An Experimental Test of the Effects of Goal Types on Creative Performance

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Abstract

Objectives*:* One key tenant of goal setting theory is that specific and challenging goals are most adaptive for optimal functioning. However, goals which are non-specific and exploratory, referred to as ‘open goals’, may actually be preferred in particular circumstances. As this evidence is limited, I aimed to experimentally test the direct and moderated effects of open goals on creative performance, when compared to do-your-best (DYB) and SMART goals. Second, I aimed to test the equivalence between two types of vaguely defined goals; open and DYB goals. ***Design****:* 3 (between-groups: SMART, DYB, open goals) x 2 (within-groups: pre- and post-intervention) experimental design. ***Method****:* Participants (N = 247, M_{age} = 30.41) with no cognitive impairments completed the alternate use task (AUT) as a proxy for creative performance before and after goal manipulation. Proposed moderators of the effects of goal types on creative performance were measured prior to participants’ random assignment to one of three goal conditions. ***Results****:* There were no meaningful differences in creative performance when focused on SMART, DYB and open goals. Only goal commitment significantly moderated the effect of goal types on creative performance, such that participants who self-reported greater goal commitment produced a significantly higher number of creative ideas when using a DYB goal compared to SMART and open goals. The effect of DYB and open goals on creative performance were not statistically equivalent. ***Conclusion****:* These findings extend the evidence base for goal setting, casting doubt that specific, challenging goals are most adaptive for human behaviour across contexts.

Keywords*:* Goal setting, creative performance, open goals, SMART goals, DYB goals

Declaration

This thesis contains no material which has been accepted for the award of any other degree of diploma in any University, and, to the best of my knowledge, this thesis contains no material previously published except where due reference is made. I give permission for the digital version of this thesis to be made available on the web, via the University of Adelaide's digital thesis repository, the Library Search and through web search engines, unless permission has been granted by the School to restrict access for a period of time.

Simon Pietsch

September 2020

Contribution Statement

In writing this thesis, my supervisors and I collaborated to generate research questions of interest and design the appropriate methodology. I conducted the literature search, completed the ethics application, designed the Qualtrics survey, and developed the methods, results and discussion sections. Guidance and review was sort from both supervisors as per the University of Adelaide School of Psychology's guidelines (Honours Thesis Information 2020). My supervisor uploaded the methods section to Open Source Framework (OSF) for peer review, and to Prolific for participant recruitment. My supervisors and I collaborated together to develop R script for power curves, all other statistical analysis was done by me.

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Introduction

When was the last time you set a personal goal or target for something you wanted to achieve (e.g., fitness, financial, educational)? Goal setting, which refers to the act of generating an objective by which to guide your efforts and assess progress, is an essential consideration for human performance across numerous behaviours and contexts (Locke and Latham, 2013). Formally defined, goals are “cognitive representations of desired (or dreaded) states that are to be approached (or avoided) through action” (Freund & Hennecke, 2015, p. 149). Aligned with this concept definition, scholars have devoted considerable attention to elucidating knowledge on the properties of goals (e.g., specificity, difficulty) and their effects on human performance and functioning (for reviews, see Epton et al., 2017; Locke & Latham, 2002; Locke & Latham, 2019; Seijits & Latham, 2005). One key conclusion from this work is that specific and challenging goals are most adaptive for human behaviour (Locke & Latham. 2019). The translation of this general conclusion into practice led to the widely adopted SMART goal acronym (Latham, 2003), that is, goals are best framed as specific, measurable, authentic, realistic, and timed in nature. However, scholars have questioned the ubiquitousness of these principles because goals which are exploratory, non-specific, and open-ended in nature (Swann et al., 2016) may actually be preferred for certain behaviours or situations (e.g., creativity, innovation). As the evidence to support this proposal is limited in scope and breadth (e.g., physical activity), I aimed to test experimentally the value of open versus specific goals for cognitive performance using Locke and Latham’s (2019) goal theory as conceptual framework.

1.1 Locke and Latham’s Core Tenants of Goal Setting Theory

Locke and Latham’s goal setting theory has accumulated over 50 years of deductive testing, making it the most prominent theory of goals to date (Locke and Latham, 2019). Goal setting theory is characterised by several core findings, implications, and considerations (Epton et al., 2017; Kleingeld et al., 2011; Locke & Latham, 2019). First, goals are delineated into dimensions of (i) *content*, which refers to the nature of the standard of behaviour (e.g., obtain 90% on an exam) and (ii) *intensity*, which is characterised by the degree of effort required, personal importance of the target outcome, and the degree of commitment toward attainment of that goal. Second, the effect of goal difficulty on performance is positive and linear, such that setting an increasingly challenging goal within one's ability promotes higher performance. Third, specific goals yield superior outcomes when compared with vaguely defined goals such as *do-your-best* (DYB) goals because non-specific goals are idiosyncratic and variable regarding the reference standard for evaluation of attainment. In contrast, specific and increasingly challenging goals optimise performance because they define the attainment standard which provides task-relevant focus, maximises persistence, and draws attention to the knowledge and task strategies required for goal attainment. The final two elements are moderation hypotheses that characterise the boundary conditions of goal setting theory. That is, firstly, the effect of goals on performance is strongest when people (i) are committed to the goal, thereby promoting persistence with the task; (ii) receive feedback to self-regulate direction and effort; and (iii) have sufficient knowledge and skills, particularly when task complexity is high. Secondly, situational factors can strengthen or weaken the effect of goals on performance (e.g., environment, social support). Meta-analytic evidence, in general, supports the robustness of these theoretical propositions of goal setting theory (e.g., Epton et al., 2017; Klein et al., 2001; Kleingeld et al., 2011).

Since Locke and Latham formalised their goal setting theory in 1990, one important conceptualisation has been the focus on which goal type is optimal for the context in which it is set. More specifically, the key proposition of differentiating a specific and challenging goal into either a *learning goal* or *performance goal* and the contexts in which each is appropriate (Locke & Latham, 2002, 2013; Swann et al., 2020). Performance goals direct focus towards the attainment of an outcome referenced to a specific standard (e.g., the number of correct responses), whereas learning goals energise attention towards the strategies, processes, or procedures required to master a task (Seijts et al., 2013). The distinction between performance and learning goals is critical because they can be adaptive in one context and maladaptive in others. With regard to physical activity, for example, setting performance goals can be detrimental to the desired outcomes in physically inactive individuals who are learning a new skill because the target behaviour itself is complex (Swann et al., 2020). For novices learning a new skill, it is critical for current practise to take into consideration the appropriateness and context in which each goal type is set for an optimal outcome (Swann et al., 2020). In other words, challenging and complex skills for novices first require that they learn the required strategies and procedures (i.e., set learning goals) in order to perform well. In the absence of this foundational knowledge and skill, performance goals for novices engaging in challenging tasks can impose additional demands such as stress and performance anxiety, which in turn consumes cognitive resources that are required for novices to learn the strategies required to master the task (Seijts & Latham, 2005).

As with performance and learning goals, context is also critical for the appropriateness of goal types. For experts, vaguely defined goals such as DYB goals (e.g., see how well you can do) undermine performance when compared to specific, challenging goals because they are ambiguous with regard to the required attainment standard (Locke & Latham, 2002). Specific goals, in contrast, are optimal because they characterise with precision the nature of what constitutes success (Mento et al., 1987; Tubbs, 1986; Wood, 1986). Nevertheless, this core proposition of goal setting theory is subject to the ‘it depends’ effect, that is, DYB goals can be superior to specific, challenging goals in certain contexts (e.g., Drach-Zahzvy & Erez, 2002; McEwan et al., 2016; Seijts & Latham, 2005; Seijts et al., 2013). Specifically, DYB goals have been shown to be superior to specific, challenging goals when one is (i) in the initial stages of learning a new and complex task, (ii) given no strategy to guide effort, and (iii) pressured to perform well immediately (Locke & Latham, 2013). Essentially, when people are confronted with a task that is complex for them, a DYB goal allows one to find effective strategies to perform optimally, whereas a specific and challenging goal increases the difficulty of finding an appropriate strategy. In so doing, cognitive resources are expended to cope with performance anxiety to achieve the set standard, thereby negatively affecting the attainment of the set target (Locke & Latham, 2013). A key conclusion from this body of literature is that context matters for the optimal goal type.

1.2 DYB, Open, and SMART Goals

Goal type is a fundamental consideration within goal setting theory, with the majority of research to date focused on comparisons between specific, challenging goals and vaguely defined goals, that is, goals characterised by the absence of a specific target (Swann et al., 2020). Meta-analytic data (e.g., McEwan et al., 2016) supports the idea that specific, challenging goals may be detrimental in situations where the individual is in the early stages of learning a complex task. In such contexts, vaguely defined goals are optimal as they allow for the systematic exploration of appropriate strategies while reducing one’s focus on attainment goals, thus minimising performance anxiety when compared to setting specific, challenging goals (Locke & Latham, 2013). Recent empirical work (e.g., Hawkins et al., 2020; Schweickle et al., 2017; Swann et al., 2020) comparing vaguely defined goals with SMART goals in the context of physical activity supports the expectation that vaguely defined goals are optimal for novices. In physical activity settings, therefore, vaguely defined goals might be preferred to specific, challenging goals as they have the potential to lead to long term positive psychological experiences with the target behaviour.

