School of Psychology and Speech Pathology

On the social nature of competence evaluations: Do task-involved individuals compare themselves to others?

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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Signature: ……

Date: 18 May 2016

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List of Papers

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Abstract

Previous studies conducted in laboratory and real-life settings have shown that mastery-approach goals are linked to social comparison processes – a finding that contradicts assumptions underpinning earlier formulations of achievement goal theory which predicted that mastery goals are not linked to social comparison processes. This thesis outlines limitations of earlier research, concerning (i) measurement, (ii) manipulation, and (iii) statistical control, and offers more comprehensive tests by addressing the aforementioned limitations. Unlike previous research in the area, this thesis is specifically focused on the achievement goals defined by evaluation standards in the original achievement goals (Nichols, 1984; 1989). For the first time, a statistical model (discrepancy model) and manipulation procedures can capture the specific effect of an achievement goal profile featuring 'pure' mastery goal that accounts for high mastery and low performance goal endorsements. The purpose of this thesis is to re-examine the link between mastery-approach goals and social comparisons. Specifically, the current studies examined whether individuals who exhibit a 'pure' mastery approach goal profile base their perceptions of competence on social comparisons.

Four studies were conducted in order to examine this research question. A quasi-experimental study adopted the 2 (distance: small and large) x 2 (social information and no information) x 2 (direction: favourable and unfavourable) x 2 (achievement goal orientations: mastery and performance) between-subject design. Participants were classified as mastery or performance orientated on the basis of self-reported achievement goals as dispositional traits. The next two experimental laboratory controlled studies adopted the same 3 (social information: unfavourable, favourable, and no information) x 2 (achievement goals: mastery and performance) between-subjects design. The effects of

social comparisons were empirically examined on the self-reported happiness and competence after the manipulation was complete. Participants were randomly allocated to one of the experimental conditions. The primary aim of Study 1 was to use hypothetical scenarios to test if individuals who adopt 'pure' mastery goals do not compare themselves to others. One hundred seventeen students took part in this experiment. Study 2 extended this question to a real task experience for stronger evidence. Two hundred and nine students participated in this study. In Study 3, a stronger manipulation of achievement goals was employed to allow a better control for a single goal adoption. This was achieved by the additional messages that directed attention away from other goals. The results showed that mastery approach students who adopt high mastery/ low performance goal profile are more selective in social comparison situations. Specifically, they reported lower self-evaluations of competence and happiness when exposed to unfavourable social comparison information, but not favourable. Finally, Study 4 connected the laboratory experiments with practice through a link to the natural environment. It was decided to adopt a prospective design in this study with two measurement points conducted in classroom settings during a mathematical class. The evaluation of the effects of social comparisons was examined through self-reports of 163 Australian high school students. Moreover, the results of academic ability tests were provided by teachers. This study yields an insight into the social processes pertaining to the effect of a purposeful social standard choice, in terms of its direction and extremity, on students' self-evaluations. The four studies combined provide an understanding between 'pure' mastery goals and social comparisons. Current findings suggest that social comparison effects are less pervasive for individuals who adopt a 'pure' mastery goal profile than analogous effects observed in previous research. For the first time,

it has been soundly demonstrated that students who adopt a ‘pure’ mastery approach goal profile disregard favourable comparisons, but remain sensitive to unfavourable ones.

Keywords: achievement goals, social comparisons, perceptions of competence, discrepancy model

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Chapter 1

Introduction

1.1 Introduction

Comparative thinking is a powerful force. People often need more than just be good looking, have a job, receive a passing grade, or have some dance moves. They want to know whether they are more or less attractive than their friends, whether their job's rate is higher or lower in relation to the average monthly pay, whether their grade is good enough when scaled to the class average, or whether they are better or worse than other people on the dancefloor. People use social comparisons to infer their self-worth or to judge about their abilities all the time. Everything needs a perspective and social information presented by the context often acts as such a default for an evaluation. People often base their self-evaluations on how they stack up against the others (Festinger, 1954). Clearly, comparative judgment is appealing because it is perceived to be more accurate. A. X. Yang, Hsee, Liu, and Zhang (2011) demonstrated that 94.1% of individuals preferred comparative modes of evaluation out of the belief that social comparisons lead to accurate and rational decisions. Moreover, social comparisons are so pervasive that people attend to them even outside of their conscious awareness (e.g.,Kahnemann & Miller, 1986). For example, some studies have documented that people engage in social comparisons even when the comparison standard is presented subliminally to them (e.g., Festinger, 1954; Mussweiler & Rüter, 2003).

However, in the 1980's a group of researchers suggested that social comparisons are not so pervasive or unavoidable after all. In achievement settings such as education, sport, or workplace, it has been argued that the way how people evaluate themselves is contingent to their goals (e.g., Dweck, 1986; Nicholls, 1984; 1989). Though people can

pursue various goals in their lives (Austin & Vancouver, 1996; Carver & Scheier, 1998; Dodge, Asher, & Parkhurst, 1989), in education, sport, or the workplace, people often engage in achievement behaviour in order to experience competence (see Elliot & Thrash, 2001, p. 140; Maehr, 1989; Pintrich & Schunk, 1996). It has been claimed that adoption of one type of achievement goals (mastery) prevents the influence of social comparisons while adoption of the other (performance) instigates it (e.g., Ames, 1992; Maehr & Midgley, 1991; Nicholls, 1989). This difference in social evaluation processing, conceptually important to define two types of achievement goals in the early days of achievement goal theory (e.g., Nicholls, 1989), remains to be neither supported nor rejected till now. This thesis outlines the limitations of the previous research and provides new tests that examine whether or not an adopted goal can protect an individual from the effects of social information. Given that in achievement settings such as education, social information is inseparable from the learning process through public feedback and grading system, the current research also provides ecological examination of this question in addition to experimentally controlled examinations.

This chapter commences with a description of two achievement goals and their differences in sociocognitive processes and behaviour outcomes. The core assumption of early achievement goal theory in relation to social comparisons is then critically discussed followed by identification of the significance of the research. The aims and objectives of the study are identified, and finally, a brief discussion of the organisation of the thesis is provided.

1.2 Background of Achievement Goals Research: Types of Achievement Goals

The achievement goal research has distinguished between two main types of achievement goals: mastery and performance (Dweck, 1986; Nicholls, 1989). Mastery goals

refer to the tendency to improve one's own abilities, whereas performance goals correspond to the tendency to outperform others (e.g., Ames, 1992; Ames & Archer, 1987; Dweck & Leggett, 1988; Nicholls, 1989; Pintrich, 2000). Early research drawing from Nicholls' (1984) achievement goal theory conceptualised and measured achievement goals in terms of how individuals defined competence in achievement contexts. In line with this theory, these two definitions of competence or success prompt individuals to adopt different comparison standards during the process of evaluation. Accordingly, instruments that aimed to measure mastery goals captured tendencies to define success on the basis of standards related to past or present performance, known as self-referenced standards of comparison (Duda & Whitehead, 1998). In contrast, measures of performance goals captured tendencies to define success on the basis of normatively-referenced (social) standards such as performance exhibited by others (Fox, Goudas, Biddle, Duda, & Armstrong, 1994). Therefore, it has been assumed that comparison standards are perfectly aligned with achievement goals.

In the mid-1990s, the dichotomous conceptualisation of achievement goals was extended into a 2 × 2 hierarchical model. In this framework, achievement goals were viewed as aims that captured the meaning and valence of achievement goals (Elliot, 1999; Elliot & Church, 1997). Accordingly, Elliot and McGregor (2001) differentiated mastery goals and performance goals into mastery-approach goals (i.e., understand and master a task), mastery-avoidance goals (i.e., avoid misunderstanding or making mistakes), performance-approach goals (i.e., try to do better than others) and performance-avoidance goals (i.e., avoid doing poorly relative to others) (e.g., Cury, Fonseca, Rufo, Peres, & Sarrazin, 2003; Elliot, 1999; Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001; Elliot & Murayama, 2008; Murayama, Elliot, & Yamagata, 2011). Both types of avoidance goals have been linked to

maladaptive outcomes as high anxiety and amotivation, low interest and attainment (Elliot & McGregor, 2001; Senko, Hulleman, & Harackiewicz, 2011; Senko & Mile, 2007). Approach goals, in contrast, promote beneficial outcomes such as intrinsic motivation, interest, and attainment, and therefore they are considered adaptive (Harackiewicz, Barron, Tauer, & Elliot, 2002; Harackiewicz, Durik, Barron, Linnenbrink-Garcia, & Tauer, 2008).

Traditionally, mastery goals have been associated with adaptive outcomes such as enhanced levels of intrinsic motivation (e.g., Asif, 2011; Cecchini Estrada, Gonzalez-Mesa, Mendez-Gimenez, & Fernandez-Rio, 2011; Halvari, Skjesol, & Bagøien, 2011; Lee, McInerney, Liem, & Ortiga, 2010; Li, Chi, & Yeh, 2011) cognitive engagement and deep processing strategies (e.g., Belenky & Nokes-Malach, 2012; Elliot, McGregor, & Gable, 1999; Pirhayati, 2012; Wang, 2013), competence and self-efficacy (e.g., Luo, Hogan, Yeung, Sheng, & Aye, 2014; Maltais, Ducheshe, Ratelle, & Feng, 2015; Poortvliet & Darnon, 2014; Seaton, Parker, Marsh, Craven, & Yeung, 2014; Yeung, Craven, & Gurvinder, 2014; Zourbanos, Papaioannou, Argyropoulou, & Hatzigeorgiadis, 2014), effort and persistence (e.g., Dysvik & Kuvaas, 2013; Hart, 2013), enjoyment and positive affect (e.g., Chen, 2015; Gillet, Lafrenière, Huyghebaert, & Fouquereau, 2015; Puente-Diaz, 2012), and interest (e.g., Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000; Harackiewicz et al., 2002; Harackiewicz et al., 2008; Schiefele, 2015). In contrast, performance goals have been associated with less adaptive outcomes (Ames, 1992; Elliott & Dweck, 1988; Smiley & Dweck, 1994). However, with the differentiation of achievement goals into approach and avoidance goals research has begun to reveal that most of the negative effects associated with performance goals were due to performance-avoidance goals. In addition, performance-approach goals rather than mastery-approach goals often predict higher achievement (Barron & Harackiewicz,

2001; Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997; Harackiewicz et al., 2000; Senko et al., 2011; Van Yperen, Blaga, & Potmes, 2015).

1.3 Statement of the Problem: Achievement Goals and Social Comparisons

An important distinction between the two types of approach goals concerns social comparison processes (Ames, 1992; Maehr & Midgley, 1991; Midgley, Kaplan, & Middleton, 2001; Nicholls, 1989). Specifically, an assumption of early achievement goal research was that performance-orientated individuals, but not mastery-orientated people, based their perceptions of competence on social comparison (e.g., Ames, 1992; Ames & Archer, 1988; Brophy, 2005; Elliot, 1999; Ku, Dittmar, & Banerjee, 2012; Nicholls, 1984; Pintrich, 2000; Pintrich, Conley, & Kempler, 2003). According to Nicholls' theory, people are concerned with social comparison when they pursue performance goals and not when they pursue mastery goals. The reason for that was believed to lie in the different standards of competence. Mastery-oriented individuals construe a competence standard in a temporal way and perceive it as a malleable construct, whereas performance-oriented ones believe that a standard (ability) is a fixed trait (Dweck, 1986; Dweck & Leggett, 1988; Stipek & Gralinski, 1996). Therefore, performance goals motivate individuals to compare to others during competence self-evaluations. This is because the belief that ability was a fixed trait led individuals to believe that the higher performance levels achieved by others were unattainable in the future (Lockwood & Kunda, 1997). In contrast, a belief that ability is malleable and could be improved through hard work and effort encourages attaining to self as a standard (Lockwood & Kunda, 1997; Van de Ven, Zeelenberg, & Pieters, 2011). Therefore, the mastery goals, underpinning ability as malleable, encourage individuals to exert effort in attempts to become better and to disregard others as a reference point.

1.4 Evidence that Challenges the Assumption that Mastery Goals do not Engage in Social Comparison Processes

Recently, however, a number of studies have documented that individuals who endorse mastery goals are interested in normative information pertaining to others' performance levels (Butler, 1992, 1993; Darnon, Dompnier, Gillieron, & Butera, 2010; Régner, Escribe, & Dupeyrat, 2007). Specifically, in a series of experimental studies conducted in educational contexts, Butler (1993) showed that students who were instructed to adopt mastery goals exhibited a marked interest in normative information pertaining to others. Likewise, Darnon et al. (2010) observed a similar effect but also for multiple-goal endorsement students who adopted both performance-approach and mastery-approach goals simultaneously.

In addition, Van Yperen and Leander (2014) demonstrated that mastery-oriented individuals were responsive to favourable and unfavourable social comparisons. In a series of experiments, they demonstrated that individuals instructed to adopt mastery-approach goals or performance-approach goals reported lower perceptions of competence when they were confronted with unfavourable social comparisons that revealed inferior performance on a task than when they were confronted with favourable social comparisons that indicated superior performance. These findings are particularly noteworthy because they contradict the traditional assumption that mastery goals do not instigate social comparisons and they imply that both mastery- and performance-oriented students respond similarly to unfavourable and favourable social comparisons.

1.5 Limitations of the Previous Research

Despite this evidence, there are still important gaps in this literature that require clarification. In particular, previous findings may not apply to the type of mastery-orientated

individuals identified in the original conceptualisation of achievement goal theory. In Nicholls' (1989) theory, achievement goals should be measured at the level of comparison standards using instruments that ask respondents to report whether they evaluate success on the basis of self-referenced versus normative comparison standards. Accordingly, individuals were assumed to exhibit a mastery goal profile if they adopted self-referenced comparison standards and not normative comparison standards. In contrast, research to date has relied almost exclusively on the achievement goal questionnaire-revised (AGQ-R; Elliot, 1997; Elliot & Murayama, 2008), which conceptualises goals as aims. This instrument may not capture comparison standards according to the original achievement goal theory. For example, there is some evidence that the AGQ-R is only moderately correlated with instruments that have been specifically designed to capture comparison standards such as Duda and Nicholls' (1992) questionnaire (Barkoukis, Ntoumanis, & Nikitaras, 2007). Till now, no study has been undertaken that would specifically test the link between instruments that measure tendencies to adopt one over another comparison standard and social comparisons.

A second gap in existing body of knowledge is related to goal endorsement. First, previous experimental evidence provided a limited account for the degree to which the participants indeed endorsed experimentally induced goals (Butler, 1987, 1995). In the experiments investigating whether or not social information affects the outcomes of evaluation processes, van Yperen and Leander (2014) performed manipulation checks of achievement goals by means of categorical questions that forced participants to choose between mastery or performance goals suggesting that a full focus was granted to the chosen goal. However, one may argue that such operationalisation expresses an assumption that self-set tendencies to adopt both goals are statistically non-significant. Needless to say,

this assumption cannot be justified on the basis of previous research showing that individuals can simultaneously endorse mastery and performance goals and produce an effect known in the literature as a multiple goal effect (Barkoukis et al., 2007; Harackiewicz, Barron, & Elliot, 1998; Meece & Holt, 1993; Pintrich & Garcia, 1991; Régner et al., 2007). Relatedly, manipulations of achievement goals in previous research aimed only to induce mastery goals through increasing focus on self-improvement, which however, does not guarantee a decrease in self-set performance goals. Therefore, earlier research evidence cannot rule out a possibility that they described a "masked" or "contaminated" social comparison effect for mastery goals, due to unaccounted effects of performance goals.

Finally, statistical models used in previous research were not capturing effects associated with a pure mastery goal profile that corresponds to tendencies to endorse mastery goals at high levels and performance goals at low levels. The reason for this is that regression analysis or analysis of variance do not estimate effects of mastery goals at low levels of endorsing performance goals. Rather, these models estimated effects of mastery goals when performance goals are endorsed at some average levels. Given this, previous studies may mislead researchers to conclude that pure mastery oriented people engage in social comparisons when in fact they do not engage in social comparisons.

