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A meta-analysis of induced achievement goals: the moderating effects of goal standard and goal framing

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Abstract
In this paper, we present a meta-analysis of the motivational and performance effects of experimentally induced achievement goals and the moderating effects of *goal standard* and *goal framing*; comprising 90 studies which provided 235 effect sizes (11,247 participants). The findings show that, relative to performance-approach and performance-avoidance goals and no-goals, induced mastery-approach goals enhanced performance, but not motivation. With regards to the goal standard used in the inducement, mastery-approach goals related to better performance than performance-approach goals, when mastery-approach goals were based on task-referenced standards or when social comparison was used as a standard for inducing performance-approach goals. With regards to the goal framing used in the inducement, mastery-approach goals were more beneficial when achievement goals were induced by means of goal content. We therefore conclude that goal framing and goal standard should be taken into consideration in achievement goal research and practice.

Keywords Induced achievement goals · Meta-analysis · Goal standards · Goal framing

1 Introduction

Goals play an important role in motivational processes and outcomes. Over the years, the achievement goal theory (Dweck 1986; Dweck and Leggett 1988; Elliot and McGregor 2001; Nicholls 1984) has been established as an influential framework for understanding individual differences in motivation and performance. A large body of research demonstrates that achievement goals are relevant in everyday

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achievement settings, including education, work, and sports. Achievement goals refer to "one's dispositional or situational goal preferences in achievement situations" (Payne, Youngcourt, and Beaubien 2007, p. 128). A distinction can be made between mastery and performance goals, further subdivided into approach and avoidance goals (Elliot and McGregor 2001). Mastery-approach goals are aimed at the development of competence and gaining task mastery while mastery-avoidance goals are aimed at avoiding the deterioration of competence and falling short of one's own standards. Performance-approach goals are aimed at the demonstration of competence and the pursuit of outperforming others while performance-avoidance goals are aimed at avoiding the demonstration of incompetence to others and avoiding to be one of the worst performers.

Achievement goal theory has been around for over 30 years, and yet there is still debate on the criteria or standards for performance evaluation that are used when pursuing mastery and performance goals (see, Elliot, Murayama, and Pekrun 2011; Elliot and Trash 2001; Korn and Elliot 2016; Senko and Tropiano 2016). Mastery goals can be based on a task-referenced (i.e., perception of mastery and learning for mastery-approach and avoiding not mastering a task for mastery-avoidance goals) or a self-referenced (i.e., doing better than before for mastery-approach and avoiding deterioration of own's own competences for mastery-avoidance goals) standard to evaluate performance. For example, Elliot, Murayama, and Pekrun (2011) demonstrated that task-based mastery-approach goals were positively and self-referenced mastery-approach goals were not related to motivation. Performance goals can be based on an appearance (i.e., perception of demonstrating competence to others for performance-approach and avoiding the demonstration of incompetence to others for performance-avoidance goals) or a normative (i.e., outperforming others for performance-approach and avoiding being one of the worst performers for performance-avoidance goals) standard to evaluate performance. For example, Hulleman, Schrager, Bodmann, and Harackiewicz (2010) demonstrated in their meta-analysis that appearance performance-approach goals were negatively and normative performance-approach goals were positively related to performance (see also Bardach, Yanagida, Klassen, and Luftenegger 2020).

Up till now, several meta-analyses have been conducted into the correlational relationships between *self-reported* achievement goals, motivation, and achievement. In sharp contrast, few meta-analyses have been conducted that examine the impact of *inducing* achievement goals by manipulating goal content or goal climate (i.e., goal framing; Kozlowski and Bell 2006). Goal content is manipulated by providing someone with a straightforward goal to strive for while goal climate is manipulated by making features of the targeted achievement goal salient in the achievement setting. To date, only three published meta-analyses have addressed situationally *induced* achievement goals and their causal effects on performance (Van Yperen, Blaga, and Postmes 2015; Utman 1997) or motivation (Rawsthorne and Elliot 1999). However, these meta-analyses do so without taking into account the possible moderating effects of the goal standard and the type of goal framing. The current meta-analysis, therefore, aims at meta-analysing studies that induced an achievement goal state to look at their effects on motivation and performance and to what extent these effects are impacted by goal content or goal climate inducement.

We examined whether the link between achievement goals and motivation and performance could be moderated by *goal standard* (i.e., the different criteria for performance evaluation) and *goal framing* (i.e., the inducement of achievement goals by either goal content or goal climate). The aim of this meta-analysis is to get insight in the kind of achievement goals one should pursue, how (i.e., goal framing), and according to which criteria for performance evaluation (i.e., goal standard) achievement goals should be induced to a have a positive effect on motivation and performance. In addition, synthesizing the evidence so far might be helpful in the development and implementation of effective interventions in educational contexts and other achievement domains.

1.1 Achievement goal theory

Achievement goal theory is a prominent motivation theory. Originally, Dweck and Leggett (1988) proposed two classes of goals to explain why people engage in achievement behavior: mastery (or learning) goals and performance goals. These two achievement goals originate in part from an individual's implicit theory of ability (Dweck 1986), such that conceiving one's ability as malleable (incremental theory) likely results in the adoption of learning goals, whereas conceiving one's ability as fixed (entity theory) likely results in the adoption of performance goals. Later on, Elliot and McGregor (2001) suggested to incorporate a valence dimension into these two goals, resulting in a 2 (mastery versus performance) × 2 (approach versus avoidance) achievement goal framework.

Achievement goals have been defined and examined either at a trait level (e.g., Button, Mathieu, and Zajonc 1996), a domain level (e.g., at work; see, e.g., VandeWalle 1997a, b), or as a changeable situational characteristic that can be induced (i.e., state-level). Trait and domain-specific achievement goals have been the focus of several meta-analyses (Baranik, Stanley, Bynum, and Lance 2010; Biddle, Wang, Kavussanu, and Spray 2003; Cellar et al. 2011; Huang 2011, 2012; Hulleman et al. 2010; Lochbaum and Gottardy 2015; Payne et al. 2007; Senko and Dawson 2017; Van Yperen, Blaga, and Postmes 2014; Wirthwein, Sparfeldt, Pinquart, Wegerer, and Steinmayr 2013). Overall, results indicate that mastery-approach goals are positively related to motivation and performance in education, sport, and work (e.g., Lochbaum and Gottardy 2015; Payne et al. 2007; Van Yperen et al. 2014). Findings regarding performance-approach goals and motivation and performance are mixed; indicating weak to non-existent effects in education and work (e.g., Payne et al. 2007) and positive effects in sports (e.g., Lochbaum and Gottardy 2015). However, although the effect sizes were less strong, the meta-analysis by Van Yperen et al. 2014 indicated positive effects for performance-approach goals in all domains. In contrast, mastery-avoidance (e.g., Baranick et al. 2010) and performance-avoidance goals (e.g., Payne et al. 2007) both tend to be negatively related to motivation and performance across different domains.

1.2 Induced achievement goals as predictors of motivation and performance

In the literature, the effects of trait, domain, and state-level achievement goals on motivation and performance are assumed to be similar, because "goal orientation dispositions and interventions lead to similar motivational and self-regulatory processes" (Chen and Mathieu 2008, p. 25). For mastery-approach and performance-approach goals, self-regulation is focused on promoting success, whereas self-regulation for mastery-avoidance and performance-avoidance goals is focused on avoiding failure. The focus on success and the associated positive emotions likely result in more effective self-regulation compared to the focus on avoiding failure and the associated negative emotions. Successful self-regulation, in turn, has been demonstrated to produce higher motivation and enhanced task performance (e.g., Kanfer 1990).

In line with this argumentation, several studies on the inducement of achievement goals (e.g., Van Yperen, Elliot, and Anseel 2009) demonstrated that the inducement of mastery-approach or performance-approach goals was associated with higher levels of motivation and task performance than the inducement of performance-avoidance or mastery-avoidance goals. However, despite their focus on success, performance-approach goals may also result in withdrawal from a task in face of difficulties and failure, making their association with motivation and performance less straightforward than that of mastery-approach goals (cf., Dweck and Leggett 1988). Some studies (e.g., Cianci, Klein, and Seijts 2010a, b) indeed indicate that induced mastery-approach goals have stronger positive effects on motivation and task performance compared to induced performance-approach goals. Studies assessing motivation have used behavioral indicators of motivation, such as free-choice persistence (e.g., Curry, Elliot, Sarrazin, Da Foseca, and Rufo 2002), as well as self-reported motivation (e.g., Steele-Johson, Beauregard, Hoover, and Schmidt 2000, Study 2). Although reliability and validity have been well-established for each of these measures of motivation separately, when combined, behavioral indicators of motivation are often inconsistent with self-reports (Elliott 2004). We therefore included both free-choice persistence and self-reported motivation in our analyses.

Based on the above, we expect that induced mastery-approach and, to a lesser extent, performance-approach goals, result in higher motivation (i.e., free-choice persistence and self-reported motivation) and better task performance compared to induced mastery-avoidance and performance-avoidance goals. In addition, we included no-goal control conditions to investigate the isolated effects of the four achievement goal conditions.

1.3 Moderators of the motivational and performance effects of induced achievement goals

Although the extant achievement goal literature (correlational as well as experimental) suggests that approach goals are more beneficial for motivation and performance than avoidance goals, these effects vary substantially across studies (see for example

Payne et al. 2007 and Hulleman et al. 2010 reporting different effects for performance-approach goals on academic achievement). As such, specific moderating variables might play a role. We propose that the effects of induced achievement goals depend, at least in part, on the nature of the goal and the framing of the manipulation that is used. Specifically, we expect that the outcomes of induced achievement goals might be affected by *goal standard* and *goal framing*.

1.3.1 Goal standard

A major debate in the achievement goal literature (e.g., Elliot et al. 2011; Hulleman et al. 2010; Senko, Hulleman, and Harackiewicz 2011) concerns the specification of criteria for performance evaluation. Mastery goals are based on self-referenced standards, such that performance is evaluated in terms of intrapersonal criteria (e.g., doing better than one did before, or avoiding the deteroriation of one's own competences). However, several achievement goal theorists (e.g., Elliot et al. 2011) have argued that, in addition to these self-referenced standards, mastery goals can also be based on task-referenced standards, such that performance is evaluated in terms of criteria for task mastery (e.g., mastering and learning a task, or avoiding not mastering and learning a task). Both standards have been used in previous experimental achievement goal studies, albeit mostly implicitly. Examples of task-referenced standards for the inducement of mastery-approach goal in previous studies include: "This session will provide you the opportunity to learn how the brain regulates emotions. When you have completed the study, you will be provided information regarding how well you learned about how the brain regulates emotions. Remember your goal is to learn how the brain regulates emotions…." (Edwards 2010, p. 56) or "….. The session will provide you with the opportunity to get to know these problems and learn how to solve the problems well. You will be informed whether you learned how to solve the problems well." (Bjørnebekk et al. 2011, p. 361, Study 2). Examples of self-referenced standards for the inducement of mastery-approach goals are: "To do better than in Trial 1" (Anseel, Van Yperen, Janssen, and Duyck 2011, p. 710) or "…the important thing is that you try as hard as you can and try to improve your performance over time" (Reinboth and Duda 2016, p. 328).

In light of this duality in mastery goal standards, it has been proposed that processing and pursuing a task-referenced mastery goal requires fewer cognitive resources than processing and pursuing a self-referenced mastery goal (Elliot et al. 2011). Evaluation of goal achievement based on a task-referenced standard requires the ability to cognitively represent the task and determine the level at which one has accomplished it. "The self-concept is not salient in such striving, as one's attention remains task-focused" (Elliot et al. 2011, p. 633). Evaluation of goal achievement based on self-referenced standards is more demanding, as it requires a cognitive representation and explicit comparison of two outcomes at the same time (i.e., previous and current outcome). Using a self-referenced standard for evaluation makes the self more salient and one's self-worth might be at stake. In line with this reasoning, Elliot and colleagues (2011) found that task-referenced mastery-approach goals were positively associated with motivation and learning efficacy, whereas self-referenced mastery-approach goals were unrelated to these variables.