An open goals is one type of vaguely defined objective that has received scholarly attention in recent years (Swann et al., 2016). An open goal is conceptualised as a non-specific, exploratory goal with no objective outcome (e.g., see how you do; Schweickle et al., 2017). The second type of vaguely defined goal is a DYB goal, which is considered less flexible than the exploratory focus with an open goal because it remains anchored against a marker of 'best', and therefore attaches an expectation of a high effort in the search for effective strategies to complete the task (Hawkins et al., 2020). There exists three recent experimental tests of the differential effects of open, DYB, and specific goals on behaviour and psychological states. First, Schweickle et al. (2017) found that university students who were assigned open and DYB goals were more likely to report psychologically adaptive experiences (i.e., flow states, intrinsic motivation, confidence, challenge perceptions), whereas specific goals fostered a clutch state (i.e., a psychological state similar to flow, yet is more effortful and consciously demanding; Swann et al., 2016). In terms of cognitive performance, however, Schweickle and colleagues found that specific goals outperformed both open and DYB goals. Second, among a sample of healthy adults who completed a 6-min walking task in a single session, Swann et al. (2020) found no meaningful differences in goal attainment outcomes with regard to distance walked between the three goal states (i.e., open, DYB, SMART), yet supported the psychologically adaptive nature of open and DYB goals relative to specific goals (e.g., effort, importance, subjective evaluations of performance). Third, Hawkins et al. (2020) compared physically *active* with physically *inactive* healthy adults on a 6-min walking task using a within-subjects design. They found that active, experienced participants performed best when guided by specific goals (i.e., distance walked), whereas inactive, novice individuals achieved the greatest distance when driven by open goals. In terms of the behavioural experience, open goals were most psychologically adaptive for inactive individuals, whereas specific goals were most adaptive for active participants (e.g., enjoyment, subjective perceptions of performance). Collectively, these three studies support the psychologically adaptive nature of vague goals (open and DYB) across a broad range of experience levels, whereas Hawkins et al. (2020) specifically demonstrated the adaptive nature of vaguely defined goals among novices when compared with specific goals. However, the findings are mixed with regard to differential effects on performance outcomes.

There are three methodological considerations of past work (Hawkins et al., 2020; Schweickle et al., 2017; Swann et al., 2020) that may explain the unequivocal findings regarding the differential effects of open, DYB, and specific goals on performance. First, across all three studies, the researchers assigned the specific goal to participants rather than having them generate their own evaluative standard. This operationalisation is incongruent with a key proposition of goal setting theory in that specific goals are most optimal when self-generated (Kwasnicka et al., 2020; Ogbeiwi, 2017). Second, the exclusion of moderator variables, particularly those factors theoretically expected to strengthen or dampen the goal-performance effect (e.g., task complexity, individual capability, commitment; Locke & Latham, 2013), means that past work offered an incomplete exposition of key tenets of goal setting theory. Third, the behavioural tasks utilised in past work – namely a cognitive test requiring participants to identify letters or numbers among a random list (Schweickle et al., 2017) or distanced walked (Hawkins et al., 2020; Swann et al., 2020) – are intuitively amenable to goal setting in general. An alternative yet complementary test of the differential effects of goal types on performance, with specific focus on the emergence of open goals, requires a behavioural task where open thinking is likely to optimise performance, such as creative performance. I addressed each of these methodological limitations in the current study.

1.3 Creative Performance

Creativity is a highly valued psychological construct in today's society, widely considered to be the basis for innovation in fields such as business, sport, and education (Ferrandiz et al., 2016; Hennessey & Amabile, 2010). In everyday life, non-routine tasks (e.g., brainstorming, doing something for the first time, or coming up with alternate ideas) occur regularly, requiring one to think creatively across a broad set of domains. Put simply, creativity is an important psychological characteristic for success in non-routine tasks (Ringelham et al., 2016). First scientifically operationalised by Guilford (1950), and then expanded by contemporary scholars (e.g., Allan & Thomas, 2011; Eysenck, 2003; Runco & Jaeger, 2012), creativity is conceptualised as the ability to explore multiple solutions from an initial problem, and then hone in on the most appropriate response, or idea, for the context or problem. Aligned with this conceptualisation, the measurement of creativity via creative performance is typically operationalised as the generation of new and original ideas, or products, that are meaningful for the context (Cortes et al., 2019; Ferrandiz et al., 2016). It is widely accepted that underlying a person's creativity is their creative cognition, a neurocognitive process of recombining existing knowledge sets that initially appear unrelated or irrelevant to one another (Cheng, Sanchez-Burks & Lee, 2008; Li et al., 2015). Meta-analytic evidence suggests the best measurement of a person's creative cognition, and by extension their creativity, is fluid intelligence; the ability to think and reason in abstract, non-concrete terms (Kim, 2005). In other words, individual differences in creative performance are in-part determined by variability in fluid intelligence (Stevenson et al. 2014).

The combination of creativity with goal setting is considered critical to the development of innovative ideas within industry, particularly science and technology related sectors (Alves et al., 2007; Prather, 2015). Despite the practical significance for modern life, there has been little consideration of creativity within goal setting theory for which vaguely defined goals (i.e., DYB, or open) might optimise creative performance (Stetler & Magnusson, 2015). Nevertheless, empirical work has found specific, challenging goals impede creative thinking, whereas non-specific goals promote greater creative performance (e.g., Amabile & Gryskiewicz, 1989; Amabile et al., 2002; Brun, & Saetre, 2009; Ringelhan et al., 2016), a finding at odds with current goal setting theory. When creative performance is the priority, non-specific goals provide an unconstrained space to think broadly for ideas that is considered essential for new and different ideas to emerge (Roskes et al., 2012). Non-specific goals are also considered to foster adaptive psychological experiences in goal striving efforts when creative performance is the objective, including higher personal commitment to the task (Stetler & Magnusson, 2015), intrinsic motivation, and task enjoyment, thereby facilitating exploration of the problem space freely, and optimising persistence in the creative process (Amabile, 1996; Roskes et al., 2012). In contrast, SMART goals are suggested to hinder creative performance and innovation by keeping people ‘in the box’, which is argued to restrict broad thinking, risk taking for innovative ideas, and unexpected breakthroughs, thereby being counterproductive to expansive and novel ideas (Prather, 2015).

There also exist findings contrary to conceptual expectations, where specific, challenging goals have maximised creative performance (e.g., Espedido & Searle, 2018; Shalley, 1991;

Stetler & Magnusson, 2015). In a study of 157 undergraduate students, for example, Espedido and Searle (2018) found that those participants who were allocated a high difficulty goal demonstrated higher creative performance than those who were assigned a low difficulty goal. However, the absence of a comparison of varying difficulties for specific goals means Espedido and Searle's findings cannot speak to their superiority outside that of a dichotomised high/low operationalisation of difficulty.

Empirical work has also revealed that vaguely defined goals, and specific, difficult goals are both optimal for creative performance. For example, Shalley (1991) showed that DYB goals, and specific, difficult goals were equally as adaptive for creative performance when compared to a no goal condition. However, the nature of this effect depends on the congruency between goal types for multiple target objectives. Shalley had participants concurrently focus on productivity goals (i.e., number of tasks to complete within set timeframe) and creativity goals (i.e., % of solutions that needed to be creative), such that the highest performance occurred when the focus for each target was congruent (e.g., DYB goal set for both productivity and creativity targets) and not contingent on goal types (i.e., SMART or DYB).

Across this past empirical work, the utilisation of experimenter assigned specific goals means the manipulations were methodologically inconsistent with goal setting theory; specific, difficult goals are most optimal when set by the person who is engaging in the behaviour to obtain the target outcome (Locke & Latham, 2002). Additionally, the exclusion of moderation tests means these studies provided incomplete tests of Locke and Latham's (2002, 2013, 2019) theory of goal setting. To date, no study has experimentally manipulated goal type (e.g., open, DYB, SMART) to examine the effect on creative performance consistent with Locke and Latham's (2013) goal setting theory.

1.4 The Current Study

Conceptual and empirical replications are essential for the acceptance or rejection of theoretical propositions (Locke & Latham, 2013). My aims in this study were to test the robustness of a core theoretical proposition of goal setting theory (Locke & Latham, 2002, 2013, 2019), namely that specific, challenging goals are preferred for optimising human behaviour. Leveraging recent work and ideas that open goals may be optimal when compared to specific, challenging goals in certain contexts (e.g., Hawkins et al., 2020; Schweickle et al., 2017; Swann et al., 2020), I report a conceptual replication of the differential effects of three goal types on creative performance. In so doing, I incorporate methodological enhancements via self-generated specific goals, tests of theoretically congruent moderators absent in previous work, and a pre-registered study design including analytical protocol. I tested the following hypotheses:

1.4.1 Primary study hypotheses.

1. People who set open goals will demonstrate higher creative performance when compared with individuals who set SMART goals.
2. Fluid intelligence will moderate the effect of goal types on creative performance, such that the effect will be stronger when individuals have higher levels of baseline cognitive ability.
3. Task complexity will moderate the effect of goal types on creative performance, such that the effect will be stronger when individuals report lower levels of subjective perceptions of task complexity.
4. Intrinsic motivation will moderate the effect of goal types on creative performance, such that the effect will be stronger when individuals report greater levels of goal internalisation.

5. Goal commitment will moderate the effect of goal types on creative performance, such that the effect will be stronger when individuals report higher levels of commitment to their goal.

1.4.2 Secondary study hypothesis.

1. The difference in creative performance between open and DYB goals will be small and statistically inconsequential.

Method

2.1 Participants and Sample Size Justifications

The University of Adelaide Human Research Ethics Sub-Committee approved this study protocol prior to execution (approval number 20/24). Power simulations indicated that approximately 260 participants provides 90% power to detect effect sizes of $d \geq .40$ that allows for a maximum Type II error rate of .05 (https://bit.ly/goaltypesblinded). I used a moderate effect size for these power simulations based on meta-analytic estimates from a range of behaviours (e.g., cognitive, production, and educational targets; $d = .34$; Epton et al., 2017) and physical activity targets ($d = .55$; McEwan et al., 2016). As a complement to these power simulations, design calculations (Gelman & Carlin, 2014) using the retrodesign function in R indicated that statistical power is sufficient ($\geq$ 80%) and concerns regarding an incorrect sign and overestimation of magnitude are minimal when effect sizes are > .40. Participants were recruited via Prolific Academic (https://www.prolific.co/) and reimbursed £2.15 for completing the study. Participants were eligible to participate in this study if they were (i) aged between 18-65 years, (ii) without cognitive impairments, intellectual disabilities, or mental illness, and (iii) from English speaking countries, primarily the US, UK, and Australia.

