistic judgments of feasibility (e.g., illusions of control; Gollwitzer & Kinney, 1989; shorter time estimates with respect to attaining the goal; Brandstätter, Giesinger, Job, & Frank, 2015).

Crucially, both deliberative and implemental mindsets carry over to various subsequent tasks independent of the original task, which evoked them, what makes them different from mere task sets. In research on MAP (summaries by Gollwitzer, 2012; Gollwitzer & Keller, 2016), a deliberative mindset is activated by having people list short-term and long-term positive and negative consequences of acting or not acting on an unresolved personal problem, trying to answer the question of whether to make a change decision or stay with the status quo. An implemental mindset, in contrast, is activated by asking people to list the steps required for successful attainment of a chosen personal project and then explicate for each of these steps when, where, and how it is to be initiated. In the present research, we activate mindsets to investigate their effects on one facet of risk perception (i.e., illusionary optimism concerning negative life events) and risk-taking behavior.

**Risk perception.** Illusionary optimism (i.e., people are optimistic concerning their own chances/risks in relation to the chances/risks of their respective peer group; recent reviews by Shepperd, Klein, Waters, & Weinstein, 2013; Shepperd, Waters, Weinstein, & Klein, 2015) is widespread. For instance, it affects car drivers and their perceived risk of a traffic accident, smokers and their perceived risk of contracting smoking-related illnesses, and newly-weds and their perceived risk of divorce (Arnett, 2000; Baker & Emery, 1993; DeJoy, 1989). Research has attempted to identify moderators of the extent to which individuals show such illusionary optimism (summaries by Klein & Helweg-Larsen, 2002; Sharot, 2011). For example, Kos and Clarke (2001) observed significantly more illusionary optimism for events an individual has some control over compared to events an individual cannot control. Therefore, the authors concluded that perceived control over experiencing a negative life event is an important moderator of the degree of illusionary optimism.

Knowing that deliberative versus implemental mindsets decrease versus enhance feelings of control (Gollwitzer & Kinney, 1989), Taylor and Gollwitzer (1995) wondered whether being in a deliberative (implemental) mindset would also reduce (enhance) illusionary optimism. Therefore, they assessed illusionary optimism with respect to negative life events, using four negative life events which were rated
to be relatively controllable in a pretest (e.g., addiction to prescription drugs, divorce), as well as four separate negative life events which were assumed to be relatively uncontrollable (e.g., losing a partner to an early death, developing diabetes). They found that the activation of an implemental mindset enhanced illusionary optimism, whereas the activation of a deliberative mindset reduced illusionary optimism, both being especially true for negative life events perceived as controllable.

**Risk taking.** Many health behavior theories (for a critical review, see Noar & Zimmerman, 2005) suggest risk perceptions to be a central antecedent of risk-taking behavior. However, similar to research marking a gap between behavioral intentions and actual behavior (Sheeran, 2002), Sheeran, Harris, and Epton (2014) report a meta-analysis suggesting that interventions which were successful in altering (i.e., heightening) risk perceptions to a medium-to-large degree ($d_c = 0.75$) only lead to a small-to-medium change in risk-related intentions ($d_+ = 0.36$) and to an even smaller reduction ($d_- = 0.25$) in actual risk-related behavior. Accordingly, we wondered whether mindset effects on risk perception also translate into respective effects on risk taking.

Further corroborating this line of thought, research on the effects of mindsets on decision-making under risk has painted a rather complex picture. Hügelschäfer and Achtziger (2014) have investigated mindset effects on behavioral decisions in hypothetical financial gambles. In line with the effects on risk perception (Taylor & Gollwitzer, 1995), female participants in an implemental mindset more readily took risks when compared to female participants in a deliberative mindset. However, male participants evinced the reverse pattern so that the widespread finding that women are more risk averse than men (Eckel & Grossman, 2008) was replicated only for participants in a deliberative mindset. Conversely, Rahn, Jaudas, and Achtziger (2016) found no differences in risk-taking behavior between mindset conditions using an eye-tracking paradigm. With increasing difficulty, however, participants in a deliberative mindset were more efficient (i.e., faster) in making decisions compared to participants in an implemental mindset; however, decision quality was not affected. To summarize, it remains unclear whether alterations in risk perceptions caused by the activation of different mindsets carry over to alterations in risk-taking behavior. Considering prior findings, it seems reasonable to assume that participants in an implemental mindset are more optimistic and therefore more prone to take risks but because it has not been tested yet, we test this novel hypothesis in Experiment 2. For
this purpose, we utilize the Balloon Analogue Risk Task (BART; Lejuez et al., 2002). This task has been used to assess risk taking in a more naturalistic setting than the usual assessment through monetary gambles (summary by Charness, Gneezy, & Imas, 2013). In the BART, participants decide repeatedly whether to keep pumping up a balloon, which increases its monetary value but also its probability to burst and losing all of the money collected so far, or to save its current monetary value by refraining from further pumping. In general, the BART can be conceived of as drawing from an urn of balls with one bad ball, without replacing the balls, which have been drawn. It is therefore quite naturalistic as everyday life risks are often cumulative and can be understood in terms of diminishing returns. For example, smoking the first cigarette after abstinence might be more pleasurable than smoking the twentieth, but because smoking constitutes an example for a cumulative health risk, the twentieth cigarette will increase the risk of experiencing undesirable effects on health more than the first. In parallel, the first pump in the BART increases the monetary value of the balloon from 0.00€ to 0.05€ while the risk of popping is still quite small. However, the twentieth pump increases the monetary value from 0.95€ to 1.00€ which is the same in absolute terms but much smaller in relative terms while the increase in the risk of popping has become immensely higher both in relative and absolute terms. Attesting to this conceptual similarity, smokers take more risks in the BART than non-smokers (Lejuez et al., 2003).

The Present Research

We argue that individuals differ in their risk perception and risk-taking behavior depending on their currently activated, action-phase-related mindsets. Experiment 1 focuses on the effects of mindset induction on risk perception, more specifically the illusionary optimism regarding negative life events in a rather close replication of Taylor and Gollwitzer’s Study 2 (1995). In Experiment 1, we expect that activating an implemental mindset should increase illusionary optimism while activating a deliberative mindset should result in decreased illusionary optimism – especially when the critical negative life event is perceived as controllable. We expect the control group to lie in between both mindset conditions (i.e., less optimistic than participants in the implemental mindset condition but more optimistic than participants in the deliberative mindset condition).
In Experiment 2, we move on to the investigation of risk-taking behavior. In line with Experiment 1, we expect participants in an implemental mindset, compared to participants in a deliberative mindset, to exert more risk-taking behavior as measured via an established risk-taking assessment tool, the BART. Once again, we expect the control group to be in between both mindset conditions.

We report how we determined our sample sizes, all data exclusions (if any), all manipulations, and all measures in the study.

**Experiment 1: Mindsets and Risk Perception**

Before expanding upon research studying mindset effects on risk perception to mindset effects on risk-related behavior, we aimed to replicate and advance the Taylor and Gollwitzer (1995) studies on illusionary optimism regarding negative life events. This was mainly done because of two reasons. First, in all the studies of Taylor and Gollwitzer (1995), data of the control condition were collected using a different setting and procedure than that applied in the implemental and deliberative mindset conditions; this impedes a reliable interpretation of the observed effects in terms of mindsets. To account for this shortcoming, we now made all experimental conditions more similar to each other by using the same setting and procedures. Second, when analyzing attitudes on radon testing, Weinstein and Lyon (1999) could not replicate the effects of mindsets on illusory optimism observed by Taylor and Gollwitzer (1995). Participants who were decided to take on radon testing saw themselves more at risk than participants who were undecided, even after watching a video with new information about the risks of radon. Note, however, that the authors equated being decided in favor of a protective behavior (i.e., to test their house for radon exposure) as equivalent to the induction of an implemental mindset which is commonly achieved by asking participants to plan the implementation of an unrelated decision. Therefore, before investigating mindset effects on risk taking, we must first accurately assess mindset effects on risk perception.

**Method**

**Participants, design, and sample size considerations.** One hundred and fourteen high school students volunteered for the experiment. We randomly assigned them to one of the three experimental conditions of our 3 between (mindsets: deliberative vs. implemental vs. control) x 2 within (negative life events: controllable
Experiment 1

27

vs. uncontrollable) mixed design. Participants (58% female) were on average 16.9 years old ($SD = 0.7; min = 16, max = 19$). The required sample size was calculated beforehand using G*Power3 (Faul, Erdfelder, Lang, & Buchner, 2007). Based on previous research (Taylor & Gollwitzer, 1995), we assumed a medium-to-large effect of $d = 0.69$ for the direct comparison between both mindset conditions. The required sample size of 34 participants per cell to detect an effect of this size at 80% power was reached in all conditions.

**Pilot study.** To identify negative life events, which vary in terms of perceived controllability, we conducted a pilot study (see Electronic Supplementary Material 1). Twenty-three freshmen psychology students filled out a questionnaire in a classroom setting, rating the degree of controllability of 39 negative life events on a scale ranging from 1 – *very uncontrollable* to 6 – *very controllable*. Using events with low and high means, respectively, as well as preferably small ranges, we identified four controllable and four uncontrollable negative events to be used in Experiment 1. The four negative events consistently perceived as controllable were: contracting the human immunodeficiency virus (HIV), developing a drinking problem, becoming obese, and committing a felony. The four negative events consistently perceived as uncontrollable were: becoming a victim or eyewitness of a terrorist attack, losing one’s partner to an early death, becoming a victim of a violent crime, and contracting the flu. The respective means and standard deviations are given in Table 1.

**Table 1.** Perceived Controllability of the Eight Risks Used in Experiment 1

<table>
<thead>
<tr>
<th>Controllable risks</th>
<th>$M (SD)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Committing a felony</td>
<td>5.22 (0.52)</td>
</tr>
<tr>
<td>Contracting HIV</td>
<td>4.91 (0.67)</td>
</tr>
<tr>
<td>Developing a drinking problem</td>
<td>4.86 (0.83)</td>
</tr>
<tr>
<td>Becoming obese</td>
<td>4.70 (0.70)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Uncontrollable risks</th>
<th>$M (SD)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being a victim or eyewitness to a terrorist attack</td>
<td>1.22 (0.42)</td>
</tr>
<tr>
<td>Losing a partner to an early death</td>
<td>1.39 (0.58)</td>
</tr>
<tr>
<td>Being a victim of violent crime</td>
<td>1.61 (0.58)</td>
</tr>
<tr>
<td>Contracting the flu</td>
<td>2.87 (1.06)</td>
</tr>
</tbody>
</table>

*Note.* Answers were recorded on a scale reaching from 1 – *very uncontrollable* to 6 – *very controllable.*
**Procedure.** Participants in the main experiment received two questionnaires. The first questionnaire pertained to the mindset manipulation. The second, ostensibly unrelated questionnaire assessed the perceived probability of encountering several negative life events (i.e., our dependent variable), mood, and demographics, in this order. Thereafter, we thanked participants for their participation and thoroughly debriefed them.

**Mindset manipulation.** Participants in the deliberative mindset condition read instructions, which asked them to name an unresolved, personal problem, which currently occupied their mind; they should not have made any decision yet whether to take action or stick to the status quo. We explicitly asked them not to name a mundane, easily solvable problem and gave examples for an appropriate problem (e.g., whether to befriend a certain person). Hence, an appropriate problem had the form of “Should I… or not?” After naming their individual problem, participants had to think about immediate and long-term, positive and negative consequences of both making a change and not making a change decision.

Participants in the implemental mindset condition read instructions, which asked them to name a project, currently occupying their mind, for which they had made a decision to take action but did not initiate any further steps yet. Parallel to the deliberative mindset manipulation, participants were asked not to name a mundane project and were given examples (e.g., to get to know a certain person). Hence, an appropriate project had the form of “I intend to…!” After naming their personal project, participants listed up to five necessary steps needed to achieve their goal, and then planned out when, where, and how to act to implement each of the named steps.

Participants in the control condition read instructions, which asked them to search for the letter “m” in a 698-words, 6-paragraph long excerpt from a book in Czech. This task was modelled after previous control conditions in psychological research (e.g., Baumeister, Bratslavsky, Muraven, & Tice, 1998). We used the Czech language because very few German high school students can speak it, it is written in the Latin alphabet, and it possesses a word and sentence length similar to German.

**Dependent and control variables.** To create the impression of participating in two independent surveys, we printed the second questionnaire using a different font, font size, layout, thicker paper, and a new cover page. In the second questionnaire, participants first rated how likely it is for an average student of their age and gender, and then how likely it is for themselves to encounter the pretested
eight negative life events (i.e., four controllable and four uncontrollable ones) on a scale from 1 – not at all likely over 4 – fairly likely to 7 – very likely. The exact wording was “Please indicate how likely you think it is that an average student of your age and gender encounters the following events” and “Now we would like you to indicate how likely you think it is that you yourself encounter the following events.” Following this, participants filled out the German version of the Positive and Negative Affect Schedule (PANAS; Krohne, Egloff, Kohlmann, & Tausch, 1996). Participants rated their current experience of ten positive (Cronbach’s α = .80) and ten negative (Cronbach’s α = .85) feelings and emotions. Then, participants reported on their age, gender, height, and their parents’ educational background; all of these variables have been found to be associated with risk taking in general (Dohmen et al., 2011).

To assess our dependent variable of illusionary optimism, we first replaced missing values (3 out of 1824) by the respective sample means. Then, ratings for the self were summed up and subtracted from the sum of the ratings for the average other. We did this for all eight risks combined, as well as separately for controllable and uncontrollable risks, resulting in three indices of illusionary optimism. Scores below zero indicate that participants think of themselves as more risk-prone than the average other, whereas positive scores indicate that participants feel less risk-prone than the average other (i.e., illusory optimism). The scores for controllable and uncontrollable risks sum up to the score of all risks combined.

Results

Preliminary analyses. First, we tested whether all three experimental conditions exhibited illusionary optimism (i.e., scores being significantly larger than zero), which turned out to be the case ($t_s \geq 2.49$, $p_s \leq .017$, two-sided). Moreover, we compared positive and negative affect as assessed by the PANAS and found no significant differences between conditions, $F_s \leq 1.62$, $p_s \geq .202$. However, negative affect correlated with two of the illusionary optimism scores (with all eight negative life events, $r(114) = -.23$, $p = .014$, and the four controllable negative life events, $r(114) = -.24$, $p = .011$). Including negative affect as a covariate did change the pattern of significance slightly which is why we report the main analyses without (i.e., ANOVA) and with negative affect as a covariate (i.e., ANCOVA); however, the mindset effects on illusionary optimism concerning controllable negative life events stayed unaffected (see below). No other variables (i.e., age, height, sex, parental
education, positive affect) correlated with any of the illusionary optimism scores, \(|r|s \leq .11, ps \geq .230.

**Main analyses.** To test our hypothesis that participants differ in their illusionary optimism with respect to encountering controllable versus uncontrollable negative life events, we first subjected illusory optimism scores to a 3 between (mindset: implemental vs. deliberative vs. control) x 2 within (negative life events: controllable vs. uncontrollable) mixed design ANOVA. The ANOVA rendered a significant main effect of controllability, \(F(1, 111) = 188.88, p < .001, \eta^2_p = .630, 90\%-CI [.539-.693].\) The interaction between mindset condition and controllability did not reach conventional levels of significance, \(F(2, 111) = 2.04, p = .135, \eta^2_p = .035, 90\%-CI [.000-.096].\) Controlling for negative affect in an ANCOVA rendered a significant but weakened main effect of controllability, \(F(1, 110) = 41.89, p < .001, \eta^2_p = .276, 90\%-CI [.163-.378],\) whereas the interaction between experimental condition and controllability reached marginal significance, \(F(2, 110) = 2.67, p = .073, \eta^2_p = .046, 90\%-CI [.000-.113].\) More importantly, dropping the control condition to further explore the difference between implemental and deliberative mindset conditions, rendered a marginally significant interaction between mindset conditions and controllability in a mixed-design ANOVA with only the two mindset conditions (between: deliberative vs. implemental) and negative life events (within: controllable vs. uncontrollable), \(F(1, 69) = 3.75, p = .057, \eta^2_p = .052, 90\%-CI [.000-.154].\) Controlling for negative affect rendered this interaction statistically significant in the respective ANCOVA, \(F(1, 68) = 4.88, p = .031, \eta^2_p = .067, 90\%-CI [.003-.177].\)

When comparing the three experimental conditions with respect to the illusionary optimism scores of all eight negative life events combined, an ANOVA showed no statistically significant difference between experimental conditions, \(F(2, 111) = 2.05, p = .134, \eta^2_p = .036, 90\%-CI [.000-.097].\) However, adding negative affect as a covariate rendered a significant main effect of experimental condition in the ANCOVA, \(F(2, 110) = 3.25, p = .042, \eta^2_p = .056, 90\%-CI [.001-.127].\)

Finally, planned contrasts comparing deliberative and implemental mindset conditions were marginally significant in the ANOVA, \(F(1, 111) = 3.42, p = .067, \eta^2_p = .030, 90\%-CI [.000-.098],\) and statistically significant in the ANCOVA, \(F(1, 110) = 5.26, p = .024, \eta^2_p = .046, 90\%-CI [.003-.122].\) Participants in the implemental mindset condition evinced increased illusionary optimism \((M = 9.13,\)
Experiment 1

SD = 5.97) compared to participants in the deliberative mindset condition (M = 6.89, SD = 4.92); control participants were in between (M = 7.21, SD = 4.43). In Table 2, we provide a breakdown of the illusionary optimism scores for each of the negative events as a function of experimental condition.

Most importantly, we then compared illusionary optimism for controllable and uncontrollable risks across experimental conditions. We observed considerable variation for controllable events, M_{implemental} = 7.69 (SD = 4.09) versus M_{control} = 6.21 (SD = 3.17) versus M_{deliberative} = 5.60 (SD = 4.05); marginally significant in the ANOVA, $F(2, 111) = 2.96, p = .056, \eta^2_p = .051, 90\%-CI [.000-.119]$, and significant in the ANCOVA, $F(2, 110) = 4.47, p = .014, \eta^2_p = .075, 90\%-CI [.009-.153]$; see Figure 3 and Table 2. Planned contrasts comparing the mindset conditions were statistically significant in both the ANOVA, $F(1, 111) = 5.53, p = .020, \eta^2_p = .047, 90\%-CI [.004-.125]$, and ANCOVA, $F(1, 110) = 8.09, p = .005, \eta^2_p = .068, 90\%-CI [.012-.154]$. Additional contrasts revealed that the implemental and control condition differed from each other according to both ANOVA, $F(1, 111) = 3.07, p = .083, \eta^2_p = .027, 90\%-CI [.000-.093]$, and ANCOVA analyses, $F(1, 110) = 5.22, p = .024, \eta^2_p = .045, 90\%-CI [.003-.122]$, whereas the deliberative and control condition did not, $F(1, 111) = 0.51, p = .477$, and $F(1, 110) = 0.49, p = .487$, respectively. We conducted the same set of analyses for the uncontrollable events; however, we did not observe any significant differences, $Fs \leq 0.41, ps \geq .668$.