1.6 Purpose of the Thesis and General Research Questions: Formulation of Hypotheses

The current thesis adds to the literature linking mastery goals to social comparison because it uses a manipulation of achievement goals that aims to induce a 'pure' mastery goal profile. In addition, the current studies employed measures of achievement goals and a statistical model (discrepancy model) that capture social comparison effects associated with a 'pure' mastery goal profile. Hence, the present thesis will test whether the conclusions of previous research that linked mastery goals to social comparison constitute a strawman's

argument, or whether such conclusions are theoretically interesting in that they contradict the hypothesis of the original theory that mastery-orientated individuals do not base perceptions of competence on social comparison. Further, at methodological level, the present studies demonstrate whether a discrepancy model provides a useful data analytic framework that enables researchers to isolate effects associated with 'pure' mastery (high mastery/low performance) and 'pure' performance (low mastery/high performance) goal profiles. This will be demonstrated if, for example, the discrepancy statistical model yields a different pattern of effects for achievement goals than findings obtained by previous research. Findings such as these are essential for theoretical progress to be made in achievement goal research because they also show that researchers' choice of statistical models affects their conclusions about mastery goals.

1.7 Importance of the Current Research

First, the social comparison effect observed for mastery goals on perceptions of competence is supposed to be theoretically interesting because it challenges the traditional hypothesis that mastery-orientated individuals do not base perceptions of competence on social comparisons. The current thesis seeks to clarify whether the results observed by previous studies falsify Nicholls' theory or whether the original assumption was incorrect. The methodological point is to find out whether statistical technique adopted in the current studies affects conclusions about social comparisons.

Second, this research makes an impact into the applied practices and policies. In particular, Nicholls' (1989) achievement goal theory conveyed an idea that mastery goals can be the means for avoiding negative effects of social comparisons. The reason for that is that mastery goals did not instigate social comparisons. Therefore, adoption of mastery goals protected people from deleterious effects of unfavourable social comparisons. The

present thesis contributes to the debate related to how to circumvent the negative effects of inequalities and social comparisons on learning. If for example mastery goals are linked to social comparison then people can be protected from unfavourable comparisons by directing attention to favourable comparisons. If on the other hand mastery goals are not linked to social comparisons then negative effects of unfavourable social comparisons can be reduced by promoting a focus on mastery goals and self-improvement.

1.8 Thesis Outline

Chapter two provides a critical review of the literature which is presented in four major sub-sections. In the first sub-section the reader is introduced to the achievement goal theories. The second sub-section introduces social comparison theory and the techniques used to identify the social comparison effects. The third sub-section of the review includes a critical review of the literature that identifies the school context as an appropriate environment where student learning behaviour is naturally immersed in social comparison processes. The fourth sub-section of the literature review identifies the limitations and gaps in the literature that links mastery goals to social comparisons. Chapter three outlines the hypothesis for the current thesis and introduces the statistical model (discrepancy model) and methodological techniques that are utilised in the current thesis to capture effects associated with the 'pure' mastery-approach goal in order to test social comparison effects.

The following four chapters (four to seven) introduce and describe the studies starting with a short introduction in each of them. The first three studies are experimental whereas the last study is a prospective study that took place in real-life classroom settings. Study 1 utilised hypothetical scenarios to test if people who adopt 'pure' mastery goals compare themselves to others. Studies 2 and 3 tested this hypothesis in an experimental context to control for levels of performance goals. Finally, Study 4 adopted a prospective

design and examined the link between mastery goals and social comparisons in real-life settings. Each chapter identifies participants, procedure and organisation of data collection and data analysis. The results are discussed and concluded after each chapter.

Chapter 8 presents the reader with a general discussion where the major findings are summarised, interpreted and discussed in relation to the extant literature. The importance of the findings is discussed from theoretical and practical perspective. The implications for practice in schools and theoretical use are highlighted. Following this the strengths and limitations of the current research are discussed. Finally, recommendations are made as a result of this thesis, and conclusions are drawn. The appendices include a copy of the original methodological files containing the questionnaires and verbatim manipulations. Ethics approvals, information sheets, consent forms and debrief sheets are also included.

Chapter 2

Literature Review

2.1 Introduction and Chapter Overview

This chapter provides the literature review of achievement goals theories and associated psychometric tools, social comparison theory and the cognitive mechanism, the existing evidence supporting the link between mastery goals and social comparisons and the limitations in previous research. Combined, these sections provide the basis for developing the rationale and the hypotheses of the current thesis.

2.2 Achievement Goals Theory

2.2.1 Definitions and measures achievement goals. The development of achievement goal theory relied on research conducted over decades. Although different researchers adopted different labels for the goals, they generally agree that there are two main types of achievement goals (Dweck, 1986; Nicholls, 1989). Mastery goals refer to the tendency to improve one's own abilities, whereas performance goals correspond to the tendency to outperform others (e.g., Ames, 1992; Ames & Archer, 1987; Dweck & Leggett, 1988; Nicholls, 1989; Pintrich, 2000).

In its initial conceptualisation, achievement goals were described as cognitive orientations (e.g., Diener & Dweck, 1978; Dweck & Leggett, 1988). This early perspective implied a dispositional tendency of individuals to adopt one of two types of achievement goals as a matter of temperament. However, it was also noted that situational cues can cause a state-like reasoning or focus for engagement in a task, known as goal involvement (Dweck & Leggett, 1988; Maehr & Nicholls, 1980; Nicholls, 1989). These situational influences are known as goal involvement and they are function of environmental climates (Ames, 1992; Nicholls, 1989). Therefore, the achievement goal construct can be employed

at several different levels of analysis (e.g., Nicholls, 1984; Nicholls, Patashnick, & Nolen, 1985): goal orientations may describe relatively stable trait-like individual differences or differences in individuals' state-like tendencies to adopt one goal or another goal (Duda, 1989; Nicholls, 1984).

There are two ways to operationalise the achievement goals. Self-report measures express one's general tendency to adopt goals. In other words, this approach captures tendencies to endorse goals also known as self-set goals. This approach is often used in studies conducted in real life settings. In experimental studies, researchers use experimental inductions or manipulations. This approach includes direct instruction to adopt a mastery or performance goals. Finally, in order to ensure that induced goals were actually endorsed by participants researchers employ manipulation checks. This technique is achieved through self-report instruments that aim to capture self-set goals. However, experimental studies have rarely employed rigorous manipulations checks (i.e., Butler, 1992; Darnon et al., 2010).

2.2.2 Dichotomous Normative Achievement Goal Theory. Goal theory was developed within a social-cognitive approach that emphasises the way individuals interpret and process information about the achievement situations (Dweck, 1986; Dweck & Leggett, 1988). This means that individuals with different achievement goals approach, perceive, and engage in achievement situations differently (Ames, 1992). In particular, early research on the achievement goal theory conceptualised and measured achievement goals in terms of what standards of success (competence) individuals used in achievement contexts (Ames & Archer, 1988; Dweck, 1986; Nicholls, 1984). Accordingly, instruments that aimed to measure mastery goals captured tendencies to define success on the basis of standards related to past or present performance (self-referenced standards of comparison) (Duda & Whitehead,

1998). In contrast, performance goals captured tendencies to define success on the basis of normative standards such as performance exhibited by others (Fox et al., 1994).

Early theorists' conceptualisation of achievement goals is known as a dichotomous normative achievement goal model (Ames, 1984; Dweck, 1986; Maehr & Nicholls, 1980; Nicholls, 1984, 1989). According to this model, a 'pure' mastery orientated person was one who endorsed only mastery goals and not at all performance goals. In contrast, a 'pure' performance orientated person was one who endorsed performance goals only and not at all mastery goals. Early theorists of achievement goals suggested that each of the goal profiles lead to different patterns of affective, cognitive and behavioural outcomes (Ames, 1992; Dweck, 1999; Hulleman, Schrager, Bodmann, & Harackiewicz, 2010; Urdan, 1997). Traditionally, mastery goals have been associated with adaptive outcomes such as enhanced levels of intrinsic motivation (e.g., Ames, 1992; Asif, 2011; Cecchini Estrada et al., 2011; Halvari et al., 2011; Li et al., 2011), cognitive engagement and deep processing strategies (e.g., Belenky & Nokes-Malach, 2012; Elliot et al., 1999; Pirhayati, 2012; Wang, 2013), competence and self-efficacy (e.g., Greene, Miller, Crowson, Duke, & Akey, 2004; Halvari et al., 2011; Luo et al., 2014; Maltais et al., 2015; Murayama & Elliot, 2009; Poortvliet & Darnon, 2014; Seaton et al., 2014; Wolters, Yu, & Pintrich, 1996; Yeung et al., 2014; Zourbanos et al., 2014), effort and persistence (e.g., Dysvik & Kuvaas, 2013; Hart, 2013; Ho & Hau, 2008; Miller, Greene, Montalvo, Ravindran, & Nichols, 1996), enjoyment and positive affect (e.g., Chen, 2015; Gillet et al., 2015; Puente-Diaz, 2012), and interest (e.g., Harackiewicz et al., 2000; Harackiewicz et al., 2002; Harackiewicz et al., 2008; Schiefele, 2015). In contrast, performance goals have been associated with maladaptive outcomes (Ames, 1992; Elliott & Dweck, 1988; Smiley & Dweck, 1994). For example, performance goals were associated with higher levels of anxiety, higher likelihood to cheat or to engage

into superficial learning (Ames, 1992), avoidance of challenge and negative affect (Dweck, 1986; Dweck & Leggett, 1988; Elliott & Dweck, 1988).

Later research has shown that the general assumption about maladaptive pattern of performance goal effects was premature. In particular, the performance goal effects on different outcomes including competence-based regulation showed inconsistent results. Performance goals were positively associated with some positive outcomes such as positive self-concept, affect, attitudes, valuing of academic work (Midgley et al., 1996; Nicholls et al., 1985; Pajares, Britner, & Valiante, 2000; Pintrich & Garcia, 1991; Roeser, Midgley, & Urdan, 1996; Skaalvik, 1997; Wolters et al., 1996), and effort (Bouffard, Boisvert, Vezeau, & Larouche, 1995; Elliot & McGregor, 1999; Elliot et al., 1999). Furthermore, performance goals have been positively associated with academic achievement and related variables (e.g., grades, task attainment, and self-efficacy) (Elliot & Church, 1997; Harackiewicz et al., 1997; Hulleman et al., 2010; Senko & Harackiewicz, 2005; Senko & Hulleman, 2013). In order to address these inconsistencies, recent research on achievement goal theory suggested reconceptualization and extension of traditional achievement goal theory. These changes led to revision of achievement goal theory (Elliot & Harackiewicz, 1996).

2.2.3 Revised Achievement Goal Theory. There are few models that modified the traditional dichotomous model and generally extended one another. Each amendment arose, in part, from a need to explain contradictory findings in the empirical literature. In addition, Elliot's models used different instruments in measuring achievement goals (e.g., Elliot & Murayama, 2008).

2.2.3.1 Trichotomous model (2 + 1). In light of contradictory evidence, Elliot and colleagues suggested that the valence (approach vs avoidance) of performance goal can provide an explanation of inconsistencies associated with performance goals (Elliot &

Church, 1997; Elliot & Harackiewicz, 1996). Therefore, performance goals (Ames, 1992; Meece, Blumenfeld, & Hoyle, 1988; Nicholls, Patashnick, Cheung, Thorkildsen, & Lauer, 1989; Nolen & Haladyna, 1990) were divided into performance-approach goals and performance-avoidance goals (e.g., Cury et al., 2003; Elliot, 1999; Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001; Murayama et al., 2011). This theoretical framework resulted in a trichotomous achievement goal theory (Elliot & Church, 1997; Middleton & Midgley, 1997; Pintrich, 2000). According to trichotomous model, most of the negative effects associated with performance goals were due to performance-avoidance goals. In addition, performance-approach goals and not mastery-approach goals often predict higher achievement (Barron & Harackiewicz, 2001; Harackiewicz et al., 1997; Harackiewicz et al., 2000; Senko et al., 2011; Van Yperen et al., 2015).

2.2.3.2 A 2x2 hierarchical model. In the mid-1990s, achievement goals conceptualisation was revised and extended to a 2×2 hierarchical model (Elliot, 1999; Elliot & McGregor, 2001; Elliot & Murayama, 2008). Specifically, capitalising on the work of Atkinson (1957) and Murray (1938), Elliot and McGregor (2001) suggested that a valence dimension can be equally applied to mastery goals. Accordingly, Elliot and McGregor (2001) differentiated mastery goals and performance goals into mastery-approach goals (i.e., understand and master a task), mastery-avoidance goals (i.e., avoid misunderstanding or making mistakes), performance-approach goals (i.e., try to do better than others) and performance-avoidance goals (i.e., avoid doing poorly relative to others) (e.g., Cury et al., 2003; Elliot, 1999; Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001; Elliot & Murayama, 2008; Murayama et al., 2011). Importantly, the hierarchical model implied a new conceptualisation of the goals as cognitive-dynamic aims (Elliot, 1999; Elliot & Church,

1997).This is particularly important, because according to traditional achievement goal theory goals were defined through the competence standards (Nicholls, 1989).

2.2.3.3 A 3x2 model. A 3x2 model is the most recent model of achievement goal theory that is an extension of Elliot and McGregors' (2001) hierarchical model and yet another attempt to rethink the achievement goals. Elliot, Murayama, and Pekrun (2011) argued that the hierarchical framework was solely conceptualized on the cognitive-dynamic aims as a desired outcome of the goal and abandoned the actual reason or standard of the goal pursuit. Therefore, they introduced a new 3x2 model that allowed accounting for both (Elliot et al., 2011): an individual's competence evaluation can be assessed on three evaluative standards (task-standard, self-standard and other-standard) as well as in relation to two valences (approach and avoidance). Elliot and colleagues (2011) suggested that mastery goals cannot only be differentiated into approach and avoidance goals. They explained that their task-approach (e.g., to score all points on a certain test, to correctly solve all the problems, to fully understand a subject) and self-approach (e.g., to score higher than did before, to improve own understanding) goals stem from former mastery-approach goals, because the focus on attainment of task -based (task parameters, absolute demands of a task) and self-based competence (intrapersonal trajectory referring to the own previous performance). Following the same logic, mastery-avoidance goals bifurcated into task-avoidance (e.g., to avoid not scoring a certain amount of points or not understanding an idea) and self-avoidance (to avoid scoring less points than did before) goals within the 3x2 approach (Elliot et al., 2011). However, the performance goals were described as other-based standards when other approach goals (e.g., to outperform others) and other-avoidance (e.g., to avoid being outperformed by others) goals mirrored performance

approach and avoidance goals, correspondingly. Though there is some research that used this model (e.g., Johnson & Kestler, 2013; Lower & Turner, in press; Méndez-Giménez, Cecchini-Estrada, Fernández-Río, Méndez-Alonso, & Prieto-Saborit, 2016; Y. Yang & Cao, 2013), it is currently under-investigated and needs more evidence of validity and reliability of its measure.

2.2.4 A multiple-goal perspective. Although some studies have found that optimal educational outcomes occur when students adopt mastery-approach goals but not performance-approach goals (e.g., Meece & Holt, 1993; Pintrich & Garcia, 1991), a considerable amount of evidence has shown that optimal performance outcomes are the result of adopting both goals (e.g., Ainley, 1993; Bouffard et al., 1995; Elliot & Church, 1997; Harackiewicz et al., 1997; Harackiewicz et al., 1998; Harackiewicz et al., 2000; Pintrich, 2000; Wentzel, 1993). Contemporary achievement goal theorists suggest that achievement goals effects do not alternate one another but rather interact in a complex and non-additive way (Barron & Harackiewicz, 2000; Darnon et al., 2010; Huang, 2012; Hulleman et al., 2010). This means that goals are not mutually exclusive (Harackiewicz et al., 1998), but adopting multiple goals may result in better learning outcomes (Barron & Harackiewicz, 2001, 2003; Harackiewicz et al., 2002; Pintrich, 2000). The reason for this is that, for example, students pursuing both goals simultaneously may accrue the benefits associated with each goal (Senko et al., 2011). In particular, a combination of mastery and performance approach goals was shown to benefit students' performance most (e.g., Barron & Harackiewicz, 2001; Conley, 2012; Elliot, 2005).

The multiple goal perspective explicitly assumes that students can and do pursue several salient goals reflecting academic concerns (Kaplan, Middleton, Urdan, & Midgley, 2002). Therefore, according to this approach, they can derive a sense of competence on the

basis of more than one single standard of evaluation. However, one standard can be more important than the other one (Barron & Harackiewicz, 2001; Van Yperen, Hamsta, & Van der Klaw, 2011). Evidence shows that individuals can possess high levels of both mastery and performance orientation simultaneously, as well as multiple other combinations or goal profiles such as 'high' in one orientation and 'low' in another (Harwood, Cumming, & Fletcher, 2004; Hodge & Petlichkoff, 2000; Vosloo, Ostrow, & Watson, 2009). Clearly, testing multiple goal models requires using the instruments with the multiple measurement points for the goals and outcomes in order to establish a robust pattern.