Performance goals, by definition, are based on an other-referenced evaluation standard: Whether or not success is achieved or failure is avoided is evaluated by comparing one's performance to that of relevant others. To date, the literature does not explicitly separate performance goals into different standards in the same way as has been done for mastery goals. Nevertheless, Senko and Tropiano (2016) argue that there are two ways how to define performance goals: Either as demonstrating ability ("appearance goals") or as outperforming others ("normative goals"). In the literature, operationalizations of performance goals have indeed been shown to rely on two different performance evaluation standards: While some rely on a self-presentation standard, others use a social-comparison standard (Elliot 1999; Hulleman et al. 2010; Senko et al. 2011; Urdan and Mestas 2006). When using a self-presentation standard, performance is evaluated based on the impression one wants to make on others. When using a social comparison standard, performance is evaluated based on a comparison with others' performance. Although these observations originate from correlational achievement goal research, the same distinction can be observed in studies on induced achievement goals. The manipulation that was used by Darnon, Harackiewicz, Butera, Mungay, and Quiamzade (2007b, p. 816), for example, reflects a self-presentation standard ("show your competencies"), while Anseel et al. (2011, p. 710) used a manipulation based on a social comparison standard ("do better than others").

Hulleman and colleagues (2010) used Convington's (2000) self-worth contingency perspective to argue that performance goals based on self-presentation standards are more closely tied to one's self-worth and thereby more strongly related to fear of failure, shame, and decreased performance, compared to performance goals based on social comparison standards. Indeed, correlational research tentatively suggests that social-comparison standards result in more beneficial outcomes compared to self-presentation standards (Hulleman et al. 2010; Senko and Dawson 2017). These studies both demonstrated a positive relationship between performance-approach goals and task performance when performance-approach goals were measured with an emphasis on social-comparison, but a negative relationship with task performance when performance-approach goals were measured with an emphasis on self-presentation items.

1.3.2 Goal framing

In an experimental context, there are different ways to induce achievement goals. The framing of achievement goals can be done by means of goal content, goal climate, or a combination of both (Kozlowski and Bell 2006). When goal content is manipulated, the focus is on a specific achievement goal. People are assigned or instructed to adopt an achievement goal for an upcoming task. Avery and Smiley (2011, p. 42), for example, told participants in the mastery-approach goal condition "Your goal whilst performing this memory task is to get to know the task better by focusing on learning how to detect correct number matches well…". In contrast, when goal climate is manipulated the focus is on the achievement climate or context, by manipulating more generally how the task is framed or presented. Teachers, experimenters, team leaders, or coaches may create different goal climates (also

referred to as goal structures; Meece, Anderman, and Anderman 2006) in an environment through the use of various cues and strategies. For example, in the study by Bereby-Meyer and Kaplan (2005, p. 8), the experiment leader informed participants in the mastery-approach condition that "In this game the idea is to learn from mistakes in order to improve their ability". With this instruction, the experimenter created a climate of learning and improvement. Participants in the performance-approach condition were told that "Most children who played this game failed to reach the solution, but a few children were very good, and they had an opportunity to show that they were good at the game". In this way, the experimenter created a climate of competition and demonstrating competencies, rather than assigning individual participants a specific individual performance-approach goal.

Kozlowski and Bell (2006) propose that goal climate affects outcomes indirectly, by influencing how intentions are translated into action. This results in a relatively weak but potentially long-lasting effect of achievement goals induced via goal climate manipulations. Goal content, on the other hand, has a more direct effect on action, by influencing the targeted behavior, resulting in a relatively strong effect that materializes relatively quickly.

1.3.3 Additional moderators

Apart from goal framing and goal standard, we included the following additional moderators based on theoretical rationale and empirical findings: *theoretical framework, country, domain, manipulation check* (yes or no), *publication status* (published papers versus unpublished manuscripts), *age*, and *gender*.

We use the "theoretical framework" to distinguish between achievement goal manipulations based on implicit theories of ability (Dweck 1986) and manipulations based on Elliot and McGregor's (2001) 2×2 framework of achievement goals. Implicit theory manipulations are based on the underlying assumptions of the initial achievement goal theory (Dweck 1986) by distinguishing between a fixed and an incremental theory of ability. Manipulations based on Dweck's implicit theory refer to capabilities and skills one can improve (incremental mindset) or which are more or less stable (fixed mindset). An incremental mindset corresponds to a mastery (approach) goal, while a fixed mindset corresponds to a performance (approach) goal (Dweck 1986). An example of an implicit theory of ability manipulation of performance-approach goals is: '*Your performance on this task is an accurate representation of your ability*' (Chen and Mathieu 2008, p. 28). Manipulations based on Elliot and McGregor's (2001) 2×2 framework of achievement goals focus more directly on goal content or goal climate, without referring to the underlying assumptions of stability or growth. Dewar, Kavussanu, and Ring (2013, p. 5), for example, pointed out that: '*The important thing is that you win this competition*', reflecting a performance-approach goal manipulation based on the 2×2 framework.

Regarding "domain", previous correlational research (e.g., Payne, et al. 2007; Van Yperen et al. 2014) produced divergent effects of achievement goals on performance in different domains (i.e., lab, educational, sport, or work settings). In the current study, we therefore differentiated between lab (i.e., task performance), education, sports, and work settings.

Regarding "age", Nicholls (1978, 1984) argued that only children from the age of 12 on are able to differentiate in their conceptions of ability. Consistent with this argument, Bong (2009) demonstrated a strong correlation between mastery-approach and performance approach goals for younger children (little discrimination) and a decrease in this correlation with increasing age. We therefore also include age (i.e., below the age of 12, between the age of 12 and 18 and above the age of 18) as a moderator.

2 Method

2.1 Literature search

We conducted an electronic search in the databases of Google Scholar, PsycINFO, PsycArticles, Dissertation Abstracts, and ABI Inform to identify published and unpublished studies from 1980 till 2017 containing an experimental manipulation of achievement goals. We used the following search terms: *achievement goal, goal orientation, mastery goal, mastery approach goal, performance goal, performance approach goal, performance avoidance goals, mastery avoidance goal, learning goal, learning goal orientation, task goal, task goal orientation, prove goal, prove goal orientation, performance prove goal, performance prove goal orientation, ego goal, ego goal orientation, ability goal, state goal orientation, task involvement, and ego involvement*. We also searched the databases for authors known to be active in achievement goal research (e.g., Biddle, Butler, Duda, Dweck, Elliot, Harackiewicz, Senko, Van Yperen, and VandeWalle). Next, using the abovementioned terms, we conducted a manual search of journals that routinely publish articles based on the achievement goal theory, including the American Educational Research Journal, Journal of Applied Psychology, Journal of Educational Psychology, Journal of Educational Research, Journal of Personality and Social Psychology, Journal of Sport and Exercise Psychology, Motivation and Emotion, Learning and Instruction, Human Performance, Personnel Psychology, and Personality and Social Psychology Bulletin. Moreover, we scanned the Society for Industrial and Organizational Psychology and the American Educational Research Association conference programs for unpublished papers. Finally, the reference lists of a large number of relevant articles (e.g., Linnenbrink-Garci, Tyson, and Patall 2008; Van Yperen et al. 2015) were hand searched for additional eligible articles. This search yielded 278 potential manuscripts for the meta-analysis that we subsequently reviewed on the inclusion criteria (see Table 5).

2.1.1 Inclusion and exclusion criteria

Inclusion in our final dataset required that studies:

1. were based on the initial achievement goal theory (Dweck 1986) or the 2×2 achievement goal theory (Elliot and McGregor 2001) and included an experimental achievement goal manipulation;

2. were reported in English so that the other inclusion criteria could be checked;
3. included at least one comparison between two achievement goal conditions (i.e., mastery-approach, performance-approach, mastery-avoidance, performance-avoidance goals) or between an achievement goal and a no-goal control condition;
4. included a dependent variable reflecting self-reported motivation (i.e., interest or intrinsic motivation), free-choice persistence (behavioural motivation), or task performance;
5. included sufficient statistical information (N, M, SD, d, t, F, p) to calculate effect sizes.

These inclusion criteria led us to exclude 206 manuscripts, due to one or more of the following reasons: (1) the study focused primarily on goal setting, error training, or self-regulation ($N=95$); (2) the study included no manipulation or a manipulation that was not primarily based on an achievement goal theory (e.g., feedback manipulation, Senko and Harackiewizc 2002; $N=57$); (3) the study did not include motivation or performance as the dependent variable (e.g., social comparison, Darnon, Dompnier, Gillieron, and Butera 2010; $N=33$), or (4) the required statistical information could not be obtained, even after contacting the author, or the achievement goal effects were confounded with other experimental manipulations ($N=21$). The final sample included 56 published articles, 14 dissertations, 1 conference contribution, and 1 master thesis, containing 90 separate studies. Together these studies included 235 effect sizes and 11,247 participants.

2.1.2 Coding procedure

The second and last authors independently coded each study on goal standard for mastery and performance goals, goal framing, and theoretical framework. We used Cohen's kappa to examine interrater reliability; all values indicated satisfactory interrater reliability.

Goal standard for mastery goals was coded as self-referenced when manipulations referred primarily to self-improvement (e.g., '*In this game the idea is to learn from mistakes in order to improve ability';* Bereby-Meyer and Kaplan 2005), as task-referenced when manipulations referred primarily to task mastery (e.g., …*try to develop a good command of the new Left-to-Right technique*; Senko, Durik, Patel, Lovejoy, and Valentiner 2013, Study 1), or a combination of both when aspects of both self-improvement and task mastery were included (e.g., studies using the TARGET framework; Barkoukis, Tsorbatzoudis, and Grouios 2008; Miles 2010; Rusk 2012*)*; Kappa 0.81.

Goal standard for performance goals was coded as self-presentation when manipulations referred primarily to the impression one wants to make to others (e.g., *That is working on the task provides people with an opportunity to demonstrate their logical reasoning skills*; Mangos and Steele-Johnson 2001), as social comparison when manipulations referred primarily to a comparison with significant others (e.g., '*The purpose of this project is to compare college students to one another in their ability to solve, our Nina puzzles';* Elliott and Harackiewitz 1994), or as a combination of both when aspects of both making an impression and comparison were included

(e.g., '*… that is, to perform better than the majority of students. In other words, what we ask you here is to show your competencies, your abilities'*; Crouzevialle and Butera 2012, Study 1); Kappa 0.92.

Goal framing was coded as goal content when people were assigned, or instructed to adopt, a specific achievement goal for an upcoming task (e.g., *Trainees who were assigned performance goals were told that their goal was to demonstrate high performance relative to others*; Nordstrom, Wenland, and Williams 1998), as goal climate when manipulations were based on a certain structure or certain cues given by experimenters, teachers or others (e.g., *Implementation of mastery approach goal structures in the mathematics classrooms using the TARGET framework and strategies*; Miles 2010), or as a combination of both when both goals were assigned or adopted and cues were given (e.g., *The learning goal training used goal content as well as goal climate;* Noordzij, Van Hooft, Van Mierlo, Van Dam, and Born 2013); Kappa.76.

Theoretical framework, finally, was coded as AGO when the manipulation was based on Elliot and McGregor's (2001) 2×2 achievement goals (e.g., '*Given that the purpose of the session is to compare college students to each other on how well they perform, its' recommended that you adopt a performance goal';* Lovejoy 2012) or as Implicit Theory when the manipulation was based on Dweck's (1986) implicit theories of ability (e.g., '*We know that participants differ in their creative ability. Participants who do well on this task are more creative than ones who do poorly'*; Butler 1995, Study 2); Kappa 0.83.

The three authors met to discuss discrepancies, all of which were resolved by consensus. Furthermore, when possible, each study was coded on country (US/Canada, Europe, or other countries), setting (lab, education, sports or work), inclusion of a manipulation check (yes or no), publication status, age (three categories: < 12 years; between 12 and 18 years; > 12), and gender (percentage of men).