![Figure 3](image_url). Experiment 1: Difference between self and average other ratings (illusory optimism) as a function of mindset condition and perceived controllability of negative life events (error bars represent 95\%-CIs).
Table 2. Individual Difference Scores (Illusionary Optimism) for Each Negative Life Event as a Function of Experimental Condition

<table>
<thead>
<tr>
<th>Mindset Condition</th>
<th>Implemental ($n$)</th>
<th>Deliberative ($n$)</th>
<th>Control ($n$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M (SD)$</td>
<td>$M (SD)$</td>
<td>$M (SD)$</td>
</tr>
<tr>
<td><strong>Controllable risks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Committing a felony</td>
<td>2.31 (1.56)</td>
<td>1.37 (1.72)</td>
<td>1.54 (1.30)</td>
</tr>
<tr>
<td>Contracting HIV</td>
<td>1.25 (1.32)</td>
<td>0.83 (0.99)</td>
<td>1.00 (1.16)</td>
</tr>
<tr>
<td>Developing a drinking problem</td>
<td>2.11 (1.88)</td>
<td>1.57 (1.40)</td>
<td>2.09 (1.46)</td>
</tr>
<tr>
<td>Becoming obese</td>
<td>2.03 (1.68)</td>
<td>1.83 (2.07)</td>
<td>1.58 (1.56)</td>
</tr>
<tr>
<td><strong>Uncontrollable risks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Losing a partner to an early death</td>
<td>0.18 (1.47)</td>
<td>-0.06 (0.84)</td>
<td>0.09 (1.11)</td>
</tr>
<tr>
<td>Being a victim of a violent crime</td>
<td>0.56 (1.08)</td>
<td>0.86 (1.26)</td>
<td>0.54 (1.39)</td>
</tr>
<tr>
<td>Contracting the flu</td>
<td>0.67 (1.43)</td>
<td>0.34 (1.26)</td>
<td>0.42 (1.35)</td>
</tr>
<tr>
<td>Being a victim or eyewitness of a terrorist attack</td>
<td>0.03 (1.00)</td>
<td>0.14 (0.77)</td>
<td>-0.05 (0.72)</td>
</tr>
</tbody>
</table>

Note. Answers for both the average other risk and the risk for oneself were recorded on a scale reaching from 1 – *not at all likely* to 7 – *very likely*. Thus, difference scores could range between -6 (lower perceived risk for average other) and 6 (higher perceived risk for average other).

Discussion

The results of Experiment 1 suggest that people’s risk appraisals vary depending on their mindset. Compared to participants who pondered over the question of whether to take action regarding an unresolved personal problem (i.e., deliberative mindset), participants who plan out the when, where, and how of steps to implement a chosen personal project (i.e., implemenetal mindset) later saw themselves as less likely to experience negative life events in comparison to the average other. Our results fit in with those obtained by Taylor and Gollwitzer (1995) who demonstrated considerably weaker mindset effects on uncontrollable as compared to controllable negative life events. While Taylor and Gollwitzer (1995) still observed reliable differences between mindsets on illusionary optimism concerning uncontrollable negative life events, however, we could not observe these differences in our experiment, probably because the participants of our pilot study chose rather extreme uncontrollable negative life events (e.g., a terrorist attack). Further studies on the relationship
between mindsets and illusionary optimism may control for perceived dread and frequency of the critical negative events as well. More importantly, the present replication helps to clarify the impact of mindsets on risk perception. Participants in an implemental mindset not only entertain more optimistic views about their personal control over outcomes (Gollwitzer & Kinney, 1989) but also about encountering various risks.

The illusory optimism exhibited by the participants of Experiment 1 was related to the degree of negative affect they evinced. In addition, controlling for negative affect consistently increased the effect sizes of the difference between mindset conditions. In Experiment 1, we measured negative affect after the administration of the negative life events because we knew from earlier work (Taylor & Gollwitzer, 1995), and thus anticipated, that having to think about such negative life events (e.g., losing a partner to an early death) may evoke negative emotions among participants. Thus, by controlling for the influence thereof, we are able to paint a clearer picture of the true effect of mindsets on illusory optimism.

The results of Experiment 1 suggest that the basic pattern of findings of earlier work (Taylor & Gollwitzer, 1995) is holding up and that the conflicting findings of Weinstein and Lyon (1999) have to be explained otherwise (see General Discussion). While participants in the implemental mindset condition expressed marked illusionary optimism, especially with respect to controllable negative life events, participants in the control condition lay in between both mindset conditions with participants in the deliberative mindset condition showing the least illusory optimism. However, this does not mean that participants in a deliberative mindset expressed “depressive realism” (Moore & Fresco, 2012). They still entertained optimistic beliefs about their personal future but were more realistic; this should be beneficial for the choice of adequate goals to be pursued.

To summarize, in Experiment 1 we observed more pronounced illusionary optimism for controllable negative life events for participants in the implemental mindset condition compared to participants in the deliberative mindset condition. Thus, our assumption that action-phase-related mindsets have an impact on risk perception was confirmed. The question that remains open, however, is whether deliberative and implemental mindsets also manage to alter risk-taking behavior. We addressed this question in Experiment 2.
**Experiment 2: Mindsets and Risk Taking**

As outlined above, the link between risk perception and risk-taking behavior is not as clear as many theories (e.g., Ajzen & Fishbein, 2005) would predict. We thus wondered whether the mindset-induced changes in risk perception observed in Experiment 1 are mirrored by mindset effects on risk-taking behavior. In other words, will a deliberative mindset make people more risk averse, whereas an implemental mindset promotes risk seeking?

In Experiment 2, participants performed the BART (Lejuez et al., 2002). To control for inter-individual differences in risk taking, we assessed peoples’ general risk-taking propensity. However, anything measured after the mindset manipulation (e.g., people’s general risk preferences) might be affected by it. In addition, participants’ performance on the BART might be affected by any prior measure of risk preferences, as merely taking this measure could have an impact on subsequent risk-taking behavior. To overcome these obstacles, we assessed all background variables in a separate experimental session.

**Method**

**Participants, design, and sample size considerations.** Seventy-five students (75% female) aged between 19 and 59 ($M = 23.6, SD = 5.4$) of a German university took part in Session 2 and were randomly assigned to one of three experimental conditions (mindsets: deliberative vs. implemental vs. control). We collected data over the course of one semester and stopped when the semester ended. The resulting number of participants was comparable to studies using the BART as a dependent variable (e.g., Lejuez et al., 2003; Lejuez, Aklin, Zvolensky, & Pedulla, 2003), and it allowed us to reliably detect a medium to large effect of $d = 0.73$ at 80% power (Faul et al., 2007).

**Procedure.** Our Experiment was split into two sessions. At the beginning of the summer term, we invited the participants via an experiment management system (Greiner, 2015) to take part in Session 1. Participants of Session 1 ($n = 148$) were then invited to Session 2 about two weeks later. At the beginning of Session 2, participants filled out the mindset manipulation questionnaire. They then moved on to the BART and subsequently filled out the PANAS. Participants generated individualized codes at the end of both sessions, allowing us to match their data anonymously.
Session 1. This session started with an investment task designed to measure risk-taking propensity (Gneezy & Potters, 1997; Charness & Gneezy, 2012). In this investment task, participants were given an endowment of 1.00€, and could invest a variable amount between 0.00€ and 1.00€ into a risky project, with a 50% chance to triple the investment and a 50% chance to lose it. The remaining amount (i.e., the amount not invested) was a certain part of their payoff. A coin was tossed at the end of the experiment to determine the outcome of the project. Higher investments reflect more pronounced preferences for taking risks because the expected payoff increases with any investment.

Thereafter, participants filled out a series of questionnaires. We assessed fear of negative evaluation by using a shortened questionnaire (Leary, 1983) in its German version (SANB-5; Kemper, Lutz, & Neuser, 2012) because previous research suggests it as a potential moderator of mindset inductions (Hiemisch, Ehlers, & Westermann, 2002). An example item of the SANB-5 is “When I am talking to someone, I worry about what they may be thinking of me;” each item is answered on a 4-point scale. Further, participants filled out two single-item self-ratings, one ten-point answer scale for willingness to take risks in general ("In general, are you willing to take risks or do you try to avoid taking risks?"; Dohmen et al., 2011) and one five-point answer scale for self-esteem ("I have high self-esteem"; Robins, Hendin, & Trzesniewski, 2001). At the end, participants provided standard demographic data and generated an individualized code following certain rules. This allowed us to match the data of Sessions 1 and 2. Participants’ payout consisted of their profits from the investment task (maximum of 3.00€) and a fixed show-up compensation of 3.00€. Because Session 1 was also used to collect data for an unrelated research project conducted at this time, we additionally assessed Preference for Intuition and Deliberation (Betsch, 2004) and numeracy (via the Berlin Numeracy Test, BNT; Cokely, Galesic, Schulz, Ghazal, & Garcia-Retamero, 2012; and a Rasch-based numeracy scale; Weller, et al., 2013).

Session 2. Data collection for Session 2 started two weeks after data collection for Session 1. However, because we ran both sessions in parallel it was possible for a participant to take part in shorter intervals but never on the same day. We slightly altered the example problems and projects of the mindset manipulations in the deliberative and implemental mindset conditions from Experiment 1 to be more appropriate to the sample of Experiment 2 (high school students in Experiment 1,
mostly undergraduates in Experiment 2). The structure of the mindset manipulations remain unchanged. The text used in the control condition, however, was changed to a 639-word long random text with natural word length and character sequences, which seemed Latin but was mere nonsense. We changed to Latin from the Slavic Czech used in Experiment 1 because Experiment 2 was conducted in the summer term of 2014 following Russia’s annexation of Crimea and we wanted to avoid any (subconscious) activation of unrelated concepts.

**BART.** We used the BART in an adapted version, implemented with PsychoPy (Peirce, 2007). It consisted of 20 trials (balloons) with participants having to hit the spacebar to pump. For every pump, the balloon increased in size and 0.05€ were added to the current balloon’s monetary value. For the sake of comparability, each balloon had a maximum number of possible pumps (ranging from 2 to 116, \( M = 59 \)) and exceeding it made the balloon pop and led to a loss of the current balloon. Participants could avoid this by pressing an alternative key to save a balloon’s monetary value early. In this case, the balloon’s current value was shown to the participant and added to a permanent bank, the balance of which was shown throughout every trial on the top of the screen. Pumps and pops were accompanied by respective sound effects. Participants were instructed that balloons would differ in maximum size and that two of the balloons will be randomly chosen at the end of the experiment to determine their payout (plus a fixed show-up compensation of 3.00€).

The BART offers two dependent variables: the number of popped balloons (i.e., participants did not stop pumping the balloon before reaching the balloon’s maximum number of pumps) and the adjusted average number of pumps (i.e., the number of pumps a participant made on balloons which were saved before popping; see Pleskac, Wallsten, Wang, & Lejuez, 2008).

**Results**

**Main analyses.** To test our hypothesis that participants in an implemental mindset exert comparatively riskier behavior, we conducted one-way ANOVAs with our experimental conditions as independent variable. For the adjusted average number of pumps, we found a significant difference between conditions, \( F(2, \, 72) = 3.67, \ p = .030, \ \eta^2_p = .092, \ 90\%-CI \ [.005-.193] \). A planned contrast comparing implemental and deliberative mindset conditions also revealed a significant difference, \( F(1, \, 72) = 6.00, \ p = .017, \ \eta^2_p = .077, \ 90\%-CI \ [.008-.187] \). Participants in an
implemental mindset pumped the most often ($M = 46.25, SD = 14.43$), closely followed by participants in the control group ($M = 45.64, SD = 12.94$) and, with some distance, participants in a deliberative mindset ($M = 37.76, SD = 8.33$; see Figure 4). Accordingly, comparing the control condition to each of the mindset conditions rendered a different picture than in Experiment 1. Control participants differed significantly in their adjusted average of pumps from deliberative participants, $F(1, 72) = 5.07, p = .027, \eta^2_p = .066, 90\%\text{-CI} [.004-.172]$, but not from implemental participants, $F(1, 72) = 0.31, p = .861$.

We found a similar pattern when we analyzed the number of popped balloons. Again, there was a significant difference between conditions, $F(2, 72) = 3.93, p = .024, \eta^2_p = .098, 90\%\text{-CI} [.007-.201]$, and a significant planned contrast when comparing the two mindset conditions, $F(1, 72) = 5.85, p = .018, \eta^2_p = .061, 90\%\text{-CI} [.007-.184]$. Participants in the implemental mindset and control conditions popped more balloons ($M = 9.00, SD = 2.58; M = 9.04, SD = 2.32$, respectively) than participants in a deliberative mindset ($M = 7.42, SD = 1.98$; see Figure 4). Accordingly, the control and implemental mindset conditions did not differ, $F(1, 72) = 0.00, p = .951$, but participants in the deliberative mindset and control conditions did, $F(1, 72) = 6.04, p = .016, \eta^2_p = .077, 90\%\text{-CI} [.008-.187]$. Importantly, controlling for the individuals’ risk preferences, as assessed by the investment task of Session 1, did not affect this pattern of findings. The same holds true for including negative affect (or any other variable we had assessed) as a covariate.
Further exploratory analyses. Speaking for its external validity, both BART scores correlated with the amount of money participants invested in the investment task in Session 1: \( r(75) = .30, p = .009 \), for the adjusted average number of pumps, and \( r(75) = .36, p = .002 \), for the number of popped balloons. Apparently, participants who invested more in the investment task of Session 1 subsequently pumped more often and let more balloons pop in Session 2. Interestingly, a posthoc analysis of the strength of this association separately for each experimental condition revealed differences between conditions. For the number of popped balloons, the association was the strongest for participants in the implemental mindset condition, \( r(26) = .58, p = .002 \), followed by participants in the control condition, \( r(25) = .26, p = .206 \) (the difference not significant, \( z = 1.32, p = .187 \)), and participants in the deliberative mindset condition, \( r(24) = .12, p = .563 \) (marginally significant difference when compared to participants in the implemental mindset condition, \( z = 1.78, p = .075 \)).

For adjusted average number of pumps, the association was again the strongest for participants in the implemental mindset condition, \( r(26) = .46, p = .019 \), this time followed by participants in the deliberative mindset condition, \( r(24) = .31, p = .143 \), and participants in the control condition, \( r(25) = .10, p = .635 \) (the latter two correlation coefficients are not significantly different from the first correlation coefficient, \( zs \leq 1.32, p \geq .187 \)).

Nonetheless, and as reported before, including the amount of money invested in the investment task as a covariate in our main analyses did not change the pattern of significance for the adjusted average number of pumps nor the number of popped balloons. There was also a significant correlation between numeracy (i.e., the BNT score) and both the adjusted average pumps, \( r(75) = .31, p = .006 \), and the number of popped balloons, \( r(75) = .27, p = .020 \). Again, including numeracy as a covariate did not change the pattern of significance. All other variables assessed in Session 1 showed no significant relationship with risk-taking behavior in the BART.

Discussion

The results of Experiment 2 strongly suggest that there is a mindset-dependent change in risk-taking behavior. The pattern of results mirrors the change in risk perceptions observed in Experiment 1. Participants in a deliberative mindset exerted less risk-taking behavior compared to participants in an implemental mindset; they exerted fewer pumps and let fewer balloons pop.
It is noteworthy that participants’ risk perception (Experiment 1) and risk-taking behavior (Experiment 2) in the control condition varied in their similarity to the respective mindset conditions. While control participants fell in between mindset conditions in Experiment 1 (leaning toward the deliberative participants), they were indistinguishable from the implemental participants in Experiment 2. One possible explanation refers to the engaging nature of the BART (indicated by its correlation with sensation seeking; Lejuez et al., 2002) and its payoff structure. While there was no incentive to answer in a specific way in Experiment 1, the BART used in Experiment 2 is an incentivized behavioral measure that has an optimal, reward-maximizing strategy. Naïve participants usually do not know, learn, or apply the optimal strategy (i.e., the amount of pumps equals the average breaking point; see Lejuez et al., 2002). It is therefore commonly observed that participants on average pump well below the optimal level (e.g., Lejuez et al., 2007), even in a “colder” version where participants indicate in advance how often they want to pump for every balloon rather than engage in “hot” sequential pumping or, most strikingly, are informed about the optimal strategy beforehand (Pleskac, Wallsten, Wang, & Lejuez, 2008). However, because participants usually pump on average below the optimal level, pumping more often and letting one or two extra balloons pop (i.e., approaching the optimal level) is on average more rewarding than saving a balloon too early. From a reward-maximization perspective and under the assumption of risk-neutrality (i.e., neither discounting nor favoring uncertain outcomes compared to certain outcomes), pumping more often is therefore rational (as long as one does not surpass the optimal level) and this may be why control participants were exhibiting more risk-taking behavior, thus being more similar to implemental participants in Experiment 2 compared to being more similar to deliberative participants in Experiment 1.

More importantly, we observed more risk-averse behavior of participants in a deliberative mindset compared to participants in an implemental mindset in Experiment 2. This effect may be driven by the lack of illusory control (Gollwitzer & Kinney, 1989) and illusionary optimism (Taylor & Gollwitzer, 1995; the present Experiment 1). It is noteworthy, however, that both behavioral patterns (i.e., risk aversion in the deliberative mindset, risk seeking in the implemental mindset) are adaptive to the challenges of goal pursuit an individual must master in the respective action phase and therefore in line with MAP. It is helpful for individuals in an
implemental mindset to take risks to implement a set goal, whereas it is similarly helpful for individuals in a deliberative mindset to remain cautious.

**General Discussion**

The present set of studies was designed to test mindset effects on risk perception and risk-taking behavior. Consistent with MAP (Gollwitzer, 1990; 2012), we found less realistic risk perceptions (i.e., more illusory optimism) in participants with an implemental mindset compared to participants with a deliberative mindset. Importantly, this difference in risk perception is mirrored by participants’ risk-taking behavior in Experiment 2. Participants in the deliberative mindset condition exerted less risk-taking behavior as they pumped less and let fewer balloons pop in the BART.

**Mindsets and Risk Perception**

In Experiment 1, we looked at one facet of risk perception, namely (illusory) optimism about encountering negative life events in the future. We found that participants in an implemental mindset as compared to a deliberative mindset see themselves much less at risk of encountering various negative life events than the average other and thereby successfully replicated earlier research (Taylor & Gollwitzer, 1995). Besides leading to the expression of less illusory optimism as observed in Experiment 1, individuals in a deliberative mindset might also be less prone to the formation of strong illusory optimism in the first place. Recent research (Korn, Sharot, Walter, Heekeren, & Dolan, 2014; Sharot, Korn, & Dolan, 2011; Sharot et al., 2012) offers an interesting view on the formation of illusory comparative optimism: *selective updating*. Selective updating describes the tendency of individuals to update their personal beliefs in light of desirable feedback (e.g., suggesting lower risk) but not or to a lesser extent in light of undesirable feedback (e.g., suggesting higher risk). Strikingly, this asymmetry in updating is not due to systematic memory errors as participants can recall desirable and undesirable feedback equally well; moreover, people do not show selective updating in any similar magnitude for estimating base rate risks (Garrett & Sharot, 2014). This means that objective risk information may lead to updated base rate estimates but not updated risk perceptions for oneself. In other words, if participants of our experiment would have received objective information about developing a drinking problem, which suggested higher
risk, they might only use this information to update their base rate estimation but not their own personal risk. Incorporating such negative or undesirable feedback into one’s own beliefs is aversive and, therefore, alterations in the extent of open-mindedness in information processing should exacerbate or diminish the asymmetries in updating. As mindsets are known to affect the open-mindedness during information processing (Bayer & Gollwitzer, 2005; Fujita et al., 2007) selective updating should also be less pronounced in a deliberative as compared to an implemental mindset.