2.2 Research Design

The study employed a 3 (between-group: SMART, DYB, and open goals) x 2 (within-subjects: pre- and post-intervention) mixed experimental design. After completing several measures at baseline, participants were randomised to one of three goal conditions using the Qualtrics randomiser: (i) SMART; (ii) open, or (iii) DYB. Subsequently, participants completed a second test of creative performance in accordance with their manipulated goal condition.

2.3 Experimental Conditions

Participants were randomised into one of three goals conditions in which they received different instructions for the objective of their performance on the creative performance test: (i) DYB goal (i.e., "This time around we want you to focus on what is referred to as a "*do your best goal*", that is, do your best in 2 minutes to generate alternate ideas for this everyday item"); (ii) open goal (i.e., "This time around we want you to focus on what is referred to as an "*open goal*", that is, see how many alternate uses you can generate for this everyday item in 2 minutes"); and (iii) SMART goal (i.e., "Thinking of your previous performance on the alternate uses task with a newspaper as the target, please use the scale below to choose a specific goal for a repeat of this task [with a different everyday item] that is challenging yet realistic for you to achieve in 2 minutes. We want you to focus on achieving this goal in the next task"). The wording for all goal conditions is based from previous studies using instructional manipulations for the three goal types (Hawkins et al., 2020; Schweickle et al., 2017; Swann et al., 2020). Participants were asked to name the type of goal they were asked to focus on as a manipulation check.

2.4 Measures

2.4.1 Primary outcomes. Creative performance is operationalised in the current study as the generation of new and original ideas, or products, that are meaningful for the context (Guilford, 1967; Lubart, 2016). The Alternate Use Test (AUT) is a widely used operationalisation of creative performance (Acar et al., 2020; Cortes et al., 2019) that requires participants to list original yet functional uses for a common object that are appropriate for the context (Guildford, 1967; Stevenson et al., 2014). In the present study, participants were given two minutes to come up with alternate and original uses for a newspaper and paperclip at baseline and post-manipulation, respectively. The written description of the task was accompanied by a visual picture of the object, with participants requested to type their answers in separate boxes; I provided space for up to 20 different uses. I removed erroneous responses from the main analyses, including random character strings (e.g., "wfae"), non-sense words (e.g., "blah"), and ideas that were irrelevant to the object or context (e.g., "spaceship"). Fluency was scored as the number of alternate ideas generated that are feasible and functional uses of the object, whereas originality was calculated as the number of uses reported by 10% or less of the total sample.

2.4.2 Moderators. Informed by previous scholarly work (e.g., Hawkins et al., 2020; Schweickle et al., 2017; Swann et al., 2020), I measured three theoretically informed moderators of the effects of goals on performance (Locke & Latham, 2013) using single items, namely performance satisfaction (i.e., "How satisfied are you with the number of alternate uses you listed for [object]?"), task complexity (i.e., "How complex did you find the task?"), and task commitment (i.e., "How committed were you to thinking of alternative uses for [object]?"). Each single item was scored on an 11-point sliding bar scale ranging from 0 (i.e., "*Not at all committed*"), 5 (i.e., *"moderately committed*") to 10 (i.e., "extremely committed").

Two other moderators were assessed using established scales, namely intrinsic motivation and cognitive ability. The Intrinsic Motivation Inventory (IMI) is a multidimensional scale intended to measure subjective experiences of a task (Deci & Ryan, 1985). The scale has six subscales which can be used independently or in combination (Ostrow & Heffernan, 2018). I used the interest/enjoyment subscale to measure intrinsic motivation for the AUT (i.e., motivation derived from a task that reflects one's personal interest and values; Koestner et al., 2008). There exists substantial reliability and validity evidence for test scores obtained with the IMI across various samples and contexts (e.g., Clancy et al., 2017; Cortright et al., 2013; Ostrow & Heffernan, 2018); in this study, the reliability coefficient ($\omega = .72$; McDonald, 1970) was sufficient. The scale consists of seven items, with statements (e.g., "*this activity was fun to do"*) measured using a 7-point scale (e.g., "*strongly disagree*" [1] to *"strongly agree*" [7]). I computed a composite average score for intrinsic motivation.

The 9-item Abbreviated Raven's Standard Progressive Matrices (ARSPM; Bilker et al., 2012) was used to measure fluid intelligence. This short form of fluid intelligence correlates well with the full version of Raven's Standard Progressive Matrices (r = .97), which is considered one of the most robust operationalisations of fluid intelligence available today (Bilker, 2012; Raven, 2008). The ARSPM requires participants to choose the missing piece that completes a logical pattern of matrices. A composite score was calculated according to the total number of correct responses.

2.5 Procedure

All study procedures were executed online using the Qualtrics platform (see Appendix A for experimental manipulations). Consenting participants first completed a baseline section including measures of demographics (i.e., age, gender, highest level of education) and fluid intelligence. Subsequently, participants completed the first test of their creative performance using a newspaper as the everyday object. For this baseline test, participants received the following instructions: "On the following page, you will be presented with an image of an everyday item. <u>Your task is to think of and list alternate uses for that item</u>. You have 2 minutes to complete the task." Participants were provided 130 seconds on the following page to allow 10 secs to orient themselves and view the picture of a newspaper prior to listing alternate uses. There were 20 blank response boxes available to type in their answers. The page timer automatically progressed to the next page after 130 seconds had elapsed, at which point participants were prompted to complete measures of intrinsic motivation, performance satisfaction, task complexity, and task commitment that pertained to the completed AUT. At this point, participants advanced to the next screen where they were randomised to one of the three goal conditions. Participants allocated to the SMART goal condition were prompted to select, using a 1 to 20 sliding scale, a specific yet achievable goal for the number of uses they believe they could come up with for a household item based on their baseline performance with the newspaper. Subsequently, participants were presented with the AUT instructions, followed by a household item (paperclip) using the same procedure as the baseline test. On completion of the second creative performance test, participants completed a manipulation check question (*"What was your goal type?")*.

2.6. Statistical Analysis

I assessed the primary study hypotheses using one-way analysis of covariance (ANCOVA) within a regression framework in jamovi (The jamovi project, 2020). In this statistical model, I included baseline creative performance as the covariate and condition as a main effect on post-manipulation creative performance. Subsequently, I included the interaction between condition and the moderator variables to examine the differential effects of goal types. The statistical meaningfulness of these moderators was examined by comparing models with and without the terms using the log-likelihood ratio test. My assumption testing prior to the main analysis was informed by guidelines for ANCOVA (e.g., Field et al., 2012) and includes tests of the independence of the covariate and experimental effect via ANOVA, homogeneity of regression slopes, normality of residual variances via a Shapiro-Wilko test, and homogeneity of variances between conditions via Levene's test. I assessed the secondary study hypothesis using equivalence tests via the TOSTER package in jamovi (The jamovi project, 2020) to provide support for the absence of a meaningful difference in creative performance between open and

DYB goals (Lakens et al., 2018). Informed by meta-analytic evidence for expected effect size (e.g., Epton et al., 2017; McEwan et al., 2016) and effect size guidelines for individual differences in research (Gignac & Szodorai, 2016), I considered an effect of *d* between -.20 and .20 ($\alpha = .05$) as too small or statistically trivial for the purposes of the secondary study hypothesis.

Results

3.1 Descriptive Statistics and Assumption Testing

In total, 299 participants responded to the survey of which 52 participants were excluded from the study due to eligibility issues (e.g., uninterpretable responses to dependent variable). Participant characteristics are presented in Table 1.

Table 1

Participant Characteristics

Characteristics	*n*	%	Mean Age	SD
Gender				
Male	111	44.90	28.74	10.37
Female	135	54.70	31.80	12.19
Gender variant	1	0.40	22	
Education				
Less than year 12	5	2.02		
Year 12 or equivalent	74	29.95		
Vocational qualification	16	6.47		
Diploma	34	13.76		
Bachelor degree	65	26.32		
Postgraduate degree	15	6.07		
Masters degree	32	12.95		
Doctorate	6	2.43		

Note: $N = 247$

Shapiro-Wilk tests and visual inspections of Q-Q plots indicated that all standardised residuals were normally distributed. Visual inspection of scatterplots supported the interpretation of an approximately linear association between the covariate and outcome for each of the experimental groups. Levene's test indicated that all groups had similar variances ($p > .05$). ANOVAs confirmed the covariate was independent of the experimental effects ($p > .05$). However, there was a statistically meaningful interaction between the covariate (baseline creative performance [originality]) and the experimental condition ($p < .05$), which casts doubts on the homogeneity of regression slopes. In such cases it is recommended that analysts compare the ANCOVA model with a regression model that includes the interaction term (covariate * experimental condition) for differences in interpretations (Leppink, 2018). This comparison is reported in hypothesis testing to ensure robustness of findings.

3.2 Primary Hypothesis 1

I expected people who set open goals would deliver better creative performance when compared with those who set SMART goals; this hypothesis was unsupported for both fluency and originality. ANCOVA indicated there was no statistically significant difference between goal conditions and creative performance for fluency, $F(2, 243) = 1.91$, $p = .150$, partial $\eta^2 = 0.015$, or originality, $F(2, 243) = 0.39$, $p = .678$, partial $\eta^2 = 0.003$. This interpretation was also consistent across a moderated regression that included the interaction term (covariate [baseline originality] * experimental condition), $F(2, 241) = 0.47$, $p = .626$, partial $\eta^2 = 0.004$. Mean fluency and originality scores across goal conditions after controlling for baseline creative performance are shown in Table 2.

Table 2

Goal Condition Marginal Means Controlling for Baseline Creativity

		95% CI	
Condition	Mean (*SD*)	*LL*	*UL*
Fluency			
Open	3.55 (3.43)	3.12	3.98
DYB	3.96 (3.39)	3.54	4.39
SMART	4.00 (3.41)	3.57	4.42
Originality			
Open	2.40 (2.98)	2.03	2.78
DYB	2.66 (2.92)	2.29	3.03
SMART	2.51 (2.93)	2.14	2.88

Note. CI = confidence interval; *LL* = lower limit, *UL* = upper limit.