2.2.5 Testing multiple goal effects. The positive effects of performance goals and mastery goals on the same or distinct educational outcomes have also lead researchers to propose that students who pursue both goal types simultaneously may experience more positive outcomes than students who adopt one type of goal only (Harackiewicz et al., 1998). The reason for this is that students pursuing both goals simultaneously may accrue the benefits associated with each goal (Senko et al., 2011). Accordingly, Barron and Harackiewicz (2001) advised researchers to examine the combined effects of achievement goals on outcomes by examining whether the following regression equation explained observations:

$$A = b_0 + b_1M + b_2P + b_3MxP + e_{10} \quad (1)$$

In Equation 1, A represents individuals' achievement on a task such as the grades that students achieve in an exam. The terms M and P are individuals' responses to instruments measuring mastery goals and performance goals. The term MxP is a product term that represents the interaction between mastery goals and performance goals. The coefficient b_0 is the intercept of the regression equation. The term e_{10} indicates residual variance unexplained by the regression equation. The coefficients b_1 to b_3 are

unstandardized regression coefficients indicating main or interactive effects of mastery goals or performance goals on achievement.

Broadly speaking, Equation 1 supports combined effects of achievement goals on academic attainment if the main effects of mastery goals (i.e., $b_1 > 0$) and performance goals (i.e., $b_2 > 0$) on achievement are positive and statistically significant. Alternatively, the model represented in Equation 1 supports combined effects if the coefficient on the interaction between mastery goals and performance goals is positive and statistically significant (i.e., $b_3 > 0$; Senko et al., 2011). However, previous research has rarely observed combined effects of achievement goals on academic attainment. A cursory review of the literature indicates that only six out of 66 studies (9%) have supported combined effects of performance goals and mastery goals on academic attainment by ways of using the model presented in Equation 1 (Kamarova, Chatzisarantis, & Hagger, 2016). These studies confirmed an additive model. However, it can be argued that these effects could be obtained by chance, given the rather small number of significant effects. This possibility is reinforced by the fact that some of the studies exhibited borderline significant results (Bodmann, Hulleman, & Harackiewicz, 2008; Finney, Pieper, & Barron, 2004; Pekrun, Elliot, & Maier, 2009).

One reason that the regression model described in Equation 1 might have not been successful in detecting combined effects may be related to the fact that it does not test the hypothesis that individuals who endorse one goal at the highest possible level and the other goal at a marginally lower level exhibit optimal performance (i.e., individuals who adopt a high-mastery/moderate-performance goal profile). This is because the model implied by Equation 1 assumes that the effects of a goal (e.g., performance goal) on academic achievement are monotonically increasing within high or low levels of endorsing the other

goal (e.g., mastery goal) (Edwards, 1994, 2001). As a consequence, when Equation 1 supports combined effects, it always "forces" researchers to conclude that a high-mastery/high-performance goal profile is the most adaptive goal profile. However, this statistical assumption of monotonicity may be restrictive and it may not express the ways that students who adopt both achievement goals regulate goal adoption. For example, in educational contexts, students who are inclined to pursue both achievement goals may endorse mastery goals at a slightly higher level than performance goals at the beginning of the semester when learning is important (Barron & Harackiewicz, 2001; Pintrich, 2000). Unfortunately, the model implied by Equation 1 does not test whether students who adopt a high-mastery/moderate-performance goal profile are the best performers. As a consequence, it may mislead researchers to reject a combined effect of achievement goals on academic attainment that corresponds to a high-mastery/moderate-performance profile when in fact observations support a combined effect.

A number of researchers have suggested that problems associated with Equation 1 can be overcome by applying the following quadratic equation to explain effects of goal orientations on attainment (Aiken & West, 1991; Cortina, 1993; Edwards & Parry, 1993; Ganzach, 1997; Krantz & Tversky, 1971; Lubinski & Humphreys, 1990):

$$A = b_0 + b_1M + b_2P + b_3M^2 + b_4MxP + b_5P^2 + e_{10} \quad (2)$$

In this equation, M^2 and P^2 are quadratic terms that represent non-linear relationships between achievement goals and academic attainment. The coefficients b_3 and b_5 are unstandardized regression coefficients that represent effects associated with the quadratic terms. The model implied by Equation 2 can test a broader set of hypothesis about combined effects because the quadratic terms can examine whether achievement goals yield higher levels of academic attainment when they are endorsed at some moderate

level (Edwards, 2001; Griffin, Murray, & Gonzalez, 1999b). For example, the quadratic model may indicate that a high-mastery/moderate-performance goal profile is the most optimal profile if, in Equation 2, the main and quadratic effects of mastery and performance goals on academic achievement are linear and concave, respectively. The reason for this is that linear functions return higher levels of attainment when achievement goals are endorsed at the highest possible levels whereas concave functions indicate that achievement goals yield higher performance levels when they are endorsed at moderate levels (Edwards & Parry, 1993). As it stands in the current literature on achievement goals, it is difficult to determine whether the quadratic model is more effective in detecting combined effects than the model implied by Equation 1. This is because the majority of studies have not included quadratic terms in their regression analyses. Most importantly, it needs to be clarified what a curvilinear relationship in this context means. In particular, performance approach goals produce a mix of simultaneously positive (e.g., Elliot & Church, 1997; Harackiewicz et al., 1997; Hulleman et al., 2010; Senko & Harackiewicz, 2005; Senko & Hulleman, 2013) and negative or null effects on academic achievement (e.g., Ames & Archer, 1988; Greene et al., 2004; Long, Monoi, Harper, Knoblauch, & Murphy, 2007; Matos, Lens, & Vansteenkiste, 2007). On the one hand, performance goals promote academic attainment because they motivate students to actively attend to teachers' instructions, guides and hints that allow them predicting content of examinations (learning agenda hypothesis; Senko, Hama, & Belmonte, 2013). These goals orient students to use studying strategies that increase probability to do well at exams. For example, allocating the studying time and effort to materials evenly ensures attainment of a high academic grade (Senko et al., 2013). On the other hand, performance goals may undermine academic achievement by increasing anxiety and perceived social pressure. For example, Eisenbarth and Petrichkoff (2012) observed a

convex relationship between these variables whereby worry reached lowest levels when participants moderately endorsed performance goals. Therefore, it is possible that a moderate endorsement of performance goals yields the highest achievement, whereas any deviation (above or below a moderate level) undermines it. There is some evidence to support this relationship (Sideridis, 2007; Sideridis, Antoniou, Stamovlasis, & Morgan, 2013; Sideridis & Stamovlasis, 2014; Stamovlasis & Sideridis, 2014). For example, Sideridis et al. (2015) demonstrated that a mild performance class-climate increased reading performance, but more active instigation of the performance goals beyond a moderate level was maladaptive for reading performance. In addition, Sideridis et al. (2015) also observed a linear relationship between reading performance and class-climates in which teachers strongly encouraged adoption of mastery goals. Building on these findings and Senko et al.'s (2013) theoretical framework, a high-mastery/moderate-performance goal profile is expected to be the most optimal goal profile. Hence, the quadratic model may prove to be a viable data analytic model that assists researchers in detecting combined effects of achievement goals on academic attainment and other psychological outcomes (Kamarova et al., 2016).

Therefore, it can be argued that previous research might have not been successful in detecting combined effects of achievement goals on academic attainment or failed to detect a combined effect on perceived competence simply because quadratic terms were not included in their regression models. Specifically, existing research that tested Nicholls' assumption used similar equations to Equation 1 where non-significant main effects (coefficients) of unfavourable and favourable information for mastery goals and interactive effects would support Nicholls' hypothesis. In contrast, van Yperen and Leander (2014), who used this model, found that both favourable and unfavourable main effects on competence

evaluation were significant for mastery goals. However, it can be argued that due to absence of quadratic representations this model was unable to detect a combined effect of both mastery and performance goals which would not be a contradiction of Nicholls' hypothesis either. This will be discussed in detail later in this chapter.

What is important to point out here is that quadratic terms, which test for nonlinear relationship between achievement goals and outcomes variables, enable researchers to examine a broader set of hypothesis about combined effects such as whether a high mastery-moderate performance goal profile is the most optimal or whether a high mastery/ low performance goal profile immunes individuals from the effects of social information on perceived competence. Therefore, in line with provided evidence suggesting that the quadratic model may be the best approach in detecting combined effects of achievement goals on academic attainment, the same methodology can be applied for testing high mastery/low performance goal profile in relation to the social information effects on competence evaluations. This technique provides a precise description of whether there is a combined effect on perceived competence and also used for testing specialized effects like the one examined in the current research.

2.3 Psychometric Tools that Measure Comparison Standards through Achievement Goals

The emergence of revised achievement goals theories has also brought a number of new instruments that aim to capture achievement goals. Studies using the 2 x 2 hierarchical model of achievement goals have adopted Elliot and Murayama's (2008) achievement goal questionnaire (AGQ-R) to tap model constructs. This instrument captures four types of goals as a combination of the valence (approach vs avoidance) and the definition (mastery vs performance). Adoption of mastery goals reflects in seeking to increase one's own ability or master a task, therefore, mastery approach goals instigate an individual to focus on success

(i.e., “I want to learn as much as possible …”), while mastery avoidance goals motivate one to avoid a failure (e.g., “Sometimes I’m afraid that I may not understand the content as thoroughly as I’d like”). Performance goals incorporate the aims to maintain a positive judgement of the ability by seeking to prove, validate them publically through outperforming others (performance-approach, e.g., “It is important for me to do better than other students”) or to avoid negative judgements when being outperformed by others (performance-avoidance, e.g., “I am striving to avoid performing worse than others” and “My goal in class is to avoid performing poorly”). An assumption behind this instrument is that goals capture comparison standards. That is, it is generally assumed that adoption of mastery goals will lead people to adopt self-reference standards of comparison during the process of evaluating competence. Although the AGQ-R captures goal adoption, it is somewhat ambiguous in terms of capturing the standards that people adopt during the process of evaluating personal competence. For example, the item “My aim is to completely master the materials presented in this class” captures the goals that people adopt (or pursue) in a context. However, the AGQ-R does not explicitly ask individuals to indicate whether they intend to use mastery information as a comparison standard during the evaluation process. This measurement issue is important because it leaves open the question of whether the relationship between mastery goals and social comparisons, observed in previous research, is due to unmeasured tendencies to adopt performance standards.

In contrast, measures of achievement goals that draw from earlier formulations of achievement goal theory are more explicit in capturing adoption of comparison standards. For example, the item “I feel most successful in….. (i.e., the task, mathematics) when I learn new things” derived from Duda and Whitehead’s (1998) mastery and performance

orientation questionnaire (TEOSQ), is more explicit in capturing predispositions to base (or define) competence on learning and self-improvement. This distinction between the AGQ-R and the TEOSQ has also been supported by empirical studies demonstrating moderate relationships between mastery goals, as measured by the TEOSQ and the AGQ-R (Barkoukis et al., 2007). Accordingly, the present thesis examines whether the link between mastery goals and social comparisons could be replicated by using a different measure of achievement goals that captured predispositions to adopt self-referenced versus normative comparison standards. This conceptual replication of previous studies is important because the hypothesis that is proposed to test in the current thesis is concerned with the misalignment between the standards that mastery oriented individuals explicitly state to adopt during evaluation of competence and the standards that they actually use during self-evaluation (Van Yperen & Leander, 2014). Hence, by using a measure of the standards that respondents are inclined to use during the self-evaluation process, the aim of the current thesis is to provide a more stringent test of the link between mastery goals and social comparisons.

2.4 Social Comparison Processes

In the early 1950's Leon Festinger (1954) proposed social comparison theory. According to this theory, people have a general drive to evaluate their abilities by comparing themselves with individuals around them. This process allows them to acquire an accurate evaluation of their abilities, strengths and weaknesses.

When individuals compare themselves to others or a normative standard, they may choose superior or inferior others as standards of comparison. A comparison is said to be favourable (or downward) when individuals compare themselves with an inferior standard. In contrast, a comparison is said to be unfavourable (or upward) when individuals compare

themselves with a superior standard. Thus far, research dealing with social comparisons or comparisons in general has provided much evidence and empirical support of the numerous consequences of social comparisons on evaluations and judgements (e.g., Collins, 1996; Crusius & Mussweiler, 2012; Crusius, Van Horen, & Mussweiler, 2003; Mussweiler, 2003; Mussweiler, Ruter, & Epstude, 2004; Taylor, Wayment, & Carrillo, 1996; Wood, 1989). These effects are shown to be so pervasive that they operated even at a subliminal level without conscious awareness (Mussweiler et al., 2004). Interestingly, this process is so overwhelming that people spontaneously compare themselves to clearly irrelevant standards (Gilbert, Giesler, & Morris, 1995). In their experimental studies Gilbert et al. (1995) have shown that these reactions to the performances of others occur even when the participants subsequently acknowledged that such social comparisons are not logically appropriate and lack reasonable grounds. This evidence suggests that social comparisons do not strictly have a deliberate nature and may involve more cognitive processes than could be initially assumed. Moreover, these processes make the evaluations more efficient especially for complex attributes that are harder to evaluate in isolation and allows saving time and resources (Hsee, 1996; Mussweiler & Epstude, 2009).

In relation to the influence of social comparison on self-image, previous research has shown that the effects of social comparisons on self-evaluations are underpinned by the distance (or extremity) between the target of evaluation and the standard and the direction of the social comparisons (e.g., Corcoran, Crusius, & Mussweiler, 2011; Mussweiler, 2003). Festinger (1954) described an overwhelming tendency toward uniformity, which would result in assimilation (e.g., Lockwood & Kunda, 1997; Mussweiler & Strack, 2000). Such a process instigates a comparer to associate her/himself with the evaluation standard. Therefore, comparing oneself with a higher standard leads an individual to arrive at a better

judgement of themselves, accordingly (Mussweiler, 2003). In other words, people evaluate themselves more positively after engaging in unfavourable (upward) social comparisons than after engaging in favourable (downward) social companions. This is particularly applicable when the difference between oneself and the standard is small (Mussweiler, 2003). The reason for this is that smaller differences lead people to believe that their performance is more similar than dissimilar to the comparison standard. However, when the distance between the target and the standard is large, this extremity instigates a contrast effect. In this case, people evaluate themselves to be worse after a comparison with a superior than inferior standard (e.g., Morse & Gergen, 1970). Therefore, unfavourable social comparisons with more capable students yield lower perceptions of competence than favourable social comparisons with less capable students (Lockwood & Kunda, 1997; MacKinnon, Krull, & Lockwood, 2000; Seta, 1982).

In this light, there are factors that affect the likelihood of one or the other effect to occur. Specifically, contrast is more likely if a standard is extreme (Herr, 1986; Mussweiler, 2003), if the standard belongs to an outgroup (Mussweiler & Bodenhausen, 2002), or if the self-knowledge is clear rather than ambiguous in relation to the target of evaluation (Lockwood & Kunda, 1997). However, the assimilation is expected in situations when the standard is moderate rather than extreme, if the standard belongs to an in-group with the self, or when the existent self-knowledge related to the evaluation is ambiguous.

As been mentioned above, beliefs of the self and the evaluated concepts direct an individual toward one of two mechanisms during the self-evaluation processes. In particular, a number of studies demonstrated that unfavourable comparisons with more capable students improved self-evaluations when individuals believed that ability was a malleable trait that could be improved through hard work and effort (Lockwood & Kunda, 1997; Van

de Ven et al., 2011). The reason was that the tendency to construe ability as a malleable trait led individuals believe that the performance levels achieved by comparison others were attainable in the future. In contrast, when participants construed ability as a fixed trait, unfavourable (upward) comparisons yielded a decrease in self-evaluation scores. This is because the belief that ability was a fixed or hereditary trait led individuals believe that the higher performance levels achieved by others were unattainable in the future (Lockwood & Kunda, 1997).