**Mindsets and Risk Taking**

In Experiment 2, we used the BART to measure altered risk-taking behavior caused by pondering over or planning the implementation of an unrelated decision (i.e., activating deliberative vs. implemental mindsets). We found that participants in a deliberative mindset pumped the balloons less often and thus engaged in decreased risk-taking behavior compared to participants in an implemental mindset. One should note, however, that although its name suggests otherwise, the BART measures decision-making under uncertainty rather than risky decision-making (Knight, 1921). While decision-making under risk pertains to decisions in which decision-makers know all possible outcomes of their choices and can assign probabilities to their respective occurrence, participants in the BART typically know that a balloon can pop or be saved but are neither told nor can infer the exact probability of popping of a single balloon over the course of the experiment. In line with this assumption, Wallsten, Pleskac, and Lejuez (2005) showed that participants falsely believe the probability of popping to remain steady throughout a balloon (i.e., independent of the number of pumps so far). It is possible that our results would be different had we adopted a paradigm of decision-making under risk (e.g., the Columbia Card Task; Figner, Mackinlay, Wilkening, & Weber, 2009). It might be argued, for example, that deliberation might be useful in situations where we know the numbers and can calculate probabilities, but under uncertainty, simple rules of thumb may be better (Gigerenzer, 2014). As other research (Rahn et al., 2016) has shown, participants in a deliberative mindset seem to be fine-tuned for feasibility and desirability calculations (or probability and value in the case of decision-making under risk). Accordingly, choosing the BART in the present research may have favored risk-taking behavior in the implemental mindset condition and hindered it in the deliberative mindset condition.
Most importantly, because of its high external validity (e.g., Lejuez et al., 2003), the observed mindset effects on risk taking in the BART speak for a general effect of the action phase in which people find themselves on risk taking in the real world. The present research shows that increased confidence (e.g., Gollwitzer & Kinney, 1989; Hügelschäfer & Achtziger, 2014) and increased optimism in an implemental mindset (e.g., Brandstätter et al., 2015; Puca, 2001) may carry over to increased risk taking when compared to participants in the deliberative mindset. This extends the scope of MAP by further validating the fine-tuning of implemental participants toward reaching their goals.

**Pre- versus Post-Decisional Deliberation**

In our two studies, we found participants in a deliberative mindset to have more realistic risk perceptions and show more risk aversion in the BART. Nevertheless, MAP does not suggest that deliberation is always associated with risk aversion. In the present research, we asked participants to deliberate on a personal problem for which they have not made a decision yet on whether to act or to maintain the status quo. Research by Gagné and Lydon (2001) as well as Nenkov and Gollwitzer (2012) suggests that deliberation of decisions, which already have been made, has quite different consequences than deliberation of decisions, which have not been made yet. For instance, Nenkov and Gollwitzer (2012) found that participants who deliberated on a goal, which they had decided to pursue, subsequently reported increased commitment compared to participants who deliberated on a goal, which they were still undecided to pursue. This further translated into higher planning intensity and most importantly goal-directed behavior; participants who had to deliberate on an already made decision were three and a half times more likely to visit a website with goal-related information than participants who deliberated on a decision they had not made yet. What may be the consequences of deliberating on risk-related decisions, which have already been made? If the decisions pertain to continuing a risky behavior or to not adopting a protective behavior, redeliberating such decisions may lead to even lower risk perceptions and more risk taking, instead of adopting more realistic risk perceptions (Experiment 1) and less risk-taking behavior (Experiment 2), as we have observed for participants in the deliberative mindset conditions. This mismatch between thinking about a decision, which has not been made, yet versus thinking about a decision, which has already been made, could
also be responsible for the discrepancy between the observed effects of mindsets on illusory optimism (Taylor & Gollwitzer, 1995; Weinstein & Lyon, 1999). In the Weinstein and Lyon case, participants who were decided to adopt a protective behavior (i.e., get the household tested for radon exposure) perceived their risk to be even higher than participants who were undecided after getting new information on the subject. The critical test for our hypothesis, however, would have been to assess how these participants (i.e., the ones decided to test for radon) rated other, unrelated risks.

**Conclusion**

By validating the mindset effects on comparative illusory optimism and identifying downstream consequences of mindset induction on risk taking, the present research suggests that action-phase related mindsets affect how individuals perceive and take risks. We observed that compared to individuals planning the implementation of a chosen project, participants weighing the pros and cons of making a decision exhibit more realistic risk perceptions and less risk-taking behavior, even when the task paradigm offers monetary incentives to engage in risk-taking behavior. This intra-individual difference should be kept in mind when it comes to communicating risks to risk-prone individuals as well as the general public.
Research Paper I: Mindsets Affect Risk Perception and Risk-Taking Behavior
Research Paper II
Self-Awareness and Desirability as Moderators of Primed and Deliberate Goal Pursuit

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Abstract

In four experiments, we tested two potential moderators of goal priming: objective self-awareness and desirability of the performance’s outcome. In Experiments 1 and 2, we manipulated participants’ self-awareness by varying facing a mirror (or not). We found that a primed goal of performing well (an achievement goal, Experiment 1) heightened performance on a strenuous task similar to a consciously set achievement goal when facing a mirror but not in the absence of a mirror. A primed goal to quit performing well on a task at hand (Experiment 2), however, hampered performance when a mirror was not faced but not when a mirror was faced. Next, we directly manipulated the desirability of the outcomes of participants’ performances on word-search puzzles (Experiments 3 and 4). In Experiment 3, a monetary incentive heightened performance and rendered a primed achievement goal dispensable; in the absence of monetary incentives, however, the primed goal managed to raise performance levels. In Experiment 4, telling participants that performance is indicative for future academic success made participants with a consciously set achievement goal choke under pressure while participants with a primed achievement goal showed enhanced performance. In sum, the present findings suggest that both self-awareness and the desirability of outcomes influence both primed and deliberate goal pursuit.
Self-Awareness and Desirability as Moderators of Primed and Deliberate Goal Pursuit

Heeding the recent call of many researchers (e.g., Cesario, 2014; Dijksterhuis, 2014; Latham, Stajkovic, & Locke, 2010; Locke, 2015), the present paper tries to advance the discussion on primed and deliberate goal pursuit by suggesting and empirically testing two moderators of goal-striving and their implications for further research: the state of objective self-awareness and the desirability of a task’s outcomes. To do this, we will first describe what we mean by prime-to-behavior effects in general and, more specifically, by behavioral consequences of primed goals. Thereafter, we will introduce the two suggested moderators and describe relevant prior work investigating the interplay between each suggested moderator and prime-to-behavior effects. We then present two experiments per moderator to check on potential similarities and differences in downstream behavioral consequences of primed and deliberate goal pursuit.

Prime-to-Behavior Effects

Prime-to-behavior effects can be defined as “the passive, subtle, and unobtrusive activation of relevant mental representations by external, environmental stimuli, such that people are not and do not become aware of the influence exerted by those stimuli” (Bargh & Huang, 2009, p. 128) on corresponding behavior. Thus, it is not necessary that a prime by itself is presented subliminally (i.e., under the perceptual threshold of conscious awareness), it is the lack of conscious awareness for either the activation of mental representations, their influence, or any link between the activation and the subsequent behavioral consequences. Research over the last decades has accumulated an overwhelming amount of evidence for the effects of subtle primes on judgments (e.g., review by DeCoster & Claypool, 2004), decision-making (e.g., Chartrand, Huber, Shiv, & Tanner, 2008; review by Vohs, 2015), and behavior (e.g., reviews by Dijksterhuis & Bargh, 2001; Shariff, Willard, Andersen, & Norenzayan, 2016; Weingarten et al., 2016). For instance, in now classic experiments in social psychology, experimenters activated stereotypes about the elderly and observed altered walking speed (both in college students; Bargh, Chen, & Burrows, 1996; Cesario, Plaks, & Higgins, 2006; and older adults; Hausdorff, Levy, & Wei, 1999; but see the replication by Doyen, Klein, Pichon, & Cleeremans, 2012). Similarly, the concept of intelligence was activated by asking participants to think
about the typical professor and subsequently, the authors observed higher performance scores in a general knowledge test (Dijksterhuis & van Knippenberg, 1998; but see the replication by Shanks et al., 2013).

Therefore, in the two examples of prime-to-behavior effects described above, the mere activation of concepts (i.e., the elderly, intelligence) led to altered behavior observed by the researchers. For the present research, however, we want to focus on another type of prime-to-behavior effect: primed goals. According to an early theory on prime-to-behavior effects – the auto-motive theory (Bargh, 1990) – goals are mentally represented as any other concept (see also Kruglanski et al., 2002), and through the repeated pairing of a given situation and the goal which is usually pursued in this situation, a link between the two is formed; a link so strong, that the situational cues eventually activate the goal directly through the established link without further need of conscious involvement (i.e., outside of conscious awareness; Bargh, 1990; Bargh & Gollwitzer, 1994; Bargh & Huang, 2009).

Priming goals differs from priming semantic concepts, as the behavioral consequences are meant to be different. Foerster, Liberman, and Friedman (2007), for instance, propose several characteristics of primed goal pursuit derived from deliberate goal pursuit on how priming goals should differ from priming other non-goal constructs. To exemplify, models of spreading activation predict that both consciously set (i.e., explicit instructions) and nonconsciously activated (i.e., primed) goals should lead to similar goal attainment rates and qualities of goal striving. And indeed, Bargh, Gollwitzer, Lee-Chai, Barndollar, and Troetschel (2001) observed that primed goals lead to goal-directed action on their own (Experiments 1 and 2), and, just like one could derive from deliberate goal pursuit, primed goals increase in strength over time until acted upon (Experiment 3), produce persistence when obstacles are encountered (Experiment 4), and induce resumption following interruption (Experiment 5).

Similarly, central assumptions of goal setting theory (Locke & Latham, 1990, 2013) such as the importance of setting challenging, specific goals (e.g., “write 500 words this morning”) instead of modest or unspecific goals or mere “do your best” goals seem to also hold for primed goals. A primed general achievement goal led to an increase in job performance in call centers as measured by the number and monetary value of pledges from donors (Shantz & Latham, 2009, 2011). Still, priming of a more specific achievement goal directly addressing job performance in the call
center instead of achievement in a more general sense, led to even higher job performance (Latham & Piccolo, 2012). Similarly, priming a more challenging goal compared to an easy goal led to more effort exerted by participants (Latham, Brcic, & Steinhauer, 2017), just as goal setting theory would have predicted (see also Chen & Latham, 2014). In contrast, priming of more specific exemplars for a semantic concept (instead of the concept itself) seems to reverse the primes’ effects on behavior (Martijn et al., 2007).

**Moderators of Primed Goal Pursuit**

Bearing the similarities between primed and deliberate goal pursuit in mind, we now turn to the investigation of potential moderators of primed goal pursuit. Recent years have seen several moderators of prime-to-behavior effects that cannot easily be explained by spreading activation models (e.g., Bargh, 1990; Dijksterhuis & Bargh, 2001; Shah, 2005). For example, Cesario and colleagues (2006) observed slower walking after priming the semantic concept of “the elderly” only if participants had positive views about the elderly but faster walking when they entertained negative views about the elderly. Cesario and Jonas (2014) therefore conclude that instead of mere spreading activation, primes are processed as input to a self-regulatory resource computation model that prepares responses (for another recent model, see Loersch & Payne, 2011). In this line of thought, the human brain’s central function is to prepare responses to demands of the external world. It is therefore assumed that depending on situational constraints, the very same prime can elicit different behavioral responses. To exemplify, researchers observed that priming a hostile out-group member in a typical experimental set-up (i.e., having the participant sitting alone in an enclosed booth) led to aggressive behavior (as in Bargh et al., 1996) but if the physical surroundings of the participants are changed to allow for other reactions (e.g., being in an open room or even an open field), participants were more likely to choose flight or distancing behavior to avoid confrontation (Cesario, Plaks, Hagiwara, Navarrete, & Higgins, 2010).

In the present research, we propose and analyze two further potential moderators of primed goal pursuit. Both relate to motivational determinants of goal striving: the activation of objective self-awareness, and the degree of desirability of the outcomes the person is striving for.
Objective self-awareness and the activation of self-standards. In their theory of objective self-awareness (OSA), Duval and Wicklund (1972) propose a dichotomous distinction of the direction of attention with respect to the self. It can either be directed outward at the environment, with the self as the subject, the perceiver or agent, who feels, sees, hears, and acts (i.e., the state of subjective self-awareness). Alternatively, attention can be directed inward, with the self as an object in an evaluation process, where internalized standards and norms are salient and compared with actual behavior (i.e., the state of OSA). The highly self-aware individual thus regards the self as an entity in the environment, which can be evaluated as any other object or person. Accordingly, she contrasts her current behavior or behavioral intentions with the personal standards she adheres.

Duval and Wicklund (1972) propose that behavior in line with self-standards manifests itself when self-awareness is high, whereas behavior that is not in line with these standards will be inhibited. Corroborating this, inducing OSA makes individuals more likely to choose a fair method (i.e., flipping a coin) to determine who has to perform a tedious task (Batan, Thompson, Seuferling, Whitney, & Strongman, 1999), and, famously, makes children more likely to comply with a “one candy per trick-or-treater” sign on Halloween (Beaman, Klentz, Diener, & Svanum, 1979). As our behaviors are rarely holding up to our self-standards, Wicklund (1979) infers that the evoked comparisons are often aversive and that OSA, thus, remains dormant until activated by external influences (e.g., by the presence of a mirror, video camera, or audience).

OSA and prime-to-behavior effects. Only one set of experiments so far has investigated the direct interplay between the activation of OSA and prime-to-behavior effects (other studies have investigated the interplay of trait self-awareness and automatic behavior, e.g., Hull, Slone, Meteyer, & Matthews, 2002; Wheeler, DeMarree, & Petty, 2007, 2014). Specifically, Dijksterhuis and van Knippenberg (2000) replicated a prime-to-behavior-effect and demonstrated that the presence of a mirror did manage to disrupt it. With half of their participants, the authors observed better performance on a general knowledge test after priming them with semantic concept of “professor” (Dijksterhuis & van Knippenberg, 1998). The other half of the participants, however, performed the priming task as well as the subsequent general knowledge test in front of a mirror; this annulled the effect of the prime. In a second experiment, participants were primed with the semantic concept of “politician” or not.
Introduction

In a subsequent essay-writing task, primed participants wrote significantly more words (in line with the stereotype that politicians are longwinded) but only if they were not seated in front of a mirror during both prime exposure and the subsequent writing task. It appears, then, that the presence of a mirror disrupts the manifestation of prime-to-behavior effects. Dijksterhuis and van Knippenberg (2000) argue that OSA (e.g., created by the presence of a mirror) disrupts the automatic link between cognition (i.e., activated concepts) and behavior (Dijksterhuis & Bargh, 2001).

Yet, while posing interesting conclusions about the interplay of OSA and automatic behavior, this set of experiments does not directly speak to the theme of the present paper. Dijksterhuis and van Knippenberg (2000) primed concepts describing certain social groups (i.e., professors, politicians) to elicit respective stereotypical behavioral patterns instead of goals. Per Duval and Wicklund’s (1972) conceptualization of OSA, the induction of OSA leads to an evaluation in which internalized standards and actual behavior are compared with each other. One might argue, therefore, that because participants were seated in front of the mirror during the priming phase, the mirror merely increased the contrast between the participants’ (accurate) self-image (i.e., neither being a professor nor a politician) and the primed concepts; which in turn may have wiped out any effects of the primes. In other words, during the priming phase participants may have become aware that they are neither professors nor politicians.

Instead, in the present paper we concentrate on priming goals rather than other concepts (e.g., social categories), and we refrain from putting participants in front of a mirror during the priming phase. Moreover, for the present research, we focus on priming either a goal that is in line with activated self-standards (achievement) or a goal that is not in line with activated self-standards (quitting). In our reasoning, the activation of OSA and its inherent comparison process interplays with the (subconscious) computations of the resource computation model brought forth by Cesario and Jonas (2014). Thereby, the desirability of a goal that is in line with the activated self-standards is raised, and thus the goal is more likely to be applied to the task at hand. The desirability of a goal that is not in line with the activated self-standards, in contrast, is lowered and has a lower chance of being reflected in actual behavior.

**Desirability.** When it comes to goal pursuit, people may entertain various conflicting (maybe even mutually exclusive) desires but have limited resources like
time, money, or applicable effort. This means that people are forced to make decisions on which goals to pursue. Motivational theories describing this process of goal setting (e.g., Heckhausen, 1977; Gollwitzer, 1990, 2012; Wigfield & Eccles, 2000) propose that desires are more likely to be turned into binding goal intentions when the goal is perceived to be feasible. So, thinking that one can obtain the desired end-state (e.g., by performing a set of specific actions one perceives oneself as capable of) is a natural prerequisite to goal striving in general. However, we want to focus on another key quality of goals that are chosen to strive for: high desirability in terms of the anticipated and experienced pleasantness/unpleasantness of goal striving and goal attainment. Therefore, adding to the consideration of feasibility-related information, one must consider in relation to potential other goals how one values the goal pursuit (e.g., how pleasant or unpleasant is taking action?) as well as its consequences (e.g., how pleasant or unpleasant will it be to have reached the goal?). These consequences can be short- as well as long-term and span from evaluations by valued others or hedonic aspects to self-evaluations, monetary rewards, and progress toward reaching a superordinate identity goal (Wicklund & Gollwitzer, 1982).

The Present Research

In the present research, we investigate the effects of two moderators of primed and deliberate goal pursuit: objective self-awareness and goal desirability. In the first set of two experiments, we analyze whether manipulating OSA during task performance moderates the effects of primed goals of different contents. OSA is expected to influence primed goal effects by either enhancing the assimilation of a desirable goal (e.g., achievement; Experiment 1) or enhancing contrast with an undesirable goal (e.g., quitting; Experiment 2). In other words, we expect the effect of OSA to depend on the direction of the primed goal: When the primed goal is in line with self-standards, we expect to see an effect of the primed goal (Experiment 1), and when the primed goal is contrary to self-standards, no effect of the primed goal should emerge (Experiment 2).

In the second set of two experiments, we test whether directly varying the desirability of the goal outcome (i.e., doing well on an assigned task) will moderate the strength of goal priming effects. By introducing monetary incentives for good task performance (Experiment 3) or by telling participants that task success is indicative of future academic success (Experiment 4), we expect the effects of a primed
achievement goal on task performance to differ between desirability conditions. When desirability is low (i.e., the task is neither incentivized nor indicative of future success), participants with a primed achievement goal should outperform participants without a primed achievement goal. When monetary incentives are introduced (Experiment 3), however, we expect that this may produce increased performance (as has been shown to happen even when the desirability itself is manipulated subliminally; Pessiglione et al., 2007). When the task is said to be indicative for future academic success (Experiment 4), we expect that participants with a primed achievement goal as well as those with a consciously set achievement goal will outperform participants without a primed or consciously set achievement goal.

**Experiment 1: Primed and Consciously Set Achievement Goals and OSA**

In this first experiment, we focused on the effect of a primed achievement goal on holding a hand grip (Muraven, Tice, & Baumeister, 1998). We chose this task for four particular reasons. First, given that the task is likely one that students have rarely encountered, we assumed that they would not know what constituted a good performance, leaving room for an achievement goal to enhance performance (Experiment 1) and a quitting goal to reduce performance (Experiment 2). Second, due to its simplicity, the task can be introduced without extensive, written instructions. Third, the activity tested by the task (i.e., the motor activity of squeezing) is unrelated to the activity required by our priming manipulation (i.e., the cognitive activity of solving word-search puzzles); accordingly, performance on squeezing the hand grip should not benefit from the activation of a mere task set (i.e., doing well on the word-search puzzle). Fourth, because the task is unattractive as it incites muscle pain rather quickly and is not incentivized, participants should be inclined to stop squeezing rather early.