3.3 Primary Hypothesis 2

I expected fluid intelligence would moderate the effect of goal types on creative performance, such that the effect would be stronger when people have higher levels of baseline cognitive ability (i.e., fluid intelligence). The inclusion of an interaction term to the ANCOVA model did not support the hypothesis that fluid intelligence moderates the effect of goal types on creative performance for both fluency, $F(3, 240) = 0.872$, $p = .456$, partial $\eta^2 = 0.011$, and originality, $F(3, 240) = 1.29$, $p = .278$, partial $\eta^2 = 0.016$. The log-likelihood ratio test revealed no statistically meaningful differences (*p*'s > .05) between models with and without the moderator term. This interpretation was also consistent across a moderated regression that incorporated the interaction term (covariate [baseline originality] * experimental condition), $F(3, 238) = 2.25$, $p = .083$, partial $\eta^2 = 0.028$.

3.4 Primary Hypothesis 3

I expected task complexity would moderate the effect of goal types on creative performance, such that the effect would be stronger when people report lower levels of subjective perceptions of task complexity. The inclusion of an interaction term to the ANCOVA model did not support the hypothesis that perceptions of task complexity moderates the effect of goal types on creative performance for both fluency, $F(3, 240) = 0.886$, $p = .449$, partial $\eta^2 = 0.011$, and originality, $F(3, 240) = 1.77$, $p = .154$, partial $\eta^2 = 0.022$. Additionally, a log-likelihood ratio test revealed no statistically meaningful differences (p's > .05) between models with and without the moderator term. This interpretation was also consistent across a moderated regression that included the interaction term (covariate [baseline originality] * experimental condition), $F(3, 238) = 2.14$, $p = .096$, partial $\eta^2 = 0.026$.

3.5 Primary Hypothesis 4

I expected intrinsic motivation would moderate the effect of goal types on creative performance, such that the effect would be stronger when people report greater levels of goal internalisation. The inclusion of an interaction term to the ANCOVA model rejected the hypothesis that intrinsic motivation ($\omega = .72$) would moderate the effect of goal types on creative performance for both fluency, $F(3, 240) = 1.81$, $p = .147$, partial $\eta^2 = 0.022$, and originality, $F(3, 240) = 2.61$, $p = .052$, partial $\eta^2 = 0.032$. The log-likelihood ratio test indicated that the addition of the interaction term was statistically inconsequential (p's > .05) when compared with the model that included direct effects only. This interpretation was also consistent across a moderated regression that incorporated the interaction term (covariate [originality] * experimental condition), $F(3, 238) = 2.44$, $p = .065$, partial $\eta^2 = 0.030$.

3.6. Primary Hypothesis 5

I expected goal commitment would moderate the effect of goal types on creative performance, such that the effect would be stronger when individuals report higher levels of commitment to their goal. The inclusion of an interaction term to the ANCOVA model indicated that goal commitment moderated the effect of goal types on creative performance for originality, $F(3, 240) = 5.83$, $p < .001$, partial $\eta^2 = 0.068$, but not for fluency $F(3, 240) = 2.62$, $p = .052$, partial $\eta^2 = 0.032$. Specifically, participants who self-reported greater goal commitment produced significantly higher creative performance for originality when using a DYB goal compared to SMART and open goals. This moderation effect is shown in Figure 1. The inclusion of the moderator in a log-likelihood ratio test was also revealed to be statistically meaningful for originality in creative performance ($p = .019$), but not for fluency ($p > .05$). This interpretation was considered consistent across a moderated regression that had the interaction term (covariate [originality] * experimental condition), $F(3, 238) = 6.34$, $p < .001$, partial $\eta^2 = 0.074$.

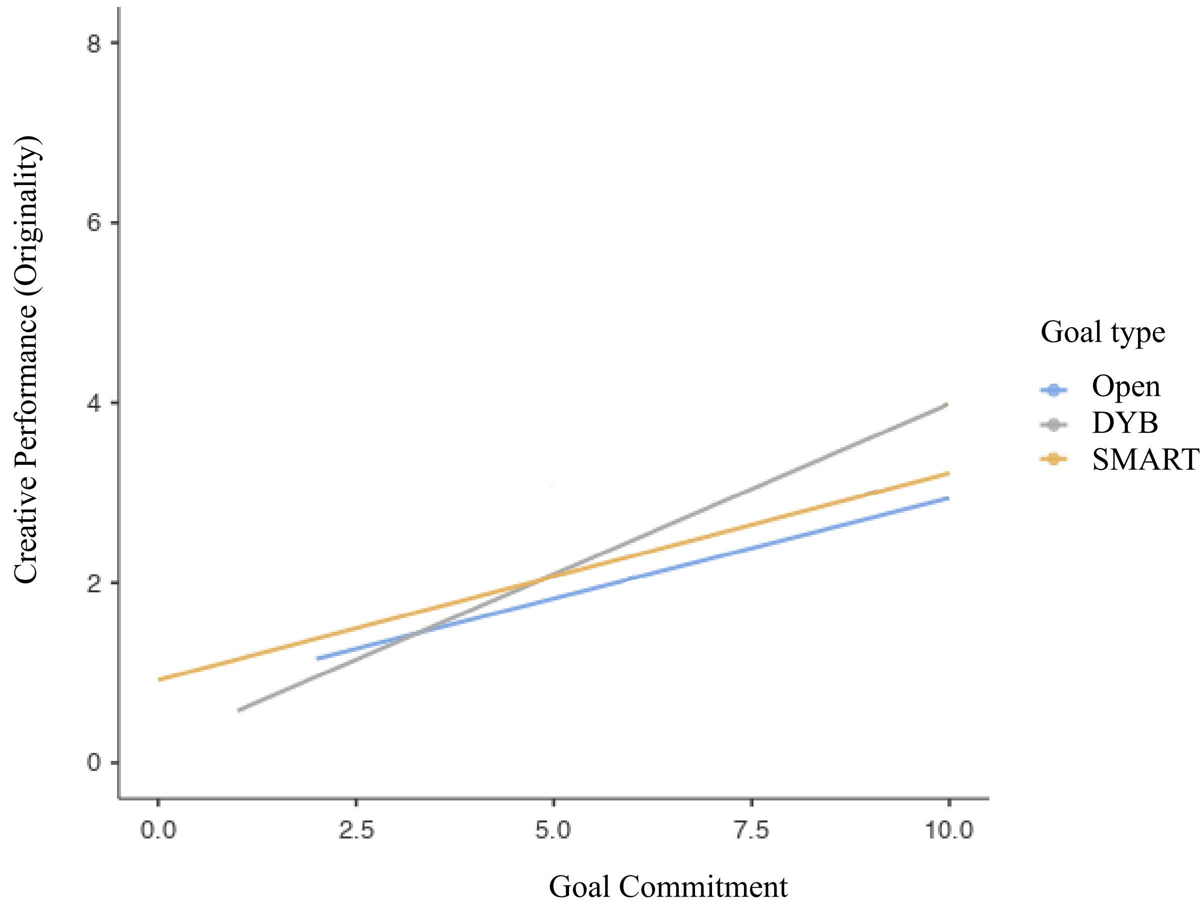

Figure 1. Moderating effect of goal commitment on creative performance (originality) by three goal conditions (open, DYB, SMART).

3.7. Secondary Hypothesis

I expected the difference in creative performance between open and DYB goals would be small and statistically inconsequential. Equivalence testing on the raw scores revealed the difference in creative performance (fluency) between the open goal condition (*M* = 3.32, *SD* = 2.01, *n* = 82) and the DYB goal condition (*M* = 4.16, *SD* = 2.47) was statistically different from zero, Welch's *t*(157) = -2.40, *p* = 0.018, and not equivalent because the larger of the two *p* values (for upper equivalence bound d = .2) exceeded .05, t(157) = -1.11, p = 0.866. Equally, the difference in creative performance (originality) between the open goal condition (M = 2.21, SD = 1.68, n = 82) and the DYB goal condition (M = 2.75, SD = 2.05) was statistically indistinguishable from zero, Welch's t(158) = -1.85, p = 0.066, but not equivalent because the larger of the two p values (for upper equivalence bound d = .2) exceeded .05, t(157) = -0.56, p = 0.714. Thus, in terms of differences between open and DYB goal conditions, I was unable to reject effects as large or larger than d = .2 for both originality and fluency in creative performance. In other words, the effect of goal types (DYB, open) on fluency and originality in creative performance are not statistically equivalent for the set equivalence bounds ($d = \pm$ .2).

Discussion

In this study, I experimentally tested the notion that striving to achieve an open goal would optimise creative performance, relative to a focus on SMART goals (Hypothesis 1), and this effect would be differentially influenced by four moderators (Hypotheses 2 to 5). A secondary aim of this study was to test the hypothesis that open and DYB goals would be equivalent in terms of creative performance. Hypotheses 1 to 4 were rejected, with partial support for the moderating effect of goal commitment on originality in performance only (Hypothesis 5). The secondary aim hypothesis was rejected. The finding that open, DYB, and SMART goals had no significant effect on creative performance is at odds with current goal setting theory, which considers SMART goals to be the most adaptive behavioural target for human performance (Locke & Latham, 2002, 2013, 2019). These findings cast doubt over the robustness of key tenants of Locke and Latham's goal setting theory, such that open goals may be equally as adaptive as SMART goals for certain behaviours or tasks.

4.1 Hypothesis Finding 1: Primary Hypothesis

The primary expectation tested in this study is that a focus on open goals would facilitate better creative performance than SMART goals. Conceptually, when compared to specific goals, vaguely defined goals (i.e., open or DYB goals) foster adaptive states (e.g., enjoyment, commitment) and outcomes (e.g., persistence, performance) in creative domains because they provide an unconstrained space to think broadly for ideas that is considered essential for new and different ideas to emerge (Roskes et al., 2012; Stetler & Magnusson, 2015). In contrast to this expectation, my analyses of the data indicated that the difference in creative performance between people who focused on open, SMART, or DYB goals was small and incompatible with a meaningful effect. Although my finding is at odds with the conceptualisation of goal setting in a creative domain, it is consistent with previous experimental work that compared open, SMART, and DYB goals on performance outcomes in a physical activity context (e.g. Schweickle et al., 2017; Swann et al., 2020). In contrast, and within a creative domain, my findings are inconsistent with past empirical work that demonstrated vaguely defined goals (i.e., DYB goals) are superior when compared to specific, difficult goals for optimal creative performance (e.g., Amabile & Gryskiewicz, 1989; Amabile et al., 2002; Brun, & Saetre, 2009; Ringelhan et al., 2016).