2.2 Statistical analyses

Both random-effects and fixed-effects models have been used in previous meta-analyses. However, fixed-effects models are prone to Type I error in significance tests (i.e., overly narrow confidence intervals) both for mean effect sizes and for moderator variables (Hunter and Schmidt 2000; Schmidt, Oh, and Hayes 2009). We therefore used random-effects models for all analyses, assuming that population effect sizes vary randomly between studies and assuming heterogeneity in the effect sizes between studies. The effect size index used in this study was Cohen's *d*. To calculate a global effect size, each effect size was weighted by the inverse of the sum of the between-study variance plus the within-study variance (Hedges and Vevea 1998). To assess statistical heterogeneity in the dataset, the within-class goodness-of-fit statistic (*Qw*) and Higgins' I^2 (Higgins and Thompson 2002) of the overall effect size were calculated. We performed subgroup moderator analyses to explore the effects of the moderators on the outcomes of interest. To guarantee the independence assumption, we carried out separate meta-analyses for each outcome and for each comparison (Borenstein, Hedges, Higgins, and Rothstein 2009). If a study used

multiple trials to examine an outcome measure, the scores of all trials were averaged to obtain one effect size. All analyses were performed with Biostat's Comprehensive Meta-Analysis version 2 (Borenstein, Hedges, Higgins, and Rothstein 2005).

3 Results

Table 1 displays the number of effect sizes (*k*) included in the analysis (for each comparison and outcome measure), mean effect sizes (*d*), estimated standard errors for the effect sizes (*SE*), 95% confidence intervals (CIs), *Z*-scores, *Qw,* and I^2. In theory, 10 unique goal contrasts could be tested for each outcome, by contrasting each of the five conditions (i.e., mastery-approach, performance-approach, mastery-avoidance, performance-avoidance, and no-goal control conditions) in a pairwise manner. In practice, however, most studies did not include all achievement goal conditions and studies also vary in terms of the outcomes that were included. The available data allowed us to test all 10 possible contrasts for task performance, five contrasts for self-reported motivation, and three contrasts for free-choice persistence (see Tables 1, 2, 3).

3.1 Direct effects of induced achievement goals

Mastery-approach goals were associated with better performance than performance-approach, $d=0.28$, $Z=3.21$, $p=0.001$, performance-avoidance goals, $d=0.37$, $Z=2.87$, $p=0.004$, and no-goals, $d=0.21$, $Z=1.98$, $p=0.045$. None of the other contrasts were significant, indicating that there were no significant performance differences between mastery-approach goals and mastery-avoidance goals, and between

Table 1 Results for performance

Comparison	*k*	*d*	*SE*	95% CI	*Z*	*Qw*	I^2
MAp-PAp	66	.29	.09	.11/46	3.21**	811.42**	91.99
MAp-MAv	3	.35	.21	−.06/.75	1.67	4.94	59.49
MAp-PAv	14	.37	.13	.12/.62	2.87**	42.72**	69.57
MAp-Control	27	.21	.11	.01/.42	1.98*	145.94**	82.18
PAp-MAv	3	−.14	.19	−.51/.24	−0.71	4.38	54.36
PAp-PAv	18	.17	.19	−.21/.56	0.89	160.93**	89.44
PAp-Control	30	−.08	.11	−.29/.13	−0.74	190.59**	84.78
MAv- PAv	3	−.33	.24	−.79/.13	1.41	6.06*	66.98
MAv-Control	2	.21	.24	−.27/.68	0.85	2.26	55.83
PAv-Control	8	.15	.15	−.14/.44	1.01	20.58**	65.98

MAp mastery-approach goals, *PAp* performance-approach goals, *MAv* mastery-avoidance goals, *PAv* performance-avoidance goals. *k* number of effect sizes, *d* mean effect size, *SE* estimated standard errors, *CI* confidence interval, *Z* standard score, *Qw* within-class goodness-of-fit statistic, I^2 Higgins I^2. *$p<.05$, **$p<.01$

Table 2 Results for self-reported motivation

Comparison	*k*	*d*	*SE*	95% CI	*Z*	*Qw*	I^2
MAp-PAp	27	.06	.17	−.26/.38	.36	422.59**	93.85
MAp-PAv	4	.30	.16	−.03/.62	1.79	3.88	22.67
MAp-Control	5	−.09	.35	−.76/.59	−0.25	68.20**	94.14
PAp-PAv	4	.42	.17	.08/.75	2.44*	4.16	27.92
PAp-Control	4	.40	.40	−.39/1.19	1.00	40.69**	92.63

MAp mastery approach goals, *PAp* performance approach goals, *PAv* performance avoidance goals. *k* number of effect size, *d* mean effect size, *SE* estimated standard errors, *CI* confidence interval, *Z* standard score, *Qw* within-class goodness-of-fit statistic, I^2 Higgins I^2.

*$p < .05$,

**$p < .01$

Table 3 Results for free-choice persistence

Comparison	*k*	*d*	*SE*	95% CI	*Z*	*Qw*	I^2
MAp-PAp	10	.26	.16	−.05/.57	1.64	40.60**	77.83
MAp-PAv	4	.69	.20	.30/1.08	3.46**	5.96	49.69
PAp-PAv	4	.48	.3	−.15/1.34	1.49	15.84**	81.06

MAp mastery approach, *PAp* performance approach, *PAv* performance avoidance goals. *k* number of effect size, *d* mean effect size, *SE* estimated standard errors, *CI* confidence interval, *Z* standard score, *Qw* within-class goodness-of-fit statistic, I^2 Higgins I^2. * $p < .05$, ** $p < .01$

any of the performance-approach, performance-avoidance, and mastery-avoidance goals and no-goal control conditions contrasts (see Table 1).

3.1.1 Motivation

Mastery-approach goals did not yield significantly stronger motivation (self-reported motivation and free-choice persistence) than performance-approach goals, self-reported motivation: $d = 0.06$, $Z = 0.36$, $p = 0.72$, and free-choice persistence: $d = 0.26$, $Z = 1.64$, $p = 0.10$. Mastery-approach goals were associated with more free-choice persistence than performance-avoidance goals, $d = 0.69$, $Z = 3.46$, $p = 0.001$. Performance-approach goals were associated with more self-reported motivation than performance-avoidance goals, $d = 0.42$, $Z = 2.44$, $p < 0.015$. The other contrasts were not significant (see Tables 2 and 3).

3.2 Moderators

We conducted subgroup analyses to test whether variation among studies in effect sizes was associated with differences in study characteristics. Because of the limited

number of available effect sizes, these analyses could only be performed on the outcome measure of performance for the mastery-approach versus performance-approach contrast. The within-class goodness-of-fit statistic (Q_w) was significant for the mastery-approach versus performance-approach contrast for performance, $Q_w(65) = 811.42$, $p < 0.001$, $I^2 = 91.99$, indicating that moderators may account for the large heterogeneity in effect sizes (see Table 1).

3.2.1 Goal standard

For goal standard, we were interested in the effects of the distinctive standards of evaluation on performance that were used to induce mastery-approach and performance-approach goals. In the moderator analyses, we included studies that used a task-referenced or a self-referenced standard for mastery-approach goal manipulations (i.e., mastery-approach goal standard) and studies that used a self-presentation or a social-comparison standard for performance-approach goal manipulations (i.e., performance-approach goal standard). We excluded studies with manipulations based on multiple standards (i.e. task-referenced plus self-referenced standard or self-presentation plus social-comparison standard; see Table 5 for the studies that used multiple standards).

When manipulations of mastery-approach goals were based on a task-referenced standard for evaluation, mastery-approach goals were more beneficial for performance than performance-approach goals, $d = 0.32$, $Z = 2.45$, $p = 0.014$. When the evaluation of mastery-approach goals was based on a self-referenced standard, no significant difference in performance emerged between mastery-approach and performance-approach goals.

When manipulations of performance-approach goals were based on a social comparison standard, mastery-approach goals were more beneficial for performance than performance-approach goals, $d = 0.26$, $Z = 2.48$, $p = 0.013$. When the evaluation of performance-approach goals was based on a self-presentation standard, no difference in performance was found between mastery-approach and performance-approach goals.

3.2.2 Goal framing

For goal framing, we were interested in the distinctive effects of goal content and goal climate on the differences in performance between mastery-approach and performance-approach goals. We therefore excluded studies from the moderation analysis in which goal content and goal climate were manipulated simultaneously (see Table 5 for the studies that used combined goal content and goal climate manipulations). When achievement goals were induced via goal content, mastery-approach goals were more beneficial for performance than performance-approach goals, $d = 0.62$, $Z = 3.45$, $p = 0.001$. When achievement goals were induced via goal climate, the mastery-approach versus performance-approach contrast was not significant.

3.2.3 Additional moderators

Regarding *theoretical framework*, for manipulations based on the achievement goal theory, mastery-approach goals were more beneficial for performance than performance-approach goals, $d=0.35$, $Z=3.32$, $p=0.001$. For manipulations based on the incremental theory of ability, no significant difference emerged. For *country*, mastery-approach goals showed performance benefits compared to performance-approach goals for studies from the U.S./Canada, $d=0.30$, $Z=2.17$, $p=0.030$, and from Europe, $d=0.23$, $Z=2.01$, $p=0.044$, but not for other countries. For *domain,* mastery-approach goals were more beneficial for performance in studies conducted in a lab setting, $d=0.26$, $Z=2.22$, $p=0.026$ but not in educational, sport, or work settings. For *manipulation check*, mastery-approach goals showed performance benefits compared to performance-approach goals in studies that reported a manipulation check, $d=0.44$, $Z=3.24$, $p=0.001$, but not in studies without a manipulation check. For *publication status*, mastery-approach goals showed performance benefits compared to performance-approach goals in published studies, $d=0.27$, $Z=3.26$, $p=0.001$, but not in unpublished manuscripts. For *age*, induced mastery-approach goals yielded better performance than performance-approach goals when participants were 18 years or older, $d=0.35$, $Z=2.95$, $p=0.003$, but not when the study sample consisted of participants younger than 12 and between 12 and 18 years of age. Finally, performance differences between mastery-approach and performance-approach goals were not affected by *gender* (see Table 4 for all results of the moderator analyses).

3.3 Publication bias

To assess publication bias for the difference between mastery-approach and performance-approach goals in terms of performance, we looked at the funnel plot, applied the trim-and-fill technique (Duval and Tweedie 2000) to the data, and conducted a fail-safe N analysis (Rosenthal 1979). Inspection of the funnel plot (see Fig. 1) for the performance difference between induced mastery-approach and performance-approach goals revealed a publication bias on the right side of the funnel plot, $t=2.35$, $p=0.02$ (Egger, Smith, Schneider, and Minder 1997). Duval and Tweedie's (2000) trim-and-fill technique adjusts the effect size for publication bias. It starts by 'trimming off' the 'asymmetric' side of a funnel plot to achieve a systematical distribution and then replace the trimmed studies and their counterparts around the adjusted center of the funnel plot. With this approach, an adjusted 'trim and fill adjusted' effect size for publication bias can be calculated. When applying this procedure to the overall effect size for the difference in task performance between induced mastery-approach and performance-approach goals, the effect size increases from 0.28 (95% confidence interval: 0.12/0.62) to 0.76 (95% confidence interval: 0.56/0.96). Duval and Tweedie (2000) have cautioned that this 'trim and fill adjusted' effect size should never be interpreted as the 'true' effect size because it is based on imputed data and has no meaning in itself. It only shows the potential

Table 4 Moderator analyses: map versus pap goals

Moderator	Between-class effects						
	k	Q_b	*df*	*d*	*SE*	*95% CI*	*Z*
MAp standard		0.99	1	.22	.09	.05/.39	2.56*
1 Task-referenced	30			.32	.13	.06/.57	2.45*
2 Self-referenced	34			.14	.12	−.08/.37	1.24
PAp standard		0.84	1	.18	.07	.06/.31	2.82**
1 Self-presentation	21			.14	.08	−.03/.30	1.63
2 Social comparison	37			.26	.10	.05/.46	2.48*
Goal framing		4.35*	1	.31	.10	.10/.52	3.05**
1 Content	19			.62	.18	.27/.97	3.36**
2 Climate	37			.16	.13	−.08/.41	1.39
Theoretical framework		5.49*	1	.17	.07	.03/.31	2.36*
1 AGT	56			.35	.11	.14/.56	3.32**
2 Implicit theory	10			.01	.10	−.19/.20	0.10
Country		0.18	2	.27	.08	.12/.43	3.43**
1 U.S/Canada	40			.30	.14	.03/.58	2.17*
2 Europe	19			.23	.12	.01/.46	2.01*
3 Other	7			.30	.17	−.03/.62	1.77
Domain		1.64	3	.25	.07	.10/.40	3.35**
1 Lab setting	47			.26	.12	.03/.49	2.22*
2 Education	11			.20	.12	−.03/.43	1.73
3 Sport	6			.95	.51	−.05/1.96	1.87
4 Work	2			.25	.18	−.11/.60	1.37
Manipulation check		5.93	1	.15	.06	.04/.25	2.65**
1 Yes	40			.44	.14	.12/.17	3.24**
2 No	25			.10	.06	−.03/.22	1.56
Publication status		0.02	1	.27	.08	.11/.43	3.35**
1 Paper	52			.27	.08	.11/.44	3.26**
2 Unpublished man	14			.23	.30	−.36/.81	0.76
Age group		2.76	2	.20	.07	.07/.33	3.07**
1 age < .12	11			.20	.13	−.05/.45	1.57
2 age between 12–18	7			.10	.10	−.09/.29	1.01
3 age > 18	48			.53	.12	.12/.59	2.95**
Gender (percentage men)	57			.00	.01	−.01/.01	0.05