These approaches to social comparison have clear implications for predicting how mastery-oriented and performance-oriented individuals may respond to unfavourable social comparisons because there is some evidence to suggest that mastery-oriented students construe ability as a malleable trait whereas performance-oriented students believe that ability is a fixed trait (Dweck, 1986; Dweck & Leggett, 1988; Stipek & Gralinski, 1996). Hence, due to these differences in perceptions of ability and confidence, mastery students may respond less negatively to comparisons with more capable classmates than performance-oriented students. However, it is important to note that in classroom settings assimilation effects are much lower than contrast effects (e.g., Huguet et al., 2009; Marsh & Hau, 2003; Marsh et al., 2008).

2.5 Achievement Goals and Social Comparison Processes

An assumption behind Nicholls' (1989) achievement goal theory is that there is a perfect alignment between goals and standards such that people choose comparison standards implied by their goals. Given this assumption, it is predicted that performance-orientated individuals, but not mastery-orientated people, will base their perceptions of competence on social comparison. This is because performance goals but not mastery goals imply adoption of social comparison standards (e.g., Ames, 1992; Ames & Archer, 1988;

Brophy, 2005; Elliot, 1999; Ku et al., 2012; Maehr & Midgley, 1991; Midgley et al., 2001; Nicholls, 1984; Pintrich, 2000; Pintrich et al., 2003). However, current evidence contradicts this assumption. A number of studies have documented that individuals who endorse mastery goals are interested in normative information pertaining to other individuals' performance levels (Butler, 1992, 1993; Darnon et al., 2010; Régner et al., 2007). What is more, in a series of experimental and field studies, Van Yperen and Leander (2014) demonstrated that individuals who were instructed to adopt mastery-approach goals or performance-approach goals reported lower perceptions of competence when they were confronted with unfavourable normative information that revealed inferior performance on a task than when they were confronted with favourable normative information that indicated superior performance. These findings are particularly noteworthy because they imply that both mastery-orientated individuals and performance-orientated individuals base perceptions of competence on favourable and unfavourable normative information.

Previous findings may not apply to the type of mastery-orientated individuals identified in the original conceptualisation of achievement goal theory. In the original theory, achievement goals were measured at the level of comparison standards and through instruments that asked respondents to report whether they evaluated success on the basis of self-referenced versus normative comparison standards (Nicholls, 1989). Accordingly, individuals were assumed to exhibit a mastery goal profile if they adopted self-referenced comparison standards and not normative comparison standards. In contrast, current research has relied almost exclusively on the Achievement Goal Questionnaire-Revised which conceptualises goals as cognitive-dynamic aims (AGQ-R; Elliot, 1997; Elliot & Murayama, 2008). This instrument may not capture comparison standards. For example, there is some evidence that the AGQ-R is only moderately correlated with instruments that

have been specifically designed to capture comparison standards such as Duda and Nicholls' (1992) questionnaire (Barkoukis et al., 2007).

In addition, in the original conceptualisation of achievement goal theory, a mastery-orientated individual was considered to be a person who endorsed self-referenced standards of comparison at high levels and normative standards of comparison or performance goals at extremely low levels (Nicholls, 1989). Unfortunately, it is unclear from previous studies whether individuals who adopt this so-called 'pure' high mastery/low performance goal profile engage in social comparison. The reason for this is that most of the previous experimental studies did not employ manipulation checks to ascertain whether participants who were instructed to adopt mastery goals did not endorse performance goals (i.e., Butler, 1992; Darnon et al., 2010). In addition, some of the studies did not even statistically control for the effects that performance goals may exert on perceptions of competence in estimating corresponding effects of mastery goals (Van Yperen & Leander, 2014). As a consequence, it is unknown whether the link between mastery goals and social comparison was instigated by performance goals. This is a possibility because evidence suggests that individuals can endorse mastery goals and performance goals simultaneously, an effect known as the multiple goal effect (Harackiewicz et al., 1998; Pintrich & Garcia, 1991). Importantly, Darnon et al. (2010) found that the link between mastery goals and social comparison depended on performance-approach goals: the higher the performance-approach goal endorsement the stronger the link between mastery goals and social comparisons (see also Régner et al., 2007).

2.6 Previous Studies Lack Internal Validity because they Employ Incorrect Statistical Models

When previous studies controlled for the effects of performance goals (Régner et al., 2007), statistical models did not capture effects associated with a 'pure' mastery goal profile. The reason for this is that researchers based conclusions about social comparison processes on interpretation of single coefficients that were estimated through regression models. However, regression models control for effects associated with performance goals by holding them constant at some level which is usually the sample mean (Edwards, 2001). It follows that if the sample mean of a study does not converge to an extremely low value then the single regression coefficients on mastery goals will capture effects that are averaged across the whole range of performance goals and they will not directly address effects associated with a high mastery/low performance goal profile (Griffin et al., 1999b).

To illustrate how regression analysis can bias conclusions about social comparison effects consider the following regression equation that estimates the main and interactive effects of achievement goals and social information on perception of competence:

$$PC = b_0 + b_1M_{app} + b_2P_{app} + b_3UNI + b_4FNI + b_5M_{app}xUNI + b_6P_{app}xUNI + b_7M_{app}xFNI + b_8P_{app}xFNI + e_{10} \quad (3)$$

In Equation 3, the terms UNI and FNI represent provision of unfavourable or favourable normative information (as opposed to no provision of normative information). For simplicity, effects associated with self-referenced information were omitted because Van Yperen and Leander (2014) did not find effects of self-referenced information on self-evaluations. PC is a dependent variable that reflects perceptions of competence. The terms M_{app} and P_{app} reflect responses to instruments measuring mastery approach and performance approach goals respectively. The coefficients b_1 to b_8 are unstandardised regressing coefficients that capture main or interactive effects. The coefficient b_0 is the intercept of the regression equation and the coefficient e_{10} captures residual variance.

There are studies in the literature that examined social comparison effects by employing Equation 3 (Butler, 1992; Van Yperen & Leander, 2014). In these studies, the model implied by Equation 3 is said to support a link between mastery goals and social comparison if the interaction between mastery goals and unfavourable normative information is negative and statistically significant (i.e., $b_6 < 0$) or the interaction between mastery goals and favourable normative information is positive and statistically significant (i.e., $b_8 > 0$) (i.e., Butler, 1992). Alternatively, the model implied by Equation 3 is considered to support social comparison effects for mastery goals if the main effect of unfavourable normative information is negative and statistically significant (i.e., $b_3 < 0$) or the main effect of favourable normative information is positive and statistically significant ($b_4 > 0$) (i.e., Van Yperen & Leander, 2014; Study 2). Important to note is that Equation 3 supports social comparison effects even if the main effects of achievement goals on perceptions of competence are not statistically significant. This is because social comparison effects are said to be general in a sense that they are not confined to individuals who adopt mastery or performance goals but they are supposed to also extend to people who do not adopt these goals (Van Yperen & Leander, 2014).

On the first glance, Equation 3 appears to isolate social comparison effects associated with a 'pure' mastery goal profile because it estimates effects of performance goals on perception of competence. Given this, effects associated with mastery goals may be taken to mean that they represent effects from a 'pure' mastery goal profile that are uncontaminated by performance goals (Régner et al., 2007). However, such an interpretation of regression coefficients can be misleading. Statistical models, such as regression models or analysis of variance models, control for effects associated with performance goals by holding them constant at some level which is usually the sample

mean (Edwards, 2011). It follows that if the sample mean of a study does not converge to an extremely low value then the regression model will capture effects that are averaged across whole range of performance goals and they will not directly address effects associated with a high mastery/low performance goal profile (Griffin et al., 1999b).

Researchers can isolate social comparison effects associated with a 'pure' mastery goal profile by testing a discrepancy model. A discrepancy model can be identified by substituting the "performance-approach" term with "minus mastery-approach" ($P_{app} = -M_{app}$) in the Equation 3 (Edwards, 2002; Edwards & Parry, 1993). Assuming $P_{app} = -M_{app}$ and re-arranging Equation 3 yields:

$$PC = (b_0 + M_{app}(b_1-b_2)) + UNI(b_3 + M_{app}(b_5-b_6)) + FNI(b_4 + M_{app}(b_7-b_8)) + e_{10} \quad (3.1)$$

In Equation 3.1, the linear combination of coefficients on the mastery term and the intercept of the regression equation represent the simple intercept of the discrepancy model. The linear combination of coefficients on the term that represents unfavourable (i.e., $b_3 + M_{app}(b_5-b_6)$) or favourable normative information (i.e., $b_3 + M_{app}(b_5-b_6)$) are simple slopes that capture social comparison effects associated with a 'pure' mastery or a 'pure' performance goal profile. The reason for this is that, in the discrepancy model, the coefficients that capture main effects of performance goals (i.e., b_2) or the coefficients that capture effects of interactions between performance goals and normative information (i.e., b_6 or b_8) are subtracted from the coefficients that describe effects associated with mastery goals (i.e., b_1, b_5 or b_7). In contrast, the single regression coefficients of mastery goals or normative information in Equation 3 do not represent effects associated with a 'pure' mastery goal profile. This is because effects associated with performance goals are not subtracted from effects associated with normative information or mastery goals.

In the context of achievement goal research, Equation 3.1 can be used in a number of ways. First, it can be used to estimate mean levels of competence associated with normative information among individuals who exhibit a 'pure' mastery or a 'pure' performance goal profile. This can be accomplished by substituting the regression coefficients in Equation 3.1 with unstandardised coefficients that are estimated from a hierarchical regression analysis and by solving the equation for values that represent provision of favourable or unfavourable normative information and adoption of a 'pure' mastery ($M_{app} = 2$) or a 'pure' performance goal profile ($M_{app} = -2$). For instance, solving Equation 3.1 for values that represent endorsement of a mastery goal profile ($M_{app} = 2$) yields the following two equations that capture effects of unfavourable or favourable normative information among individuals who adopt a 'pure' mastery goal profile:

$$PC = (b_0 + 2b_1\text{-}2b_2) + UNI(b_3 + 2b_5\text{-}2b_6) \quad (3.2)$$

$$PC = (b_0 + 2b_1\text{-}2b_2) + FNI(b_4 + 2b_7\text{-}2b_8) \quad (3.3)$$

Mean levels of competence associated with unfavourable normative information can be estimated by substituting the regression coefficients in Equations 3.2 and 3.3 with unstandardised coefficients that are estimated from a hierarchical regression analysis and by solving the equations for values that represent provision of unfavourable (i.e., UNI = -1) and favourable normative information (i.e., FNI = 1).

Second, researchers can examine whether observed differences in the mean levels of competence are statistically significant by testing a series of constrained discrepancy models that test the null hypothesis of "no social comparison" effects on perceptions of competence among individuals who adopt a 'pure' mastery goal profile. This can be accomplished by estimating residual variances of constrained models that assume the linear combination of coefficients on favourable (i.e., $b_4 + 2b_7\text{-}2b_8 = 0$) or unfavourable (i.e., $b_3 +$

$2b_5$-$2b_6 = 0$) normative information to be indistinguishable from zero. Following estimation of these constrained models, researchers can use incremental *F* -tests to formally test whether the constrained models produced a significant amount of misfit (residual variance) relative to the unconstrained model implied by Equation 3 (Edwards & Parry, 1993). A social comparison effect is supported if the incremental *F* -test is statistically significant and the residual variances of the constrained models are higher than the residual variances of the unconstrained models. Under this scenario, it can be concluded that observed differences in levels of competence are statistically significant.

Unfortunately, previous research did not employ a discrepancy model to examine social comparison effects associated with a 'pure' mastery goal profile. Hence, caution should be exercised in inferring social comparison effects for the 'pure' mastery-orientated individuals from previous studies. Equations 3.2 and 3.3 clearly show that conclusions about the 'pure' mastery-orientated individuals should not only depend on the main effects of normative information or interactions, as previous research suggests (Régner et al., 2007; Van Yperen & Leander, 2014). They should depend on linear combinations (sums) of main effects and their interactions. For instance, previous studies have observed strong main effects of normative information on perceptions of competence (Butler, 1992; Van Yperen & Leander, 2014). Likewise, studies that linked achievement goals to interest in social comparison observed strong main effects of performance-approach goals and mastery-approach goals on interest in social comparison information (Darnon et al., 2010; Régner et al., 2007). However, the discrepancy model shows that it may be premature to conclude, on the basis of main effects, that individuals who adopt a 'pure' mastery goal profile engage in social comparisons. This is because Equations 3.2 and 3.3 point out that statistically significant main effects may not support social comparisons effects among people who

adopt a ‘pure’ mastery goal profile if (i) the interactions between mastery goals and normative information are not statistically significant but (ii) the interactions between performance goals and normative information are positive and at least half of the size of the main effects of favourable normative information. Therefore, it is recommended that researchers who wish to test premises underpinning earlier formulations of achievement goal theory to do so by ways of using the discrepancy model. By using discrepancy models, researchers can then determine whether statistical coefficients present a challenge to the earlier formulation of achievement goal theory or constitute a strawman’s argument that do not contradict the traditional hypothesis that the ‘pure’ mastery-orientated individuals do not base perceptions of competence on social comparisons.

2.6 Contribution of this Thesis

This research examined whether the link between mastery goals and social comparison extended to individuals who exhibited a ‘pure’ mastery (high mastery/low performance) achievement goal profile. This provides an answer to the research question related to whether the original assumption expressed by Nicholls constitutes a strawman argument or it was insightful though had no evidence to rely on. The current thesis provides a recommendation to researchers who wish to test premises underpinning earlier formulations of achievement goal theory to do so by using the discrepancy model. This model, for the first time, can determine whether statistical coefficients present a challenge to earlier formulations of achievement goal theory and evaluate whether regression coefficients reflect a link between a ‘pure’ mastery goal profile and social comparisons.

Chapter 3

Current Research

3.1 Research Rationale

The social comparison effect observed for mastery goals on perceptions of competence is supposed to be theoretically interesting because it challenges the traditional hypothesis that mastery-orientated individuals do not base perceptions of competence on social comparisons. After consideration of the limitations and gaps in previous research that warrant further investigation, the current research suggests that previous findings may not apply to the type of mastery-orientated individuals identified in the original conceptualisation of achievement goal theory. The previous methodology and techniques used in earlier research may have led to incorrect conclusions about mastery goals.

Importantly, when studies controlled for the effects of performance goals (Régner et al., 2007), statistical models did not capture effects associated with a 'pure' mastery goal profile. The reason for this is that researchers based conclusions about social comparison processes on interpretation of single regression coefficients that represented (i) main effects associated with social comparisons and mastery goals (Van Yperen & Leander, 2014), or (ii) interactive effects between mastery goals and social comparisons (Butler, 1992, 1993). However, single regression coefficients do not capture effects associated with the 'pure' mastery goal profile even when the regression models control for effects associated with performance goals (Edwards, 2001; Griffin, Murray, & Gonzalez, 1999a).

In the current thesis, the limitations of previous research are addressed by using a discrepancy statistical model that captured effects associated with 'pure' mastery and 'pure' performance goal profiles. In addition, to control the variability in self-set goals self-report

achievement goals were measured, using an instrument that captured individuals' tendencies to use self-referenced versus normative comparison standards. This allows to perform a statistical control for effects from performance goals when estimating effects form mastery goals. In addition, in experimental studies, instruction aimed to facilitate a 'pure' mastery goal profile because they emphasised adoption of mastery goals and importance of not adopting performance goals.

3.2 Purpose and Hypotheses

The purpose of the current studies was to examine whether individuals who exhibited a 'pure' high mastery/low performance goal profile based their perceptions of competence on social comparisons. To address the limitations of previous research, it was decided to apply the following: (i) experimentally inducing a 'pure' mastery goal profile, (ii) measuring achievement goals at the level of comparison standards, and (iii) using a discrepancy statistical model that captured effects associated with 'pure' mastery and 'pure' performance goal profiles.

At an empirical level, this hypothesis would be confirmed if participants who exhibited a 'pure' mastery goal profile reported: (i) lower perceptions of competence when they received unfavourable normative information compared to when they did not receive normative information pertaining to performance levels achieved by others and (ii) higher perceptions of competence when they received favourable normative information compared to when they did not receive normative information (see also Van Yperen & Leander, 2014). Analogous social comparison effects for individuals who adopted a 'pure' performance goal profile that corresponded to tendencies to endorse performance goals at high levels and mastery goals at low levels were also examined.