There are two possible explanations for my findings. First, the self-driven nature of the online methodology assumes participants interpreted the wording of the goal instructions correctly, without any support or clarification from the researcher. In my study it appears this assumption was partially violated with only 52%[1] of participants correctly identifying their goal condition in the manipulation check posttest. It is possible that participants misunderstood the instructions, and therefore defaulted to their preferred approach to setting goals for task performance, which may have been incongruent with the experimental manipulation. This interpretation is consistent with a body of evidence that suggests personality traits are associated with a person's natural approach to goal setting for optimal performance (e.g., Campbell & Paula, 2002; Klein & Lee, 2006; Zweig & Webster, 2004). For example, Elliot and Thrash (2002) found extraversion to be positively correlated with a person's preferred approach to focus on strategies to achieve a target outcome, whereas McCrae and Costa (1987) found neuroticism to be strongly and positively correlated with a person's preferred focus on the performance

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[1] This figure is based on participants precisely reporting their goal type in the manipulation check (e.g., participants who wrote 'specific goal' for the SMART goal condition were measured as failing the manipulation check). However, because the manipulation check did not state that participants needed to record their goal type precisely, they were retained for data analysis unless their response was in no way related to their goal type (e.g., responding 'I don't know').

outcome of a goal. Second, in contrast to previous work that has employed researcher generated specific goals (e.g., Espedido & Searle, 2018; Shalley, 1991; Stetler & Magnusson, 2015), participants in my study self-generated their target in the SMART goal condition making it conceptually congruent with goal setting theory. In so doing, it is possible that they set a target that maximised their self-efficacy by selecting the degree of challenge commensurate with their capabilities, which in turn optimised their creative performance when compared to open and DYB goal conditions – a notion consistent with goal theory (Locke & Latham, 2002).

Collectively, these findings support an interpretation that the goal conditions in my study may be interacting with other psychological factors (e.g., personality traits and self-efficacy), thereby functioning dissimilarly when compared to past empirical and conceptual work. Ultimately, these possible interpretations make it difficult to draw definitive conclusions from my data about the robustness of the primary tenant of goal setting theory in a creative domain.

4.2 Hypothesis Finding 2: Secondary Hypothesis

A secondary expectation tested in this study is that the difference in creative performance between open and DYB goals will be small and statistically inconsequential. The conceptual and empirical distinctions between open and DYB goals is an important consideration for goal setting theory and practice, because each may only be optimal dependant on context. Conceptually, open and DYB goals are broadly suggested to be similar concepts in that both are vaguely defined goals that facilitate exploration of the problem space, which is an essential dimension of goal types for optimising creative performance (Stetler & Magnusson, 2015; Swann et al., 2020). Empirically, past scholarly work suggests there are minimal differences regarding the adaptive nature of open versus DYB goals for cognitive and physical tasks (e.g., Hawkins et al., 2020; Swann et al., 2020). However, rejecting the null hypothesis in the absence of a meaningful effect provides little evidence for no effect all; researchers need to test the expectation of statistical equivalence directly or use Bayesian statistics to evaluate the degree of evidence in favour of the null (Lakens et al., 2018). Thus, this element of the current study represents an important extension of past work on the equivalency between different types of vague goals.

The findings reported here indicated that the difference in creative performance between the open and DYB goal conditions were statistically different from zero and not equivalent for fluency, and statistically indistinguishable from zero but not equivalent for originality. Essentially, these findings indicate that there is a meaningful difference for both fluency and originality in creative performance between open and DYB goals, when d of $\pm.20$ is considered the smallest effect size of interest, in favour of the DYB target. A possible reason for the finding of non-equivalence, even though both open and DYB goals are considered vaguely defined goals, is that an open goal is conceptualised as a non-specific, exploratory goal with no objective outcome (e.g., see how you do; Schweickle et al., 2017). In contrast, a DYB goal is considered less flexible than the exploratory focus of an open goal because it remains anchored against a marker of 'best' and therefore attaches an expectation of a high effort in the search for effective strategies to complete the task (Hawkins et al., 2020). Therefore, it is possible that a DYB goal is more amenable to creative performance when compared to an open goal because it has an attached expectation of high effort. Kudrowitz and Dippo (2013) argue that the notion of high effort is a requirement for a person to 'push past' common uses in the AUT to come up with original, yet feasible uses for that item. It is therefore possible that in my study the higher effort required for creative performance, and conceptual differences between goal types, resulted in a meaningful difference between open and DYB goals, in favour of the latter.

This contribution to the literature is important because to date, open and DYB goals have not been empirically shown to function differentially, with no studies formally testing the equivalency of these two goal conditions (e.g., Hawkins, 2020; Schweickle et al., 2017; Swann et al., 2020). Nevertheless, it is important to acknowledge that firstly, the statistical power with a sample size of 157 participants and equivalence bounds of $\pm$ .20, assuming the true effect is zero, was only 61% (80% power occurs for equivalence bounds of $\pm$ .23), suggesting this finding was only slightly above a chance occurrence. Secondly, from a practical standpoint, the difference between the two goal conditions with reference to the number of original ideas generated was only small, as shown in Table 2 in the results section.

4.3 Hypothesis Finding 3 (Moderation Effects)

Consistent with core tenants of goal setting theory (Locke & Latham, 2002) and a substantial body of meta-analytic evidence (Donovan & Radosevich, 1998; Epton et al., 2017; Neubert, 2009; Wood et al., 1987), I expected the effect of goal types on creative performance to be strongest for individuals with higher cognitive ability, goal commitment, intrinsic motivation, and who perceived the task to be low in complexity. In essence, when the most appropriate goal is set for the context, these moderators are hypothesised to optimise the enactment of task processes and strategies that underpin successful performance. First, ability is expected to strengthen the effect of goals on creative performance because "people cannot attain goals if they do not know how to do so" (Locke & Latham, 2019, p. 98). Given the context of creative performance, I focused on fluid intelligence as a proxy for a person's creative ability because meta-analytic evidence suggests the best measurement of a person's creative cognition, and by extension their creative ability, is fluid intelligence; the ability to think and reason in abstract, non-concrete terms (Kim, 2005). Second, increased task complexity is said to dampen the effects of goals on task performance because complex tasks require the simultaneous enactment of multiple strategies; this information is typically absent from a specified goal, and therefore provides insufficient information to guide performance. Third, internalised motivation is hypothesised to strengthen the goal-performance association because people behave in ways that are driven by interest and inherent satisfaction, which internally energises commitment to the task and maximises task performance (Deci & Ryan, 2000). Finally, goal commitment is expected to strengthen the effects of goals on performance because it maximises the mobilisation of effort and ongoing persistence towards goal attainment (Locke & Latham, 2019).

Contrary to these expectations, I rejected the hypothesis that ability, task complexity, and internalised motivation moderate the effects of goals on creative performance. However, the analyses provided partial support for the moderating effect of goal commitment, specifically, that the effect was meaningful only for DYB goals. My data demonstrated participants who self-reported greater goal commitment produced significantly higher creative performance for originality when using a DYB goal compared to SMART and open goals. This meaningful finding is in direct contrast to a core tenant of goal setting theory (Locke & Latham, 2002) in that goal commitment is stated to be strongest for specific, challenging goals (e.g., SMART goals). One possible reason for this meaningful, yet conflicting finding to goal theory, is that specific, challenging goals need to be realistic given the person's ability for them to optimise performance (Locke & Latham, 2002). Participants in my study, on average, set 7.46 alternate uses (SD = 2.98) as their target for performance in the SMART goal condition, when their average baseline number of alternate uses was 4.40 (SD = 3.01). Thus, participants in the SMART goal condition set as their target a goal that was 1.7 times greater than their baseline creative performance, which may have been unrealistic for most individuals, resulting in a dampening of the effectiveness of SMART goals. By way of contrast, Shalley (1991) reported a 10% increase in creative performance from a no goal condition to a specific, difficult goal condition. Relatedly, the finding that only DYB goals functioned differentially when compared to open goals in terms of goal commitment, when both are conceptualised as vaguely defined goals, and theoretically should function similarly (Schweickle et al., 2017; Stetler & Magnusson, 2015; Swann et al., 2020) may be due to a subtle yet important conceptual difference. Specifically, DYB goals are considered less flexible than the exploratory focus of an open goal, because they remain anchored against a marker of 'best' and therefore attach an expectation of a high effort in the search for effective strategies to complete the task (Hawkins et al., 2020). This notion of high effort is important because for people to produce novel ideas in the AUT "one must 'push past' and build upon the ideas generated first to arrive at less obvious ideas" (Kudrowitz & Dippo, 2013, p. 433). Therefore, it makes conceptual sense that when a person sets a DYB goal, with the implied expectation of high effort, the ability to "push past" common alternate uses to come up with novel ideas will be enhanced with an increasing commitment to the goal. However, an exploratory open goal, without the implied 'best' appears not to be differentially effected by goal commitment.