MAp mastery approach goals, *PAp* performance approach goals. *k* number of effect size, *Qb* between-class goodness-of-fit statistic, *df* degrees of freedom, *d* mean effect size, *SE* estimated standard error, *CI* confidence interval, *Z* standard score. * $p < .05$, ** $p < .01$

impact of missing studies; in our case this means that the effect size of 0.28 might be an underestimation of the 'true' effect size because of publication bias. The fail-safe N analysis for the overall difference between induced mastery-approach and performance-approach goals in their effect on performance was 926, suggesting that

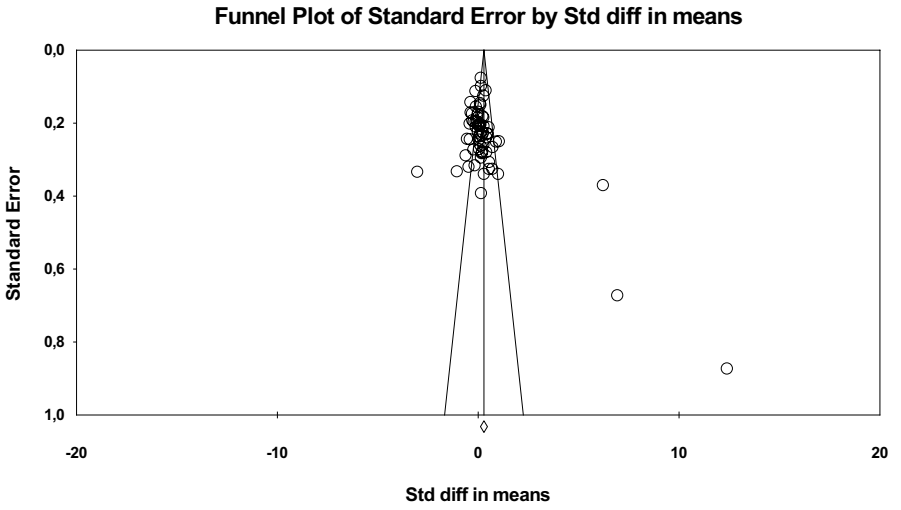

Fig. 1 Funnel plot for the difference between mastery-approach and performance-approach goals on performance

926 additional studies with no effect should exist in the population of studies for this result of the meta-analysis to be non-significant.

For the other significant contrasts on performance (i.e., between mastery-approach and performance-avoidance goals, and between mastery-approach goals and no-goal control), inspection of the funnel plots revealed a publication bias on the right side ($t=2.30$, $p=0.04$ and $t=2.11$, $p=0.046$, resp.). However, "trimming off" did not result in an adjustment of the effect size.

Finally, for motivation, the only significant contrast for free choice motivation between mastery-approach and performance-avoidance goals and for self-reported motivation between performance-approach and performance-avoidance goals revealed no significant publication bias ($t=0.41$, $p=0.36$ and $t=1.23$, $p=0.17$, resp.). Based on the results, publication bias seems an unlikely explanation of the outcomes of our meta-analysis (Table 5).

4 Discussion

With the present meta-analysis, we aimed at meta-analysing all studies on induced state achievement goals by including a comprehensive sample of 235 individual effect sizes from 90 separate studies. We examined the differences between induced mastery-approach, performance-approach, mastery-avoidance, and performance-avoidance achievement goals and no-goals in terms of motivation and performance as well as the extent to which the differences in performance were contingent on goal standard, goal framing, and various additional moderators.

Table 5 Studies included in the meta-analysis and the corresponding achievement goal manipulations

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
1	Anseel, Van Yperen, Janssen, and Duyck (2011)	Content	MAp: self-referenced PAp: social comparison	AGO	MAp: Do better than in Trial 1 PAp: Do better than most other participants in Trial 1
2	Avery and Smilie (2013)	Content	MAp: task-referenced PAp: social comparison	AGO	MAp: Your goal whilst performing this memory task is to get to know the task better by focusing on learning how to detect correct number matches well. Developing your own proficiency on the memory task is the aim of the game! PAp: Your goal whilst performing this memory task is to detect as many correct number matches as you can in order to perform better than other students taking part. Being more proficient on the memory task than other students is the aim of the game!
3	Barker, McInerney, and Dowson (2002)	Climate	MAp: self-referenced PAp -PAv: self-presentation	AGO	MAp: If you concentrate on this task, try to see it as a challenge and enjoy mastering it, you will probably get better as you go along. PAp: Your performance on this activity will tell me something about how good you are at this kind of task. PAv: Answer the following questions to this test with the correct answers so your class don't think you are silly or stupid.
4	Barkoukis, Tsorbatzoudis, and Grouios (2008)	Climate	MAp: self and task-referenced	AGO	MAp: The teachers were asked to teach using the guidelines of the TARGET intervention program.
5	Barron and Harackiewicz (2001, study 2)	Content	MAp: task-referenced PAp: social comparison	AGO	MAp: The purpose of this session was to teach them a new way of doing math and to adopt a learning goal as they went through the session and to focus on how the new techniques could help them develop and improve their math skills. PAp: The purpose of the session was to evaluate how well students could perform math problems using a new way of doing math" and to adopt a performance goal as they went to the session and to focus on how the techniques could aid them in performing well and in solving more math problems than other students.
6	Bereby-Meyer and Kaplan (2005, study 1)	Climate	MAp: self-referenced PAp: social comparison	AGO	MAp: In this game the idea is to learn from mistakes in order to improve their ability. PAp: Most participants who played this game failed to reach the solution, but a few participants were very good and that they had an opportunity to show that they were good in playing the game
7	Bereby-Meyer and Kaplan (2005, study 2)	Climate	MAp: self- referenced PAp: social comparison	AGO	See Study 1

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
8	Bergin (1995)	Content/climate	MAp: task- referenced PAp: social comparison	AGO	MAp: The purpose of this study is to investigate how college students learn from text. We would like you to study this passage as though you were really trying to learn the material so you could use it. PAp: The purpose of this study is to investigate how college students learn from text. We will administer a series of questions that will allow us to rank you. We want to know who is best and who is worst at learning and remembering from this type of reading.
9	Bjørnebekk, Gjesme, and Ulrikson (2011, study 1)	Climate	MAp: self-referenced PAp: social comparison	AGO	MAp: What we are interested in is how much you improve your skills by working with this type of problem. When you have finished, you will have the opportunity to learn whether you did well and made progress toward mastering these tasks. PAp: What we are interested in is how well you perform on the tasks as compared with other sixth-graders. When you have finished, you will have the opportunity to know how well you performed compared with others.
10	Bjørnebekk, Gjesme, and Ulrikson (2011, study 2)*	Climate	MAp: task-referenced Pap-PAv: social comparison	AGO	MAp: This session will provide you with the opportunity to get to know these problems and learn how to solve the problems well. You will be informed whether you learned how to solve the problems well. PAp: The purpose of this study is to compare sixth-graders with one another in their ability to solve these problems. Previous work had indicated that most sixth-graders are fairly similar in their ability to solve problems but that some students stand out because they do it exceptionally well. Thus, the problem-solving session will provide the opportunity ‘‘to demonstrate that you are an exceptional problem solver.’’ You will be informed whether you did well compared with others. PAv: The purpose of this study is to compare sixth-graders with one another in their ability to solve these problems. They were told that previous tests had indicated that most sixth-graders are similar in their ability to solve problems, but that some pupils stand out because they do so poorly. Thus, the session would provide some insight into whether they were a poor problem-solver. You will be informed whether you did poorly compared with others
11	Blaga and Van Yperen (2011)[a]	Content	MAp self-referenced PAp: social comparison	AGO	MAp: Do better than before PAp: Do better than others

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
12	Bodmann (2008, study 3)[a]	Content/climate	MAp: task-referenced PAp: social comparison	AGO	MAp: Participant were asked to approach the task the same way they would when trying to learn as much as possible in one of their classes and that the computer would give them feedback about how much they learned. They were also told that previous research has identified different type of goals, what mastery goals were and that they should adopt a mastery goal for this task. PAp: Participant were asked to approach the task the same way they would when trying to do well on an exam in one of their classes and that the computer would give them feedback about how well they did compared to others. They were also told that previous research has identified different type of goals, what performance goals were and that they should adopt a performance goal for this task.
13	Bodmann (2008, study 4)[a]	Content/climate	MAp: task- and self-referenced PAp: social comparison	AGO	MAp: Adopt a mastery goal and try to learn as much as you can. People who pursue a mastery goal are motivated by the desire to learn as much as they possibly can. The tests will show your improvement compared to previous tests PAp: Adopt a performance goal. People who pursue a performance goal are motivated by the desire to do well compared to others. The tests will show your performance compared to others.
14	Bouffard, Bouchard, Goulet, Denoncourt, and Couture (2005)	Climate	MAp: self-referenced PAp: self-presentation	Implicit theory	MAp: Working carefully on problems will allow you to discover new ways and strategies as how to solve them. You may encounter difficulties during the solving process, but this is usual and normal. The very important thing is to do your best since this will lead you to improve your vocabulary and comprehension skills which could be useful for your learning in class. PAp: Since the performance on this task is linked to verbal IQ, working carefully on problems will allow you to have information about your verbal competence. You may encounter difficulties during the solving process, but this is usual and normal. The very important thing is to do your best since this will lead you to get information about your verbal IQ.

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
15	Butler (1992)	Climate	MAp: task-referenced PAp: self-presentation	Implicit theory	MAp: We know that everyone is capable of being imaginative and creative but does not always have the chance to express these capacities. We have developed a task which can help you express your imagination, and development ways of looking at ever day things. There are no right or wrong pictures; try and think of complex and different pictures, which reflect your own special way of looking at things. PAp: We know that students differ in their creative ability. Before you are a test of creative ability. Studies have shown that students who do well on this test are more creative than ones who do poorly. Try to do the test as well as you can. There are no right or wrong pictures; success on the test depends on the number of complex and different pictures drawn.
16	Butler (1993, study 1)	Climate	MAp: task-referenced PAp: self-presentation	Implicit theory	MAp: The problems before you do not require prior skills. They have been constructed to enable you to develop proficiency and to learn and refine problem-solving strategies on a novel task. PAp: The problems before you test analytic thinking and problem solving. Problems like these appear on IQ tests and university entrance exams because success on them is correlated with academic ability.
17	Butler (1993, study 2)	Climate	MAp: self-referenced PAp: self-presentation	Implicit theory	MAp: Analytic thinking skills are an important component of much academic activity. The tasks before you provide an opportunity to apply logical problem-solving skills, to modify ineffective strategies where necessary; and thus, to develop and refine optimal strategies as you go along. PAp: Academic success depends in large part on the quality of one's analytic thinking. The tasks before you are a valid test of analytic problem solving, which includes the ability to modify ineffective strategies where necessary. University students should do well on them.
18	Butler (1995, study 2)	Climate	MAp: task-referenced PAp: self-presentation	Implicit theory	MAp: We know that everyone is capable of being imaginative and creative but does not always have the chance to express these capacities. We have developed a task, which can help you express your imagination, and development ways of looking at everyday things. There are no right or wrong pictures; try and draw a lot of pictures, including complex ones. PAp: This task measures creative ability. We know that participants differ in their creative ability. Participants who do well on this task are more creative than ones who do poorly. Try to do the test as well as you can. There are no right or wrong pictures; success on the test depends on the number of complex pictures drawn. Later I shall be collecting the tasks to see who did best