We deliberately chose performing a task as our dependent variable for which participants should prefer giving up early to persisting, whereas both our primed and our consciously set achievement goal in Experiment 1 ran counter to this preference. Thus, both conscious and nonconscious achievement goals should help participants to persist on performing the aversive task for the sake of goal attainment; participants with such achievement goals should show better performance than participants without achievement goals.
In this first experiment, we included a consciously set achievement goal as a benchmark for what level of performance is possible when participants are explicitly asked to perform well. The introduction of a mirror should induce the state of OSA, which makes self-standards salient and evokes the desire of participants to act in line with their standards and goals, even when the goals are activated subconsciously. Once more, we want to stress that some of these influences are designed to conflict with each other. Using a hand grip as our dependent variable should lead to a high number of participants who are inclined to stop squeezing rather early because they want to avoid experiencing muscle pain. Therefore, performance levels of participants without a goal should constitute a lower boundary, whereas performance levels of participants with a consciously set achievement goal should constitute an upper boundary for performance.

Importantly, Experiment 1 addresses the remaining question of how participants with a primed achievement goal will perform, and whether a primed achievement goal suffices to overcome the aversive qualities of the task at hand or whether the activation of OSA constitutes a further necessary factor? In other words, how strong and robust (in terms of independence of other influences) is the priming of an achievement goal in comparison to its consciously set counterpart?

Method

Participants and design. We recruited 116 students at a German University who participated in exchange for course credit or 5€ for a 30-minute experiment. Participants were randomly assigned to one of the six experimental conditions of a 3 between (achievement goal: consciously set goal vs. primed goal vs. no goal) x 2 between (mirror: present vs. absent) factorial design. During data collection, two participants had to be excluded due to problems with the hand-grip measure. Both excluded participants were in the primed goal/no mirror condition. For one, the cent-coin (see below) slipped very early at Time 1, and for the other, it stuck to the hand-grip handles and thus did not fall off, even though the participant stopped squeezing. Moreover, one participant did not complete the final questionnaire. Because this latter participant’s hand-grip times were counter to our hypotheses, we decided to retain this participant in our analyses wherever possible. Thus, the final sample consisted of 114 students (86 females) with a mean age of 22.9 years (SD = 4.8) and allowed us to
detect an effect of $\eta_p^2 = .080$ for the main effect of our goal manipulation at 80% power (Faul, Erdfelder, Lang, & Buchner, 2007).

**Procedure.** Participants arrived individually and were first given instructions about how to get into the right standing position for the baseline hand-grip measurement. Leg posture was standardized and participants were asked to stand upright, to form a right angle with their arm, and to look directly at the wall in front of them. They held the hand grip in their dominant hand, and as they began to squeeze it, a coin was put in between the grips by the experimenter. Time until the coin fell and hit the ground was measured without allowing the participants to take a glance at the stopwatch, and without the experimenter establishing eye contact or making any comments at all.

Participants were then seated at a table and worked on the word-search puzzles. Once completed, they were led into another room. Leg posture was again standardized and participants stood in front of the mirror, which depending on experimental condition was either uncovered or covered. Participants were again told to stand upright and face forward, which forced them to look at the mirror. The mirror itself was never mentioned. At this point, only participants in the consciously set goal condition were told that it is important that they try their best.

After the second hand-grip measurement, participants took a seat in the same room as the mirror but facing away from it for answering the final questionnaires. After finishing the final questionnaires, participants received their pay. Finally, the experimenter administered a funneled debriefing (Chartrand & Bargh, 1996) to probe for suspicions concerning the aim and purpose of the experiment.

**Goal manipulation.** The word-search puzzles were modeled on puzzles used in previous achievement goal priming experiments (Bargh et al., 2001; Engeser, Wendland, & Rheinberg, 2006; Engeser, 2009). The puzzles were constructed as 10x10 letter matrices with a total of 13 German words hidden in each. To allow some recovery in the participants’ muscles and to increase the time between the two hand-grip measurements, participants of all conditions had two word-search puzzles to solve between the two hand-grip measurements. All three goal conditions shared seven neutral words per puzzle (e.g., *house, cat, brown*); the primed goal condition had seven additional words closely related to the concept of high-performance (e.g., *success, master, aspire*). Respective neutral words in the no goal control and the consciously set goal condition were matched for length and level of familiarity to
these seven achievement-related words. A pretest did not show any differences in difficulty or time it took to finish the puzzles between versions. Before participants began the second hand-grip measurement, participants in the consciously set goal condition were told “This time it is important that you try your best and try to hold it as long as you can” by the experimenter.

**Dependent variable: hand-grip performance.** Participants were given the same hand grip for both measurements in the experiment. Pressing time was taken with a regular stopwatch by the experimenter. During taking the hand-grip measures, experimenters followed certain rules to minimize potential experimenter bias. Experimenters were trained to keep their gaze on the wall, avoid eye contact, and to stand in a spot where the participant could not see them in the mirror. The percent change between the two measurements served as the dependent variable in this experiment to minimize pre-existing inter-individual differences.

**Final questionnaires.** Participants filled out the *Positive and Negative Affect Schedule* in its German Version (PANAS; Krohne, Egloff, Kohlmann, & Tausch, 1996). In the PANAS, participants indicated their current experience of ten positive (e.g., excited, strong; Cronbach’s α = .86) and ten negative (e.g., nervous, ashamed; Cronbach’s α = .84) emotions. Furthermore, we used the achievement striving subscale of the German version of the *NEO-Personality Inventory* in its revised version (Ostendorf & Angleitner, 2004). It consists of eight items (e.g., “I work hard to reach my goals”, “At everything I do, I strive for perfection”) which could be answered on a five-point scale ranging from 1 – *strongly disagree* to 5 – *strongly agree*; internal consistency reached a Cronbach’s α of .67.

Moreover, we designed a mirror manipulation check modeled on research by Davis and Brock (1975): Participants were given fifteen sentences in Swahili and Icelandic (i.e., two languages the typical German student does not speak). One to two words per sentence were underlined and participants were instructed that the underlined words are pronouns and that the ability to guess pronouns in foreign languages would be indicative of linguistic aptitude, which fit the cover story of the experiment. Participants were given a full selection of German pronouns, and we subsequently counted the number of guessed first person pronouns to assess the degree of participants’ OSA.

We further asked participants how important it is for them to perform well on a) tasks like the hand grip, b) tasks like the mirror manipulation check, and c) the
experiment in general using a scale ranging from 1 – not at all or very slightly to 5 – extremely important. In addition, participants had to indicate their sex, handedness, age, and mother tongue. These measures did not correlate significantly with hand-grip performance, $ps \geq .103$.

Results

**Preliminary analyses.** We compared the experimental conditions across positive and negative affect as well as achievement striving, which turned out to be nonsignificant, $Fs \leq 2.64$, $ps \geq .107$. To test whether the presence or absence of the mirror influenced the subjective importance of performing well on the hand-grip task, we compared these ratings among participants without an achievement goal (i.e., the no goal control condition). Participants in the control condition for whom the mirror was absent saw the hand-grip task only of mediocre importance ($M = 3.2$, $SD = 0.9$) while participants in the control condition who performed the hand-grip task in front of a mirror subsequently rated doing well as significantly higher, $M = 4.1$, $SD = 0.9$, $t(34) = 2.97$, $p = .005$, $d = 0.99$, 95%-CI [0.29–1.68].

Moreover, to see whether the mirror manipulation induced a state of objective self-awareness, we compared the amount of listed first person pronouns in the mirror manipulation check by conducting an ANOVA with mirror presence and goal condition as our independent variables. This ANOVA rendered a significant main effect for mirror condition, $F(1, 107) = 5.60$, $p = .020$, $\eta^2_p = .050$, 90%-CI [.004–.130]. As expected, other effects were not significant, $Fs \leq 1.29$, $ps \geq .280$. The effect of the mirror manipulation on the amount of listed first person pronouns, however, turned out to be ironic as participants for whom a mirror was present during the second hand-grip measurement chose fewer first person pronouns ($M = 5.3$, $SD = 2.1$) than participants for whom the mirror was absent ($M = 6.3$, $SD = 2.2$). Because the mirror manipulation check took place a few minutes after the second hand-grip measure and with the possibility of facing away from the mirror, participants for whom a mirror was present may have actively avoided it (see more in the discussion of this experiment).

**Main analyses.** To compare performance on the hand-grip measure, we calculated a percentage change in performance. To do this, individuals’ first score (number of seconds spent squeezing at Time 1) was subtracted from their second score (number of seconds spent squeezing at Time 2), and this value was then divided
by the first score. A positive value thus indicates that participants showed increased performance on the second trial, whereas a negative value indicates a decrease in performance. This procedure allowed us to minimize skew from individual differences in strength and easily detect when participants could overcome fatigue on the second trial. More specifically, we found a significant difference in performance between genders at Time 1, \( t(32.61) = 6.04, p < .001, d = 1.33, 95\%-CI [0.79-1.87] \), and Time 2, \( t(111) = 6.86, p < .001, d = 1.51, 95\%-CI [1.04-1.99] \), but not on percent change in performance, \( t(111) = 1.20, p = .232, d = 0.27, 95\%-CI [-0.17-0.70] \); our percent change in squeezing performance thus allows us to rule out differences in performance due to gender. Gender is therefore not included in the following analyses.

A two-way ANOVA with goal condition and mirror condition as our independent variables and percent change in squeezing performance as our dependent variable rendered a significant main effect of our goal manipulation, \( F(2, 108) = 4.24, p = .017, \eta_p^2 = .073, 90\%-CI [.007-.151] \), and a marginally significant main effect of the mirror condition, \( F(1, 108) = 3.84, p = .053, \eta_p^2 = .034, 90\%-CI [.000-.106] \). The interaction between our two manipulations, however, did not reach conventional levels of significance, \( F(2, 108) = 1.46, p = .237, \eta_p^2 = .026, 90\%-CI [.000-.082] \).

Further, a planned contrast, testing the hypothesis that a primed goal has the same effect on hand-grip performance as a consciously set goal (i.e., increased performance compared to the no goal control condition; contrast weights of -2, 1, 1 for control, primed, and consciously set goal, respectively) was significant, \( t(111) = 2.27, p = .025 \), when the mirror was present, \( t(52) = 2.17, p = .035 \), but not when the mirror was absent, \( t(56) = 0.98, p = .334 \). Apparently, the primed goal condition is the only condition which profits from the introduction of the mirror, as can be seen in a significant difference in hand-grip performance between mirror conditions in the primed goal condition, \( t(39) = 2.16, p = .037, d = 0.66, 95\%-CI [0.04-1.28] \), but not in the no goal control or consciously set goal conditions, \( ts \leq 0.94, ps \geq .352 \).
Figure 5. Hand-grip performance as a function of goal and mirror condition in Experiment 1. Bars represent standard errors.

In sum, when no mirror was present, the consciously set goal condition ($M = 0.12, SD = 0.43$) clearly outperformed both the primed goal condition ($M = -0.18, SD = 0.32$) and the no goal control condition ($M = -0.13, SD = 0.33$). When a mirror was present, however, both participants in the consciously set goal condition ($M = 0.29, SD = 0.65$) and the primed goal condition ($M = 0.20, SD = 0.76$) outperformed individuals without a goal ($M = -0.14, SD = 0.32$; see Figure 5).

Discussion

We tested whether a primed goal only exerts its influence when its content is in line with activated self-standards. In our experiment, the primed goal ran counter to the inherent affordance of stopping early in a strenuous task (i.e., a hand-grip task). We observed significantly better performances of participants with a primed goal when a mirror was present compared to when a mirror was absent, and compared to control conditions. As compared to those with no goal, individuals with a consciously set goal and individuals with a primed goal in front of a mirror show enhanced performance on the hand-grip task.

Without the presence of the mirror, we would have concluded that there was no effect of our primed achievement goal. Participants with a consciously set achievement goal reliably outperformed participants without an achievement goal and
when the mirror is absent, participants with a primed achievement goal. Yet by adding the moderator of OSA, we observed increased goal striving in participants for whom both OSA is activated and an achievement goal is primed. Apparently, when a behavior is strenuous or strong performance is difficult to surmise but the primed goal is in line with self-standards, the comparison process resulting from the activation of OSA may help to still bring out the effect of the primed goal: Participants in the mirror condition with a primed achievement goal showed enhanced performance on the hand-grip task as compared to those with a primed goal without a mirror and those without an achievement goal.

The fact that participants in the mirror conditions chose fewer first person pronouns in our mirror manipulation check contrasts with our expectations and earlier work on which the manipulation check was modeled (Davis & Brock, 1975). However, after reexamining our procedure, it may be further proof to Wicklund’s (1979) assertion that OSA is an aversive state and remains latent if not activated otherwise. In our experiment, the mirror manipulation check was administered after participants squeezed the hand grip for the second time and were seated at a table in a room with the mirror still (un)covered but were facing away from the mirror. Thus, participants for whom OSA was activated during the hand-grip task may no longer have entertained the state of OSA but distanced themselves from it. This would be in line with the lower number of first person pronouns chosen compared to participants for whom the mirror was covered and OSA was not activated during the experimental procedure. Of course, this explanation is based on post facto reasoning and therefore should be tested in further research.

Taken together, in Experiment 1, we found effects of a consciously set achievement goal independent of OSA but an effect of a primed achievement goal only when OSA was induced. Due to the design of Experiment 1, we could observe participants with a primed achievement goal to approach a lower boundary of performance (i.e., the performance in the no goal control conditions) when the mirror was absent (i.e., OSA was not activated), and participants with a primed achievement goal to approach the upper boundary of performance (i.e., the performance in the consciously set achievement goal conditions) when the mirror was present (i.e., OSA was induced). OSA alone had no influence on the performance of the control or the consciously set achievement goal conditions. It appears then that primed goals to be effective need to be in line with activated self-standards.
Still, the observed pattern of results allows for a potential alternative explanation. One may argue, that it is not the fact that the primed goal was in line with self-standards, which the activation of OSA made salient, but that OSA may facilitate the priming of any goal. Therefore, we designed Experiment 2 to test whether OSA boosts any primed goal independent of its content or whether the respective behavioral consequences of the primed goal must be desirable (i.e., in line with self-standards) to be boosted.

**Experiment 2: Primed Quitting Goal and OSA**

In Experiment 2, we sought to test the hypothesis that the activation of OSA would hinder goal priming when the primed content is not in line with self-standards. In order to do this, we examined the effect of a quitting prime (activating the goal to disengage from a given goal pursuit; Henderson, Gollwitzer, & Oettingen, 2007). In other words, the effect of activating OSA on a given primed goal pursuit should depend on the goal’s content.

To be able to say that the primed goals differed in how they line up with the self-standards of students, we pretested both motivational concepts used in Experiments 1 and 2, achievement and quitting, respectively. We asked 27 psychology students to rate whether the following concepts match their personal standards for behavior on a scale from 1 – yes over 2 – neutral to 3 – no: relax, persist/persevere, quit/give up, achieve/strive, obey/take orders. Although relax and quit/give up have similar behavioral consequences, quit/give up was rated significantly worse, $M = 1.6$, $SD = 0.6$ versus $M = 2.4$, $SD = 0.6$, respectively, $t(26) = 5.77$, $p < .001$. Similarly, quit/give up was rated worse than achieve/strive, $M = 1.2$, $SD = 0.4$, $t(26) = 9.92$, $p < .001$. Therefore, we are confident that participants see a quitting goal as less in line with their self-standards than an achievement goal.

We decided to retain a similar procedure to the one used in Experiment 1. In contrast to the first experiment, however, the primed goal of Experiment 2 is in line with the task’s affordance of giving up early but the mismatch between self-standards made salient by the presence of a mirror and the primed goal’s content should hamper the establishment of a prime-to-behavior-effect. In other words, we expect that being primed with a quitting goal should enhance the propensity to quit which is already present in the control participants, thus constituting a new lower boundary of performance. However, this should only be the case if said performance has not to be
Research Paper II: Moderators of Primed and Deliberate Goal Pursuit

delivered in front of a mirror, which induces the state of OSA, and consequently results in the comparison of self-standards to actual behavior. We abstained from giving one part of the participants a consciously set quitting goal in Experiment 2, as this may have confused participants and thus produced an enormous floor effect. In addition, we decided to recruit only female students to exclude gender-based inter-individual differences in hand-grip strength, which allowed us to streamline the experimental procedure and drop the first baseline hand-grip measure.

Method

Participants and design. We recruited 105 female students at a Dutch University; they participated for course credit or 2€. Participants were randomly assigned to one of the four experimental conditions of a 2 between (quit goal: primed goal vs. no goal) x 2 between (mirror: present vs. absent) factorial design. During data analysis, a single participant had to be excluded from the dataset. Her time spent squeezing the hand grip was more than double the time of the next highest value and over 6.5 standard deviations from the mean. The next highest value was within 3 standard deviations of the mean and so all remaining values were analyzed. Thus, the final sample consisted of 104 female participants with a mean age of 21.0 years (SD = 1.8) and allowed us to detect an effect of $\eta_p^2 = .072$ for the main effect of our goal manipulation at 80% power.

Procedure. Participants were first given the word-search puzzle and after solving it, they sat in a chair and focused on a dot, which was either on the wall or on a mirror in the same spot. They were given a hand grip for their dominant arm with a small sponge to put between the grips when participants started to squeeze. Time was measured until the sponge fell out and hit the floor (Vohs, Baumeister, & Ciarocco, 2005). Prior to the experiment, participants filled out several questionnaires. As in Experiment 1, participants were asked at the end of the experimental session for any suspicions about the purpose of the experiment using a funneled debriefing technique.

Goal manipulation. The word-search puzzles were each 20x20 letter matrices in which 14 Dutch words were hidden. Puzzles of both conditions shared seven neutral words (e.g., agenda, house, tablecloth). While the no goal condition had another seven neutral words (e.g., broom, book, kitchen), the primed quit goal condition was given seven words related to the concept of resigning and quitting (e.g., give up, quit, resign).
**Final questionnaires.** The questionnaires administered before the hand-grip measure included self-control (Cronbach's $\alpha = .86$; Tangney, Baumeister, & Boone, 2004) and the PANAS (Cronbach's $\alpha$s were .79 and .77 for positive and negative affect, respectively), as well as other measures included by students involved in running the experiment for educational purposes, such as assessing fear of failure and self-image. These measures were uncorrelated with performance (see below).

**Results**

**Preliminary analyses.** Neither positive nor negative affect did correlate with actual hand-grip squeezing times, $|r|s \leq .04$, $ps \geq .729$, as did no other measure in this experiment, all $|r|s \leq .15$, $ps \geq .131$.

**Main analyses.** A two-way ANOVA was conducted with goal and mirror conditions as independent variables and log-transformed squeezing times as the dependent measure (the data were positively skewed); raw hand-grip squeezing time means and standard deviations are reported for ease of interpretation. The two-way ANOVA yielded no significant main effects, $F$s $\leq 0.32$, $ps \geq .576$, but the expected interaction effect obtained significance, $F(1, 100) = 4.22$, $p = .043$, $\eta_p^2 = .040$, 90%-CI [.001-.119] (see Figure 6). Follow-up analyses to disseminate the structure of this interaction revealed a marginally significant effect of goal priming when the mirror was absent, $t(49) = -1.69$, $p = .097$, $d = 0.48$, but this effect did not reach conventional levels of significance when the mirror was present, $t(42.82) = 1.34$, $p = .189$, $d = 0.37$. Note that the reported $t$-values shift from negative to positive, indicating a shift in direction of the effects.