Finally, in the current thesis a number of additional variables were measured in order to statistically control for their effects on perceptions of competence or clarify social comparison effects further. Specifically, in accordance with previous research (Van Yperen & Leander, 2014), happiness with task performance was measured in order to examine whether the hypothesised social comparison effects generalised to performance measures that encompass an affective component. The effects of age and gender on perceptions of competence were statistically controlled as these variables were shown to affect perceptions of competence (Butler, 1992). General levels of self-esteem were also measured because previous research has shown individuals with relatively low self-esteem to assign greater importance to favourable social information (Aspinwall & Taylor, 1993; Vohs & Heatherton, 2004). Hence, a measure of self-esteem was included in the analysis to control for its effects on perceptions of competence or happiness with task performance.

Chapter 4

Study 1

4.1 Overview

The purpose of Study 1 was to examine whether mastery-orientated individuals engaged in social comparison when they evaluated academic competence. This hypothesis was examined by employing a quasi-experimental design in which participants were exposed to a series of hypothetical scenarios that aimed to induce favourable or unfavourable social comparisons. In Study 1, social comparisons were induced by informing participants about their performance on a hypothetical task and performance exhibited by others. In addition, Study 1 incorporated two types of experimental control. The first control condition was a single evaluation condition in which participants were not provided with information about others' performance. In the second set of control conditions participants were informed about others' performance, but the difference between personal performance and others were so small that it was not expected to induce a social comparison.

4.2 Method

4.2.1 Participants and design. Prior to commencing Study 1, ethics approval was sought through the Curtin University Human Research Ethics Committee (HREC). The research presented and reported in this study was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007) – updated March 2014. The proposed research study received human research ethics approval from the Curtin University HREC of Low Risk Research for the initial protocol (PSYCH SP 2013-09) was granted on 4 June 2013 (see Appendix B). Following ethical approval, participants were recruited and informed about the study with

an information letter and asked to provide a verbal consent (see Appendix H) prior to participation. Participants were also given the opportunity to ask questions about their involvement in the study prior to consenting to participate.

Participants were University students who were recruited through an advertisement offering a $7 reward for participation (*N* = 174, *M age* = 22.65, *SD* = 3.69, Male = 100, Female = 74). It was decided to adopt a four-way study design: performance difference (large versus small), achievement goal-orientation (mastery versus ego), social information (present versus absent) and improvement (unfavourable versus favourable) as between-participant factors. A table of random numbers was used to allocate participants to conditions. Participants were classified into a mastery-orientation group and a performance-orientation group on the basis of responses to a questionnaire measuring goal perspectives.

4.2.2 Procedure. The experiment was conducted in small groups of no more than 10 participants. Upon arrival, participants were seated in front of desks separated by partitions. Immediately after, participants read hypothetical scenarios that prompted deliberation of results related to an academic test. The manipulation of improvement and social information was executed by varying the content of the scenarios. Finally, participants completed a questionnaire that measured goal-orientations and reported perceived competence, effort and happiness with their improvement. The methodological materials are provided verbatim in Appendix L.

4.2.3 Manipulations

4.2.3.1 Direction and distance. In the favourable or unfavourable improvement groups, participants were asked to read the following message that prompted deliberation of a larger or a smaller improvement: “Academic ability includes a set of important skills that can be extended and improved through effort. The Academic Potential Index (API) is a

measure of academic ability. Now imagine that your goal is to improve your API to 1200 (700) points and that after a period of studying hard you manage to improve your API to 1200 (700) points". In large distance conditions, the message led participants consider that their API improved to 700 (in the unfavourable improvement group) or 1200 points (in the favourable improvement group). In smaller distance condition, the message led participants consider that their API improved to 1200 (in the unfavourable improvement group) or 1400 points (in the favourable improvement group).

4.2.3.2 Social information. In the "no-social information groups", participants read and evaluated a single scenario indicating unfavourable improvement or favourable improvement. In the "social information conditions", participants, who were allocated to one improvement group, were asked to evaluate personal improvement (unfavourable or favourable) after they had been informed about how much participants in the other improvement group improved. Thus, for example, in large distance conditions, participants who were provided with social information in the unfavourable improvement group were asked to evaluate the prospect of improving their API score to 700 points (a unfavourable improvement) after they had been informed that the API scores of their peers improved to 1200 points. Likewise, in the "favourable improvement" group, students evaluated the prospect of improving their API score to 1200 points (a favourable improvement) after they had been informed that the API scores of their peers improved to 700 points (see also Hsee, Yang, Li, & Shen, 2009; Hsee & Zhang, 2010).

4.2.4 Measures

4.2.4.1 Goal orientations. The mastery and performance-orientation questionnaire was used to measure goal-orientations (Duda & Whitehead, 1998; Fox et al., 1994). This instrument comprises 13 items tapping goal-orientations on 5-point scales ranging from

strongly disagree (1) to *strongly agree* (5). The instrument was modified to reflect success related to academic potential test. An example item for performance-orientation is: "I would feel most successful if my API scores were greater than the API scores of my friends". An example item for mastery-orientation is: "I would feel most successful at the academic potential test if I did my best". This instrument was administered after manipulation of social information. Participants who scored above the mean on the mastery-orientation scale and below the mean on the performance-orientation scale were classified into a mastery-orientation group. All other participants were classified into a performance-orientation group. In large distance conditions, the alpha reliability for the mastery (α = .90) and performance-orientation scales (α = .90) were satisfactory. In small distance conditions, the alpha reliabilities for the mastery (α = .87) and performance orientation scales (α = .87) were also satisfactory.

4.2.4.2 Happiness. The item measuring happiness was borrowed from Hsee & Zhang (2004). Happiness was measured on a 19-point semantic differential scale ranging from *very unhappy* (-9) to *very happy* (+9). The middle of the scale, which was assigned the value of zero, reflected a neutral state of happiness. An example item measuring happiness (in large distance conditions) was: "I would be happy if I improved my API score to 700 (1200) points."

4.2.4.3 Perceived competence and perceived effort. Three items from McAuley, Duncan and Tammen's (1989) intrinsic motivation inventory were used to measure perceived competence. An example item (in small distance conditions) was: "I would feel pretty competent if I improved my API score to 1200 (1400) points". All items were measured on 7-point scales ranging from *not true at all* (1) to *very true* (7). The alpha reliability for this scale was satisfactory in large distance (α = .93) and small distance

conditions (α = .80). Also, two items from McAuley, Duncan and Tammen's (1989) intrinsic motivation scale were used to measure perceived effort. An example item was: "I would try hard to improve my API scores even further if I learned that I improved my API to 700 (1200) points". All items were measured on 7-point scales ranging from *not true at all* (1) to *very true* (7). The correlations between the two indicators of effort were satisfactory in large distance (r = .70) and small distance conditions (r = .82).

4.3 Results

4.3.1 Preliminary analysis. A 2 (distance: large versus small) x 2 (social information: present versus absent) x 2 (level of improvement: unfavourable versus favourable) multivariate analysis of variance was conducted to examine whether the manipulations of social information affected goal profiles of students. In that analysis, distance to the standard, social information and level of improvement were the independent variables whereas self-reported mastery and performance goals were the dependent variables. Results from this analysis did not reveal statistically significant multivariate main effects for social information on mastery and performance goals ($F(2, 167) = 1.41$, $p = .25$, $\eta^2 = .02$). Hence, results from this analysis suggested that introduction of social information did not lead students endorse performance goals.

Table 1 presents descriptive statistics and correlations for all psychological variables. In accordance with previous research stemming from achievement goal theory, correlations indicated positive relationships between mastery orientation with perceived competence and perceived happiness. The correlation between mastery orientation and effort was not statistically significant. In contrast, the relationships between performance orientation and dependent variables were not statistically significant. Correlations also pointed out strong relationships between perceived competence, perceived happiness, and perceived effort.

4.3.2 Main analysis. A 2 (distance: large versus small) x 2 (achievement goals: mastery orientation versus performance orientation) x 2 (social information: present versus absent) x 2 (improvement: unfavourable versus favourable) multivariate analysis of variance was conducted to examine effects of all independent variables on outcome variables. In that analysis, distance, achievement goals, social information and improvement were the independent variables whereas self-reported perceived competence, perceived happiness and perceived effort were the dependent variables. Results revealed statistically significant multivariate effects for distance ($F(3,157) = 8.85$, $p < .001$, $\eta^2 = .15$) and improvement ($F(3,157) = 7.15$, $p < .001$, $\eta^2 = .12$). Main effects for achievement goals ($F(3,157) = 1.59$, $p = .19$, $\eta^2 = .03$) and social information ($F(3,157) = .50$, $p = .69$, $\eta^2 = .01$) were not statistically significant. In addition, the two-way interaction between achievement goals and improvement was statistically significant ($F(3,157) = 2.72$, $p = .05$, $\eta^2 = .05$). However, two-way interactions between distance and achievement goals ($F(3,157) = .85$, $p = .47$, $\eta^2 = .02$), distance and social information ($F(3,157) = .60$, $p = .61$, $\eta^2 = .01$), distance and improvement ($F(3,157) = 2.15$, $p = .10$, $\eta^2 = .04$), achievement goals and social information ($F(3,157) = .19$, $p = .91$, $\eta^2 = .01$), and between social information and improvement ($F(3,157) = 2.19$, $p = .09$, $\eta^2 = .04$) were not statistically significant. Most critical, the three-way interaction between distance, social information and improvement was statistically significant ($F(3,157) = 2.94$, $p = .04$, $\eta^2 = .05$). The three-way interactions between distance, achievement goals and social information ($F(3,157) = .58$, $p = .63$, $\eta^2 = .01$), distance, achievement goals and improvement $F(3,157) = 1.21$, $p = .31$, $\eta^2 = .01$), and between achievement goals, social information and improvement ($F(3,157) = .05$, $p = .99$, $\eta^2 = .15$) were not statistically significant. Finally, the four-way interaction between distance, achievement goals, social information and improvement was not statistically significant ($F(3,157) = 1.66$, $p = .18$, $\eta^2 = .03$). This

statistically non-significant four-way interaction supports the notion that effects of social information and improvement on perceptions of competence, happiness and effort are similar across mastery and performance orientated individuals.

Post-hoc univariate analysis of the three-way interaction between distance, social information and level of improvement revealed statistically significant effects for perceived competence ($F(1,159) = 8.71$, $p = .001$, $\eta^2 = .05$) and perceived happiness ($F(1,159) = 4.01$, $p = .05$, $\eta^2 = .03$). The effect for effort was below conventional levels of statistical significance ($F(1,159) = 2.06$, $p = .15$, $\eta^2 = .01$). Despite this, simple effects analysis supported the notion that, in large distance conditions, unfavourable (upward) social comparisons did undermine perceived effort (see Table 2). Further analysis also pointed out that while, in large distance conditions, unfavourable (upward) social comparisons undermined perceptions of competence, favourable (downward) social comparisons increased perceived happiness and perception of competence. For example, participants felt less competent and happy with unfavourable improvement as well as they were willing to exert less effort when they were told (in the social information group) that their peers improved their academic skills to a greater extent than when social information pertaining to peer's improvement was not revealed to them (in the no-social information group). Conversely, participants felt more competent and happy with favourable improvement when they were told that their peers improved their academic skills to a lesser extent. However, simple effects analysis also revealed that unfavourable (upward) and favourable (downward) social comparisons did not alter perceptions of competence, happiness or perceived effort in smaller distance conditions in which social comparisons revealed a small difference between personal performance and performance achieved by peers. Hence, in accordance with the hypothesis, results revealed that mastery-orientated individuals base their competence

evaluations on social comparisons processes and they were more likely to do so when social comparisons revealed a large performance difference between oneself and others[1].

4.4 Discussion

The present study demonstrated that mastery-orientated students based competence evaluations on social comparison processes when social information pertaining to others' performance was made available to them and when social comparisons reveal a large performance difference between oneself and others. In addition, Study 1 showed that effects of social comparisons resemble contrast effects: while unfavourable (upward) social comparisons undermine perceptions of competence, happiness and effort, favourable (downward) social comparisons increase perceptions of competence and happiness for mastery and performance-orientated individuals. The practical implication of these findings is that negative effects of social comparisons on perceptions of competence, happiness and effort can be minimised by exposing young students to learning environments that minimise performance differences between oneself and others (e.g., Seaton, Marsh, & Craven, 2010).

However, it would be a remiss to not mention some limitations of Study 1. One limitation is concerned with the use of hypothetical scenarios. Although hypothetical scenarios are useful in assessing predicted competence, it may be important to replicate these findings with real tasks that afford measurement of actual experiences of competence (Dolan & Kahneman, 2008). Therefore, Study 2 extends Study 1 by adopting an experimental design to examine real experiences of competence.

Another limitation of the present study is concerned with a group of performance-orientated students. This group is not a 'pure performance' group because it does not consist only of students who endorse performance goals to a greater extent than mastery goals. This group also consists of students who endorse both performance and mastery

goals. In other words, so called ‘performance group’ is a mixed group that comprised from high performance/high mastery orientated students and high performance/low mastery orientated students. The reason for which the study did not employ a more differentiated analysis that involved high performance/low mastery orientated students is that few students endorsed performance goals to a greater extent than mastery goals. Although this is not surprising considering that students avoid to publicly endorse performance goals (Vohs & Heatherton, 2004), it may be important to experimentally induce a pure performance-involvement group and examine social comparison effects among this group of individuals in future studies. However, it is important to stress that the absence of a pure performance group does not affect conclusions of the present study because the hypothesis concerned mastery-orientated rather than performance-orientated individuals. Most critical, additional analyses that involved only mastery-orientated students who did not endorse performance goals did reveal the same pattern of results (see footnote 1). Likewise, Study 2 adopts a stronger statistical control to overcome the current limitation and to test ‘pure’ mastery and ‘pure’ performance goals profiles.

Chapter 5

Study 2

5.1 Overview

Study 2 extends Study 1 by conducting an experimental study that aimed to induce real experiences of competence. In addition, in Study 2 we used a discrepancy model to estimated effects of individuals who adopted a 'pure' mastery goal profile.

5.2 Method

5.2.1 Participants and procedure. Prior to commencing Study 2, ethics approval was sought through the Curtin University Human Research Ethics Committee (HREC). The research presented and reported in this study was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007) – updated March 2014. The proposed research study received human research ethics approval from the Curtin University HREC. Approval for the initial protocol (HR 53/2014) was granted on 8 April 2014 (see Appendix C). Following ethical approval, participants were recruited and informed about the study with an information letter and asked to provide a written consent (see Appendix I) prior to participation. Participants were also given the opportunity to ask questions about their involvement in the study prior to consenting to participate.

A total of 205 (44 males and 157 females (76.2%), 4 did not report the gender; *M* age =21.57 years, *SD*= 6.34) undergraduate students recruited using the University research participant pool. Participants were invited to participate in the experiment in return for course credit. Those who volunteered to participate in the study were randomly allocated to an experimental or control condition by using a table of random numbers (Urbaniak, Plous, & Lestik, 2007). The participants completed the experiment in separate cubicles.

A two-way design: 2 (achievement goal involvement: mastery versus performance) × 3 (social information: favourable comparison information vs. unfavourable comparison information vs. information concealed) design was adopted in this research. After signing a consent form, the achievement goals manipulation was initiated, which was followed by an administered manipulation check in order to examine the degree to which the manipulated goal was endorsed. This self-report measure was used in subsequent analysis to establish whether competence evaluations of participants who were instructed to adopt mastery goals were not influenced by performance goals. Immediately after, participants were asked to engage in a computerised task twice. The experiment was presented to participants as an "Attention study" examining tendencies to sustain attention on a target for long intervals of time. The experimental task required participants to trace the border of geometric figures (a rhombus in first trial and a pentagon in the second) by using a computer-mouse with a reversed mouse tracking. The task was made meaningful to students through explicit statements emphasising that the task benefited academic outcomes. Specifically participants were informed that: "The Attention Sustained Index (ASI) is an index that reflects a set of skills and it facilitates learning and performance in many different areas of life such as education, sport, and workplace."

Participants engaged in the figure tracing task twice. Each occasion of task engagement lasted 5 minutes. Participants were unaware of how long they participated in the figure tracing task. Social information was manipulated upon completion of the second trial after which we measured participants' perceived competence, tendency to compare, happiness and satisfaction with their own performance at the figure tracing task. By completion of the experiment the participants were debriefed and told about actual purposes of the experiment, they were also given an opportunity to pull their data back

from being used in the research due to the deception. The methodological materials are provided verbatim in Appendix M.