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
19	Butler (1999, study 1)	Climate	MAp: self-referenced PAp: self-presentation	Implicit theory	MAp: In school, one learns how to think and solve problems. These tasks give you an opportunity to try out your problem-solving skills, to see if you are using effective methods and to develop and improve your thinking and methods as you go along. PAp: Success in school depends on your ability to think and solve problems, to see if you are using good methods, and to use better methods if necessary. Some participants have better ability than others. These tasks test how good you are at thinking and solving problems. Students of your age should do good on them.
20	Chalabaev, Major, Cury, and Sarrazin (2012, study 1)	Climate	Pap-PAv: social comparison	AGO	PAp: Participants heard that a scoring method would be used to identify students who had strong math or problem-solving ability. These instructions referred to competence relative to others, by informing participants that their performance on the math test would be compared to the performance of other university students. PAv: Participants heard that a scoring method would be used to identify students who had weak math or problem-solving ability. These instructions referred to competence relative to others, by informing participants that their performance on the math test would be compared to the performance of other university students.
21	Chalabaev, Major, Cury, and Sarrazin (2012, study 2)	Climate	Pap-PAv: social comparison	AGO	See Study 1
22	Chasteneuf (2005)[a]	Climate	MAp: task-referenced PAp: social comparison	AGO	MAp: Many people make mistakes on these puzzles in the beginning but get better as they go along. When people see the puzzle as a challenge, it makes them try harder and have more fun along the way. If you concentrate on the task, try to see it as a challenge and enjoy mastering it, you will get better as you go along. PAp: From how you did on the puzzles, I have a pretty good idea of how good you are at this type of problem solving compared to other people your age. The reading activity is a lot like that in that people are either good at it compared to other people their age or they are not. So how you did on the puzzle activity tells me something about how well you will do on the reading activity compared to other people your age.

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
23	Chen and Mathieu (2008)	Climate	MAp: task-referenced PAp: self-presentation	Implicit theory	MAp: Research has demonstrated that the performance on this task sharpens the mind and learning to do it well could help academic studies. While performing this task, you will probably make a bunch of mistakes, get a little confused, maybe feel a little dumb at times but eventually you will learn some useful things. PAp: Research has demonstrated that your performance on this task is an accurate representation of your ability on these kinds of tasks. While performing this task, you should work hard and concentrate on scoring as well as you can.
24	*Chia (1995)[a]	Content/climate	MAp: task-referenced PAp: self-presentation	AGO	MAp: Participant were told that the purpose of the task was to enable them to learn about predicting stock prices. Participants were told to treat this task as an opportunity for learning and self-improvement. They should take advantage of the task to learn as much as they can, and to develop their knowledge, skills, and abilities to the fullest. PAp: Participants were told that the purpose of the task was to allow them to prove their ability at predicting stock prices. Participants were told to treat this task as an opportunity to assess how good they are at predicting stock prices. They should take advantage of the task to see whether they have all the knowledge, skills, and abilities necessary to do well at this task.
25	*Chillarege, Nordstrom, and Willimas (2003)	Content	Map: self-referenced Pap: social comparison	AGO	MAp: Instructions emphasized that the trainee's goal was mastery and individual improvement. PAp: Instructions stressed that the trainee's goal was to demonstrate high performance relative to other trainees and that their performance was diagnostic of intellectual ability.
26	Cianci, Klein, and Seijts	Content	MAp: task-referenced PAp: self-presentation	AGO	MAp: Your goal throughout the next task is to learn how to approach the task as well as possible. You should view this as an opportunity to learn and develop your ability to perform this task. The process by which you learn to do and understand the task should be your concern. PAp: Your goal throughout the next task is to perform as well as possible, achieving the highest score possible. You should view this as an opportunity to demonstrate your ability to perform this task.
27	Cianci, Schaubroeck, and Mc Gill (2010, study 1)	Content	MAp: task-referenced PAp: self-presentation	AGO	See Cianci, Klein, and Seijts
28	Cianci, Schaubroeck, and Mc Gill (2010, study 2)	Content	MAp: task-referenced PAp: self-presentation	AGO	See Cianci, Klein, and Seijts

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
29	Convington and Omelich (1984)	Climate	MAp: task-referenced PAp: social comparison	AGO	MAp: Any number of students could achieve a given letter grade on each test as long as they all met preannounced criteria in the form of items correct. PAp: Your individual performances will be evaluated relative to the performance of your group on each test.
30	Crouzevialle and Butera (2012, study 1)	Climate	PAp: self-presentation and social comparison	AGO	PAp: It is important for you to be proficient, to perform well and to obtain a high score, in order to demonstrate your competence. You should know that a lot of students will do this task. You are asked to keep in mind that you should try to distinguish yourself positively, that is, to perform better than the majority of students. In other words, what we ask you here is to show your competencies, your abilities.
31	Crouzevialle and Butera (2012, study 2)	Climate	PAp: self-presentation and social comparison	AGO	See study 1
32	Crouzevialle and Butera (2012, study 3)	Climate	PAp: self-presentation and social comparison	AGO	See study 1
33	Cury, Elliot, Sarrazin, Da Fonseca and Rufo (2002)	Climate	MAp: self-referenced PAp-PAv: social comparison	AGO	MAp: The aim of this session is to see if you can quickly improve your dribbling. There are two trials and the object is to go as fast as possible. When you have finished your two attempts, you will be provided with information regarding your time taken to complete the course. PAp: The intention is to compare French students to one another on their technical level of dribbling, which is estimated by their time taken to complete the course. If your performance is better than a majority of students, you will demonstrate that you have a good technical level of dribbling. PAv The intention is to compare French students to one another on their technical level of dribbling, which is estimated by their time taken to complete the course. If your performance is worse than a majority of students, you will demonstrate that you have a poor technical level of dribbling.

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
34	Darnon, Butera, and Harackiewicz	Content	MAp: task-referenced PAp: self-presentation	AGO	MAp: It is very important for you to accurately understand the aims of this experiment. You are here to acquire new knowledge that could be useful to you, to understand correctly the experiments and the ideas developed in the text, and to discover new concepts. In other words, you are here to learn. PAp: It is very important for you to accurately understand the aims of this experiment. You are here to perform, to be good, to get a good grade on the Multiple-Choice Test, to prove your abilities, and to show your competencies. Experimenters will evaluate your performance. This evaluation has to be as good as possible.
35	Darnon, Harackiewicz, Butera, Mugny, and Quiamzade (2007b, study 1)	Content	PAp-PAv: social comparison	AGO	PAp: The experimenters will evaluate your performance. It is important for you to perform well and obtain a good grade on the different tasks presented here. You should know that a lot of students will do this task. You are asked to keep in mind that you should try to distinguish yourself positively, that is, to perform better than the majority of students. In other words, what we ask you here is to show your competencies, your abilities. PAv: The experimenters will evaluate your performance. It is important for you to avoid performing poorly and not obtain a bad grade on the different tasks presented here. You should know that a lot of students will do this task. You are asked to keep in mind that you should try not to distinguish yourself negatively, that is, try not to perform more poorly than the majority of students. In other words, what we ask you here is to avoid performing poorly.
36	Dewar, Kavussanu, and Ring (2013)	Content/Climate	Map: self-referenced Pap: social comparison	AGO	MAp: The purpose of the manipulation was to get participants to use self-referenced criteria to evaluate their competence. The important thing is that you try hard to improve your competence. Pap: The aim of the manipulation was to get participants to use other-referenced criteria to evaluate their competence. Therefore, performing well relative to others was stressed. The important thing is that you win this competition.

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
37	*Dickhäuser, Buch, and Dickhäuser (2011)	Climate	MAp: self-referenced Pap-PAv: social comparison	AGO	MAp: The purpose of this project is to give students the opportunity to develop their problem-solving skills. If you practice, you can train your ability in solving complex problems. Hence, we want to discover how students develop their competence in problem solving. PAp. The purpose of this project is to compare students to one another in their abilities to solve anagrams. In numerous studies, we have found that university students are comparable in their abilities to solve anagrams, but some students stand out as they do quite well on the anagrams. This session will give you the opportunity to demonstrate that you are a good anagram solver. Hence, we want to discover whether you do better than other students. PAv: The purpose of this project is to compare students to one another in their abilities to solve anagrams. In numerous studies, we have found that university students are comparable in their abilities to solve anagrams, but some students stand out as they do quite poorly on the anagrams. This session will give you the opportunity to demonstrate that you are not a bad anagram solver. Hence, we want to discover whether you do worse than other students.
38	Edwards (2010)[a]	Content	MAp: task- referenced Pap-PAv: self-presentation and social comparison	AGO	MAP: This session will provide you the opportunity to learn how the brain regulates emotions. When you have completed the study, you will be provided information regarding how well you learned about how the brain regulates emotions. Remember your goal is to learn how the brain regulates emotions. Please read the passage with your goal in mind. PAp: This session will give you the opportunity to demonstrate that you are exceptional at answering questions about the text you are about to read. When you have completed the study, you will be provided information regarding how well you did compared to the other students. Remember your goal is to demonstrate that you are exceptional at answering the short answer questions about the passage. Please read the passage with your goal in mind. PAv: This session will give you the opportunity to demonstrate that you are not extremely poor at answering questions about the text you are about to read. When you have completed the study, you will be provided information on whether you did poorly compared to other students. Remember your goal is to demonstrate that you are not extremely poor at answering the short answer questions about the passage. Please read the passage with your goal in mind

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
39	*Elliot, Cury, Fryer, and Huguet (2006)	Climate	MAp: self-referenced Pap-PAv: self-presentation and social comparison	AGO	MAp: The intention is to see if the course can be used to examine students' progress in dribbling. The first aim of this session is to see if you can quickly improve your dribbling. PAp: This course has been set up and used all over France in order to compare students and identify students at each school who do the best dribbling. You will be videotaped and the tape of the students with the best times will be shown to the other students at your school. PAv: This course has been set up and used all over France in order to compare students and identify students' most important errors in dribbling. You will be videotaped and the tape of the students with the worst times will be shown to the other students at your school so they can see the errors to avoid.
40	Elliott and Harackiewitz (1994)	Content	MAp: self-referenced PAp: social comparison	AGO	MAp We would like you to pursue a moderately challenge goal for each game. So, these goals can help you to develop your skills on this pinball machine and gauge your progress. PAp We would like you to pursue a performance goal for each game. So, these goals can give you a good sense of your pinball playing ability. The goals represent the 65th percentile score for students with your level of pinball experience. Only 35% students were able to attain this score on their first game of pinball on this machine.
41	Elliott and Harackiewitz (1996, study 1)	Climate	MAp: task- referenced Pap-PAv: social comparison	AGO	MAp: The purpose of this project is to collect data on college students' reactions to our Nina puzzles. When you have completed the four puzzles, you will be provided with information regarding the percentage of the total hidden Nina's that you found in today's session. PAp: The purpose of this project is to compare college students to one another in their ability to solve, our Nina puzzles. We have found that most students are fairly comparable in their ability to solve Nina puzzles, but some students stand out because they do quite well on the puzzles. This session will give you the opportunity to demonstrate that you are a good puzzle solver. PAv: The purpose of this project is to compare college students to one another in their ability to solve our Nina puzzles. We have found that most students are fairly comparable in their ability to solve Nina puzzles, but some students stand out because they do quite poorly on the puzzles. This session will give you the opportunity to demonstrate that you are not a poor puzzle solver.