A contrast testing the hypothesized structure of the cross-over interaction (i.e., contrast weights of 2, -2, -1, and 1 for quit*mirror, quit*no mirror, neutral*mirror, and neutral*no mirror, respectively) reached marginal significance, $t(100) = 1.77$, $p = .080$. Among participants for whom the mirror was absent, participants in the neutral prime condition held the hand grip for a longer time ($M = 57.75$ s, $SD = 30.58$) than those with a primed quitting goal ($M = 45.88$ s, $SD = 25.94$), suggesting that without the induction of OSA, the quitting goal decreased performance on a persistence task (i.e., led to earlier quitting) as expected. Participants facing a mirror, however, showed the opposite pattern of results, such that participants in the quitting goal condition ($M = 56.56$ s, $SD = 27.31$) performed slightly better than those in the no goal condition ($M = 53.37$ s, $SD = 45.23$), suggesting that the mismatch between
activated self-standards and the goal’s content may prevent individuals from acting in line with the primed quitting goal.

![Figure 6. Log-transformed time spent squeezing the hand grip in Experiment 2. Bars represent standard errors.](image)

**Discussion**

In this second experiment, we obtained a significant interaction between the activation of OSA and a primed goal, suggesting that activating OSA has differential effects on those primed with quitting versus not. In the absence of a mirror, participants with a primed quitting goal gave up earlier than participants in the control condition. In the presence of a mirror, however, participants with a primed quitting goal did not give up early but persisted even slightly longer than participants in the control condition. Therefore, instead of generally facilitating the application of a goal to a task at hand (as suggested by Experiment 1), the introduction of a mirror seems to buffer participants from the detrimental effect of a primed quit goal on a task measuring perseverance (Vohs et al., 2005). Thus, while future research is needed to detail the process behind the interaction between OSA and perseverance, both content and context must be considered when predicting the effects of primed goals on behavior. More specifically, our results suggest that when there is a mismatch between the primed goal and self-standards, the activation of OSA can moderate the expected prime-to-behavior effect given the content – a quitting goal in conjunction with OSA does not lead to detriments in goal striving.
In the following two experiments, we will turn to a different moderator of goal priming effects: the desirability of performing well on a given task. Instead of varying whether participants are in a state of OSA while working towards task attainment and whether participants are operating because of an achievement (Experiment 1) or a quitting goal (Experiment 2), all participants operated on an achievement goal in Experiments 3 and 4. However, we altered the perceived desirability associated with succeeding on the task at hand by varying desirability via monetary incentives (Experiment 3) or by describing success on the task as highly indicative (or not) for future academic success (Experiment 4).

**Experiment 3: Primed Achievement Goal and Monetary Incentives**

In a neuroimaging experiment using hand-grip force, Pessiglione and colleagues (2007) varied the received reward trial-by-trial by presenting either a penny (£0.01) or a pound (£1.00) coin before participants were to squeeze a hand grip. Crucially, the authors also manipulated the duration for which the coins were presented. When a coin was presented for 100 ms, participants could name its value and adjusted their grip force, accordingly (i.e., exerting more force when the pound was shown compared to when the penny had been shown). Strikingly, when a coin was presented for a duration which is below the threshold for conscious awareness (i.e., it is presented subliminally; in this case, the authors chose 50 ms), participants were not able to identify (i.e., name) the coin anymore but brain activation, skin conductance, and grip force still adapted to its value. The same held true, though to a lesser extent, for an even shorter presentation of 17 ms. Thus, it seems reasonable to assume that the desirability of an action’s outcomes has an impact on the subconscious computation of behaviors to be exhibited.

The authors of this experiment manipulated desirability of each trial’s reward under the assumption that participants in general react to monetary incentives because they have the superordinate goal to maximize their payoff when participating in a laboratory experiment. Consequently, for experiments in which monetary reward associated with task performance is varied, we can expect increased effort, even when no goal is explicitly set or primed. This allows for two different, conflicting hypotheses. First, depending on its desirability, an incentive alone may be sufficient and a further achievement goal is unnecessary; if it is set anyhow, it may not be able to raise the performance level beyond the performance increase caused by the
incentive alone. Second, increasing the desirability of an action’s outcome is increasing the willingness of the individual to pursue the goal, and the goal effect is therefore amplified via the increase of the respective incentive value. We address and test these two different predictions in Experiments 3.

In this experiment, we varied the monetary value that is associated with the experiment’s dependent variable. Some participants were told that they have the chance to win up to 50€ if they perform well in the task either after participants had been exposed to achievement primes or neutral words in a scrambled sentence task (Srull & Wyer, 1979). By incentivizing performance in the task, we wanted to test two competing hypotheses. First, monetary incentives alone can raise performance levels in an effort-based task. Second, one might argue that a task needs to be incentivized for a primed achievement goal to be effective in the first place. This second line of thought suggests that desirability considerations enhance goal strength. To test this latter view, we decided to vary monetary value at three levels: no reward, chance of receiving 5€ as a reward, and chance of receiving 50€ as a reward. If incentive value itself is sufficient to raise performance levels, a primed achievement goal may fail to exert its influence on top of the incentives’ influence. Its influence is then only detectable in the no reward condition and no or only a minor influence in the other two incentive value conditions. Conversely, if primed goals rely on the increased incentive value of task success, performance levels in the primed goal condition should linearly increase throughout the three levels of our incentive value manipulation, whereas staying flat in the no goal condition.

We used word-search puzzles (more specifically, puzzles as the ones used in the control condition of Experiment 1) as dependent variable in Experiments 3 and 4. Finding words in these puzzles has proven to be manageable and by spending more time searching, more words can be found easily.

Method

Participants and design. Two hundred sixty-six German high school students volunteered to participate in a 15-minute experiment. Participants were randomly assigned to one of the six experimental conditions of a 2 between (achievement goal: no goal vs. primed goal) x 3 between (chance of monetary reward: no reward vs. 5€ reward vs. 50€ reward) factorial design. During data analysis, eleven participants were excluded due to having found an amount of words two standard deviations
below or above the individual condition’s mean (6 participants in the primed goal condition; 5 participants in the no goal condition; not a function of goal and value conditions, Fisher’s exact test, \( p = .197 \)). Thus, the final sample consisted of 255 high school students (75% female) with a mean age of 17.0 years (\( SD = 0.9 \)) and allowed us to detect an effect of \( \eta_p^2 = .030 \) for the main effect of our goal manipulation at 80% power.

**Procedure.** After giving consent, participants began with the scrambled sentences task (i.e., our goal manipulation). Thereafter, they read instructions (i.e., our incentive value manipulation) for performing two word-search puzzles (i.e., our dependent variable). Participants had seven minutes to work on the word-search puzzles; the experimenters announced half time. Thereafter, participants moved on to the final questions covering demographics and were thoroughly debriefed concerning the aim and purpose of the experiment.

**Goal manipulation.** Participants were instructed to construct 20 sentences in a scrambled-sentences-task (Srull & Wyer, 1979). For each sentence to be constructed, they were given a set of five words and were told that four of the five words can be used to construct a grammatically correct sentence. In the no goal condition, all 20 sentences were of no coherent theme (e.g., *his hair is blonde, many plants are green*).

In the primed achievement goal condition, however, 8 of the 20 sets of five words either contained a word which was achievement-related or the constructed sentences themselves were achievement-related (e.g., *triumph, the team will win*). Additionally, the scrambled sentences were printed over the picture of a runner used for achievement goal priming in previous experiments (Shantz & Latham, 2009, 2011; Latham & Piccolo, 2012).

**Monetary reward manipulation.** In a first paragraph, all participants read that they had seven minutes to work on both puzzles and that the experimenters will announce when three and a half as well as seven minutes are over. In a second paragraph, participants in the 5€ and 50€ reward conditions read that they have the chance to win a 5€ or 50€ voucher for a multinational online store, respectively, if they are among the top performers on this task (i.e., found the most words). This second paragraph was missing altogether in the no reward condition.

**Dependent variable: word-search puzzles.** All participants were given further word-search puzzles, which incorporated many possible words, but not of any
coherent theme. They were constructed similarly to the word-search puzzles used in the neutral and consciously set goal conditions of Experiments 1 and 2. While devising the task and thus before counting the words, we discussed that words which were found more than once only count once; moreover, components of a compound should not be counted when both the compound and the component was marked by participants (e.g., marking both barn and barnyard would only count as one word). This was done because otherwise, by design, finding compounds would give more points than other words.

**Final questionnaires.** We assessed several background variables to be able to control for their influence. Participants had to give their sex, age, most recent grades in German, English, and math, as well as parental educational background.

**Results**

**Preliminary analyses.** Except for recent math grades, $r(252) = .20, p = .001$, all background measures (see above) were uncorrelated with actual word search performance, $|r|s \leq .09, ps \geq .154$. We thus report our main results with and without math grades as a covariate.

**Main analyses.** To compare performance in the word-search puzzles, we calculated an ANOVA with our experimental factors of goal and monetary reward as independent variables, and the number of words detected as our dependent variable. This rendered a significant main effect of monetary reward, $F(2, 249) = 5.27, p = .006, \eta^2_p = .041, 90\%-CI [.007-.083]$, and a marginally significant main effect of goal condition, $F(1, 249) = 3.13, p = .078, \eta^2_p = .012, 90\%-CI [.000-.045]$. The interaction between our two manipulations, however, did not reach significance, $F(2, 249) = 0.35, p = .703, \eta^2_p = .003, 90\%-CI [.000-.016]$. Adding math grades as a covariate did not change the pattern of results; the main effect of monetary reward, $F(2, 245) = 3.93, p = .021, \eta^2_p = .031, 90\%-CI [.003-.070]$, the main effect of goal condition, $F(1, 245) = 3.56, p = .060, \eta^2_p = .014, 90\%-CI [.000-.048]$, or the interaction between both factors, $F(2, 245) = 0.50, p = .609, \eta^2_p = .004, 90\%-CI [.000-.021]$, did not change in the level of significance. Please note, three participants did not provide their recent math grades, which is why the number of participants for the ANCOVA is lower than in the ANOVA. As you can see in Table 3, participants in the primed achievement goal condition found more words than participants in the no goal condition did throughout all levels of the incentive value.
factor. Similarly, participants in both the 5€ reward and 50€ reward conditions found more words than participants who had no information about a potential reward throughout both goal conditions.

Further, to test the hypothesis that the primed goal improves performance when the task is not incentivized but its impact is diminished when an incentive is present, we calculated pairwise comparisons comparing goal conditions on each level of the incentive value manipulation with and without considering math grades (see Table 3). Only in the no reward condition, this comparison was (marginally) significant.

Finally, a linear contrast assuming increasing task value in line with the amount of money (i.e., contrast weights of -1, 0, and 1 for the no-reward, 5€, and 50€ conditions, respectively) was significant, $t(165.38) = 2.93, p = .004$, but failed to fit the data better than a simplified version (i.e., comparing only the no-reward to the other two reward-conditions combined; contrast weights of -2, 1, and 1, for the no-reward, 5€, and 50€ conditions, respectively), $t(172.51) = 3.52, p = .001$.

**Table 3.** Means of Word Search Performance in Experiment 3 as a Function of Goal and Monetary Reward Condition

<table>
<thead>
<tr>
<th>Monetary reward condition</th>
<th>Primed goal</th>
<th>No goal</th>
<th>Pairwise comparison</th>
<th>Pairwise comparison adjusted for math grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>No reward</td>
<td>16.9 (3.4)</td>
<td>15.6 (3.7)</td>
<td>$F(1, 82) = 2.86$, $p = .095$, $\eta^2 = .034$</td>
<td>$F(1, 80) = 3.53$, $p = .064$, $\eta^2 = .042$</td>
</tr>
<tr>
<td>5€ reward</td>
<td>18.0 (3.6)</td>
<td>17.6 (3.2)</td>
<td>$F(1, 83) = 0.23$, $p = .632$, $\eta^2 = .003$</td>
<td>$F(1, 82) = 0.19$, $p = .661$, $\eta^2 = .002$</td>
</tr>
<tr>
<td>50€ reward</td>
<td>18.3 (4.0)</td>
<td>17.6 (4.5)</td>
<td>$F(1, 84) = 0.80$, $p = .372$, $\eta^2 = .010$</td>
<td>$F(1, 81) = 0.72$, $p = .398$, $\eta^2 = .009$</td>
</tr>
</tbody>
</table>

*Note.* Pairwise comparisons (unadjusted and adjusted for math grades) compare both goal conditions across respective monetary reward conditions. Standard deviations in parentheses.

**Discussion**

Experiment 3 was designed to test the general hypothesis that priming an achievement goal should lead to increased performance in a subsequent task. Moreover, the interplay between a monetary reward and the primed goal was tested.
We had two competing hypotheses. The first, claiming that incentives by themselves can increase performance and goal effects may no longer be detectable received stronger empirical support than the second hypothesis, claiming that monetary incentives are a precondition for effects of primed goals to emerge. We observed significantly worse performances of control participants compared to participants with a primed achievement goal when the task was not associated with a reward. However, incentivizing performance lead to a performance increase in all conditions and minimized differences between participants with a primed achievement goal and no goal. Moreover, by testing two sets of contrasts, the assumption of a linear increase in performance from no reward over a 5€ reward to a 50€ reward did not fit the data better than assuming that both rewards (i.e., 5€ and 50€) have positive effects on performance which are of equal strength.

Providing low or high incentives for good performance are one way of altering the desirability of doing well on a given task. In the next experiment, we altered this desirability by describing the success on the task as being either indicative of future academic success (or not) to test how primed and deliberate goals guide a person’s behavior under conditions of high or low desirability of successful task performance.

**Experiment 4: Primed and Consciously Set Achievement Goals and Describing Task Success as Indicative of Future Academic Success**

In this last experiment, we varied whether good performance on the task used as our dependent variable is associated with something very desirable, namely future academic success. Participants were told that the task is indicative for their future academic success after they either had been exposed to achievement primes in the form of a scrambled sentence task, read only neutral words in this scrambled sentences task, or read neutral words but had explicit instructions that it is important to perform well.

To be able to say that monetary incentives and the prospect of future academic success differed in desirability, we pretested both incentives used in Experiments 3 and 4 to pilot participants. We asked 27 psychology students to rank the following events according to their desirability: receiving many likes for a picture in social media, receiving 5€, receiving 50€, listen to an exciting lecture, eating an excellent meal, learn a music instrument, learn a language, improve in a hobby, future academic success, future relationship satisfaction. The order of the events listed reflects the
order of their median ratings from least desirable to most desirable. Therefore, we are confident that participants see receiving money as less desirable than a more long-term future academic success.

This last experiment tested the hypothesis that goal strength increases in line with a task’s desirability, as heightened desirability constitutes a precondition for goal pursuit. It would translate into higher performance for participants with an achievement goal only when the desirability of the task’s outcomes is high compared to when it is low. In this experiment, we included a consciously set goal condition to test for potential differences between consciously set and primed goal pursuit. Furthermore, we tested whether increasing the desirability in a more meaningful matter (i.e., the task being described as a predictor of future academic success) than merely having the chance to win money (i.e., Experiment 3), might still have the same performance increasing effects (see above).

Method

Participants and design. One hundred and fifty high school students volunteered to participate in a 15-minute experiment. Participants were randomly assigned to one of the six experimental conditions of a 3 between (achievement goal: consciously set goal vs. primed goal vs. no goal) x 2 between (desirability: indicative for future academic success vs. not indicative) factorial design. During data analysis, five participants were excluded due to having found an amount of words two standard deviations below or above the individual condition’s mean (2 participants in the primed goal condition; 1 participant in the no goal condition, 2 participants in the consciously set goal condition; not a function of goal and value conditions, Fisher’s exact test, \( p = .867 \)). Thus, the final sample consisted of 145 high school students (all but one indicated to be either male or female; of those 76% were female) with a mean age of 17.5 years (SD = 1.3) and allowed us to detect an effect of \( \eta_p^2 = .064 \) for the main effect of our goal manipulation at 80% power.

Procedure. The sequence of tasks was the same as in Experiment 3, and so were the word-search puzzles (i.e., the dependent variable), the counting criteria, and the final questionnaires (see above).

Goal manipulation. Control participants as well as participants in the primed achievement goal condition received the same scrambled sentences task as in Experiment 3. Participants in the consciously set achievement goal condition received
the same set of sentences as control participants but before working on the dependent variable read that they should “strive hard in the subsequent task and try to find as many words as possible” in addition to the desirability manipulation.

**Desirability manipulation.** The first paragraph was the same as in Experiment 3. In the second paragraph, however, participants in the indicative for future success condition read that performance on the task is indicative of their future academic success. Participants in the not indicative condition read that performance on the task is merely a function of which font it is printed in.

**Results**

**Preliminary analyses.** This time, all measures were uncorrelated with actual word search performance, $|r|s \leq .16, ps \geq .058$.

**Main analyses.** To compare performance in the word-search puzzles, we calculated an ANOVA with our experimental factors of goal and desirability as independent variables, and the number of words found as our dependent variable. A significant main effect of desirability, $F(1, 139) = 7.31, p = .008, \eta^2_p = .050, 90\%-CI [.008-.119]$, and a marginally significant main effect of the goal condition, $F(2, 139) = 2.80, p = .064, \eta^2_p = .039, 90\%-CI [.000-.095]$, emerged. The interaction between our two manipulations, however, did not reach significance, $F(2, 139) = 0.22, p = .803$. As one can see in Table 4, participants in the not-indicative condition tended to find more words than participants in the indicative condition throughout all levels of the goal manipulation. Similarly, participants in the primed achievement goal condition found more words than both participants with no achievement goal or a consciously set achievement goal throughout all levels of the desirability manipulation.

Consequently, a planned contrast comparing the two achievement goal conditions to the no goal control condition (i.e., contrast weights of 1, 1, and -2 for the primed achievement goal, consciously set achievement goal, and no goal control conditions, respectively) was not significant, $t(142) = 1.39, p = .166$. A contrast comparing the primed achievement goal condition to the other two conditions (i.e., contrast weights of 2, -1, and -1 for the primed achievement goal, consciously set achievement goal, and no goal control conditions, respectively) was significant, $t(142) = 2.32, p = .022$. This finding is further validated by post-hoc pairwise comparisons between goal conditions. Overall, participants with a primed
achievement goal differed significantly from participants in the no goal control condition ($p = .030$) and marginally significantly from participants with a consciously set achievement goal ($p = .067$). The latter two conditions did not differ from each other ($p = .759$).

**Table 4. Means of Word Search Performance in Experiment 4 as a Function of Goal and Desirability Condition**

<table>
<thead>
<tr>
<th>Desirability condition</th>
<th>Primed goal</th>
<th>Consciously set goal</th>
<th>No goal</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>17.4 (3.6)</td>
<td>16.0 (3.3)</td>
<td>15.8 (4.2)</td>
<td>16.5 (3.8)</td>
</tr>
<tr>
<td>Not indicative</td>
<td>18.2 (3.2)</td>
<td>17.0 (3.1)</td>
<td>16.4 (4.1)</td>
<td>17.3 (3.5)</td>
</tr>
<tr>
<td>Indicative for academic success</td>
<td>16.6 (4.0)</td>
<td>14.9 (3.3)</td>
<td>15.2 (4.2)</td>
<td>15.6 (3.9)</td>
</tr>
<tr>
<td>Pairwise comparison</td>
<td>$F(1, 51) = 2.66$, $p = .109$, $\eta^2 = .050$</td>
<td>$F(1, 43) = 5.25$, $p = .027$, $\eta^2 = .109$</td>
<td>$F(1, 45) = 0.93$, $p = .341$, $\eta^2 = .020$</td>
<td>$F(1, 139) = 7.31$, $p = .008$, $\eta^2 = .050$</td>
</tr>
</tbody>
</table>

*Note. Pairwise comparisons compare both desirability conditions across respective goal conditions. Standard deviations in parentheses.*

**Discussion**

The present experiment was designed to test the general hypothesis that a primed achievement goal should lead to increased performance in a subsequent task. Moreover, the interplay between the desirability of good performance on the task and primed achievement goals was tested. A primed achievement goal raised performance levels throughout both low and high levels of desirability (compared to the no goal control condition), whereas participants with a consciously set achievement goal evinced choking under pressure when desirability was high. In line with other research (e.g., Wallace, Baumeister, & Vohs, 2005), increasing the subjective importance of the task might have led to choking under pressure due to conscious reinvestment (i.e., the phenomenon that performance may deteriorate if conscious attention is directed to its execution; Masters, Polman, & Hammond, 1993) for participants with a consciously set achievement goal. This phenomenon translated into performance-increasing effects of both primed and consciously set achievement goals when the desirability of doing well on the task at hand was low (compared to the no goal control conditions) but a deterioration of performance in participants with
a consciously set goal when the desirability of doing well on the task was high. It is interesting to note that this seems to have affected participants with a primed achievement goal only to a lesser extent as they do not show a significant decline in performance when comparing the desirability conditions. Nevertheless, they do not show better performances when the desirability of a good performance in the task is high.