5.2.2 Manipulations

5.2.2.1 Manipulation of achievement goals. Participants, allocated to a mastery goal instruction, read the following message that aimed to focuses attention on improvement: "One characteristic of attention skills is that they can be extended and improved through effort. Today you will be provided with an opportunity to improve your attention skills by using the figure tracing task. The figure tracing task is a valid and reliable task that has helped many people like you improve their attention skills. To improve your attention skills, you need to work on the figure tracing task twice. At the end of the first trial, you will learn your current level of attention and how much you can improve your attention skills today. During the second trial, you should try to improve your attention level by exerting more effort at the figure tracing task. At the end of the second trial, we will let you know how much your attention skills have been improved." (Nicholls, 1989).

An additional manipulation of mastery goal was conducted by means of providing an opportunity to get a sense of self-improvement. The task was divided into two subtasks. The instruction directed participants to progress throughout the experiment (i.e., from the first engagement in the task to the second) activating therefore focus on self-referenced standard. Moreover, participants received an attention-related feedback in a form of computerised message after each engagement in the task. The first message informed them that they scored 130 points on ASI and the second one stated that their score was 200 points. This task structure allowed participants to experience a sense of importance, improvement and relevance.

Performance goal was manipulated through asking participants to read the following message that focused attention on the goal of outperforming others: “Sustained attention is the ability to stay focused on a target for a long interval of time. Attention is important skill as it facilitates performance in many different areas of life such as education, sport, workplace, etc. The figure tracing is a valid and reliable measure of individuals’ attention level. Today, you will find out whether or not your attention level is better than others. Therefore, your goal is to do better than others on the figure tracing task. To achieve this objective, you need to work on the figure tracing task twice. At the end of each trial, I will inform you about your attention level. Your attention level is better than others if your best score at the figure tracing task is greater than scores achieved by others” (Nicholls, 1989).

Additional aspects of the manipulation were provided by means of the task structure. Participants were told that the presentation of their best achieved result would be provided upon completion of the two attempts/ trials. This score would be compared to the scores achieved by other participants. Consequently, participants received only one feedback message stating the achievement of 200 points on ASI. Therefore, the task structure induced competitive sense of the experimental condition that (i) ensured that social comparison standard was relevant and (ii) avoided an adoption of a self-improvement standard.

5.2.2.2 Manipulation of social information. Manipulations of social information were adopted after experiments by Hsee and Zhang (2010). The social information was operationalised through presentation of an average score of other participants. Specifically, individuals who were allocated to *favourable social information* condition were told that others’ average score was 60. This condition exposed participants to downward social comparisons. Hence, in this group the difference was 70 points below the initial feedback

(130-70=60). Participants who were allocated to *unfavourable social information* condition learned that on average other participants' scores were 270, where the same distance of 70 points above the final feedback (200+70=270). Accordingly, this information involved upward social comparisons. In the control conditions, the participants who were instructed to adopt mastery goals did not receive any social information, whereas participants who were instructed to adopt performance goals were informed that their best score was equivalent to the average best score of others (200). This information facilitated a sense of goal completion among participants who were instructed to adopt mastery goals or performance goals.

5.3 Measures

5.3.1 Self-set achievement goals. Duda and Nicholls' (1992) questionnaire was used to measure achievement goal orientations. This instrument comprises 13 items tapping achievement goal-orientations on 5-point scales ranging from *strongly disagree* (1) to *strongly agree* (5). The instrument was modified to reflect success related to the task performance. An example item for performance orientation is: "I would feel most successful if I score the most ASI points." The alpha reliability of this scale was satisfactory (α=.84). An example item for mastery orientation is: 'I would feel most successful if I do my best". The alpha reliability of this scale was satisfactory (α=.78).

5.3.2 Experimentally induced achievement goals. A contrast code was used to model effects of experientially induced goals on the dependent variables. Specifically, the value of minus one (-1) was assigned to participants who were allocated to the performance goal condition and the value of one (+1) to participants who were allocated to the mastery goal condition.

5.3.3 Social information. It was decided to use a backward difference contrast code to model effects of unfavourable and favourable normative information on the dependent variables. Specifically, the unfavourable normative information contrast code was expressed by assigning the value of minus one (-1) to participants who were allocated to conditions that received unfavourable normative information and the value of one (+1) to participants who were allocated to the 'no-normative information' conditions. Analogously, the favourable normative information contrast code was expressed by assigning the value of minus one (-1) to participants who were allocated to the 'no-normative information' condition and the value of one (+1) to participants who were allocated to the favourable normative information condition (Davis, 2010).

5.3.4 Happiness. The item measuring happiness was borrowed from Hsee & Zhang (2004). Happiness was measured on a 19-point semantic differential scale ranging from *very unhappy* (-9) to *very happy* (+9). The middle of the scale, which was assigned the value of zero, reflected a neutral state of happiness. The item was as follows: "How happy are you with your performance at the figure tracing task?"

5.3.5 Perceived competence. Three items from McAuley, Duncan and Tammen's (1989) intrinsic motivation inventory were used to measure perceived competence. An example item was: "I feel pretty competent with my performance at the figure tracing task". All items were measured on 7-point scales ranging from *not true at all* (1) to *very true* (7). The alpha reliability of this scale was satisfactory (α=.89).

5.3.8 Self-esteem. Rosenberg's (1965) measure of self-esteem was selected as an instrument for the study. It consists of ten items. A sample item read as follows: "I feel I am a person of worth, at least on an equal plane with others". Participants were asked to use a

9-point scale ranging from 1 (*strongly disagree*) to 9 (*strongly agree*) to respond to each item. The alpha reliability of this scale was satisfactory (α=.88).

5.4 Statistical Analysis

Descriptive statistics was initially calculated for all psychological variables. Moreover, Pearson's correlations were estimated to examine relationships between variables. For the main analysis, a hierarchical regression analysis was conducted to test whether the following regression equation explained observations:

$$DV = b_0 + b_1IG + b_2M + b_3P + b_4UNI + b_5FNI + b_6Age + b_7Gender + b_8SE \ (1^{st} \text{ step})$$

$$+ b_9MxUNI + b_{10}MxFNI + b_{11}PxUNI + b_{12}PxFNI + b_{13}IGxUNI + b_{14}IGxFNI$$

$$+ e_{10} \ (2^{nd} \text{ step}) \quad (4)$$

In Equation 4, DV is a dependent variable. In the current study, the dependent variables were perceptions of competence or happiness with task performance. The term IG represents induced goals or membership in the mastery versus performance goal conditions. M and P represent tendencies to adopt self-referenced versus normative comparison standards which are captured by participants' responses to items measuring mastery goals (M) and performance goals (P). The term UNI represents membership in the unfavourable versus no-normative information conditions. Likewise, the term FNI represents membership in the no-normative information versus favourable normative information conditions. The term SE represents responses to items measuring self-esteem (SE). This variable together with gender and age were treated as covariates the effects of which were statistically controlled in the analysis. The coefficients b_1 to b_{14} are unstandardised regression coefficients that capture main or interactive effects of the independent variables on the dependent variables. The coefficient b_0 is the intercept of the regression equation and the coefficient e_{10} is the residual variance.

The regression model in Equation 4 is an unconstrained model in the sense that it does not impose any equality constraints on the parameters. In addition, previous studies based conclusions about social comparison processes on interpretation of single regression coefficients from Equation 4. Broadly speaking, studies concluded that mastery goals instigated social comparisons if the interaction between mastery goals (or performance goals) and unfavourable normative information was negative and statistically significant (i.e., $b_9 < 0$) or the interaction between mastery goals (or performance goals) and favourable normative information was positive and statistically significant (i.e., $b_{10} > 0$) (i.e., Butler, 1992). Further, some studies concluded that there was a link between mastery goals and social comparison if the main effect of unfavourable normative information was negative and statistically significant (i.e., $b_4 < 0$) or the main effect of favourable normative information was positive and statistically significant ($b_5 > 0$) (see Van Yperen & Leander, 2014; Study 2)[2]. However, such an interpretation of regression coefficients can be misleading in the context of achievement goal research. This is because the regression coefficients on mastery goals capture effects that are averaged across whole range of performance goals and do not directly address effects associated with a high mastery/low performance goal profile (Griffin et al., 1999a).

The current study addressed the limitations of previous research by using a discrepancy model that captured effects associated with 'pure' mastery and 'pure' performance goal profiles. Following Edwards and Parry (1993), a discrepancy model was identified by substituting the 'performance' term with a 'minus mastery' (P = −M) term in the second step of Equation 4. Assuming P = −M and re-arranging Equation 4 gives the following discrepancy model that captures effects associated with social comparisons:

$$PC \text{ or } HT = (b_4 + M(b_9 - b_{11}))\, UNI + (b_5 + M(b_{10} - b_{12}))FNI + (b_0 + M(b_2 - b_3)) + b_1 IG + b_6 Age + b_7 Gender + b_8 SE + b_{13} IGxUNI + b_{14} IGxFNI \quad (5)$$

In Equation 5, a high score on the mastery term represents a 'pure' mastery goal profile whereas a low score on the mastery term represents a 'pure' performance goal profile. The intercept and linear combination of coefficients on the term that represents mastery goals (i.e., $b_0 + M(b_2 - b_3)$) is the simple intercept of the equation. Most critical, the linear combination of coefficients on the terms that represent unfavourable (i.e., $b_4 + M(b_9 - b_{11})$) or favourable normative information (i.e., $b_5 + M(b_{10} - b_{12})$) capture simple slopes that indicate effects of normative information among individuals who exhibit a 'pure' mastery or a 'pure' performance goal profile. The reason for this is that, in the discrepancy model, the coefficients that capture interactions between performance goals and normative information (i.e., b_{11} or b_{12}) are subtracted from the coefficients that describe main effects of normative information or interactions between mastery goals and normative information (i.e., b_4, b_5, b_9 or b_{10}). In contrast, the single regression coefficients of mastery goals or normative information do not represent effects associated with a 'pure' mastery goal profile in Equation 4. This is because effects associated with performance goals are not subtracted from effects associated with normative information or mastery goals[3].

In the current study, it was decided to use the linear combination of coefficients on normative information to identify a subset of simple slopes that enabled us to estimate mean levels of competence and mean levels of happiness with task performance associated with the 'pure' mastery or the 'pure' performance goal profiles. In addition, the same subset of regression equations was used to identify a series of constrained discrepancy models that tested the null hypothesis of no differences in mean levels of competence or happiness with task performance across the different goal profiles. Following estimation of these

constrained models incremental *F*-tests were employed to formally test whether the constrained models produced a significant amount of misfit (residual variance) relative to the unconstrained model in Equation 4 (Edwards & Parry, 1993). The hypotheses were supported if the incremental *F*-test was statistically significant and the residual variances of the constrained models were higher than the residual variances of the unconstrained models. Under this scenario, it was concluded that observed differences in levels of competence or happiness with task performance were statistically significant. A detailed derivation of the specific equations for testing the hypotheses can be found in an Appendix A. Further, prior to this analysis all independent variables were standardised (Aiken & West, 1991).

5.5 Analysis

5.5.1 Preliminary analysis. Table 3 presents means, standard deviations, and zero-order correlations between psychological variables. As it is shown, correlations did not support relationships between experimentally induced goals and self-reported mastery goals or performance goals. Hence, in this study, manipulation of achievement goals was not successful in inducing mastery or performance goals. However, correlations pointed out that the manipulations of social information were successful in inducing social comparisons. This is because the relationships between the instrument measuring “use of normative information” and the backward difference contrast code that indicated presence of favourable or unfavourable social information were positive and statistically significant. Moreover, in accordance with previous research, correlations supported negative relationships between unfavourable normative social information and perceptions of competence or happiness with task performance. However, induced or self-reported

achievement goals were not associated with perceptions of competence happiness with performance, or measures of self-esteem.

5.5.2 Main analysis. Table 4 presents results of the hierarchical regression analyses that examined effects of achievement goals and normative information on the dependent variables. As it is shown, the first step of the analysis supported additive effects of experimentally induced goals and social information on perceptions of competence and happiness with performance. This is because the main effects of experimentally induced goals on perceptions of competence or happiness with task performance were statistically significant. In addition, the backward difference contrast code that captured provision of social information exerted statistically significant effects on perceptions of competence or happiness with performance. Most relevant, in accordance with previous research, analysis of the additive effects supported a link between mastery goals and social comparisons. This is because the additive effects showed that students who were instructed to adopt mastery or performance goals reported higher perceptions of competence when they were provided with positive social information than when they were not provided with social information. In contrast, students who were instructed to adopt mastery or performance goals reported lower perceptions of competence when they were provided with unfavourable social information than when they were not provided with social information.

If single regression coefficients from the hierarchical regression analysis were used to examine the main hypothesis then findings would support social comparison effects of mastery goals and performance goals on perceptions of competence or happiness with task performance. To show this more directly, the mean levels of competence associated with mastery goals can be estimated by using the regression coefficients associated with mastery goals and normative information from the first step of the regression analysis. The

competence levels of participants who did not receive normative information were 4.57 for mastery-oriented and 4.60 for performance-oriented. Much lower levels of competence were obtained for both mastery-oriented and performance- oriented participants who received unfavourable normative information (3.84 and 3.87, respectively). In contrast, for mastery-oriented and performance-oriented participants there were higher means of competence (4.76 and 4.79, in respect). However, as it has been mentioned, such an interpretation of the hierarchical regression analysis may be misleading because it does not capture effects associated with a 'pure' mastery goal profile.

Interestingly, although the second step of the regression analysis was not significant it supported an interactive model for performance goals and unfavourable social information. These interactive models held only for perceptions of competence but not for happiness with task performance. The analyses of these interactions indicated that unfavourable social information yielded lower perceptions of competence among students who endorsed performance goals. In contrast, unfavourable social information did not affect perceptions of competence among students who did not endorse performance goals. At this juncture therefore the additive and interactive models might have led one to conclude that social comparisons drive competence evaluations of individuals who endorsed mastery goals (Van Yperen & Leander, 2014). However, analysis of the discrepancy model does not support this proposition.

Table 5 shows residual variances of the constrained discrepancy models that assumed no social comparison effects for participants who exhibited a 'pure' mastery or a 'pure' performance goals profiles. For participants who endorsed mastery goals at high levels and performance goals at low level, the constrained discrepancy model supported effects of unfavourable normative information only on happiness with performance. The

reason for that was that the constrained model that assumed no social information effects among 'pure' mastery oriented participants who received unfavourable social information, yielded a significant misfit. In contrast, the unstandardised regression coefficient that described effects of favourable social information on happiness with task performance or effects of unfavourable or favourable social information on competence perceptions for the participants with the same goal profile were not statistically significant. Respectively, the corresponding constrained models did not reveal a considerable amount of misfits. Moreover, the mean scores for the participants whose goal profiles conformed to 'pure' mastery goal showed lower levels of happiness with task performance when they received unfavourable normative information than when they did not receive any information (see Table 6). However, there were no significant differences between means of models referring to favourable information. Moreover, no difference in competence perceptions was detected using the constrained models for any type of normative information. Finally, consistent with the additive or interactive models, the discrepancy model supported effects of social information not only on perceptions of competence but happiness with task performance among participants who endorsed performance goals at high levels and mastery goals at low level.

5.6 Discussion

Results of Study 2 showed that the operational definition of mastery goals affects conclusions about the link between mastery goals and social comparisons. It has been demonstrated that 'pure' mastery goal profile was not associated with any significant fluctuations in the means of perceived competence when normative information was revealed or concealed. The constrained models did not show any significant differences. Therefore, it can be concluded that the 'pure' mastery oriented individuals do not engage in

social comparisons. Hypothesis concerning competence that individuals who exhibit extremely high mastery and extremely low performance achievement goal profile do not engage in social comparisons was confirmed. This evidence supports the original assumption of early achievement goal theory (Nicholls, 1989). However, a limitation of Study 2 was that the manipulations of mastery goals were not successful. Study 3 was sought to re-examine the link between mastery goals and social comparisons by employing a stronger manipulation of mastery goals.

Chapter 6

Study 3

6.1 Overview

In Study 3, a stronger manipulation of achievement goals was employed to provide a stronger test of the link between social comparison and mastery goals. Specifically, in Study 3 manipulations of mastery goals aimed at simultaneously increase focus on mastery goal and decreasing a focus on performance goals. Analogously, manipulation of performance goals aimed at inducing focus on performance goal and undermining focus on mastery goals. This manipulation of mastery goal therefore aims to induce a pure mastery and a pure performance goal profile.