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
42	*Elliott and Harackiewitz (1996, study 2)	Climate	MAp: task- referenced PAp-PAv: social comparison	AGO	MAp: See Study 1 PAp: The purpose of this project is to compare college students to one another in their ability to solve, our Nina puzzles. For instance, if you find more Ninas than a majority of students you will demonstrate that you have good puzzle solving ability. PAv: The purpose of this project is to compare college students to one another in their ability to solve our Nina puzzles. For instance, if you find fewer Nina than a majority of students, you will demonstrate that you have poor puzzle solving ability.
43	Elliott, Shell, Henry, and Maier (2005, study 1A)	Climate	MAp: task-referenced PAp-PAv: social comparison	AGO	MAp: The purpose of this study is to collect data on high school students' reactions to the problems." They were told that the session would provide them with the opportunity to "get to know these problems and learn how to solve them well. PAp: The purpose of this study is to compare students with one another in their ability to solve these problems. Previous work has indicated that most high school students are comparable in their ability to solve these problems but that some students stand out because they do exceptionally well. This session would provide the opportunity to demonstrate that you are an exceptional problem solver. PAv: The purpose of this study is to compare high school students with one another in their ability to solve these problems. Previous work has indicated that most high school students are comparable in their ability to solve the problems, but that some students stand out because they do so poorly. Thus, the session would provide the opportunity to demonstrate that you are not a poor problem solver.
44	Elliott, Shell, Henry, and Maier (2005, study 1B)	Climate	MAp: task-referenced PAp-PAv: social comparison	AGO	See Study 1a MAp
45	Elliott, Shell, Henry, and Maier (2005, study 2)	Climate	MAp: task-referenced PAp-PAv: social comparison	AGO	See Study 1a
46	Escribe and Huet (2005)	Climate	MAp: self-referenced PAp: social comparison	AGO	MAp: This task is a means of developing your own competencies and methods of study. This is an opportunity for you to train and improve your way of learning. PAp: This task is a test to measure your memory capacity. At the end of the experiment, we will collectively tell you what is your level and how you compared to the others.

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
47	Gabriele and Montecinos (2001)	Climate	MAp: self-referenced PAp: social comparison and self-presentation	AGO	MAp: Understanding how to solve multistep math problems like these will help you become more skillful at solving all sorts of problems. The harder you try, the more you will learn. The next problem is going to be a little more challenging so if you just continue to think hard, try to see it as a challenge, and enjoy working together on it, you will probably continue to get better at under- standing these types of problems. PAp: Working on multi- step math problems like these will help us discover how much kids your age knows about multistep math word problems. We are interested in how you do compared with other kids at your grade level. So you should do the best you can. I can tell how you are at these types of problems compared to other kids your age. The next problem is a lot like the last two in that people are either good at solving these problems compared to other kids their age or they are not. So how well you do will tell me some- thing about how good you are at these types of problems.
48	Gano-Overway (2001, pilot)[a]	Content and climate	MAp: self-referenced PAp: social comparison	AGO	Map: The participants were asked to focus on learning and improving by doing the computer task and that the purpose of the task was to help the researchers find out whether the computer programme can help people. Pap: the participants were asked to perform better than other students their age. They were provided with a normative people. Additionally, they were told that the people tested so far had scored between the 45th and 80th percentile
49	Gano-Overway (2001)[a]	Content and climate	MAp: self-referenced PAp: social comparison	AGO	MAp: This task tests how good you are at responding quickly to situations. Many people show slow reactions at first but with more practice, they begin to show improvements in their reaction time. The purpose of this project is to see if by doing this task people can learn to improve their reaction time. So as you perform this task, we would like you to focus on improving your reaction time score over the course of several attempts at the task. There is no set standard, but you should try to improve your personal score. PAp: This task test how good you are at responding quickly to situations. The purpose of this task is to see which students have the best reaction time. Therefore, as you perform this task I would like you to focus on performing better than as many people as possible. How you do on this task will tell me how good your reaction time is compared to others. There is no set standard, but you should perform better than as many people as possible.

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
50	Gelety (2011, pilot)[a]	Climate	MAp: self-referenced Pap: social comparison and self-presentation	AGO	MAp: We would like your group to engage in a task that involves conceptual problem solving. This is not a test at all. Although it is a very challenging task, it is simply a training tool that groups can learn from and use to improve their problem-solving skills. Our research indicates that these are skills that can be acquired over time, and your group will have an opportunity to improve. Pap-normative: We would like your group to complete a problem-solving test which involves decision making and strategic skills. We will use the results from your group's work and compare them to that of the other groups that have already done this task. From these results, we will be able to inform you of how your group's performance compares to others PAp-ability: we would like your group to complete a problem-solving test, which involves decision making and strategic skills, both crucial aspects of intelligence. Whereas older group-based ability and intelligence measures often depended on knowing facts, scores on this one, instead, reflect the ability of a group to effectively carry out a task. It is a very challenging task that we will use to discriminate between high-ability groups and low-ability groups
51	Gelety (2011, study 1)[a]	Climate	MAp: self-referenced Pap: social comparison and self-presentation	AGO	See pilot study
52	Gelety (2011, study 2)[a]	Climate	MAp: self-referenced PAp: social comparison and self-presentation	AGO	See pilot study
53	Giannini, Weinberg, and Jackson (1988)	Content	MAp: self-referenced PAp: social comparison	AGO	MAp: Subjects were instructed to strive for improvement over their previous best score. Before each subsequent trial, subjects expressed their goal. PAp: They were instructed to compete against each other in the following two trials with the goal being to beat the other subject. Before each subsequent trial, subjects were given feedback concerning both their own and their competitor's performance.

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
54	Graham and Golan (1991, study 1)	Climate	MAp: task-referenced PAp: self-presentation and social comparison	AGO	MAp: Many people make mistakes on these puzzles in the beginning but get better as they go along. When people see the puzzles as a challenge, it makes them try harder and have more fun along the way. The next activity is a lot like this one. So if you just concentrate on the task, try to see it as a challenge and enjoy mastering it, you will probably get better as you go along. PAp: From how you did on the puzzles, I have a pretty good idea of how good you are at this type of puzzle-solving compared to other kids your age. The next activity is a lot like this one in that people are either good at these activities compared to other kids their age or they are not. So how you do will tell me something about how good you are at this kind of task.
55	Graham and Golan (1991, study 2)	Climate	MAp: task referenced PAp: self-presentation and social comparison	AGO	See study 1
56	Haegberg (2000)[a]	Content	MAp: self-referenced PAp: social comparison	AGO	MAp: On the next task, I really want you to try to learn and apply the rules of proper writing that were emphasized in the computerized training and in your training information packet. You should view the next editing task as an opportunity to improve your writing skills. In other words, the purpose of the next task is for you to try to increase your mastery in proper writing-style. PAp: On the next editing task, I really want you to try to do better than the other students who are also working on the task. To ensure that you outperform the other students, you should try to obtain a score near the 95th percentile. You should view the next editing task as an opportunity to show how knowledgeable you are about proper writing style. In other words, the purpose of the next task is for you to try to do better than the other students and to show me how much you know.
57	Harackiewicz, Abrahams, and Wageman (1987)	Climate	MAp: task-referenced PAp: social comparison	AGO	MAp: Later you will be shown whether your total point score is above or below the Standard Score for these same puzzles. The standard score is the average score for high schools. The researchers will tell you how to judge the quality of your performance on these puzzles by comparing your score to the standard score. PAp: Later you will be shown whether the number of words you found is better or worse than the average number of words found on these very same puzzles by other high school students. The researchers will tell you how to judge the quality of your performance on these puzzles by comparing the number of words you found against the average number found by other high school students.

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
58	Hole and Crozier (2007)	Content	MAp: task-referenced PAp: self-presentation	AGO	Map: I'm going to give you some puzzles which should help to learn how to solve problems. It does not matter how many you get right, just enjoy it and you will probably find you improve your skills as you go along. PAp: I'm going to give you some puzzles which should test how good you are at solving problems. Children who solve these tests are very good problem solvers. These tests will show how good you are at solving problems compared to other children your age so try to get the best score you can
59	Jagacinski, Madden, and Reider (2001)	Climate	MAp: self-referenced PAp: social comparison	AGO	MAp: Participants were told that everyone is capable of being creative, that the task would give them a chance to express and develop their creativity, and that we were interested in how students develop their creative skills. PAp: Participants were told that the task was a measure of creative ability, that some students had the creative ability to do well on this type of task, but others did not, and that we were interested in how well they could perform relative to other students.
60	Jagacinski, Kumar, and Kokkinou (2008)	Climate	PAp: social comparison	AGO	PAp: Participants were told that the problems they would be working on were designed to assess intelligence and that we would be comparing their performance to that of other students.
61	Johnson (2010)[a]	Content	MAp: task-referenced PAp: social comparison	AGO	MAp: The purpose of this instruction is to learn more about solving fractions. You should try to do your best. It is okay if you make mistakes. Remember, making mistakes is part of the learning process. PAp: The purpose of this instruction is to outscore you classmates at solving fractions and win.
62	Kavusano, Morris, and Ring (2009)	Content	MAp: task- and self-referenced PAp-PAv: social comparison	AGO	Map: Participants were informed that the aim of the study was to understand how students learn the skill of golf putting and that the session would give them the opportunity to practice this skill. They were instructed that their goal was to do their best to learn this. PAp: Participants were informed that the study aim was to compare university students on performance in golf putting. They were instructed that their goal was to demonstrate that they were better than other students in the experiment at golf-putting Participants were also informed that at the end of the session, their performance would be compared against that of other performers PAv: Participants were informed that the study aim was to compare university students on their performance in golf putting and that their goal was to demonstrate that they were no worse than other students. They were told that at the end of the session their performance would be compared against that of other performers.

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
63	*Koestner, Zuckermann, and Koestner (1987)	Climate	MAp: task-referenced PAp: self-presentation	Implicit theory	MAp: The puzzles were described without mentioning any relation to creative intelligence; in addition, the task was referred as a puzzle instead of as a test. PAp: Participants were told that the hidden-figure test measures ability to break down and reorganize a perceptual field and that this ability is associated with creative intelligence; in fact, it was said, such tests are even used as one component of many IQ batteries.
64	*Lawrence, and Crocker (2009, study 1)	Climate	MAp: task-referenced PAp: self-presentation	AGO	MAp: The instructions emphasized that the experiment was about problem solving styles and approaches, and not about the number of correct answers. PAp: The instructions informed students that the test measured verbal ability that the experiment was to measure their strengths and weaknesses.
65	Lawrence and Crocker (2009, study 2)	Climate	MAp: task-referenced PAp: self-presentation	AGO	MAp: The instructions indicated that the purpose was to examine problem-solving skills, and not about the number of correct answers. PAp: the instructions indicated that the purpose of the test was to examine math ability, that the experiment was to measure their strengths and weaknesses.
66	Lovejoy (2012)[a]	Content and climate	PAp-PAv: social comparison	AGO	PAp: At the end of the session, you will receive information about how you performed overall, relative to other students. Given that the purpose of the session is to compare college students to each other on how well they perform, its' recommended that you adopt a "performance goal" for the rest of the session. People who pursue a performance goal focus on performing better than others in this study. In other words, try to do better than as many other students as possible. PAv: At the end of the session, you will receive information about how you performed overall, relative to other students. Given that the purpose of the session is to compare college students to each other on how well they perform, it is recommended that you adopt a "performance goal" for the rest of the session. People who pursue a performance goal focus on not performing worse than others in this study. In other words, try to avoid doing worse than as many other students as possible

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
67	Mangos and Steele-Johnson (2001)	Climate	MAp: self-referenced PAp: self-presentation	Implicit theory	MAp: The task instructions were designed to create the perception that skill on the task could being raised through the effort and practice. That is skills on problem-solving tasks such as class scheduling are developed through practice. Working on [the] task provides people with an opportunity to improve their logical reasoning skills. PAp: The task instructions were designed to create the perception that skill on the task was related to stable, underlying abilities. That is working on the task provides people with an opportunity to demonstrate their logical reasoning skills. Initial performance is a good indicator of later performance. The higher your performance on this task, the higher your logical reasoning skills
68	Matthews (2007)[a]	Climate	MAp: self-referenced PAp: social comparison	AGO	MAp: Creating a rehearsal climate that emphasized effort and individual improvement and highlighted the process of learning PAp: Creating a rehearsal climate that focused the instrumentalists' focus upon their own performance relative to others and that placed high value on the final performance.
69	Miles (2010, part 1)[a]	Climate	MAp: task- and self-referenced	AGO	MAp: Implementation of mastery approach goal structures in the mathematics classrooms using the TARGET framework and strategies.
70	Moos (2004)[a]	Content/climate	MAp: task-referenced PAp-PAv: social comparison	AGO	MAp: In this learning task, you will be given the opportunity to study the respiratory system. After the learning task, you will be given a post-test that measures your learning. Though I will be scoring the post-test, I am again most interested in how you learn in this environment. You should use this time to learn as much as you can about the respiratory system. PAp: The purpose of this learning task is to compare the performance of undergraduate students to one another. Some students stand out because they perform quite well in this task and on the post-test. I will be comparing your answers, as well as your performance on the post-test, with other students. In this task, you will be given an opportunity to demonstrate that you excel on the task and on the post-test. PAv: The purpose of this learning task is to compare the performance of undergraduate students to one another. Some students stand out because they perform quite poorly in this task and on the post-test. I will be comparing your answers on this task, as well as your performance on the post-test, with other students. In this task and on the post-test, you will be given an opportunity to demonstrate that you do not perform poorly on the learning task questions and on the post-test.