At first glance, the findings regarding the rejection of the moderating effects of ability, intrinsic motivation, and task complexity on goal types appear to challenge core tenants of goal theory, yet there are several methodological elements that need to be considered when interpreting these findings. First, participants' self-reported scores on these key moderators, on average, fell around the midpoint of the scales used with limited variation; a common limitation of online research when compared to face-to-face studies (Duffy et al., 2005). This methodological limitation is suggested to artificially restrict a study's data to reliably capture the full range of a variable (Duffy et al., 2005), which may explain why my study partially failed to demonstrate differential effects of key moderators. Second, although there is sufficient reliability and validity evidence for the Raven's Standard Progressive Matrices as a measure of fluid intelligence (Bilker et al., 2012; Raven, 2008), and by extension creative ability (Cheng, Sanchez-Burks & Lee, 2008; Li et al., 2015), the Abbreviated Ravens Standard Progressive Matrices (ARSPM) was used in the current study to reduce participant burden. Although the ARSPM demonstrates strong correlations to the full Ravens test ($r = .97$; Bilker et al., 2012), it may represent an insufficient operationalisation in the context of empirical tests of substantive hypotheses in a creative domain. Therefore, in my study, the finding that ability had no moderating effect of goal types on creative performance may be a result of an incomplete measure of creative ability. Equally, in the context of the current study, there are potential incongruences between the Raven's test and the outcome variable (i.e., originality and fluency in creative performance). For example, The Raven's (and Abbreviated) Standard Progressive Matrices is an indirect measure of a person's creative ability (Sternberg & Kaufman, 2010). That is, creative potential is inferred from a person's fluid intelligence, rather than directly measured. Sternberg and Kaufman (2010) argue that indirect measures of a person's creativity reduces the reliability to predict subsequent creative performance. Consequently, by using the ARSPM, my study may not be reliably capturing a person's creative ability to perform the experimental task. Third, goal commitment, intrinsic motivation, and task complexity were assessed after baseline testing yet prior to the experimentally manipulated performance. The assessment of these moderator variables at this point in the procedures was designed to minimise the influence of one's experimentally manipulated task performance on these self-reports. Yet, presumes that the baseline test was sufficiently representative of the experimental manipulation for the purpose of measuring these moderators. Collectively, therefore, these findings support the need for additional tests of the differential effects of these core moderators of goals on creative performance in future research.

4.4 Implications

Should these findings be replicated in future research, there are several potential implications for practice. First, the finding of no differential effects of goal types on creative performance casts doubt on the widely implemented approach of setting vaguely defined goals for optimal creative performance. Specifically, the recent emergence of open goals in a physical activity domain, and the finding that open goals are more adaptive when compared to specific, difficult goals may not translate to being an optimal goal type in a creative domain. This casts doubt over the 'one size fits all' approach to simply using vaguely defined goals for optimal creative performance across all creative domains.

Second, goal setting theory is not articulated to be domain specific. Instead, the theory states specific, challenging goals are optimal for goal directed behaviour once appropriate task strategies have been learnt (Locke & Latham, 2002, 2013, 2019). However, my analysis revealed specific, difficult goals (i.e., SMART goals) were no more optimal than vaguely defined goals such as open and DYB goals in a creative domain. My findings add to previous empirical work that also found no difference in physical activity performance across these three goal states (Schweickle et al., 2017; Swann et al., 2020). Collectively, these findings cast doubt over the robustness of goal setting theory and the widely implemented use of SMART goals for optimal target behaviour (Swann et al., 2020). Perhaps there is a need to consider personalised choice as to which goal type, or their combination, is preferred for individuals and tasks.

Third, an important extension of my study was the finding of non-equivalence between open and DYB goals conditions. This evidence is important because it extends previous work in which DYB and open goals have been found to function similarly (Schweickle et al., 2017; Swann et al., 2020). The implication of revealing non-equivalence between the two goal conditions casts doubt over the robustness of simply using the term “vaguely defined goals” (e.g., Roskes et al., 2012; Stetler & Magnusson, 2015), without differentiating vaguely defined goals into open, and DYB goal types for optimal creative performance. Put simply, the broad brush approach of using a non-specific vague goal may not be best practise, and the differentiation of open and DYB goals may provide a more optimal way of assigning goals types for optimal performance in creative domains.

4.5 Limitations and Future Directions

There are limitations to my study which need to be considered when interpreting the findings. First, participants were limited to two minutes for the AUT in order to reduce the likelihood of them using search engines (e.g., Google) to generate solutions. However, Guilford (1967) recommends that participants are provided with several minutes, or even no timeframe to capture the full scope of one’s creativity. Empirical support for this proposition was demonstrated by Kudrowitz and Dippo (2013) who observed that original ideas (alternate ideas <10% of respondents gave) occurred, on average, after participants listed nine common alternative ideas. It is therefore recommended in future studies that researchers utilise longer timeframes for the AUT, in a lab based environment, to control for extraneous variables (e.g., using electronic search engines) in order to maximise the generation of creative performance.

Second, the measurement of creative performance using the AUT, specifically originality, was based on previous work in which an original idea was operationalised as one that less than

10% of participants listed (e.g., Guilford, 1967; Kudrowitz & Dippo, 2013). However, one limitation to this approach is dichotomising originality based on an arbitrary 10%, when creativity may best be conceptualised along a continuum (Cohen, 1989; McFadzean, 1998). Future research should consider alternative ways of operationalising originality in creative performance tasks to better capture its conceptualisation. Moving away from a binary yes/no measure of originality, in order to observe more gradual differences in its dimension.

Third, meta-analytic data suggests creative performance is multidimensional (Ma, 2009), being as a result of three distinct dimensions: (i) individual characteristics (e.g., personality, intelligence, cognitive style), (ii) the creative process (e.g., the stages one uses to find a solution), and (iii) the creative domain (e.g., music, arts, mathematics). Conceptualised as a multidimensional concept, one may demonstrate high creative performance in one domain (e.g., alternate uses for common items), yet have differential performance in other creative domains (e.g., art, science, music). Consequently, my study is limited to the creative domain utilised in the AUT, and cannot more broadly address the effect that goal setting has on the taxonomy of creative performance. It is therefore recommended future studies explore a wider range of creative domains, and the effect that goal setting has more broadly on creative performance.

Finally, it is important to acknowledge that the design and test combination implemented in this study was sufficiently powered for the primary research question regarding the effects of goal types on creative performance, rather than for the moderation tests. This consideration is important because the primary hypothesis was powered based on a medium effect size guided by previous meta-analytic work (d = .34; Epton et al., 2017; d = .55; McEwan et al., 2016). Whereas meta-analytical data indicates the differential effects of theoretical moderators on goal types is small (e.g., d = .2; Epton et al., 2017), suggesting the current study was insufficiently powered to reveal small interactional effects between goal types and theoretical moderators. Power simulations indicate that approximately 970 participants provide 80% power to detect effect sizes of $d \geq .20$ that allows for a maximum Type II error rate of .05.

4.6 Conclusions

My study set out to test whether open goals would be optimal for creative performance when compared to specific, difficult goals (i.e., SMART goals), and differentially effected by proposed moderators of goal setting theory. Additionally, I set out to reveal if DYB and open goals would be equivalent in their adaptability to creative performance. The findings reported here are in contrast to previous research that demonstrated the adaptive nature of vaguely defined goals on target behaviour in a creative context. My study instead found no differences between goal types for creative performance, which casts doubt over the efficacy for setting vaguely defined goals in a creative context. Furthermore, my results were unable to support the main tenant of goal setting theory that states specific, difficult goals are most optimal for human performance (Locke & Latham, 2002).

I also revealed that the proposed moderators from goal setting theory had no differential effects of goal types on creative performance – although most likely underpowered – except for goal commitment moderating the effect of DYB goals on originality in creative performance. However, although my study is unable to support the main tenants of goal theory, it was limited by a number of methodological features such as administering an experimental control via an online platform; a necessary approach due to imposed restrictions brought about by a global pandemic, and the requirement for a large sample size to adequately power the primary hypothesis.

One important extension of my study was the finding of non-equivalence between DYB and open goals, which is the first study to offer empirical evidence to suggest DYB and open goals function differentially in a creative domain. However, future research is needed to address the limitations of my study, and to further investigate the core tenants of goal setting theory in a domain that is amenable to vaguely defined goals, such as creativity.

References

Acar, S., Runco, M., & Park, H. (2020). What should people be told when they take a divergent thinking test? A meta-analytic review of explicit instructions for divergent thinking. *Psychology of Aesthetics, Creativity, and the Arts*, *14*(1), 39-49. doi:10.1037/aca0000256

Alves, J., Marques, M.J., Saur, I. and Marques, P. (2007), Creativity and innovation through multidisciplinary and multisectoral cooperation. *Creativity and Innovation Management*, *16*(1), 27-34. doi:10.1111/j.1467-8691.2007.00417.x

Allen, A., & Thomas, K. (2011). A Dual Process Account of Creative Thinking. *Creativity Research Journal*, *23*(2), 109-118. doi:10.1080/10400419.2011.571183

Amabile, T. M., & Gryskiewicz, N. (1989). The creative environment scales: The work environment inventory. *Creativity Research Journal*, *2*(4), 231–254. doi:10.1080/10400418909534321

Amabile, T. M. (1996). Creativity and Innovation in Organizations. Boston, MA: Harvard. Retrieved from https://www.hbs.edu/faculty/Pages/item.aspx?num=13672

Amabile, T. M., Hadley, C., & Kramer, S. (2002). Creativity under the gun. *Harvard Business Review*, *80*, 52–61. Retrieved from https://hbr.org/2002/08/creativity-under-the-gun

Batey, M., & Furnham, A. (2006). Creativity, Intelligence, and Personality: A critical review of the scattered literature. *Genetic, Social, and General Psychology Monographs*, *132*(4), 355-429. doi:10.3200/mono.132.4.355-430

Beauchamp, M., Crawford, K., & Jackson, B. (2019). Social cognitive theory and physical activity: Mechanisms of behaviour change, critique, and legacy. *Psychology of Sport and Exercise, 42*(5), 110-117. doi:10.1016/j.psychsport.2018.11.009

Bilker, W., Hansen, J., Brensinger, C., Richard, J., Gur, R., & Gur, R. (2012). Development of Abbreviated Nine-Item Forms of the Raven's Standard Progressive Matrices Test. *Assessment*, *19*(3), 354-369. doi:10.1177/1073191112446655