**General Discussion**

The present paper highlights that many aspects of the environment can contribute to the presence or absence of priming effects. More specifically, different factors may affect whether and how a primed construct may influence behavior. Taken together, we presented four experiments, which investigated different factors affecting the effects of goal priming. These experiments showed that altering either OSA or the desirability of performing well on a given task could systematically moderate the strength of prime-to-behavior effects.

More specifically, the results of our Experiments 1 and 2 suggest that OSA interacts with primed goals in a way that is content-dependent, leading to an effect when the goal’s content itself is in line with the self-standards and no effect when it is not in line. In sum, our results expand on previous research regarding the interplay of priming and OSA, examining self-awareness as a moderator of priming in a motivational context, namely goal priming, and investigating the effect of OSA during a person’s acting on a primed goal instead of during the priming procedure.

We observed in Experiment 1 that goal priming might not be enough to elicit corresponding behavioral consequences. Instead, we found that for individuals exposed to achievement goal priming, only those with a conjointly induced state of OSA showed increased striving to perform well. We argue that this should not be regarded as a failure of replication, but rather as an important insight regarding the identification of a powerful moderator of achievement goal priming. In Experiment 2, we could again observe the moderating effect of creating a state of OSA on goal priming effects, this time with a different goal – the goal of quitting to perform the task at hand rather than excelling in it. Without examining the moderating role of OSA, we might have falsely concluded that the goal priming manipulations used in Experiments 1 and 2 were simply ineffective or at best erratic.
Relevant to these findings, Seitchik and Harkins (2014) investigated the
effects of primed achievement goals and task framing in a social loafing paradigm. In
this paradigm, participants were asked to generate as many uses as they could think of
for a common object (i.e., a knife). Prior to the use-generation-task, they were either
primed with an achievement goal or not and told that their performance would be
evaluated by the experimenter or not. In two experiments, the authors found an
interaction between experimenter evaluation and achievement goal priming, such that
for participants who did not think that they will be evaluated by an experimenter, the
primed achievement goal leads to more generated uses for a knife; in contrast, when
they think they will be evaluated, no effect of the achievement goal priming was
detected (Seitchik & Harkins, 2014). Given that the anticipation of being evaluated
can activate OSA (Duval & Wicklund, 1972) and increase cooperation (Ernest-Jones,
Nettle, & Bateson, 2011), we suggest that both our current experiments and these
findings indicate that the effects of a primed goal are content- and context-dependent
(see Cesario, 2014) – may change based on the activation of OSA. One should note
that while in our Experiment 1 OSA was a necessary factor to observe effects of a
primed achievement goal, Seitchik and Harkins (2014) observed these effects when
OSA (or at least an antecedent of OSA) was absent. Most likely, the choice of
dependent variable is one part of the explanation for these differences. As in our
Experiments 3 and 4, Seitchik and Harkins’ (2014) primed achievement goals exerted
an effect in effort-based but not aversive or muscle-pain inducing tasks (i.e., word
search and use generation instead of hand grip).

To further highlight the importance of considering OSA as a potential
moderator of goal priming effects, we want to point to another recent discussion
regarding a large scale replication effort (registered replication report, RRR;
Wagenmakers et al., 2016) on a well-known experiment (Strack, Martin, & Stepper,
1988) supporting the facial feedback hypothesis (James, 1890; Tomkins, 1962). In
both the original experiment and the RRR, researchers tested the effects of holding a
pen either with the teeth (inducing an expression like smiling) or with the lips
(inducing a facial expression like pouting). Only in the original experiment, however,
these facial expressions had a direct effect on how funny participants rated a set of
cartoons. While the replication effort is laudable and was conducted at utmost levels
of transparency and statistical expertise, the RRR deviated from the original
experiment in several aspects. As Strack (2016) observed, one of these deviations
involved a classic manipulation of OSA: videotaping participants. Considering the results of our Experiments 1 and 2, this ostensibly small deviation from the original protocol may have had a considerable influence. Sensitivity to changes in psychological states which can be brought upon by small changes in experimental procedures may therefore be essential for the best science we can do (Cesario, 2014).

Experiments 3 and 4 highlight the moderating influence of low versus high desirability of performing well on a task on the effects on achievement goal priming on task performance. We hypothesized that for a goal to be pursued, desirability of its outcomes that is the desirability of good performance in a task must be high. Increasing the desirability experimentally should therefore result in increased goal strength. We increased the desirability through the introduction of monetary rewards and by describing the task as indicative for future academic success, an attribute highly desired (see above), or not, in Experiments 3 and 4, respectively. In the absence of monetary rewards, a primed achievement goal raised performance levels of participants significantly, letting them outperform participants in a control condition. The introduction of monetary incentives, however, did not further increase goal strength but diminished the impact by raising performance in both participants with a primed achievement goal and participants in the control condition without an achievement goal. Compared to the low desirability condition in Experiment 4, describing the task as indicative of future academic success, however, led to significant worse performances overall with the strongest decline for participants with a consciously set achievement goal. Participants with a primed achievement goal were not significantly worse but performed (descriptively) better when desirability was low. Therefore, both experiments do not support the hypothesis that for a primed goal to be pursued, desirability of associated outcomes have to be high. Note that in our experiments, the desirability of doing well on a task was manipulated. Aarts, Custers, and Marien (2008) observed heightened effort put into squeezing a hand grip when effort-related words (e.g., exert, vigorous) were primed. Instead of manipulating the desirability of a task’s outcomes, the authors paired the subliminal primes themselves with desirable adjectives (e.g., good, pleasant) during the priming phase and then observed an even larger increase in effort. Similarly, the more important a primed goal itself was to the participants, the stronger was its effect (Marien, Custers, Hassin, & Aarts, 2012). Combined with our results, these findings suggest that increasing the desirability of a goal during motivational phases (i.e., before or during goal setting;
Gollwitzer & Keller, 2016) may lead to increased primed goal strength, whereas increasing the desirability of outcomes during volitional phases (i.e., during goal striving) may not necessarily do so.

**Implications and Future Directions**

In Experiments 3 and 4, increasing the desirability of the outcome affected the effects of achievement goal priming on task performance. Strikingly, participants with a consciously set goal to perform well exhibited significantly worse performance levels when the task was described as indicative for future success in academia than both participants with a primed achievement goal as well as when the task was not described in such a way (Experiment 4). The fact that participants with a primed achievement goal do not (or only to a lesser extent) evince choking under pressure (Masters et al., 1993) may have interesting implications for both research on differences between primed and deliberate goal pursuit (Gollwitzer, Parks-Stamm, & Oettingen, 2009) and for diagnostic tests when a test’s framing seems to be able to influence performance levels.

Furthermore, we suggest future studies that further explore the role of the self as a moderator of prime-to-behavior effects. For example, we suggest experiments that vary the strenuousness of the task and include OSA as a moderator. In addition, future work might use the same behavior, such as ceasing the behavior afforded by the task, framed either negatively such as “quitting” or positively such as “relaxing” to see whether OSA reduces application of the former (as in our Experiment 2) but maybe boosts the application of the latter (as it is a positive, desirable construct; see above).

Finally, we see important implications for self-regulation. Inducing the state of OSA might be a helpful strategy for overcoming unwanted nonconscious influences on behavior. For example, while it may be tempting to give up a long-term goal which is difficult to achieve but very desirable (e.g., a healthy eating goal), inducing OSA may be a way to turn thoughts of quitting into a motivational boost which enhances goal striving. Indeed, it is likely that this strategy will be effective, given previous work showing that priming dieting goals aids in restricted eating (Papies & Hamstra, 2010) and that the presence of a mirror helps dieters make healthy food choices (Sentyrz & Bushman, 1998). Our findings strongly speak for the combination of priming dieting goals and creating a state of OSA.
Conclusion

We try to offer a starting point for new lines of research on potential moderators of primed goal pursuit. So far, we analyzed two such moderators, objective self-awareness and the desirability of good performances on a task at hand. In four experiments, we highlight that primed (much like deliberate) goal pursuit does not happen in complete isolation as a simple prime-to-behavior-expressway. Rather, the contexts in terms of the psychological states of the person (e.g., objective self-awareness), the content of the primed goal, and the features of the task at hand (e.g., low vs. high desirability) need to be considered to understand when and why different behavioral consequences emerge from priming the same type of goal (e.g., the goal to perform well on a given task).
Research Paper III
Overcoming Defensiveness – Learning Goal Orientation and Implementation Intentions Help to Process Negative Feedback

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Abstract
To successfully incorporate negative feedback during goal pursuit, two self-defensive tendencies must be overcome: negative feedback must be processed and challenging situations in which the feedback could be experienced anew must not be avoided. In three experiments, we tested whether naïve theories that one’s abilities are malleable predict the incorporation of threatening, negative feedback about one’s performance. In Experiment 1, we primed learning versus performance goal orientations and observed that compared to participants with a primed performance goal orientation, participants with a primed learning goal orientation exhibited better recall of feedback information as well as better performance in a feedback-related task thereby overcoming the first self-defensive tendency. In Experiment 2, we observed threatening, evaluative feedback to lead to more self-defensive choices concerning the difficulty of the upcoming task than non-evaluative feedback. Neither chronic learning nor performance goal orientation managed to moderate this effect. In Experiment 3, all participants formed a learning goal and one half of them used implementation intentions to stimulate the incorporation of feedback. We confronted participants with threatening, evaluative feedback and observed less defensive choices of task difficulty level compared to participants who merely acted on a learning goal. Chronic learning but not performance goal orientation increased the likelihood of choosing more diagnostic and challenging math problems. The present experiments thus highlight a personal (goal orientation) and a situational moderator (form of feedback) of feedback processing as well as a self-regulatory strategy to further reduce self-defensive tendencies beyond mere learning goals.
**Overcoming Defensiveness – Learning Goal Orientation and Implementation**

**Intention Help to Process Negative Feedback**

In the course of goal pursuit, people commonly receive feedback about their striving. Be it subtle reactions by persons with whom one interacts or an explicit performance report by a supervisor or teacher. This feedback can range from very positive to devastating, can put your performance in reference to other people’s performances, or may simply add external valence to consequences of behavior. Most importantly, however, the incorporation of valid feedback is essential for successful goal striving, for example, to adapt to changing environments, to exert effort accordingly, or as an indicator for goal progress (e.g., Carver & Scheier, 1998).

The model of action phases (Gollwitzer, 1990, 2012) suggests that after enacting goal-directed behaviors, individuals enter a dedicated phase that pertains to the evaluation of prior goal striving. In this postactional phase, feedback helps the individual to identify whether the goal is attained and the effort was worthwhile, or further action is needed. However, a successful and productive incorporation of feedback is not guaranteed. Negative feedback may be threatening to one’s self-image (e.g., Kernis, Brockner, & Frankel, 1989) which is why otherwise helpful negative feedback may be devalued, rationalized, and in the end, ignored (cf. Sharot, Korn, & Dolan, 2011). To successfully incorporate potentially threatening negative feedback in the postactional phase, goal-striving individuals must overcome two self-defensive tendencies. First, they must acknowledge and process the feedback information. Second, they must overcome the tendency to avoid further situations in which the performed skill could be observed and therefore the feedback experienced again (e.g., Atkinson, 1957; Di Paula & Campbell, 2002).

In the following, we will refer to an important personal moderator of how such negative feedback is dealt with: the recipients’ naïve beliefs about their own abilities as either static and fixed (i.e., leading to a performance goal orientation) or developable and malleable (i.e., leading to a learning goal orientation). Subsequently, we will present a situational moderator, the form of the feedback. Lastly, we will present the self-regulatory strategy of specific if-then planning (Gollwitzer, 1999, 2014) to overcome the two self-defensive tendencies and thus successfully incorporate negative feedback.
Learning versus Performance Goal Orientations

Dweck (1996, 1999; for a refinement based on neuroscientific evidence, see Mangels, Butterfield, Lamb, Good, & Dweck, 2006) distinguished between two naïve theories about the malleability of abilities, attitudes, or attributes. The ability to solve math problems, for instance, is seen by some individuals as a given and fixed characteristic (e.g., “I am not made for math”, “Math is one of my talents”) which cannot be drastically influenced by training, learning, or exercise. This may make people refrain from engaging in mathematical thinking if they perceive their math skills to be low but to focus on mathematical thinking if they perceive their skills to be strong. The main concern of individuals with the assumption of a fixed attribute, however, is to perform well which is why they are more likely to set themselves performance goals (e.g., to solve a specific amount of problems, to perform better than others; see also Stone, 1998) and are more concerned what others may think of their performance and how clever they are (Dweck, 1999). If they do not encounter obstacles or setbacks, they may perform well (e.g., VandeWalle, Cron, & Slocum, 2001). When confronted with negative feedback about their performance, however, people with a performance goal orientation tend to underperform (VandeWalle et al., 2001) and to attribute their failure to a lack of ability (vs. a lack of effort; Hong, Chiu, Dweck, Lin, & Wan, 1999). They may search for reasons which may invalidate the task or feedback instead of searching for information to improve their skills. Furthermore, they try to avoid experiencing the negative feedback anew (Dweck, 1999).

In contrast, another group of people may see their ability to solve math problems as something they can develop and improve through training, learning, or exercise (e.g., “If only I practice enough, my math skills will get better”, “My math skills grow with challenges”). Accordingly, individuals with the assumption of a malleable personal attribute are more likely to set themselves learning or mastery goals (e.g., to become better over time, to learn from failure; see also Grant & Dweck, 2003) and are more likely to exhibit self-improvement instead of self-defensiveness (Nussbaum & Dweck, 2008). Furthermore, they are intrinsically motivated to learn in new situations, may perceive failure in achieving top performance as informative feedback and a natural part of the learning process (Dweck, 1999), and attribute their failure to a lack of effort rather than a lack of skill (Hong et al., 1999).
It is important to note that previous research by Dweck, Chiu, and Hong (1995) and her colleagues did not identify one single factor accounting for the perceived malleability of a set of all kinds of attributes and attitudes (e.g., intelligence, morality, and nature of the world) but unique factors for each attribute or attitude. In other words, it is possible that, for instance, a person can hold a malleable belief about her ability to solve math problems but a fixed belief about her moral behavior (e.g., “I did this because I was raised that way”).

These two conflicting naïve theories do not only influence how one sees one’s own abilities and attributes but also how people think about the abilities and attributes of others. Most importantly, they have downstream consequences for behavior. Wood and Bandura (1989; see also Jourden, Bandura, & Banfield, 1991; Tabernero & Wood, 1999) observed that participants with a performance goal orientation had lower perceived self-efficacy than participants with a learning goal orientation. This led to less effective use of analytic strategies and, in turn, to lower performance. However, other research demonstrated that to restore self-esteem, individuals with a learning goal orientation use different strategies than individuals with a performance goal orientation but that both are effective in the restoration of self-esteem (Nussbaum & Dweck, 2008). Research in schools and colleges has lent empirical support for the outlined classification and the impact of learning versus performance goal orientations in learning environments (e.g., Ahmavaara & Houston, 2007; Ames & Archer, 1988; Dupeyrat & Mariné, 2005).

**Evaluative versus non-evaluative feedback.** As outlined above, we propose goal orientations to determine how individuals deal with negative feedback about their performance. Negative feedback can be threatening for one’s self-image and self-esteem. It can cause ruminations about failure which lead to negative affect like depression and anxiety (Jones, Papadakis, Orr, & Strauman, 2013) and it can be counterproductive for future task performance. However, not only the recipient determines in which way the feedback tends to be interpreted. Feedback is often given by setting a performance in relation to a comparison group (e.g., teammates, colleagues, fellow students). This *evaluative* feedback carries information about the value of the observed performance. If, for instance, a student receives his grade accompanied by the average grade of his fellow students, he would not only have the option to think about whether the grade satisfied his own expectations (as it is the case with receiving *non-evaluative* feedback) but also how he performed in relation to
other students. By highlighting the comparison with others instead of the potential for development of the individual, giving evaluative feedback promotes a performance goal orientation (Butler, 1987).

Implementation Intentions

How could we help people with a strong performance goal orientation to face evaluative negative feedback? Merely setting oneself learning goals might not suffice, as goals alone often are not powerful enough to elicit corresponding behavior (Sheeran, 2002; Sheeran & Webb, 2016). Researchers have found that furnishing goals with specific plans (so-called implementation intentions; Gollwitzer, 1999, 2014) can substantially increase goal attainment rates (meta-analysis by Gollwitzer & Sheeran, 2006). A goal intention (e.g., “I intend to do X”) is thereby supplemented by a specific if-then plan (e.g., “If I encounter situation Y, then I will initiate goal-directed behavior Z”). In an implementation intention, the goal-striving individual identifies a suitable opportunity to act (i.e., the if-part), a goal-directed action (i.e., the then-part), and establishes a link between the two. Researchers investigating implementation intentions found that this link does not necessitate a further act of conscious intent (Bayer, Achtziger, Gollwitzer, & Moskowitz, 2009) but leads to efficient and immediate initiation of the planned behavior upon identifying the specified situation (e.g., Brandstätter, Lengfelder, & Gollwitzer, 2001).

Implementation intentions have been proven a suitable strategy for facilitating goal attainment in various behavior change domains such as health, interpersonal, and achievement (e.g., recent reviews by Adriaanse, Vinkers, De Ridder, Hox, & De Wit, 2011; Bélanger-Gravel, Godin, & Amireault, 2013; Toli, Webb, & Hardy, 2016). Most relevant to the present research, implementation intentions have helped individuals to overcome both impulsive behavior in social settings (e.g., regulating social projection; A. Gollwitzer, Schwörer, Stern, Gollwitzer, & Bargh, 2017; helping school-aged children to ignore distractions; Wieber, von Suchodoletz, Heikamp, Trommsdorff, & Gollwitzer, 2011; or regulating the effects of mimicry; Wieber, Gollwitzer, & Sheeran, 2014) and self-defensiveness (e.g., regulating the claiming or creating of self-serving performance handicaps; Thürmer, McCrea, & Gollwitzer, 2013). Compared to goal striving by goal intentions, goal striving that is based on implementation intentions has also been shown to be more immune to disruptions.
caused by adverse internal states (Bayer, Gollwitzer, & Achtziger, 2010) such as negative mood caused by receiving negative feedback.