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
71	Mousseau (2011)[a]	Climate	MAp: task-referenced	Implicit theory	MAp: After the presentation, students completed a writing activity in which they were asked to think of things they learned to do well, and to recall how practice had been the key to attaining mastery.
72	Newman and Schwager (1995)	Climate	MAp: task-referenced PAp: social comparison	AGO	MAp: Working on math puzzles like these will probably help you learn new things in math, and that may, really help you do well in math class. In fact, it might be a big help in school, in general, because doing these puzzles tends to "sharpen the mind" and make you think. It helps you become more skillful at solving all sorts of problems. PAp: How you do on math problems like these helps us know how smart you are in math and what kind of grade you might get in math class. We are interested in how you do compared with other kids at your grade level. I will let you know at the end of the session how you did compared with all the other kids.
73	Niemvirita (2002)	Climate	MAp: task referenced PAp: self-presentation	AGO	MAp: A new problem-solving task is being developed and the students were encouraged to work on the task as if it had been real but it was emphasized that they were not tested and evaluated in terms of relative success. PAp: The students were stressed that the task was a test that measures student's reasoning ability. It was also stated that the level of performance in the task was a good predictor of future success at school. To further highlight the evaluative function of the task, the students were told that the results would be announced in a few days by their own teacher.
74	Noordzij, Van Hooft, Van Mierlo, Van Dam, and Born (2013)	Content/climate	MAp: task- and self-referenced	AGO	MAp: The learning goal training used goal content (setting learning goals) as well as goal climate, conducive to learning and development. A MAp climate was created by means of the motto of the training: "Goals will help you improve your job-search abilities'. Participants also practiced with setting mastery goals.
75	Nordstrom, Wenland, and Williams 1998	Content	MAp: self-referenced PAp: social comparison and self-presentation	AGO	Map: Trainees assigned learning goals were told that their goal in training was to master computer skills and demonstrate improvement. Pap: Trainees who were assigned performance goals were told that their goal was to demonstrate high performance relative to others and that computer skill acquisition was diagnostic of intellectual capacity.

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
76	Ntoumanis, Thogersen-Ntoumani, and Smith (2009)	Content	MAp-MAv: self-referenced PAp -PAv: social comparison	AGO	MAp: The aim of this session is to see if you can improve your own dart-throwing performance. MAv: The aim of this session is to see if you can avoid making mistakes that can hinder your own dart-throwing performance. PAp The intention is to compare students to one another according to their dart throwing ability. If your performance is better than the majority of students, you will demonstrate that you have a high level of dart throwing ability PAv: The intention is to compare students to one another according to their dart throwing ability If your performance is worse than the majority of students, you will demonstrate that you have a low level of dart- throwing ability.
77	Reinboth and Duda (2016)	Content/Climate	Map: self-referenced Pap: social comparison	AGO	Map: ….However, the score is not the main issue here; the important thing is that you try as hard as you can and try to improve your own performance over time Pap:… Your scores will also be compared against other students in subsequently displayed on the college website, …So, focus all your attention on winning.
78	Rusk (2012)[a]	Climate	MAp: task- and self-referenced	AGO	MAp: The intervention was designed to promote learning goals, including fostering exploration, offering choice, encouraging experimentation, and other aspects of the TARGET framework.
79	Senko, Durik, Patel, Lovejoy, and Valentiner (2013, study 1)	Content	MAp: task-referenced PAp: social comparison	AGO	MAp: We recommend that you adopt a mastery goal for today's session. In other words, try to develop a good command of the new Left-to-Right technique. PAp: We recommend that you adopt a performance goal for today's session. In other words, try to do better than previous participants.
80	Senko and Harackiewicz (2005, study 1)	Content	MAp: self-referenced PAp: social comparison	AGO	MAp: we recommend that you adopt a "mastery goal" for the next pair of puzzles. Achieving this mastery goal involves learning and using the word-finding strategies on the next pair of puzzles. PAp: we recommend that you adopt a "performance goal" for the next pair of puzzles. Achieving this performance goal involves finding more words than other participants on the next pair of puzzles.
81	*Senko and Harackiewicz (2005, study 2)	Content	MAp: self-referenced PAp: social comparison	AGO	MAp: People who pursue a mastery goal approach the activity as an opportunity to develop their skills. We recommend that you adopt a mastery goal for the next pair of puzzles PAp: People who pursue a performance goal approach the activity as an opportunity to test their skill against other people. We recommend that you adopt a performance goal for the next pair of puzzles.

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
82	Song (2004)[a]	Climate	MAp: task-referenced PAp: social comparison	AGO	MAp: Task-instruction messages stressing the importance of challenging work and the intrinsic value of learning. Students in the learning-oriented context were allowed to set priorities and choose activities that interested them. Evaluation was privately. Pap: Task-instruction messages stressing the importance of performance. Evaluation practice included social comparison information and evaluation comments based on norm-referenced standards.
83	*Steel- Johnson, Beauregard, Hoover, and Schmidt (2000, study 1)	Climate	MAp: self-referenced PAp: self-presentation	Implicit theory	Map: Participants were instructed that "skills on problem solving tasks like the class scheduling task are developed through practice, the more people practice, the more capable they become." Pap: Participants were instructed that performance on problem-solving tasks like the class scheduling task reflects basic cognitive capabilities and that the higher their underlying cognitive capacities are, the better their problem solving is.
84	*Steele- Johnson, Beauregard, Hoover, and Schmidt (2000, study 2)	Climate	MAp: self-referenced PAp: self-presentation	Implicit theory	See Study 1
85	Steele-Johnson, Heintz, and Miller (2008)	Climate	MAp: self-referenced PAp: social comparison	AGO	MAp: Participants were informed that they could increase their task performance by developing strategies for learning the terms and definitions. PAp: Participants were informed that it was important to match as many terms and definitions as possible and that participants should focus on comparing their performance relative to others' performance.
86	Stout and Dasgupta (2013, study 3)	Content	MAp: self-referenced PAp-PAv: self-presentation	AGO	MAp: Participants were given a mastery goal and instructed to try to focus on how this experience will help you build your interview skills. PAp: Participants were given a performance-approach goal and instructed to try to focus on performing as well as you can; being the best interviewee is important right now. PAv: Participants were given a performance-avoidance goal and instructed to try to avoid making mistakes; downplay any weakness you have.

Table 5 (continued)

	Study	Goal framing	Goal standard	Theoretical Framework	Manipulations
87	*Turner, Johnson, and Pickering (1996)	Climate	Map self-referenced Pap: self-presentation	Implicit theory	Map: Many people make mistakes in the beginning but get better as they go along. When people view the codes as a challenge, they try harder and have more fun along the way. The next task is similar as the one before; view the task as a challenge and enjoy mastering it. Pap: Based on your performance you have a pretty good idea of how good you are at this type of activity. How well you do on the following task will indicate your ability on this type of task.
88	Van Hooft and Noordzij (2009)	Content/climate	MAp: self-referenced PAp: social comparison	AGO	MAp: View this workshop as a useful aid to increase your job seeking skills Participants were invited to practice with setting learning goals in their exercise book. Feedback was given, both positive and negative, to ensure a climate of development and improvement. PAp: View this workshop as a useful aid to get the best results in searching for employment". Participants were invited to practice with setting performance goals in their exercise book. To ensure a climate of competition and outperforming others, participants were encouraged to focus on competition with others, and to reward themselves when performing well.
89	Van Yperen, Elliot, and Anseel (2009, study 1)	Content	Map-MAv: self-referenced Pap-PAv: social comparison	AGO	MAp: Do better than your total score in Version 1. MAv Don't to do worse than your total score in Version 1. PAp: Do better than the average total score in your norm group. PAv: Don't do worse than the average total score in your norm group.
90	Van Yperen, Elliot, and Anseel (2009, study 2)	Content	Map-MAv: self-referenced Pap-PAv: social comparison	AGO	See Study 1

Studies indicated with an asterisk indicate studies whereby the sample size was modified because it was not clear how the participants were divided. When a study indicated that subjects were randomly divided, and the number of participants could not be equally divided, the total number of participants was adjusted. Studies indicated with [a] indicate dissertations, master thesis or poster presentation

4.1 Direct effects

Our findings support our central tenet that, overall, induced mastery-approach goals result in higher task performance compared to performance-approach, performance-avoidance goals, and no-goal control conditions. This result is in line with the original assumptions of the achievement goal theory (e.g., Dweck and Leggett 1988; Nicholls 1984) and confirms the results of previous meta-analyses on induced achievement goals (e.g., Van Yperen et al. 2015). However, the results contradicts the findings of some previous meta-analyses that were correlational in nature (e.g., Hulleman et al. 2011). So, it seems that the two methodologies (i.e., self-reported goals vs. experimentally induced goals) produce different effects.

Remarkably, we found no difference in task performance between induced performance-approach and performance-avoidance goals. This result does not align with the common observation that performance-approach goals have beneficial effects, while performance-avoidance goals have detrimental effects on task performance (e.g., Elliot and Harackiewicz 1996; Senko et al. 2011), even when those goals are induced (Van Yperen et al. 2015). Our results for motivation, did, however, support the idea that induced performance-approach goals are more beneficial compared to performance-avoidance goals, but only for self-reported motivation and not for free-choice persistence. The question, then, is why this advantage of performance-approach over performance-avoidance goals in terms of self-reported motivation did not translate into more motivated behavior (i.e., free-choice persistence) and/or a performance benefit. Most studies inducing performance-avoidance goals were conducted in a lab setting. In this context, the most salient characteristics of performance-avoidance goals might be less prevalent. For example, opportunities for self-handicapping are limited in lab settings and withdrawal is often almost impossible. In such a situation, where 'escape' or actual task avoidance is not an option, the aim of avoiding doing worse than others may motivate individuals to initiate action and strive for a performance level that prevents losing face (see also Van Mierlo and Van Hooft 2015). This striving to prevent losing face springs from an avoidance motive, which is likely reflected in the difference in self-reported motivation between performance-approach and performance-avoidance goals but not in actual motivated behavior or performance level.

4.2 Moderating effect of goal standard

As proposed by both Elliot et al. (2011) and Hulleman et al. (2011), processing and pursuing a task-referenced mastery goal requires fewer cognitive resources than processing and pursuing a self-referenced mastery goal. Previous correlational research based on self-reported achievement goals (e.g., Elliot et al. 2011) indeed shows a performance advantage for mastery-approach goals with a task-referenced goal standard compared to a self-referenced standard. Our findings support this notion by showing that the inducement of mastery-approach goals based on a task-referenced goal standard for evaluation (i.e., learning and mastering a task), translates in a performance gain for those goals compared to performance-approach goals.

An example of a task-referenced standard for mastery-approach goal manipulations is the following: "This session will provide you with the opportunity to learn how to solve the problems well" (Bjørnebekk, Gsjeme, and Ulrikson 2011, p. 361). Evaluation of goal achievement based on this manipulation requires that participants cognitively represent the problem-solving task and determine their level of accomplishment. The frame of reference for evaluation is the task itself and participants' attention likely remains task-focused, which requires only limited cognitive resources (Elliot et al. 2011).

In contrast to a task-based standard for evaluation, when performance is evaluated in terms of intrapersonal criteria (e.g., doing better than one did before), the inducement of mastery-approach goals translates into a performance gain for mastery-approach goals compared to performance-approach goals. Consider, for example, the mastery-approach goal manipulation "Do better than your total score in Version 1", used by Van Yperen and colleagues (2009, p. 935). Evaluation of goal achievement based on this manipulation requires that participants cognitively represent and compare two outcomes at the same time (i.e., Version 1 versus Version II). Moreover, in case of self-referenced standards, the frame of reference for evaluation is more self-based and less task-based, which may cause participants' attention to shift from the task itself towards maintaining a positive self-concept (Elliot et al. 2011).