6.2 Method

6.2.1 Participants and design. Prior to commencing Study 3, ethics approval was sought through the Curtin University Human Research Ethics Committee (HREC). The research presented and reported in this study was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007) – updated March 2014. The proposed research study received human research ethics approval from the Curtin University Human Research Ethics Committee. Approval for the initial protocol (HR53/2014) was granted on 8 April 2014 (see Appendix C). Ethical approval was amended following initial approval of the study on 24 July 2014 (see Appendix D). Following ethical approval, participants were recruited and informed about the study with an information letter and asked to provide a written consent prior to participation (see Appendix J). Participants were also given the opportunity to ask questions about their involvement in the study prior to consenting to participate.

Participants were 201 undergraduates (males, n = 57; females, n = 144; *M* age= 22.53, *SD*= 6.51) who participated in the experiment for a course credit. The study adopted a two-way design with achievement goals (mastery vs. performance) and normative information as a between participant factors (favourable comparison information vs. unfavourable comparison information vs. information concealed). A table of random numbers was used to randomly allocate participants to conditions.

6.2.2 Procedure. Upon arrival, participants entered experimental cubicles where they signed consent forms. The experimental task was a divergent thinking task that aimed to assess creative thinking (Torrance & Templeton, 1963). This was a pencil and paper task that prompted participants to create figures by using sets of circles. A divergent thinking task was employed because it was also used in previous research that linked mastery goals to social comparisons (Butler, 1992, 1993). The task was introduced to research participants verbally by an instructor (i.e., the candidate). Participants were also asked to read the following message that described the aims and objectives of the task: “You are about to engage in the Circles Creativity task which consists of a set of circles. You can see the circles printed in the page in front of you. This task requires from you to draw original and detailed pictures by using one or more circles each time. There are no “right” or “wrong” pictures; success depends on the quality and uniqueness of your pictures”.

After reading this message, participants received messages that aimed to induce achievement goals. In the mastery goal condition, participants were explicitly told that they would be required to engage in two trials of a “circle creativity task” and that they would be provided with feedback indicating their performance (test scores) on both trials. This procedure ensured that participants focused on self-improvement. In contrast, in the performance goal condition participants were told that they would be provided with

feedback indicating their score from their best trial of the task. This procedure ensured that participants focused on outperforming others and that participants could not assess their own degree of self-improvement. Following the manipulation of achievement goals, participants completed a measure of achievement goals. Immediately afterwards, participants engaged in two consecutive trials of the divergent thinking task. After completion of the task, the manipulation of normative information took place. Following this, all participants completed measures of happiness with task performance, competence and self-esteem[4]. The methodological materials are provided verbatim in Appendix N.

6.2.3 Manipulations

6.2.3.1 Manipulations of achievement goals. In the 'pure' mastery goal conditions, the instructor read to research participants the following message that aimed to focus their attention on self-improvement and learning: "We know that everyone is capable of being imaginative and creative but does not always have the chance to express these capacities. The circle creativity task which you are about to perform was shown in previous research to help express imagination and develop new ways of looking at everyday events. It is a reliable and valid task that develops creative skills. It is very important that you actually understand the aim of the experiment. You are here to acquire new knowledge and extend your creative skills. To improve your creative skills you need to work on the circle creativity task twice and then you will be evaluated in order to know whether you personally improved on this experiment. Thus, your goal should be to progress along the experiment. More specifically, you should try to acquire new knowledge that could be useful for you. In other words, what we ask here is for you to learn".

Next, the instructor read the following message to the participants aimed at directing participants' attention away from performance goals: "This challenge is not about

your actual performance relative to your peers. Previous research has shown that creativity is a skill and it can be extended and improved. Therefore, your creativity score in comparison to other students is inconsequential and it does not mean that you are developing your skill. You can call yourself creative, only if you are working hard and making progress in your creative skills. At the end of your trials, we will evaluate your performance so you will know about how you improved." In the 'pure' mastery goal conditions, participants also read the messages themselves before completing the questionnaire that measured achievement goals.

After completion of the divergent thinking task, the experimenter asked the research participants to wait for a couple of minutes while s/he was calculating their test results. In the 'pure' mastery goal condition, participants were told that they had achieved a significant amount of improvement because their performances were equivalent to 81 and 104 in the first and second trials, respectively. This procedure ensured that participants would endorse the mastery goals because evidence suggests that individuals are more likely to endorse mastery goals when they receive positive rather than negative self-referenced feedback (Erkuran-Ilier, 2014; Pekrun, Aisling, Murayama, Elliot, & Thomas, 2014; Viciana, Cervello, & Ramirez-Lechuga, 2007).

In the 'pure' performance goal condition, the instructor read the following message to research participants that focus their attention on outperforming others: "The circle creativity task is a valid and reliable measure of creativity. Previous research has shown that people differ in their ability to create novel or unique solutions. Students who did well on the circle creativity task were more creative than ones who did poorly. After you completed the task twice, your creativity will be evaluated. Note, this is a competition, and your performance is good if your best creative score is higher than the score that is achieved by

other undergraduate students who are of the same age, gender, and attendance year at University as you. It is very important for you to actually understand the aim of this experiment. You are here to be a performer and to demonstrate that you are a creative individual. More specifically, you should try to perform better than majority of other undergraduates who are of the same age, gender, and attendance year as you. In other words, what we ask you here is to demonstrate that you are the most creative person."

The instructor then read the following message that aimed to direct participants' attention away from mastery goals: "This competition is not about improving your creativity skills or learning. Previous research showed that creativity is an inherited trait and it is fixed and stable over time. Therefore, how much you improve (if you improve) your creativity score is inconsequential and it does not mean that you are creative. You can call yourself creative, only if you outperform other students of the same age and gender as you who took the test. At the end of your trial we will evaluate it so you will know about how your performance compares to performance achieved by your peers". In the 'pure' performance goal conditions participants also read the messages themselves before completing the questionnaire that measured achievement goals.

Similar to the 'pure' mastery goal condition, in the 'pure' performance goal condition participants were provided with positive performance feedback after competition of the divergent thinking tasks. Specifically, participants were told that their best score on the divergent thinking task was 104 and that a score of 104 was one of the best scores achieved by other students of similar age, attendance year and gender in the University. The instructor emphasised to research participants that comparison others had similar age and gender because evidence suggest that individuals are more likely to compare themselves to

others of similar age and gender (Huguet, Dumas, Monteil, & Genestoux, 2001; Lubbers, Kuyper, & Van der Werf, 2009).

6.2.3.2 Manipulation of normative information. In the favourable normative information conditions, participants were told that they outperformed others because their test score was in the top 25th percentile of students with the same age, gender, and attendance year in the University while in the unfavourable normative information conditions participants were told that they had performed worse than others because their test score was in the bottom 25th percentile. Participants were also shown a diagram of a normal distribution in which the average, top, and bottom performance levels were highlighted. In the no normative information conditions, participants were not provided with such distributional information about personal performance. However, in those conditions, participants who were instructed to adopt performance goals were provided with positive performance feedback that emphasised that a score of 104 was one of the best scores achieved by other students of similar age, attendance year and gender in the University. In addition, in the no-social information conditions, participants who were instructed to adopt mastery goals were provided with positive mastery feedback that emphasised that their test score improved from 81 and 104 points.

It is important to note that although in the no normative information condition and favourable information condition performance feedback was always positive, in the no normative information condition, performance feedback was not normative. This is because it did not indicate whether participants' performance levels were in the top or bottom percentiles of the distribution. In contrast, in the favourable normative information condition, performance feedback was more specific and normative because it provided participants with distributional information about relative performance.

6.2.4 Measures

6.2.4.1 Experimentally-induced achievement goals. A simple contrast code was used to model effects of experientially-induced goals on the dependent variables. Specifically, the value of minus one (-1) was assigned to participants who were allocated to the performance goal condition and the value of one (+1) to participants who were allocated to the mastery goal condition (Davis, 2010).

6.2.4.2 Unfavourable and favourable normative information. A backward difference contrast code was used to model effects of unfavourable and favourable normative information on the dependent variables. Specifically, the unfavourable normative information contrast code was expressed by assigning the value of minus one (-1) to participants who were allocated to conditions that received unfavourable normative information and the value of one (+1) to participants who were allocated to the 'no-normative information' conditions. Analogously, the favourable normative information contrast code was expressed by assigning the value of minus one (-1) to participants who were allocated to the 'no-normative information' condition and the value of one (+1) to participants who were allocated to the favourable normative information condition (Davis, 2010).

6.2.4.3 Achievement goals. Achievement goals were measured using Duda and Nicholls' (1992) questionnaire. This instrument comprises 13 items tapping achievement goals on five-point scales ranging from *strongly disagree* (1) to *strongly agree* (5). The instrument was modified to reflect success related to the divergent thinking task. In addition, the items that aimed to capture performance goals were phrased specifically to orient respondents' attention to comparisons with others who had the same age and gender as the respondents. This ensured that the performance goal items captured the

content of experimental instructions that aimed to induce performance goals. An example item for performance orientation was: “I will feel most successful at the creativity task if I score more points relative to other students who are of the same age, gender and attendance year as me.” An example item for mastery orientation was: “I will feel most successful at the creativity task if I learn something fun while I am engaging in the circle creative task”. The reliabilities for the mastery (α = .88) and performance (α = .89) orientation scales were satisfactory.

6.2.4.4 Happiness with performance. Happiness was measured through two items on nineteen-point semantic differential scale ranging from *very unhappy* (-9) to *very happy* (+9). The middle of the scale, which was assigned the value of zero, reflected a neutral state of happiness (see also Hsee & Zhang, 2004). An example item was: “How happy are you with your performance at the circle creativity task?” The alpha reliability for the happiness scale was satisfactory (α = .89)

6.2.4.5 Perceived competence. Five items from McAuley, Duncan and Tammen’s (1989) intrinsic motivation inventory were used to measure perceived competence. An example item was: “I think I was pretty good at the circle creativity task”. All items were measured on seven-point scales ranging from *strongly disagree* (1) to *strongly agree* (7). The alpha reliability for perceived competence was satisfactory (α = .90).

6.2.4.6 Self-esteem. This variable was assessed through Rosenberg’s (1965) measure of self-esteem. The instrument comprises 10 items and it measures self-esteem on a nine-point scale ranging from 1 (*strongly disagree*) to 9 (*strongly agree*). An example item was: “I feel I am a person of worth, at least on an equal plane with others”. The alpha reliability of this scale was satisfactory (α = .90).

6.3 Results

6.3.1 Preliminary analysis. Table 7 presents means, standard deviations, and zero-order correlations among study variables. The correlations indicated that the manipulations of achievement goals were successful in inducing adoption of mastery or performance goals. The positive relationship between experimentally-induced goals and self-reported mastery goals indicated that participants who were prompted to adopt mastery goals endorsed those goals to a greater extent than participants who were prompted to endorse performance goals. In addition, the negative correlation between induced goals and self-reported performance goals supported the notion that participants who were prompted to adopt performance goals endorsed those goals to a greater extent than participants who were prompted to adopt mastery goals.

Correlations also supported positive relationships between the contrast code that represented membership in the no-normative information versus unfavourable normative information conditions with perceptions of competence or happiness with task performance. This pattern of relationships was consistent with previous research as it suggests that provision of unfavourable normative information undermined perceptions of competence or happiness with task performance (Van Yperen & Leander, 2014). In contrast, the positive correlation between favourable normative information with perceptions of competence or happiness with task performance suggested that provision of favourable normative information increased perceptions of competence or happiness with task performance.

6.3.2 Main analysis. Table 8 presents results of the hierarchical regression analyses that examined effects of achievement goals and normative information on the dependent variables. The first step of the analysis supported main effects of favourable or unfavourable normative information on perceptions of competence and happiness with task

performance. If single regression coefficients from the hierarchical regression analysis were used to examine our hypothesis then findings would support social comparison effects of mastery goals and performance goals on perceptions of competence or happiness with task performance. To show this more directly, mean levels of competence associated with mastery goals were estimated by using the regression coefficients associated with mastery goals and normative information from the first step of the regression analysis. Competence levels for mastery-orientated and performance-orientated participants who did not receive normative information were 4.89 and 4.51, respectively. In contrast, mastery-orientated and performance-orientated participants who received unfavourable normative information reported much lower levels of competence (4.07 and 3.69, respectively). In addition, mastery-orientated and performance-orientated participants who received favourable normative information reported much higher levels of competence (5.77 and 5.39, respectively). However, such an interpretation of the hierarchical regression analysis may be misleading because it does not capture effects associated with a 'pure' mastery goal profile.

Table 9 presents residual variances of the constrained discrepancy models that assumed no social comparison effects for participants who exhibited a 'pure' mastery or a 'pure' performance goal profile. In accordance with the hierarchical regression analysis and previous research (Van Yperen & Leander, 2014), the constrained models supported the conclusion that participants who endorsed performance or mastery goals based perceptions of competence or happiness with task performance on unfavourable normative information. This is because the constrained models, that assumed no social comparison effects among the 'pure' mastery or 'pure' performance-orientated participants who received unfavourable normative information, yielded significant amounts of misfit. In addition, mean scores indicated that participants who adopted a 'pure' performance or a 'pure'

mastery goal profile reported lower levels of competence or happiness with task performance when they received unfavourable normative information than when they did not receive normative information (see Table 10). However, in the domain of favourable normative information, the constrained models supported social comparison effects only for the 'pure' performance-orientated participants and not for the 'pure' mastery-orientated participants. This is because the constrained model that assumed no social comparison effects among the 'pure' mastery-orientated participants who received favourable normative information did not yield a significant amount of misfit with the data. Mean scores also indicated that the 'pure' mastery-orientated participants who received favourable normative information reported the same levels of competence or happiness with task performance as the 'pure' mastery-orientated participants who did not receive normative information (see Table 10).

6.4 Discussion

Results of Study 3 supported the notion that participants who adopted a 'pure' mastery goal profile were affected by social information. Although findings suggest that the pure mastery orientated individuals did not engage in favourable social comparison, results support the conclusion that they engaged in unfavourable social comparisons. Hence, at an empirical level, the current study replicates in part Study 1 and previous research that also demonstrated unfavourable normative information to undermine positive affect and competence evaluations of individuals who endorsed mastery goals (Van Yperen & Leander, 2014). Given this findings, null findings from Study 2 can be attributed to poor manipulations of mastery goals.

Chapter 7

Study 4

7.1 Overview

The studies (Study 1, Study 2, and Study 3) reported in this thesis examined the link between social comparisons and mastery goals in laboratory settings. Hence, current findings may lack ecological validity in a sense that they may not generalise in classroom settings. Likewise, research conducted by other researchers has never tested the link between social comparisons and mastery goals in naturalistic settings. Study 4 was therefore sought to examine the link between mastery goals and social comparison in classroom settings and in the context of a prospective study that aimed to predict perceptions of competence in a mathematics course.

7.2 Method

7.2.1 Participants. Prior to commencing the study, ethics approval was sought through the Curtin University Human Research Ethics Committee (HREC). The research presented and reported in this study was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007) – updated March 2014. The proposed research study received human research ethics approval from the Curtin University HREC. Ethics approval (HR178/2014) was granted on 29 August 2014 (see Appendix E), and amendments were approved on 17 February 2015 (see Appendix F). The approval from the Catholic Education Office of Western Australia (CEOWA) approved the application to conduct the study in Catholic Schools on 20 October 2014 (see Appendix G).

Following ethical approval, participants were recruited to the study in three waves. Adolescents and their parents interested in participating were given an information letter

and asked to provide written consent (see Appendix K) prior to participation. The information letter outlined confidentiality, benefits, risks, expectations of participation, and the right to withdraw from the study at any time without negative repercussions. Participants were also given the opportunity to ask questions about their involvement in the study prior to consenting to participate.

Participants were Year 9, 10, 11 and 12 high school students who attended a mathematics class (N = 163, M age = 13.75, SD = .46, Male = 82, Female = 81). Students attended classes in small groups of no more than 30 students. In each group, students attended the class with the same classmates and each group had an identical curriculum that was taught by the same teacher. Students' informed consent and permission from University's ethics committee were obtained prior to data collection. All students were informed about the study by their teachers and given the opportunity to decline participation.

7.2.2 Procedure and design. In the current study, psychological variables were measured in the middle of the semester so that the data could capture social comparisons that students might have formed anew (Huguet et al., 2001). Specifically, students initially completed measures of achievement goals. Next, participants were asked to nominate a classmate with whom they tended to compare their performance in mathematics. Immediately after, students were prompted to compare their personal performance in mathematics to the performance of their nominated classmate. This measure of comparative evaluations with the chosen classmate was the moderator variable that aimed to capture judgments indicating whether comparison with nominated classmates were favourable or unfavourable. At the end of the semester participants reported perception of competence. The questionnaire is provided in Appendix O.