**The Present Research**

We argue that for the most adaptive incorporation of negative feedback, two self-defensive tendencies must be overcome. First, to overcome the tendency to disregard negative feedback, the feedback information must be acknowledged and processed. Second, to overcome the tendency to avoid further situations in which negative feedback could be experienced again, tasks of challenging instead of easy difficulty must be chosen. We further propose an inter-individual moderator (i.e., the predominant goal orientation) as well as a situational moderator (i.e., the form of feedback) of feedback processing. At last, we suggest that the forming of specific plans can help people to incorporate negative feedback.

In Experiment 1, we test whether a learning goal orientation (vs. a performance goal orientation) facilitates the processing of feedback in the postactional phase. After priming learning versus performance goal orientations and asking participants to take an intelligence test on which they received evaluative negative feedback, we exposed participants to a surprise recall test of feedback information as well as a behavioral measure where they could invest effort in an area related to the feedback. Better recall for feedback information as well as more effort invested in the behavioral measure would signal a deeper processing and acknowledgment of the feedback information (i.e., overcoming the first self-defensive tendency).

In Experiment 2, we move on to test whether the form of feedback further moderates its incorporation in the postactional phase of goal pursuit. We expect that in the absence of a goal orientation manipulation, people react in a maladaptive manner to evaluative negative feedback compared to non-evaluative negative feedback. After facing negative feedback on a first set of math problems, participants can choose which difficulty the second set of problems should have. Choosing a challenging task difficulty (instead of an easy one) would signal the overcoming of the second self-defensive tendency that is the avoidance of situations in which the negative feedback could be experienced anew.

In Experiment 3, we ask people to use implementation intentions to incorporate the negative feedback. We expect that the formation of plans can help incorporating negative feedback independent of the predominant goal orientation. Thus, implementation intentions to incorporate threatening negative feedback should
help people to overcome both self-defensive tendencies of disregarding feedback information and avoiding future situations in which feedback could be experienced again.

**Experiment 1: Manipulating Goal Orientations**

In this first experiment, we want to establish that predominant goal orientations moderate the incorporation of feedback. We use a subtle manipulation to facilitate learning versus performance goal orientations. Following the priming of goal orientations, we give participants evaluative feedback on an intelligence test and provide them with a set of traits they could improve. We test the recall of feedback information as well as let participants work on a task that measures participants’ level of concentration, one of the personal attributes that is mentioned in the feedback.

Being in the postactional phase, a person with a performance goal orientation should be more likely to think that the negative feedback on his performance signals that he is not able to perform well and that pursuing this activity might not be worth the effort (Hong et al., 1999). Furthermore, an individual with a strong performance goal orientation might be prone to selective processing of feedback information or to disregard the information entirely (e.g., Balcetis, 2008). A person with a strong learning goal orientation, in contrast, should be more likely to use the feedback nonetheless to improve her abilities (Hong et al., 1999). Therefore, the way the very same feedback is interpreted may differ as a function of the pre-existing naïve beliefs of the recipient. We expect participants in the learning goal orientation condition to incorporate the negative feedback better as participants in the performance goal orientation. This should be expressed in better retaining and recall of feedback information as well as more effort put into the concentration task.

**Method**

**Participants, design, and sample size considerations.** We recruited 82 students (76% female) with a mean age of 23.1 years ($SD = 7.1$) at a German university. We randomly assigned participants to one of our two experimental conditions (goal orientation: learning vs. performance). This sample allowed us to detect differences between the means of the two experimental conditions of $d = .63$ at 80% power (Faul, Erdfelder, Lang, & Buchner, 2007). Participants were compensated
with 8.00€ or course credit for their participation in the 1-hour experiment. We barred psychology students in their sophomore year or above from participation.

**Procedure.** After being welcomed and their signing of the informed consent form, participants were told that they take part in testing potential tools for the human resources department of a company the university is collaborating with. They first read a company portrait (i.e., to prime the goal orientation) to “get to know” the company and should imagine working for the company. Thereafter, they worked on a set of personality and intelligence tests and received bogus feedback for the intelligence test. They then performed the Frankfurter Aufmerksamkeits Inventar 2 (i.e., our first dependent variable; FAIR-2; Moosbrugger & Oehlschlägel, 2011). Thereafter, we tested the recall of the feedback information (i.e., our second dependent variable). The experiment ended with the debriefing and compensation after participants filled out a questionnaire and performed a voluntary picture-rating task, both suiting the cover story, as well as answered questions concerning their theory of intelligence (Dweck et al., 1995).

**Priming of goal orientations.** The company portraits were used to activate the respective goal orientation by describing the fictitious company “Deckler” and its corporate culture. All participants received the same information about its products, number of employees, and its globalist orientation. The following three sections and the final slogan differed between goal orientation conditions.

In the learning goal orientation condition, the three sections were titled innovative and learning-oriented, forward-looking, and flexible and contained respective information. The final slogan was “A permanent upgrade, on a technical and personal level – that’s Deckler®.”

In the performance goal orientation condition, however, the three sections were titled value-oriented, professional and first class, and performance-oriented and contained respective information. The final slogan was “Quality by high performance, high performance by tradition – that’s Deckler®.”

**Intelligence test and evaluative bogus feedback.** We used four parts (general knowledge, vocabulary, numeracy, and finding of commonalities; in this order) of the revised Hamburger Wechsler Intelligenz Test für Erwachsene (HAWIE-R; Tewes, 1991). Before starting, participants gave their gender and age, ostensibly so that the feedback could be adjusted accordingly. Participants received bogus evaluative feedback indicating that their test score of 41.1 for this part was below the average of
their norm sample of 50.2. Furthermore, participants saw a list of abilities that “show potential for improvement according to their intelligence results.” This list consisted of 15 areas where they could improve, including abstract thinking, to learn from failure, concentration, and develop ideas. Later in the experiment, we assessed if they remembered the feedback score and asked them to recall as many of the areas as possible.

**FAIR-2.** The FAIR-2 is a test for investigating the individual’s capability of continuously directing one’s attention onto relevant stimuli (Moosbrugger & Oehlschlägel, 2011). Participants worked on the FAIR-2 after receiving negative feedback about their performance on the intelligence test and potential areas to improve, one of which was concentration. The FAIR-2 thus constituted an opportunity to exercise and improve. In the FAIR-2, participants are asked to draw a continuous line under rows of symbols that vary in two dimensions (shape and number of dots). Whenever one of two predefined critical symbols is encountered (e.g., a circle with three dots in it), participants should draw a line through the symbol. This approach allows to control for misses (i.e., critical symbols were passed without being crossed out), false alarms (i.e., non-critical items were crossed out), and hits (i.e., critical symbols were crossed out); also, it does not allow participants to correct their answers.

The FAIR-2 provides three performance indices, which can be converted into stanine values to relate performance to the norming sample and thus ease interpretation. *Performance* is assessed by the amount of correctly processed items and is an indicator of work speed. *Quality* is assessed by the relative number of errors (i.e., misses and true errors) and is an indicator of carefulness and accuracy. *Continuity* is the product of the two and indicates whether the demanded concentration was kept up over time.

**Questionnaires.** To increase the credibility of the cover story, we added several personality inventories as well as a voluntary task; these were not analyzed any further. Furthermore, participants filled out a German version of the *Organizational Commitment Questionnaire* (OCQ; Mowday, Steers, & Porter, 1979) to see whether participants identified with the fictitious company. The OCQ indicates the affective bond between employees and the organization they work for; participants should imagine working for the fictitious company Deckler.
At the end, we asked participants how they would rate the subjective accuracy (“How much did the feedback match your own estimate of intelligence?”) and credibility (“How much did you believe the feedback to be true?”) of the feedback on a 7-point scale ranging from 1 – *not at all* to 7 – *very much.*

**Results and Discussion**

**Preliminary analyses.** In line with previous research (Dweck et al., 1995), we did not find an effect of our goal orientation manipulation on naïve intelligence theory: The comparison of goal orientation conditions (learning vs. performance) regarding their naïve intelligence theory was not significant, $t(80) = 0.26, p = .795$. Similarly, there were no significant differences between conditions in participants’ ratings of the feedback’s subjective accuracy, $t(80) = 0.82, p = .413$, or credibility, $t(80) = 0.73, p = .470$. Overall, participants rated the feedback’s credibility as below the midpoint of the scale and thus as rather not credible, $M = 3.0, SD = 2.0$.

However, conditions did differ in their affective commitment to the organization as assessed through the OCQ. Participants in the learning goal orientation condition indicated a stronger commitment than participants in the performance goal orientation condition, $M = 3.7, SD = 0.5$ versus $M = 3.3, SD = 0.8$, respectively, $t(71.7) = 2.58, p = .012, d = 0.570, 95\%$-CI [0.125-1.011]. This implies that participants in the learning goal orientation condition saw the fictitious employer as more favorable and developed a stronger bond compared to participants in the performance goal orientation condition.

**FAIR-2 performance.** To test whether goal orientation conditions differed in their FAIR-2 performance, a MANOVA with stanine values of all three indices of the FAIR-2 (performance, quality, and continuity) as dependent variables and goal orientation condition as the independent variable was conducted. Using Pillai’s trace, the MANOVA indicated a marginal significant effect of goal orientation condition on FAIR-2 performance, $F(3, 77) = 2.64, p = .056, \eta^2_{multivariate} = .093$, 90\%-CI [0.000-0.179]. Follow-up analyses showed that goal orientation conditions only differ in quality, $F(1, 79) = 6.80, p = .011, \eta^2_p = .079, 90\%$-CI [0.010-0.184], but not performance or continuity, $Fs \leq 1.80, ps \geq .184, \eta^2_p s \leq .022$. Figure 7 depicts the FAIR-2 scores as a function of primed goal orientations. In their quality score, participants in the learning goal orientation condition were slightly above average, $M = 5.5, SD = 1.9$, and outperformed participants in the performance goal orientation
condition by one stanine, \( M = 4.5, SD = 1.6 \). Because the quality score represents carefullness and accurateness, the difference in performances between goal orientations means that participants primed with a learning goal orientation more likely took the FAIR-2 as an opportunity to grow following the feedback that indicated that concentration is an area in which they could grow. In contrast, participants with a primed performance goal orientation may have interpreted the received feedback as indicating a lack of skill (vs. a lack of effort) and thus were inclined to disengage from further striving.

**Figure 7.** Stanine scores in the FAIR-2 as a function of primed goal orientation (error bars represent standard errors).

**Recall of feedback information.** To test whether our experimental manipulation affected the ability to recall the feedback information correctly, we conducted a logistic regression for the recall of feedback scores as well as compared the average amount of areas the feedback indicated participants could improve in.

Participants in the learning goal orientation condition were more than one and a half times more likely to recall their feedback score correctly than participants in the performance goal orientation condition, as depicted in the right panel of Figure 8 and indicated in a logistic regression using experimental condition to predict whether the participants recalled their feedback score correctly, \( p = .042, OR = 2.57, 95\%-CI [1.04-6.36], \chi^2(1) = 4.28, p = .039, \) Nagelkerke’s \( R^2 = .039 \). As one can see in the left panel of Figure 8, participants with a primed learning goal orientation also remembered more areas in which the bogus feedback indicated they could improve,
Experiment 1

\[ M = 3.2, SD = 1.5, \] compared to participants with a primed performance goal orientation, \( M = 2.4, SD = 1.5, t(77) = 2.15, p = .035, d = 0.475, \] 95%-CI [0.034-0.913]. These results clearly show that participants primed with a learning goal orientation remembered more of the feedback than participants primed with a performance goal orientation.

Taken together, the results of this first experiment corroborate the assertion that a performance goal orientation is associated with an avoidance of processing negative feedback. Participants with a primed performance goal orientation were less likely to recall their feedback score correctly, remembered fewer areas that have been described as areas one could improve, and performed worse in a subsequent task compared to participants with a primed learning goal orientation.

**Figure 8.** Recall of feedback items and the feedback score as a function of primed goal orientation (error bars represent standard errors).

**Experiment 2: Evaluative versus Non-Evaluative Negative Feedback**

The first experiment demonstrated that participants with a primed performance goal orientation may give in to their self-defensive tendency to ignore negative feedback on their performance. Building on this finding that the predominant goal orientation moderates the incorporation of feedback in the postactional phase of goal pursuit, we now turn to another proposed moderator over which the goal-striving individuals have no immediate control over: the form of feedback they receive. In the second experiment, we test the hypothesis that participants react differently to evaluative versus non-evaluative feedback on their performance. We specifically
address the second proposed self-defensive tendency by testing whether participants who receive negative evaluative feedback choose easy and thus nondiagnostic tasks over medium-to-hard and thus diagnostic tasks in an upcoming test. We propose that when being compared to others, people’s need of a good appearance will take precedence over further development of their skills.

In this second experiment, we do not manipulate goal orientations on the spot but assess participants’ chronic goal orientations. Still, we expect that participants’ chronic goal orientations should moderate the impact of evaluative negative feedback. Participants with a strong chronic learning goal orientation should be eager to choose challenging task difficulties independent of the form of feedback. Participants with a strong chronic performance goal orientation, on the other hand, should choose easy task difficulties especially when the feedback they receive highlights the comparison with others (i.e., evaluative feedback).

Method

Participants, design, and sample size considerations. We recruited 64 students (77% female) with a mean age of 23.5 years (SD = 6.5) at a German university. We assigned participants to one of two experimental conditions (feedback: evaluative vs. non-evaluative) in an alternating way. This sample allowed us to detect differences between the means of the two experimental conditions of $d = .71$ at 80% power (Faul et al., 2007). Participants were compensated with 6.00€ or course credit for their participation in the 45-minute experiment. Psychology students in their sophomore year or above were barred from participation.

Procedure. After being welcomed by the experimenter, participants gave their informed consent and then solved a first set of math problems. While the experimenter prepared the bogus feedback, participants completed questionnaires assessing learning and performance goal orientations among other questionnaires, which suited the cover story of the experiment. Then, participants received the negative bogus feedback and could choose the difficulty of their second set of math problems. Following their choice, all participants solved the second set of math problems. Thereafter, participants answered a questionnaire assessing their chronic learning and performance goal orientations, were asked to state their demographic data (e.g., age, gender) as well as what they thought the purpose of the experiment
was. At last, they rated the negativity and credibility of the feedback, were fully
debriefed and compensated.

**Math problems.** We used the same set of 70 math problems modeled after the
*Konzentrations-Leistungs-Test* in its revised form (Düker, Lienert, Lukesch, &
Mayrhofer, 2001) before and after giving bogus feedback. At both times, participants
had six minutes to solve as many of the 70 problems as possible. When administered
for the second time, the math problems appeared in a new order to evoke the
impression of a new set of math problems. The math problems demand participants to
solve up to three equations, memorize each result, and, finally, subtract the lowest
from the highest result. The math problems’ difficulty levels were devised to range
from easy (i.e., two equations, only subtraction and addition) over medium (i.e., two
equations, only multiplication and division) to hard (i.e., three equations, only
subtraction and addition). Please note that while participants saw math problems of all
three difficulties, this classification was never presented to the participants.

**Feedback manipulation.** All participants received bogus feedback after their
first set of math problems. Feedback in both conditions was presented on a printout,
handed out to them by the experimenter, individualized by a subject code. In the
evaluative feedback condition, the feedback read that they would have solved 18% of
the math problems correctly while the average solution rate of students between 18
and 27 years old would be 46%. Therefore, the printout further indicated that their
performance would lie in the 39th percentile which means that 6 of 10 participants of
their reference group have shown better performances on this task.

In the non-evaluative feedback condition, participants read that they solved
18% of the presented math problems correctly. No information regarding a reference
group was given.

**Dependent variable: choice of difficulty.** After having received the bogus
feedback regarding their first performance, participants had to choose the difficulty of
a second set of math problems to be worked on thereafter. They had the choice
between easy, medium, or hard. Participants were told that these ratings are based on
how, on average, other students rated the respective difficulty.

**Questionnaires.** To assess learning and performance goal orientations, we
devised two six-item scales similarly to questions used in previous research (Button,
Mathieu, & Zajac, 1996). Both scales could be answered on a five-point scale ranging
from *does not apply* to *does fully apply* and were administered after the first and after
the second set of math problems. Internal consistencies of learning goal orientation (e.g., “I like challenging and difficult tasks, because I can learn a lot from them”, “An important quality of being a good student is to always improve at such tasks and learn new things”) at the first and second assessment were acceptable, Cronbach’s $\alpha = .62$ and .72, respectively. For performance goal orientation (e.g., “I would rather abort math and memory tasks than being evaluated badly”, “I am happy when I perform better in math and memory tasks than others”), internal consistencies were better after excluding one item (“Competing with peers in assessment centers motivates me”) but still rather low, Cronbach’s $\alpha = .54$ and .61, for the first and second assessment, respectively.

Participants were further asked whether they experienced the feedback to be negative (on a five-point scale), whether they found it to be credible (yes/no answer), and to state their demographics (gender, age, major, mother tongue) as well as to reveal their math grade in their final secondary-school examinations (i.e., Abitur).

Results and Discussion

Preliminary analyses. We first compared feedback conditions (evaluative vs. non-evaluative) to test whether they differed in learning or performance goal orientation at the first assessment. This was not the case, all $t$s < 0.55, all $p$s > .583. Similarly, there were no significant differences in participants’ ratings of the feedback’s negativity, $t(62) = 1.59, p = .116$, or credibility, $\chi^2(1) = 0.06, p = 1$. Twenty-three of our 64 participants (i.e., 36%) rated the feedback as not credible.

Main analyses. Because only very few participants chose hard math problems (8 out of 64 participants), we combined medium and hard choices into medium-to-hard. A logistic regression analysis was conducted to predict choice of difficulty using feedback condition as a predictor while controlling for chronic learning goal orientation, chronic performance goal orientation, and math ability assessed via their final math grade. A test of the full model was statistically significant, indicating that the variables as a set reliably influenced difficulty choice, $\chi^2(4) = 12.62, p = .013$, Nagelkerke’s $R^2 = .245$. In addition, adding the feedback condition after already controlling for chronic goal orientations and math ability, significantly increased the explanatory power of the model, $\chi^2(1) = 5.22, p = .022$, change in Nagelkerke’s $R^2 = .096$. A complete overview of the stepwise logistic regression is given in Table 5.
Examining the individual model coefficients, Wald criteria indicated that only math ability \((p = .030)\) and feedback condition \((p = .030)\) were significant predictors for the level of difficulty the participants chose to work on. Rather surprisingly, chronic learning goal orientation \((p = .242)\) and chronic performance goal orientation \((p = .417)\) did not influence choice of difficulty level. Odds ratios (see Table 5) indicated that both better math grades and non-evaluative feedback led to higher probability of choosing more medium-to-hard math problems for the second math test. In other words, participants who received non-evaluative feedback (instead of evaluative feedback) were on average almost three times more likely to choose math problems of medium-to-hard difficulty after controlling for the influence of math abilities by controlling for math grades. The proportions of participants who chose medium-to-hard math problems as a function of experimental condition in Experiment 1 are presented in Table 6.

**Table 5. Logistic Regression for Experiment 2**

<table>
<thead>
<tr>
<th>DV: easy (0) vs. medium-to-hard (1)</th>
<th>95%-CI and Odds Ratio (OR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(B (SE))</td>
</tr>
<tr>
<td>Step 1(^A)</td>
<td>Constant</td>
</tr>
<tr>
<td></td>
<td>Performance goal o.</td>
</tr>
<tr>
<td></td>
<td>Learning goal o.</td>
</tr>
<tr>
<td></td>
<td>Math grade</td>
</tr>
<tr>
<td>Step 2(^B)</td>
<td>Constant</td>
</tr>
<tr>
<td></td>
<td>Performance goal o.</td>
</tr>
<tr>
<td></td>
<td>Learning goal o.</td>
</tr>
<tr>
<td></td>
<td>Math grade</td>
</tr>
<tr>
<td>non-evaluative feedback</td>
<td>1.35 (0.62)</td>
</tr>
</tbody>
</table>

\(^A\) \(R^2 = .111\) (Cox & Snell), .149 (Nagelkerke); Model \(\chi^2(3) = 7.40, p = .060\).