The performance advantage of mastery-approach goals over performance-approach goals also depended on the goal standard that was used to induce performance-approach goals. Previous correlational research (Hulleman et al. 2010; Senko and Dawson 2017) suggests a performance benefit of social-comparison over self-presentation (i.e., appearances) standards for performance-approach goals. This should translate into a performance benefit for mastery-approach goals when performance-approach goals are induced via self-presentation standards. In our meta-analysis, however, we only found a significant performance benefit for mastery-approach goals when performance-approach goals were induced via social-comparison standards. Some caution is due when interpreting these results because of the small difference between the confidence intervals for social comparison (0.05–0.46) and self-presentation (−0.03–0.30). Despite being cautious about this result, it still raises the question whether there might be a difference between self-reported and manipulated performance-approach goals with regards to the standard of evaluation that is utilized.

Already in the eighties of the past century, Dweck (1986) and Convington (1984) argued that performance goals are closely related to self-worth. Following this line of reasoning and focusing on self-reported achievement goals, Hulleman and colleagues (2010) argued and demonstrated that self-presentation performance-approach goals are more closely tied to one's self-worth compared to social comparison performance-approach goals. Our results suggest that this difference between self-presentation and social comparison standards of evaluation disappears and may even reverse when performance-approach goals are induced rather than measured with self-reports. Several reasons might explain why, in an experimental setting, a self-presentation standard of evaluation is less tied to one's self-worth and therefore less likely to result in adverse effects for performance-approach goals relative to mastery-approach goals. First, self-presentation manipulations are often aimed at

a specific skill or ability (e.g., logical reasoning skills). They do not address broader self-evaluative constructs such as being 'smart' or 'good', as do items measuring self-presentation performance-approach goals in self-report studies (e.g., "It is important that others know that I'm a good student"; VandeWalle 1997a, b). Such broad conceptions of demonstrating ability that are, moreover, self-imposed (i.e., measured rather than induced), present a much stronger ego-threat compared to narrowly defined skills that may have limited personal relevance outside the experimental setting. Second, self-presentation manipulations rarely involve a 'real' or meaningful audience or target person, even though they are sometimes framed in relation to the experiment leader. In self-report studies, however, the target person(s) to whom one seeks to demonstrate one's ability is or are self-selected and salient and, hence, likely to be more meaningful. Without significant others present, an induced performance-approach goal based on a self-presentation standard seems less tied to one's self-worth. However, in case of social comparison standards of evaluation, this same lack of significant others may be detrimental for performance. In the experimental settings in our meta-analysis, social comparison was mostly manipulated via aggregated normative scores that were often unknown to the participants until after task completion (e.g., 'The computer will give you feedback about how well you did compared to others'; Bodman 2008, p. 87). In case of aggregated scores, participants are unable to judge whether they perform better than others during task performance. Those feelings of uncertainty may prompt a slacking of effort and heightened fear of failure (cf., Dweck and Leggett 1988). In contrast, when performance-approach goals are self-reported, the comparison others are specific and self-selected and most of the time known (e.g., "My goal in this class is to do better than others"; item from Elliot and McGregor 2001). In such contexts, when the comparison others are known, individuals are better able to judge whether their goal of outperforming others is feasible, and whether they are on track to achieve their goal. Another explanation might be the different reasons for social comparison. According to Senko and Tropiano (2016) the goal of outperforming others can be based on controlled or autonomous reasons. The first one resulting in maladaptive effects and the last one resulting in adaptive results. One can argue that the inducement of a performance goal with the instruction of outperforming others will likely result in individuals who has a controlled reason to strive for this goal.

In all, the different standards of evaluation partly explain the performance differences between mastery-approach goals and performance-approach goals in experimental settings. It is important to note that no studies in our sample included a direct comparison of different goal standards. As such, our findings do not allow us to compare the performance effects of task-referenced mastery-approach goals to those of self-referenced mastery-approach goals or for social-comparison performance-approach goals to those of self-presentation performance-approach goals. We can only conclude that whether or not there was a significant difference in performance between induced mastery-approach and performance-approach goals depended on the different standards of evaluation that were used.

4.3 Moderating effect of goal framing

Our findings for goal framing support Kozlowski and Bell's (2006) proposition that the exact framing of achievement goal interventions matters. Induced mastery-approach goals only showed performance benefits relative to induced performance-approach goals when goal content was manipulated. No such benefit was found for manipulations that only focused on goal climate. This finding indicates that there is no difference in performance between induced mastery-approach or performance-approach goals unless participants are assigned, or instructed to adopt, specific goals for an upcoming task (e.g., "Your goal whilst performing this memory task is to detect as many correct number matches as you can in order to perform better than other students taking part"; Avery and Smilie 2013, p. 42.)

Although our findings might appear to support the idea of goal content manipulation as superior to goal climate manipulation, we would like to call for caution when drawing conclusions about the role of goal framing based on studies on induced achievement goals. As Kozlowski and Bell (2006) argued, goal content manipulations shape self-regulation and action more directly than goal climate manipulations resulting in a stronger immediate effect. Goal climate manipulations take more time to materialize because they affect self-regulatory processes that generate effects mainly in the longer term. This postponed effect can result in a relatively weak but more durable effects of goal climate manipulations. Most studies on induced achievement goals focus on immediate, short-term outcomes, so that potential goal climate effects may remain undetected. The few studies measuring long-term outcomes did demonstrate positive effects for the inducement of a mastery-approach goal climate compared to a performance-approach climate (Convington and Omelich 1984; Miles 2010). Furthermore, research on classroom structure and teacher pedagogical style indicates that in general a mastery-approach climate leads to the most optimal learning outcomes (e.g., Murayama and Elliot 2009). However, for the time being, these are speculative reflections, also because the studies in our sample did not explicitly differentiate between different types of goal framing. Based on our results, we strongly recommend that future studies differentiate between goal content and goal climate operationalizations and examine potential differences in effects over time and across different outcomes.

4.4 Additional moderators

Mastery-approach goals were more beneficial for performance than performance-approach goals when the manipulation was based on the 2×2 achievement goal theory (Elliot and McGregor 2001), but not when the manipulation was based on the implicit theories of ability (Dweck 1986). Dweck theorized that implicit theories of ability serve as antecedents of achievement goals: Believing that abilities can be improved likely results in the adoption of mastery goals, whereas believing that abilities are fixed likely results in the adoption of performance goals. Previous meta-analyses (Burnette, O'Boyle, VanEpps, Pollack, and Finkel 2013; Payne et al. 2007) indeed found an association between implicit theories of ability and achievement

goals. However, the correlations were rather weak. Furthermore, as argued by Dweck (2000), implicit theories influence self-regulatory processes which, in turn, predict achievement. Dweck therefore proposes that implicit theories only have a weak direct effect on achievement. As such, in our meta-analysis, the achievement goal manipulations based on the incremental theories of ability might not have been powerful enough to trigger performance differences between induced mastery-approach and performance-approach goals. Manipulations based on the incremental theory can certainly be relevant in their own right (see Sisk, Burgoyne, Sun, Butler, and McNamara 2018), but the incremental theory seems less suitable as underlying framework for the manipulation of achievement goals. The performance difference between induced mastery-approach and performance-approach goals only emerged in the lab, and not in the other domains (educational, sports, or work). The non-significant results for the other domains might be due to the relatively small numbers of studies conducted in the educational (11), sport (7), and work (2) domain compared to the lab (47). More specific, the effect sizes for education and sport almost reached significance. As such, future research should examine the effects of induced achievement goals in the different fields to investigate whether this performance difference between induced mastery-approach and performance-approach goals also emerges in the "real world" and not only in the lab.

Mastery-approach goals were also more beneficial when participants were older than 18 years but not when they were below 18 years of age. This latter finding is in line with Nicholls (1978), who proposed that children's' conception of ability changes around the age of 12, when they start to distinguish between effort (related to mastery goals) and ability (related to performance goals). However, it seems that for the inducement of achievement goals children hardly differentiate between mastery and performance goals and only when they reach adulthood their ability to distinguish between mastery-approach and performance-approach goals becomes prominent. Finally, the difference between induced mastery-approach and performance-approach goals was not affected by gender.

4.5 Limitations and considerations for future research

Although we established a robust positive effect of induced mastery-approach goals on performance relative to performance-approach, performance-avoidance goals, and no-goals, more research is needed to allow comprehensive tests of all possible contrasts in relation to motivation as well as performance. Studies on induced mastery-avoidance goals are particularly scarce. In addition, we did not include the effects of manipulated multiple goals on different outcomes (see for example, Linnenbrink 2005; Pahljina-Reinić and Kolić-Vehovec 2017).

Furthermore, due to sample size limitations, we could only test for moderators in the contrast between mastery-approach and performance-approach effects, and only for effects on task performance. In addition, we examined the effects of each moderator separately, as the sample size was not sufficient for nested moderation analyses. Moreover, the heterogeneity in effect sizes was not fully accounted for by our moderators. Additional potential moderators of the performance effects of induced state

achievement goal might include task complexity (see Utman 1997), task demands (see Steele-Johnson, Beauregard, Hoover, and Schmidt 2000), or feedback and time pressure (Van Yperen et al. 2015).

Another issue that should be addressed in future studies concerns the inclusion of manipulation checks and control conditions. Not all studies in our meta-analysis included a manipulation check and/or a control condition. A manipulation check is essential to ensure that effects can indeed be attributed to the intended change in achievement goals. Investigating the differential effects of induced achievement goals can be done without a control group but this does not allow for conclusions about the effects of achievement goals compared to the absence of such goals. Thirty-six out of the 90 studies included a control condition, and the nature of those control conditions differed dramatically. Some control conditions only comprised a short general task or 'do you best' instruction (e.g., Darnon, Harackiewicz, Butera, Mugny, and Qiumzade 2007), while other control conditions had the same structure as the experimental conditions (e.g., Noordzij, Van Hooft, Van Mierlo, Van Dam, and Born 2013). Although all these conditions still qualify as control conditions in the sense that they involved no explicit achievement goal manipulations, results for the control group contrasts are difficult to interpret because of the heterogeneity within this category. We recommend that future studies include manipulation checks and control conditions with the same structure as the experimental condition, as this would enhance methodological rigor and contribute to the validity of results for the inducement of achievement goals.

Finally, when designing and implementing achievement goal manipulations and interventions, we strongly recommend that future studies take the role of goal framing and goal standard into account. Educational researchers (e.g., Ames 1992) in the early nineties already suggested that mastery goals should be promoted in school policies and teacher education programs. Those early researchers did not take into account that mastery goals could be phrased by referring to mastering a task or to improve oneself compared to previous accomplishments (i.e., goal standard) or could be induced by means of content or climate (i.e., goal framing). The same holds for the studies included in this meta-analysis; none of them explicitly named the goal standard or the goal framing. So, at the very least we argue that a new gold standard for future research should be to explicitly report what goal standard was used and how goals were framed (see for an example, Chung, Bong, and Kim 2019). Our coding procedure and outcomes for these moderators indicate that increasing clarity on these issues is indeed warranted. With regards to goal framing, examining both the short-and long-term effects of achievement goal content and goal climate manipulations could add to the understanding of the effects of achievement goal interventions.

5 Conclusion and practical considerations

Achievement goal theory is one of the most influential motivational theories of the last decades. Previous meta-analytical findings of the correlational research on self-reported achievement goals provided valuable information about the connection

between achievement goals and motivation and performance across domains and contexts. However, when it comes to the practical implications of achievement goal theory, meta-analytical findings based on experimental research provide a more solid basis for the development of interventions aimed at enhancing motivation and performance in the educational, sports, and work domain. Practically speaking, mastery-approach goals are more beneficial for performance compared to other achievement goals. So, interventions should first and foremost induce mastery-approach goals by structuring task to convey students, athletes, and employees that learning and mastering something new involves making mistakes and requires effort. More specifically, teachers but also sports coaches, trainers, and employers should promote mastery-approach goals focusing on learning and mastering a task and less on comparing oneself to previous accomplishments or to others.

Compliance with ethical standards

Conflict of interest The authors declare that there is no conflict of interest.

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