Brun, E., & Saetre, A. (2009). Managing ambiguity in new product development projects. *Creativity And Innovation Management*, *18*(1), 24-34. doi:10.1111/j.1467-8691.2009.00509.x

Campbell, J., & Paula, A. (2002). Perfectionistic self-beliefs: Their relation to personality and goal pursuit. *Perfectionism: Theory, Research, And Treatment.*, 181-198. doi:10.1037/10458-007

Cheng, C., Sanchez-Burks, J., & Lee, F. (2008). Connecting the Dots Within. *Psychological Science*, *19*(11), 1178-1184. doi:10.1111/j.1467-9280.2008.02220.x

Clancy, R., Herring, M., & Campbell, M. (2017). Motivation measures in sport: A critical review and bibliometric analysis. *Frontiers in Psychology*, *8*. doi:10.3389/fpsyg.2017.00348

Cohen, L. (1989). A continuum of adaptive creative behaviors. *Creativity Research Journal*, *2*(3), 169-183. doi:10.1080/10400418909534313

Cortes, R., Weinberger, A., Daker, R., & Green, A. (2019). Re-examining prominent measures of divergent and convergent creativity. *Current Opinion in Behavioral Sciences*, *27*, 90-93. doi:10.1016/j.cobeha.2018.09.017

Cortright, R., Lujan, H., Blumberg, A., Cox, J., & DiCarlo, S. (2013). Higher levels of intrinsic motivation are related to higher levels of class performance for male but not female students. *Advances in Physiology Education*, *37*(3), 227-232. doi:10.1152/advan.00018.2013

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behaviour. New York: Plenum

Deci, E., & Ryan, R. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227-268. doi:10.1207/s15327965pli1104_01

Deci, E. L., & Ryan, R. M. (2012). Self-determination theory. In P. A. M. Van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology* (p. 416–436). Sage Publications Ltd. doi:10.4135/9781446249215.n21

Donovan, J., & Radosevich, D. (1999). A meta-analytic review of the distribution of practice effect: Now you see it, now you don't. *Journal of Applied Psychology*, *84*(5), 795- 805.
doi:10.1037/0021-9010.84.5.795

Drach-Zahavy, A., & Erez, M. (2002). Challenge versus threat effects on the goal–performance relationship. *Organizational Behavior and Human Decision Processes*, *88*(2), 667-682. doi:10.1016/S0749-5978(02)00004-3

Duffy, B., Smith, K., Terhanian, G., & Bremer, J. (2005). Comparing Data from Online and Face-to-face Surveys. *International Journal of Market Research*, *47*(6), 615-639. doi: 10.1177/147078530504700602

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41*(10), 1040–1048. doi:10.1037/0003-066X.41.10.1040

Elliot, A., & Thrash, T. (2002). Approach-avoidance motivation in personality: Approach and avoidance temperaments and goals. *Journal of Personality And Social Psychology*, *82*(5), 804-818. doi:10.1037/0022-3514.82.5.804

Epton, T., Currie, S., & Armitage, C. J. (2017). Unique effects of setting goals on behavior change: Systematic review and meta-analysis. *Journal of Consulting and Clinical Psychology*, *85*(12), 1182-1198. doi:10.1037/ccp0000260.

Espedido, A., & Searle, B. (2018). Goal difficulty and creative performance: The mediating role of stress appraisal. *Human Performance*, *31*(3), 179-196. doi:10.1080/0895928 5.2018.1499024

Eysenck, H. J. (2003). Creativity, personality and the convergent-divergent continuum. In M. A. Runco (Ed.), *Perspectives on creativity research. Critical creative processes* (p. 95–114). Hampton Press. Retrieved from https://psycnet.apa.org/record/2003-02671-004

Ferrándiz, G. C., Ferrando, M., Soto, G., Sainz, M., & Prieto, M. D. (2016). Divergent thinking and its dimensions: What we talk about and what we evaluate? *Annals of Psychology*, *33*(1), 40-47. doi:10.6018/analesps.32.3.224371

Field, A., Miles, J., & Field, Z. (2012). *Discovering statistics using R*. Retrieved from https://tmbukz.ga/read.php?id=Q9GCAgAAQBAJ

Freund, A., & Hennecke, M. (2015). On means and ends. *Current Directions in Psychological Science*, *24*(2), 149-153. doi:10.1177/0963721414559774

Gelman, A., & Carlin, J. (2014). Beyond power calculations: Assessing Type S (Sign) and Type M (Magnitude) errors. *Perspectives on Psychological Science, 9,* 641– 651. http://dx.doi.org/10.1177/ 1745691614551642

Gignac, G., & Szodorai, E. (2016). Effect size guidelines for individual differences researchers. *Personality and Individual Differences*, *102*, 74-78. doi:10.1016/j.paid.2016.06.069

Guilford, J. P. (1950). Creativity. *American Psychologist, 5*(9), 444–454. doi:10.1037/h0063487

Guilford, J. P. (1967). Creativity: Yesterday, Today and Tomorrow. *The Journal of Creative Behavior*, *1*(1), 3-14. doi:10.1002/j.2162-6057.1967.tb00002.x

Hawkins, R., Crust, L., Swann, C., & Jackman, P. (2020). The effects of goal types on psychological outcomes in active and insufficiently active adults in a walking task: Further evidence for open goals. *Psychology of Sport and Exercise*, *48*, 101661. doi: 10.1016/j.psychsport.2020.101661

Hennessey, B., & Amabile, T. (2010). Creativity. *Annual Review of Psychology*, *61*(1), 569-598. doi:10.1146/annurev.psych.093008.100416

Jackson, S. (1996). Toward a conceptual understanding of the flow experience in elite athletes. *Research Quarterly for Exercise and Sport*, *67*(1), 76-90. doi:10.1080/02701367.1996.10607928

Jamovi project. (2017). Jamovi (Version 0.8) [Compute software]. Retrieved from https://www.jamovi.org/download.html

Kashdan, T. B., Gallagher, M. W., Silvia, P. J., Winterstein, B. P., Breen, W. E., Terhar, D., & Steger, M. F. (2009). The Curiosity and Exploration Inventory-II: Development, Factor Structure, and Psychometrics. *Journal of Research in Personality*, *43*(6), 987–998. https://doi.org/10.1016/j.jrp.2009.04.011

Kim, K. H. (2005). Can only intelligent people be creative? A meta-analysis. *Journal of Secondary Gifted Education*, *16*(2–3), 57–66. doi:10.4219/jsge-2005-473

Kim, K., Cramond, B., & VanTassel-Baska, J. (2010). The relationship between creativity and intelligence. *The Cambridge Handbook of Creativity*, 395-412. doi:10.1017/cbo9780511763205.025

Klein, H., & Lee, S. (2006). The Effects of Personality on Learning: The Mediating Role of Goal Setting. *Human Performance*, *19*(1), 43-66. doi:10.1207/s15327043hup1901_3

Klein, H., Wesson, M., Hollenbeck, J., Wright, P., & DeShon, R. (2001). The assessment of goal commitment: A measurement model meta-analysis. *Organizational Behavior and Human Decision Processes*, *85*(1), 32-55. doi:10.1006/obhd.2000.2931

Kleingeld, A., van Mierlo, H., & Arends, L. (2011). The effect of goal setting on group performance: A meta-analysis. *Journal of Applied Psychology*, *96*(6), 1289-1304. doi:10.1037/a0024315

Koestner, R., Otis, N., Powers, T., Pelletier, L., & Gagnon, H. (2008). Autonomous Motivation, Controlled Motivation, and Goal Progress. *Journal of Personality*, *76*(5), 1201-1230. doi:10.1111/j.1467-6494.2008.00519.x

Kudrowitz, B., & Dippo, C. (2013). When Does a Paper Clip Become a Sundial? Exploring the Progression of Originality in the Alternative Uses Test. *Journal of Integrated Design And Process Science*, *17*(4), 3-18. doi:10.3233/jid-2013-0018

Kwasnicka, D., Ntoumanis, N., & Sniehotta, F. (2020). Setting performance and learning goals is useful for active and inactive individuals, if goals are personalized and flexible: commentary on Swann et al. (2020). *Health Psychology Review*, 1-5. doi:10.1080/17437199.2020.1762107

Latham, G. (2003). Goal setting. *Organizational Dynamics*, *32*(3), 309-318. doi:10.1016/s0090-2616(03)00028-7

Lakens, D. (2017). TOSTER: Two one-sided tests (TOST) equivalence testing (Version 0.3) [Computer software]. Retrieved from https://CRAN.R-project.org/package=TOSTER

Lakens, D., Scheel, A. M., & Isager, P. M. (2018). Equivalence testing for psychological research: A tutorial. *Advances in Methods and Practices in Psychological Science, 1,* 259-269. doi:10.1177/2515245918770963

Leppink, J. (2018). Analysis of Covariance (ANCOVA) vs. Moderated Regression (MODREG): Why the Interaction Matters. *Health Professions Education*, *4*(3), 225-232. doi:10.1016/j.hpe.2018.04.001

Li, W., Li, X., Huang, L., Kong, X., Yang, W., Wei, D., Li, J., Cheng, H., Zhang, Q., Qiu, J., & Liu, J. (2015). Brain structure links trait creativity to openness to experience. *Social Cognitive and Affective Neuroscience, 10*(2), 191–198. doi:10.1093/scan/nsu041

Locke, E., & Latham, G. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist*, *57*(9), 705-717. doi:10.1037/0003-066x.57.9.705

Locke, E. A., & Latham, G. P. (2013). Goal setting theory, 1990. In E. A. Locke & G. P. Latham (Eds.), *New developments in goal setting and task performance* (p. 3–15). Routledge/Taylor & Francis Group. Retrieved from https://www.researchgate.net/publication/232501090_A_Theory_of_Goal_Setting_Task_Performance

Locke, E., & Latham, G. (2019). The development of goal setting theory: A half century retrospective. *Motivation Science*, *5*(2), 93-105. doi:10.1037/mot0000127

Lubart, T. (2016). Creativity and convergent thinking: Reflections, connections and practical considerations. *Journal of Psychology and Pedagogics, 4,* 7-15. doi:10.22363/2313-1683-2016-4-7-15