\(^B\) \(R^2 = .182\) (Cox & Snell), .245 (Nagelkerke); Step \(\chi^2(1) = 5.22, p = .022\); Model \(\chi^2(4) = 12.62, p = .013\); \(LL\) = lower limit; \(UL\) = upper limit

Furthermore, we tested whether chronic learning and performance goal orientations changed in between the two assessments (i.e., before and after receiving negative feedback). We conducted repeated measures ANOVAs with assessment (after the first set of math problems vs. after the second set of math problems) as a within-factor and feedback condition as a between-factor for both chronic learning
and performance goal orientations. The ANOVAs did not render significant effects neither for chronic learning goal orientation nor for chronic performance goal orientation (all \(Fs < 2.13, ps > .150, \eta^2_p s < .033\)). This finding corroborates the stability of these chronic orientations but must be interpreted cautiously because of the rather low internal consistency of both scales.

Taken together, the results of this second experiment show that receiving negative evaluative feedback about one’s performance can bring people to prefer easy over more challenging levels of task difficulty. So, the effect of evaluative feedback is similar to what one can usually observe in performance goal oriented entity theorists who want to avoid having to experience failure again (see also Atkinson, 1957). Because choosing problems that are more challenging would have been beneficial for further skill development, choosing easy problems is counter-productive in terms of achieving improvements. However, we did not observe effects on or of chronic performance or learning goal orientation in this experiment. This means, on the one hand, that receiving (evaluative vs. non-evaluative) negative feedback did not influence the naïve theories of participants. On the other hand, people with a strong learning goal orientation were as likely to fall prey to the effect of evaluative feedback as people with weaker learning goal orientations or a strong performance goal orientation. Apparently, receiving negative feedback does not trigger the setting of learning goals even for participants with a strong chronic learning goal orientation.

**Table 6.** Proportions of Participants Who Chose Medium-To-Hard Math Problems in Experiments 2 and 3 as a Function of Feedback and Goal Condition, respectively

<table>
<thead>
<tr>
<th>Difficulty chosen</th>
<th>Experiment 2</th>
<th>Experiment 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-evaluative feedback</td>
<td>Evaluative feedback</td>
</tr>
<tr>
<td>Medium-to-hard</td>
<td>68.8%</td>
<td>46.9%</td>
</tr>
</tbody>
</table>

*Note.* Grey shade indicates conditions with evaluative negative feedback.

**Experiment 3: Learning Goals and Implementation Intentions**

In Experiment 1, we observed that participants with a performance goal orientation show worse recall for feedback information. In Experiment 2, we observed that participants who receive evaluative negative feedback are less likely to choose challenging over easy math problems, while there was no evidence of chronic
learning goal orientation moderating this effect on choice. Experiment 3 now tests the idea that having an explicit learning goal may help with the incorporation of evaluative negative feedback and thereby affect the subsequent choice regarding task difficulty.

Whereas participants in Experiment 2 were merely instructed to perform the task at hand, participants in Experiment 3 are now asked in addition to form an explicit learning goal. To enhance its effect, one half of the participants is asked to supplement this learning goal by forming an implementation intention to consider negative feedback. As outlined above, we assume that a learning goal alone should not suffice in helping participants to overcome their self-defensive tendencies and to choose a task difficulty that can help them to improve their performance. Participants may have to furnish their learning goal with implementation intentions to incorporate the negative feedback in order to accrue beneficial effects.

Method

Participants, design, and sample size considerations. We recruited 64 students (66% female) with a mean age of 22.8 years ($SD = 4.7$) at a German university. We randomly assigned participants to one of the two experimental conditions (learning goal vs. learning goal and implementation intention). Participants were compensated with 6€ or course credit. Again, psychology students in their sophomore year or higher were barred from taking part. Sample size was determined to be equal to that of Experiment 2.

Procedure. We did not alter the procedure of Experiment 2 except for the goal manipulation. The goal manipulation took place immediately after participants gave their informed consent. Experiment 3 thereafter followed the same procedures as Experiment 2.

Feedback. All participants received evaluative feedback, indicating that they solved 18% of the math problems correctly, that the average solution rate for their peers was 46%, and that this performance puts them into the 39th percentile (see Experiment 2).

Goal manipulation. After having learned about the nature of the upcoming tasks, all participants were asked to form the learning goal “I want to improve!” Participants were asked to write down this goal twice.
In addition to the learning goal above, participants in the implementation intention condition were also asked to form the plan “And if I receive feedback, then I will think about how to perform the task better.” Participants were asked to write down the goal and the added plan twice.

**Dependent variable: choice of task difficulty.** We assessed the dependent variable as in Experiment 2. Participants again had the choice between easy, medium, or hard math problems. They were told that these classifications are based on how other students rated the difficulty of the math problems.

**Questionnaires.** We used the same questionnaires as in Experiment 2. Internal consistencies of learning goal orientation at both assessments after the first and second set of math problems were acceptable, Cronbach’s $\alpha = .68$ and $.67$, respectively. For performance goal orientation, internal consistencies were slightly better after excluding the same item as in the previous experiment, Cronbach’s $\alpha = .58$ and $.67$, for the assessments after the first and second set of math problems, respectively.

**Results and Discussion**

**Preliminary analyses.** We first compared the experimental conditions (learning goal vs. learning goal and implementation intention) to test whether they differed in learning or performance goal orientation after solving the first set of math problems. This was not the case, all $t$s $< 1.24$, all $p$s $>.220$. Similarly, there were no significant differences in participants’ ratings of the feedback’s negativity, $t(62) = 0.89$, $p = .378$, or credibility, $\chi^2(1) = 0.61$, $p = .603$. This time, only 23 of our 64 participants (i.e., 36%) rated the feedback as credible.

**Main analyses.** This time, 12 out of 64 participants chose hard math problems. To be able to compare the results to Experiment 2, we nevertheless decided to combine choices of medium and hard difficulty. A logistic regression analysis was conducted to predict choice of difficulty using goal condition as a predictor while controlling for chronic learning goal orientation, chronic performance goal orientation, and math ability assessed via their final math grade at their high school. A test of the full model was statistically significant, indicating that the variables as a set reliably influenced difficulty choice, $\chi^2(4) = 16.06$, $p = .003$, Nagelkerke’s $R^2 = .312$. Also, adding the goal condition after already controlling for chronic learning and performance goal orientations as well as math ability, increased the explanatory
power of the model in a marginally significant way, \( \chi^2(1) = 3.01, p = .083 \), change in Nagelkerke’s \( R^2 = .052 \). A complete overview of this stepwise logistic regression is given in Steps 1 and 2 of Table 7.

Examining the individual model coefficients, Wald criteria indicated that math ability \( (p = .022) \), chronic learning goal orientation \( (p = .034) \), and goal condition \( (p = .093) \) were (marginally) significant predictors at which difficulty level participants chose to work on. Again, chronic performance goal orientation \( (p = .565) \) did not influence the choice of difficulty level. Odds ratios (see Table 7) indicated that better math grades, higher chronic learning goal orientation, and implementation intentions made it more likely that participants chose more difficult math problems for the second set. In other words, participants who also formed implementation intentions (instead of merely forming an explicit learning goal) were on average two times more likely to choose math problems of a diagnostic difficulty level instead of an easy, undiagnostic difficulty level for the second set of math problems. Similarly, participants who were one unit more learning goal oriented were more than two times more likely to choose medium-to-hard over easy math problems. Table 6 also depicts the proportions of participants of Experiments 2 and 3 who chose medium-to-hard math problems in the experimental conditions (i.e., the feedback conditions of Experiment 2 and the goal conditions of Experiment 3).

Furthermore, we tested whether learning and performance goal orientations changed in between the two assessments. Therefore, we conducted repeated measures ANOVAs with assessment (after the first set of math problems vs. after the second set of math problems) as a within-factor and goal condition as a between-factor for both learning and performance goal orientations. The ANOVAs rendered no significant effects for learning goal orientations (all \( F_s < 1.22, ps > .275 \)). For performance goal orientation, however, a marginally significant main effect of assessment emerged, \( F(1, 62) = 3.63, p = .062, \eta^2_p = .055, 90\%\text{-CI} [.000-.166] \). This effect was not qualified by an interaction between assessment and goal condition, \( F(1, 62) = 0.75, p = .388 \). Participants of both goal conditions reported a slightly lower performance goal orientation following the negative feedback at Time 2, \( M = 3.0, SD = 0.6 \), compared to Time 1, \( M = 3.1, SD = 0.6 \).
### Table 7. Logistic Regression for Experiment 3

<table>
<thead>
<tr>
<th>Step 1A</th>
<th>DV: easy (0) vs. medium-to-hard (1)</th>
<th>B (SE)</th>
<th>95%-CI and Odds Ratio (OR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-4.13 (2.61)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance goal o.</td>
<td>-0.46 (0.52)</td>
<td>0.23</td>
<td>0.63</td>
</tr>
<tr>
<td>Learning goal o.</td>
<td>1.02 (0.55)</td>
<td>0.96</td>
<td>2.78</td>
</tr>
<tr>
<td>Math grade</td>
<td>0.25 (0.10)</td>
<td>1.05</td>
<td>1.29</td>
</tr>
</tbody>
</table>

| Step 2B | Constant | -5.79 (2.96) | |
| Performance goal o. | -0.31 (0.54) | 0.25 | 0.73 | 2.12 |
| Learning goal o. | 1.25 (0.59) | 1.10 | 3.48 | 10.98 |
| Math grade | 0.24 (0.11) | 1.04 | 1.28 | 1.57 |
| Implementation intention | 1.10 (0.65) | 0.83 | 3.00 | 10.81 |

| Step 3C | Constant | -7.80 (3.67) | |
| Performance goal o. | -0.23 (0.59) | 0.25 | 0.80 | 2.51 |
| Learning goal o. | 1.72 (0.66) | 1.53 | 5.60 | 20.50 |
| Math grade | 0.20 (0.12) | 0.97 | 1.22 | 1.55 |
| Implementation intention | 1.28 (0.74) | 0.85 | 3.61 | 15.32 |
| Feedback rated as credible | -1.92 (0.72) | 0.04 | 0.15 | 0.60 |

**Note.**

- $A^2 = .187$ (Cox & Snell), .260 (Nagelkerke); Model $\chi^2(3) = 13.05, p = .005$;
- $B^2 = .225$ (Cox & Snell), .312 (Nagelkerke); Step $\chi^2(1) = 3.01, p = .083$; Model $\chi^2(4) = 16.06, p = .003$;
- $C^2 = .319$ (Cox & Snell), .442 (Nagelkerke); Step $\chi^2(1) = 8.10, p = .004$; Model $\chi^2(4) = 24.16, p < .001$; $LL = \text{lower limit}; UL = \text{upper limit}$

Throughout Experiments 2 and 3, participants judged the feedback not to be very credible. A significant proportion of 36% and 64% of participants in Experiments 2 and 3, respectively, denied the credibility of the feedback. This may be due to the following reasons: First, participants may think that the information about the performance of other participants cannot be real. However, the fact that credibility ratings did not differ between the evaluative and non-evaluative feedback conditions of Experiment 2, of which the latter did not receive information about the performance of other participants at all, rules this out as an explanation. The second reason may pertain to the feedback score of the participants’ own performances. The bogus feedback used indicates a solution rate of 18% for the first set of math problems. This would mean that participants would have solved 13 (out of the 70)
items correctly. Participants of Experiments 3 who think of the feedback as credible solved on average exactly 13.0 math problems ($SD = 6.7$), whereas participants who rated the feedback as not credible solved on average 18.3 math problems ($SD = 7.9$); this difference was significant, $t(62) = 2.70, p = .009, d = 0.703, 95\%$-CI [0.176-1.226]. This implies that participants accurately judged the feedback as not credible because they indeed performed better on the task. Adding credibility to the logistic regression (in addition to chronic learning goal orientation, chronic performance goal orientation, math grades, and experimental condition) altered the results slightly. Whereas the influence of the experimental condition (i.e., implementation intentions) remained stable, math grades lost explanatory power while the influence of chronic learning goal orientations became even stronger (see Step 3 of Table 7). This implies that even when the effect of credibility of the feedback is controlled for, implementation intentions and a strong chronic learning goal orientation still helped participants to react to the feedback in a more productive way.

In this third and last experiment, we observed that furnishing a learning goal with implementation intentions made it more likely for participants to choose medium-to-hard over easy tasks compared to only setting a learning goal. Participants with an implementation intention were more likely to choose diagnostic task difficulties (i.e., difficult tasks instead of unchallenging easy tasks). This is striking because all participants in this experiment received evaluative negative feedback, which is potentially threatening and should lead to reduced processing of negative feedback (Experiment 1) and to preferring tasks of lower difficulty level (Experiment 2). In this third experiment, we were also able to observe an effect of the participants’ chronic learning goal orientation on task choice, which did not emerge in the second experiment. Taking the two different findings of Experiments 2 and 3 together, this may imply that people with a strong learning goal orientation may not always set themselves a learning goal if not explicitly asked to do so. When, however, they are asked to form a learning goal, they benefit from the fit between the active goal and their chronic learning versus performance goal orientation.

**General Discussion**

We hypothesized that to successfully incorporate negative feedback, two self-defensive tendencies must be overcome. First, goal-striving individuals must acknowledge and process the negative feedback. The self-defensive tendency not to
acknowledge and process negative feedback was tested in our first experiment where we observed that people with an activated learning goal orientation retain negative feedback information better than people with an activated performance goal orientation. Subsequently, they invested more effort in a task related to the feedback information.

Second, goal-striving individuals must not avoid the experience of negative feedback anew. The self-defensive tendency to avoid further challenges by choosing low task difficulty levels instead of challenging task difficulty levels was tested in our second and third experiments. In Experiment 2, we observed that people are more likely to choose easy over medium-to-hard task difficulty levels after receiving negative evaluative feedback compared to receiving non-evaluative negative feedback. The form of feedback (i.e., evaluative feedback) is therefore detrimental to the incorporation of negative feedback by promoting self-defensiveness, while chronic goal orientations did not moderate this effect. We built upon these findings by asking participants in Experiment 3 to form an implementation intention to investigate whether implementation intentions are able to counter the effects of evaluative feedback and make it more likely that people choose tasks of a challenging difficulty level after receiving evaluative negative feedback. By explicitly asking for the formation of learning goals, we were able to observe more productive reactions to negative feedback, namely the subsequent choice of challenging task difficulties. A strong chronic learning goal orientation further eased the incorporation of negative feedback in our third experiment.

In sum, the avoidance of processing negative feedback as well as avoiding the possibility of experiencing negative feedback anew by choosing to work on easy math problems after receiving evaluative feedback was overcome by a primed learning goal orientation and learning goals supplemented with specifically tailored if-then plans, respectively. This set of results is compatible with earlier research. In one set of studies, Hong and colleagues (1999) manipulated goal orientations and gave negative, evaluative bogus feedback on participants’ performance. They subsequently observed lower willingness among participants with a performance goal orientation to take part in a remedial tutorial. At the end of their experiment, participants with a performance goal orientation also indicated that they would have preferred to have had easier tasks. Participants with a learning goal orientation, in contrast, were fine with having had to work on difficult and challenging items although both participants with performance
and learning goal orientations received the same negative feedback on their performance. By extending this to the choice of task difficulty immediately following the negative feedback, the present experiments corroborate the findings of Hong and colleagues (1999). Interestingly, goal orientations also affect choice of feedback. Participants with a learning goal orientation were more likely to choose feedback which helped them to master the task at hand, whereas individuals with a performance goal orientation chose to see normative (i.e., evaluative) feedback (Butler, 1993).

**Implications and Future Directions**

The overwhelming amount of research on performance versus learning goal orientations has painted a rather dark picture for individuals who hold a strong performance goal orientation (e.g., Ames & Archer, 1988; Dupeyrat & Mariné, 2005; Dweck, 1999). In the following, we thus propose two future directions for research on potential interventions: First, we can address the reasons why performance goal-oriented participants may underperform. Second, we want to propose the use of implementation intentions to help individuals to adopt a learning goal orientation.

The disregard of negative feedback expressed by performance goal oriented individuals, indicated for instance in their worse recall of feedback information in Experiment 1, seems to expand even into their thinking about the future. When thinking about the future, people may either think only about positive outcomes or also about the setbacks (e.g., negative feedback) and obstacles they must cope with to reach the positive outcomes. In their research on the effects of merely engaging in positive fantasies, Kappes, Stephens, and Oettingen (2011) observed that engaging in positive fantasies translated into less optimal academic outcomes (i.e., lower GPA) for persons with a strong performance goal orientation but not that much for persons with a weak performance goal orientation; also the calming effects of thinking positively about the future on anger and anxiety were less pronounced in people with a strong performance goal orientation. The authors therefore suggest that getting people with a strong chronic performance goal orientation to fantasize about setbacks would allow for a substantial improvement. Our findings in respect to priming of goal orientations as well as utilizing the self-regulatory strategy of implementation intentions suggest that both techniques can be used to help individuals to enact the recommendations of the authors (Kappes et al., 2011), that is to fantasize about the experience of negative feedback in the future. Related, the self-regulatory strategy of mental contrasting with
implementation intentions (Oettingen, Wittchen, & Gollwitzer, 2013), which first prompts the individual to think about a positive future and then to contrast it with the present obstacles, uses implementation intentions to overcome the identified obstacles. It is very likely that especially participants with a performance goal orientation profit from the use of mental contrasting with implementation intentions as the present research shows that one obstacle, the incorporation of negative feedback, can be effectively regulated by implementation intentions.

Another interesting avenue for future research could target the following question: Can individuals utilize implementation intentions to change their predominant goal orientation? In a study on personality change, Hudson and Fraley (2015) observed that implementation intentions helped participants to change the personality trait of extraversion. Similarly, participants with a chronic performance goal orientation might be willing to adopt a learning goal orientation but lack the effective self-regulation tools to support such a change. According to the results of our research, formulating specific if-then plans to help them in typical negative feedback situations may prove to be effective.

**Conclusion**

The present research shows that the incorporation of negative feedback depends on the activated goal orientation of the recipient (i.e., learning vs. performance goal orientation; Experiment 1), the form of the feedback (i.e., evaluative vs. non-evaluative; Experiment 2), and whether the recipient formed specific if-then plans to better incorporate the negative feedback (i.e., the formulation of implementation intentions; Experiment 3). By showing that negative effects of evaluative feedback can be countered by the use of implementation intentions, we provided further evidence on the usefulness of this self-regulation strategy. We further validated that a strong learning goal orientation not only hinders the self-defensive tendency to avoid subsequent situations in which failure could be experienced anew (Experiments 2 and 3) but also helps to overcome the self-defensive tendency to ignore negative feedback (Experiment 1). Taken together, these findings should be considered when designing learning environments or trying to help individuals to deal with setbacks.
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Record of Achievement

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Research Paper I
I contributed to the following: design of all experiments, programming of the task paradigm, creating experimental material, data collection and analysis, interpretation and theoretical refinement, and writing the manuscript.

Research Paper II
I contributed to the following: design of Experiments 1, 3, and 4, creating material for Experiments 1, 3, and 4, data collection of Experiments 1, 3, and 4, data analysis, interpretation and theoretical refinement, and writing the manuscript.

Research Paper III
I contributed to the following: data analysis, interpretation and theoretical refinement and classification, and writing the manuscript.