Ma, H. (2009). The effect size of variables associated with creativity: A meta-analysis. *Creativity Research Journal*, *21*(1), 30-42. doi:10.1080/10400410802633400

McCrae, R., & Costa, P. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality And Social Psychology*, *52*(1), 81-90. doi:10.1037/0022-3514.52.1.81

McDonald, R. (1970). The theoretical foundations of principal factor analysis, canonical factor analysis, and alpha factor analysis. *British Journal of Mathematical And Statistical Psychology*, *23*(1), 1-21. doi:10.1111/j.2044-8317.1970.tb00432.x

McEwan, D., Harden, S. M., Zumbo, B. D., Sylvester, B. D., Kaulius, M., Ruissen, G. R., & Beauchamp, M. R. (2016). The effectiveness of multi-component goal setting interventions for changing physical activity behaviour: a systematic review and meta-analysis. *Health Psychology Review*, *10*(1), 67-88. doi:10.1080/1743 719 9.2015.1104258

McFadzean, E. (1998). The creativity continuum: Towards a classification of creative problem solving techniques. *Creativity and Innovation Management*, *7*(3), 131-139. doi:10.1111/1467-8691.00101

Mento, A., Steel, R., & Karren, R. (1987). A meta-analytic study of the effects of goal setting on task performance: 1966–1984. *Organizational Behavior and Human Decision Processes*, *39*(1), 52-83. doi:10.1016/0749-5978(87)90045-8

Neubert, M. (1998). The Value of Feedback and Goal Setting Over Goal Setting Alone and Potential Moderators of this Effect: a Meta-Analysis. *Human Performance*, *11*(4), 321 - 335. doi:10.1207/s15327043hup1104_2

Ogbeiwi, O. (2017). Why written objectives need to be really SMART. *British Journal Of Healthcare Management*, *23*(7), 324-336. doi:10.12968/bjhc.2017.23.7.324

Ones, D., Anderson, N., Viswesvaran, C., & Sinangil, H. (2018). *The SAGE handbook of industrial, work and organizational psychology* (pp. 146 - 148). Los Angeles: Sage reference. doi:10.4135/9781473914957

Ostrow, K., & Heffernan, N. (2018). Testing the Validity and Reliability of Intrinsic Motivation Inventory Subscales Within ASSISTments. *Lecture Notes in Computer Science*, 381-394. doi:10.1007/978-3-319-93843-1_28

Prather, C. (2005). The dumb thing about smart goals for innovation. *Research-Technology Management*, *48*(5), 14-15. doi:10.1080/08956308.2005.11657331

Raven, J. (2008). *The Raven Progressive Matrices Tests: their theoretical basis and measurement model*. Retrieved from https://www.researchgate.net/publication/ 255605513_The_Raven_Progressive_Matrices_Tests_Their_ Theoretical_Basis_and _Measurement_Model

R Core Team (2018). *R: A language and environment for statistical computing.* R Foundation for Statistical Computing, Vienna, Austria. Retrieved from https://www.R- project.org/.

Ringelhan, S., Stumpf-Wollersheim, J., Ostermaier, A., Welpe, I., & Spörrle, M. (2016). Give me a goal to be creative: Investigating goal setting and creative performance. *Schmalenbach Business Review*, *17*(3-4), 337-359. doi:10.1007/s41464-016-0022-7

Roskes, M., De Dreu, C. K. W., & Nijstad, B. A. (2012). Necessity is the mother of invention: Avoidance motivation stimulates creativity through cognitive effort. *Journal of Personality and Social Psychology, 103*(2), 242–256. doi:10.1037/a0028442

Runco, M., & Jaeger, G. (2012). The Standard Definition of Creativity. *Creativity Research Journal*, *24*(1), 92-96. doi:10.1080/10400419.2012.650092

Schweickle, M., Groves, S., Vella, S., & Swann, C. (2017). The effects of open vs. specific goals on flow and clutch states in a cognitive task. *Psychology Of Sport And Exercise*, *33*, 45-54. doi:10.1016/j.psychsport.2017.08.002

Seijts, G. H., & Latham, G. P. (2005). Learning versus performance goals: When should each be used? *Academy of Management Perspectives*, *19*(1), 124-131. doi:10.5465/AME.2005.15841964

Seijts, G. H., Latham, G. P., & Woodwark, M. (2013). Learning goals: A qualitative and quantitative review. In E. A. Locke & G. P. Latham (Eds.), *New developments in goal setting and task performance* (pp. 195-212). New York, NY: Routledge. Retrieved from https://psycnet.apa.org/record/2013-00428-013

Shalley, C. E. (1991). Effects of productivity goals, creativity goals, and personal discretion on individual creativity. *Journal of Applied Psychology, 76*(2), 179–185. doi:10.1037/0021-9010.76.2.179

Sternberg, R. J., & Kaufman, J. C. (2010). Constraints on creativity. *The Cambridge Handbook of Creativity*, 467-482. doi:10.1017/cbo9780511763205

Stetler, K., & Magnusson, M. (2014). Exploring the tension between clarity and ambiguity in goal setting for innovation. *Creativity and Innovation Management*, *24*(2), 231-246. doi:10.1111/caim.12102

Stevenson, C., Kleibeuker, S., de Dreu, C., & Crone, E. (2014). Training creative cognition: adolescence as a flexible period for improving creativity. *Frontiers in Human Neuroscience*, *8*. doi:10.3389/fnhum.2014.00827

Swann, C., Hooper, A., Schweickle, M., Peoples, G., Mullan, J., & Hutto, D. et al. (2020). Comparing the effects of goal types in a walking session with healthy adults: Preliminary evidence for open goals in physical activity. *Psychology of Sport and Exercise*, *47*, 101475. doi:10.1016/j.psychsport.2019.01.003

Swann, C., Keegan, R., Crust, L., & Piggott, D. (2016). Psychological states underlying excellent performance in professional golfers: “Letting it happen” vs. “making it happen”. *Psychology of Sport and Exercise*, *23*, 101-113. doi:10.1016/j.psychsport.2015.10.008

Swann, C., & Rosenbaum, S. (2018). Do we need to reconsider best practice in goal setting for physical activity promotion? *British Journal of Sports Medicine, 52*(8), 485-486. doi:10.1136/bjsports-2017-098186

Swann, C., Rosenbaum, S., Lawrence, A., Vella, S., McEwan, D., & Ekkekakis, P. (2020). Updating goal-setting theory in physical activity promotion: a critical conceptual review. *Health Psychology Review*, 1-17. doi:10.1080/17437199.2019.1706616

The jamovi project (2020). *jamovi* (Version 1.2) [Computer Software]. Retrieved from https://www.jamovi.org

Tolman, E. C. (1958). *Behavior and Psychological Man*. Univ of California Press. Retrieved from https://https://books.google.com.au/books

Tosi, H., Locke, E., & Latham, G. (1991). A Theory of Goal Setting and Task Performance. *The Academy of Management Review*, *16*(2), 480. doi:10.2307/258875

Tubbs, M. E. (1986). Goal setting: A meta-analytic examination of the empirical evidence. *Journal of Applied Psychology, 71,* 474-483. doi:10.1037/0021-9010.71.3.474

Wood, R., Mento, A., & Locke, E. (1987). Task complexity as a moderator of goal effects: A meta-analysis. *Journal of Applied Psychology*, *72*(3), 416-425. doi:10.1037/0021-9010.72.3.416

Zweig, D., & Webster, J. (2004). What are we measuring? An examination of the relationships between the big-five personality traits, goal orientation, and performance intentions. *Personality and Individual Differences*, *36*(7), 1693-1708. doi:10.1016/j.paid.20 03.07.0 10

Appendix A

Qualtrics Survey: Experimental Manipulations

Smart Goal Condition

Setting specific yet challenging goals are one way to achieve optimal outcomes in life. Thinking of your previous performance on the alternate uses task, generating non-obvious uses for a newspaper, please use the scale below to choose a specific goal for a repeat of this task (with a different everyday item) that is challenging yet realistic for you to achieve in 2 minutes. We want you to focus on achieving this goal in the next task.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

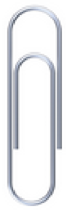
Number of non-obvious uses for a basic household item

→

On the following page, you will be presented with an image of an everyday item. Your task is to think of and list down non-obvious uses for that item.

This time around we want you to focus on achieving the specific goal you chose on the previous page, which is commonly referred to as a "SMART goal".

→



In the boxes below, please list down non-obvious uses for a paperclip. Remember, your focus is on the SMART goal you chose on the previous page. You have 2 minutes to achieve this goal.

Non-obvious use 1

Non-obvious use 2

Non-obvious use 3

Non-obvious use 4

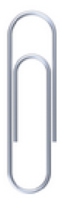
Non-obvious use 5

Open Goal Condition

On the following page, you will be presented with an image of an everyday item. Your task is to think of and list down non-obvious uses for that item.

This time around we want you to focus on what is referred to as an "*open goal*", that is, see how many uses you can generate for this everyday item in 2 minutes.

→



In the boxes below, please list down non-obvious uses for a paperclip. Remember, your focus is on an open goal, that is, to see how many uses you can generate in 2 minutes.

Non-obvious use 1

Non-obvious use 2

Non-obvious use 3

Non-obvious use 4

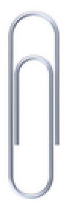
Non-obvious use 5

Do-Your-Best Goal Condition

On the following page, you will be presented with an image of an everyday item. Your task is to think of and list down non-obvious uses for that item.

This time around we want you to focus on what is referred to as a "*do your best goal*". That is, do your best in 2 minutes to list down as many non-obvious uses for this everyday item as you can.

→



In the boxes below, please list down non-obvious uses for a paperclip. Remember, your goal is to do your best in 2 minutes to list down as many non-obvious uses for a paperclip as you can.

Non-obvious use 1

Non-obvious use 2

Non-obvious use 3

Non-obvious use 4

Non-obvious use 5