7.2.3 Measures

7.2.3.1 Achievement goals. Duda and Whitehead's (1998) questionnaire was used to measure achievement goals (see also Fox et al., 1994). This instrument comprises 13 items tapping achievement goals on 5-point scales ranging from *strongly disagree* (1) to *strongly agree* (5). The instrument was modified to reflect success in mathematics. An example item for performance-orientation was: "I feel most successful in mathematics when my performance is greater than the performance achieved by others". An example item for mastery-orientation was: "I feel most successful in mathematics when I do my best". The alpha reliability for the mastery (α = .85) and performance-orientation scales (α = .91) were satisfactory.

7.2.3.2 Perceived competence. Five items from McAuley, Duncan and Tammen's (1989) intrinsic motivation inventory were used to measure perceived competence. An example item was: "I feel pretty competent in mathematics". All items were measured on 7-point scales ranging from *strongly disagree* (1) to *strongly agree* (7). Higher scores indicated higher levels of competence in mathematics. The alpha reliability for this scale was satisfactory (α = .94).

7.2.3.3 Comparative evaluation with chosen classmate. This variable was measured through a single item asking participants to rate how good they were relative to their nominated classmate in mathematics. Students' ratings were made on a 5-point evaluative scale (1 = *much worse*, 3 = *the same*, 5 = *much better*) (see also Huguet et al., 2009). This was an ordinal-level variable with students who scored low on this scale were considered to engage in unfavourable social comparisons. In contrast, students who scored high on this scale were considered to engage in more favourable social comparisons.

7.2.3.4 Academic ability (standardised mathematic achievement test). The numeracy results from the standardised national academic achievement test called the National Assessment Program – Literacy and Numeracy (NAPLAN) were provided without the names of the students mentioned. The academic ability was linked to the individual responses by means of the unique codes. These tests are the same and standard to other students in different schools and classes to assess the students' individual ability. NAPLAN tests, developed by Australian Curriculum, Assessment and Reporting Authority (ACARA) for use throughout Australia, are examples of standardised achievement tests that provide for nationally comparable data on individual student performance.

7.3 Data Analysis

In the present study, calculations of descriptive statistics for all psychological variables were initially performed. Pearson's correlations were estimated to examine zero-order relationships among study variables. For the main analysis, a regression analysis was initially conducted to examine whether the following equation explained observations:

$$PC = b_0 + b_1M + b_2P + b_3C + b_4MxC + b_5PxC + b_6A + e_{10} \quad (6)$$

In Equation 6, PC represents perceptions of competence and the terms M and P represent participants' responses to items measuring mastery goals (M) and performance goals (P). The term C represents participants' responses to items measuring comparative evaluations. The regression coefficients b_1 to b_6 are unstandardised regression coefficients. The coefficient b_0 is the intercept of the regression equation and the coefficient e_{10} is the residual variance. In Equation 6, measures of comparative evaluations are treated as a moderating variable. Important to note is that the model implied by Equation 6 is unconstrained in the sense that it does not impose any equality constraint on the parameters.

Following Edwards and Parry (1993), a discrepancy model was identified by substituting the "performance" term with "minus mastery" (P = −M) in Equation 6. Assuming P = −M and re-arranging Equation 6 yields:

$$PC = (b_0 + (b_1\text{-}b_2)M) + C(b_3 + (b_4\text{-}b_5)M) + b_6A + e_{10} \quad (7)$$

In Equation 7, the linear combination of coefficients on the term that represents comparative evaluations (i.e., $(b_3 + (b_4\text{-}b_5)M)$ are simple slopes that describe effects of comparative evaluation among individuals who adopt a 'pure' mastery or a 'pure' performance goal profile.

In the current study, Equation (7) was used to identify a subset of regression equations (i.e., simple slopes) that enabled us to estimate mean levels of competence associated with the 'pure' mastery or the 'pure' performance goal profiles. These equations where estimated by solving Equation (7) for values that represents a pure mastery (M = 2) and a pure performance goal profile (P = -2) which yielded:

$$PC = (b_0 + (b_1\text{-}b_2)2) + C(b_3 + (b_4\text{-}b_5)2) + b_6A + e_{10} \quad (7.1;\ \text{'pure' mastery goal})$$

$$PC = (b_0 + (b_1\text{-}b_2)(-2)) + C(b_3 + (b_4\text{-}b_5)(-2)) + b_6A + e_{10} \quad (7.2;\ \text{'pure' performance goal})$$

In addition, the same subset of regression equations were used to identify a series of constrained discrepancy models that tested the null hypothesis of no differences in mean levels of competence or happiness with task performance across the different goal profiles. Following estimation of these constrained models incremental *F*- tests was used to formally test whether the constrained models produced a significant amount of misfit (residual variance) relative to the unconstrained model implied by Equation 6 (Edwards & Parry, 1993). The hypotheses were supported if the incremental *F*- test was statistically significant and the residual variances of the constrained models were higher than the residual

variances of the unconstrained models. Under this scenario, it was concluded that observed differences in levels of competence were statistically significant.

7.4 Results

7.4.1 Preliminary analysis. Table 11 presents descriptive statistics and correlations among psychological variables. Correlations supported statistically significant and positive relationships between perceptions of competence with mastery goals or comparative evaluations. The correlation between perceptions of competence and academic ability was also statistically significant. This positive correlation supported the choice to control for the effects that this variable may exert on perceptions of competence.

7.4.2 Main analysis. Table 12 presents results of the unconstrained hierarchical regression analysis. Mastery goals predicted perceptions of competence. Likewise, effects of comparative evaluations and academic ability on perceptions of competence were all statistically significant. Overall, the unconstrained quadratic model explained 50% of variance in perceptions of competence. Most critical, Table 13 shows that the sum of standardised residuals of the constrained models, in which the null hypothesis of no social comparison effects for the 'pure' mastery or the 'pure' performance orientated students were higher than the sum of standardised residuals of the unconstrained model were tested. These findings support social comparison effects for both mastery and performance orientated students. In addition, in accordance with initial hypothesis, the discrepancy model revealed that a mastery or performance orientated students engaged in unfavourable social comparison.

7.4 Discussion

Overall, in accordance with Study 3 and previous research, Study 4 shows that both mastery-orientated and performance-orientated students engaged in social comparison.

Broadly speaking, students who chose to compare their performance in mathematics with classmates who achieved a better grade reported lower perception of competence than students who chose to compare their grades in mathematics with classmates who attained worse grades. However, the present study adds to the existing literature because it is the first study that examined the link between mastery goals and social comparisons in naturalist settings. Hence, Study 4 adds ecological validity to previous studies that observed a link between mastery goals and social comparisons. In the next section the significance of the current thesis to theory development and practice are discussed.

Chapter 8

Discussion

8.1 Introduction

The current thesis contributes to the existing body of knowledge by targeting the question whether the link between mastery goals and social comparison extends to individuals who exhibit a 'pure' mastery (extremely high mastery and extremely low performance) achievement goal profile. It examined the assumption of early achievement goal research that people who adopt performance goals and not mastery goals base their perceptions of competence on social comparisons (e.g., Ames, 1992; Brophy, 2005; Elliot, 1999; Ku et al., 2012; Nicholls, 1989). Recent research, however, contradicted this belief (Butler, 1992, 1993; Darnon et al., 2010; Régner et al., 2007). In particular, van Yperen and Leander (2014) found that both mastery- and performance-oriented individuals base perceptions of competence on social information. This thesis outlined the issues that have contributed to the difficulties in arriving at an adequate examination of the original assumption of achievement goal theory from existing research and offered more comprehensive tests by addressing a number of these limitations. First, it was argued that to answer a specific theoretical question the measure of the achievement goals needs to capture the concept in the most precise way. In particular, prior experimental investigations have not used wording referring to the evaluation standards but referred to the purposes implied by the goals to measure them. Furthermore, it was suggested that such an operationalisation of the mastery goals could be a confound because the goals as standards do not perfectly align with the goals as purposes (Barkoukis et al., 2007). Second, prior to the current research, researchers used more traditional statistical models to examine the effects of mastery goals. However, these models failed to capture the specific effect of an

achievement goal profile featuring 'pure' mastery goal. To provide a better test that for the first time can account for high mastery goal and low performance, a discrepancy model was introduced and explained. Thus, an important strength of the current work is that the model captures the 'pure' or 'uncontaminated' goal profiles, because this has not been achieved in prior research. Third, building on Barron and Harackiewicz's (2001) multiple goal perspective, it was suggested that manipulation of induced mastery goal can be strengthened if self-set performance goals were decreased with explicit statements.

Finally, in order to translate the experimental findings (Studies 1, 2, and 3) into real life settings and improve ecological validity, it was argued that the social comparison effect needs to be examined in the natural environment (Study 4). In classrooms, teachers provide the feedback to the students in groups and use a grade system. These practices instigate social comparison processes and can be compared to manipulation techniques of social information that were used in Study 1, 2 and 3. Therefore, it is unrealistic to assume that mastery-orientated students always evaluate personal competence in isolation because, in educational settings, social information pertaining to others' performance is available to them. However, no previous study examined whether a 'pure' mastery-oriented student who would not adopt performance goals would compare in educational settings that naturally contains social information. Moreover, it was of importance to examine a potential effect of social information on perceived competence when another moderator (the academic ability) was taken into consideration.

Therefore, the current studies aimed to provide more compelling evidence on whether or not the original assumption of achievement goal theory construes a strawman's argument. The current chapter summarises findings from Study 1 through to Study 4. Inconsistences with the results are discussed, in addition to addressing the efficiency of

achievement goals and social information manipulations and statistical method. The application of study findings to the current literature is then discussed. Finally, strengths and limitations of the study; both theoretical and applied implications; and suggestions for future research are discussed.

8.2 Overview of Main Findings

This thesis presented four studies, a quasi-experimental study (Study 1), two laboratory controlled experimental studies (Study 2 and Study 3), and a field study (Study 4), in order to test the main hypothesis. Overall, results of the studies showed that mastery-orientated individuals based competence evaluations on social comparison processes. Consistent with prior research (Butler, 1992, 1993; Darnon et al., 2010; Régner et al., 2007; Van Yperen & Leander, 2014), both Study 1, Study 3 and Study 4 showed that mastery-orientated individuals base predicted and actual competence evaluations on social information. However, this effect applied only to the information that referred to a large performance difference between one-self and others, while a small difference did not instigate social comparison processes in mastery-oriented people (Study 1). Therefore, a difference in magnitude between individual performance and performance of others is one important factor regarding the social comparison effect.

Replicating research by van Yperen and Leander (2014), this thesis extended prior knowledge in relation to the nature of mastery goals. In contrast to previous evidence that demonstrated that both directions of social comparisons (favourable and unfavourable) are equally persuasive for mastery-orientated individuals (Van Yperen & Leander, 2014), Studies 3 and 4 showed that individuals who endorsed ‘pure’ mastery goal profile exhibited a more selective pattern in attending to only unfavourable social comparisons. The present research employed a statistical model that for the first time captured effects associated with

a ‘pure’ mastery goal profile and showed that the assumption of achievement goal theory was accurate because the findings suggested that the pure mastery orientated individuals did not engage in favourable social comparison (Study 2, Study 3, and Study 4). Hence, at an empirical level, the aforementioned studies replicate in part Study 1 and previous research demonstrating that unfavourable normative information undermines positive affect and competence evaluations of individuals who endorsed mastery goals (Van Yperen & Leander, 2014). Given these findings, evidence of null findings in Study 2 that showed no social effect can be attributed to poor manipulations of mastery goals. Because extensive control measures were taken, it could be concluded that the inconsistencies in Study 2 with Study 3 and Study 4 refer to the differences in origin of the goals (self-set and induced).

It is important to note, that the findings of Studies 2 and 3 did not induce a simultaneous goal endorsement profile (Harackiewicz et al., 1998; Senko et al., 2011). The reason for this is that these studies sought to examine the hypotheses on the ‘high mastery/low performance’ goal profile. In addition, the fact that the ‘pure’ mastery goal profile did not instigate favourable social comparisons should not be taken to mean that mastery goals will buffer tendencies to endorse favourable social comparisons among people who endorse performance goals. This is unlikely because evidence suggests that social comparison effects are particularly pronounced among individuals who adopt both mastery and performance goals (see Darnon et al., 2010; Régner et al., 2007). Relatedly, it is important to emphasise that the discrepancy model does not capture social comparison effects associated with a multiple goal endorsement profile. This is because it is a very specific model that pits the ‘pure’ mastery goal profile against the ‘pure’ performance goal profile. Rather, the discrepancy model should be viewed as a viable data analytic framework

that assists researchers in isolating effects associated with the 'pure' mastery and the 'pure' performance goal profiles.

8.3 Implications of the Findings

8.3.1 Theoretical implications. Evidence supported the notion that participants who adopted a 'pure' mastery goal profile were affected by social information. The current findings suggest that 'pure' mastery-orientated participants reported lower perceptions of competence and happiness with task performance when they were told that others achieved a higher performance level on the divergent thinking task than when unfavourable social information was concealed from them. Hence, at an empirical level, the current studies replicated previous research that also demonstrated unfavourable normative information to undermine positive affect and competence evaluations of individuals who endorsed mastery goals (Van Yperen & Leander, 2014). However, the present studies contribute to achievement goal literature because it employed a statistical model that captures effects associated with a 'pure' mastery goal profile. Hence, the current studies show that previous findings do not present a strawman's argument but a real challenge to original achievement goal theory that predicted mastery goals to be isolated from social comparison.

Favourable social information, however, did not alter competence evaluations of participants who exhibited a high mastery/low performance goal profile. Importantly, the present thesis shows that the inconsistencies in the results were due to manipulations of mastery goals only for Study 2 and not in Study 3. Moreover, the inconsistencies could not be explained due to the fact that mastery goals were measured at the level of comparison standards. This is because current findings, based an interpretation of results on single regression coefficients obtained from the hierarchical regression analysis, supported a social

comparison effect for mastery-orientated individuals who received favourable normative information. In contrast, findings of the present thesis were inconsistent with previous research when results were interpreted using the discrepancy model that captured effects associated with the 'pure' mastery goal profile. Hence, the present thesis shows that inconsistencies between the studies' results are due to the different mastery goal profiles captured by the different statistical models.

8.3.2 Methodological implications. At a methodological level, the present findings suggest that the statistical models that researchers use to analyse observations are likely to affect their conclusions about goal profiles. For instance, in the context of the present studies, the main effects of favourable normative information do not represent effects associated with the 'pure' mastery goal profile. The reason for this is that, in the current studies, the coefficient that describes the interaction between performance goals and favourable normative information (i.e., b_{12}, Equation 5) was statistically significant. Yet this coefficient, which captures effects associated with performance goals, is not completely subtracted from the coefficient (i.e., b_5, Equation 5) that represents the main effect of favourable social information. In contrast, the discrepancy model captures effects associated with the 'pure' mastery goal profile because it subtracts the interaction between performance goals and favourable normative information from the coefficient that captures main effects of favourable normative information. Notably, the regression analysis would capture social comparison effects for the 'pure' mastery-orientated individuals if the equation implied by the regression model was solved for goal values that represented a tendency to endorse performance goals at an extremely low level (i.e., P = -2). However in this case, the resultant regression equation would be equivalent to a discrepancy model because it would "force" a subtraction of the coefficient that represented the interaction

between performance goals and favourable social information from the coefficient that represented main effects of favourable social information.

Unfortunately, previous research did not perform such operations on regression coefficients that represent main or interactive effects associated with mastery goals and normative information (e.g., Darnon et al., 2010; Régner et al., 2007; Van Yperen & Leander, 2014). Hence, caution should be exercised in inferring social comparison effects for the 'pure' mastery-orientated individuals from previous studies. Drawing from the current findings, it is recommend researchers who wish to test premises underpinning earlier formulations of achievement goal theory to do so by adopting the discrepancy model. By using discrepancy models, researchers can then determine whether statistical coefficients present a challenge to earlier formulations of achievement goal theory and evaluate whether regression coefficients reflect a link between a 'pure' mastery goal profile and social comparisons.

8.3.3 Empirical implications. At an empirical level, the fact that participants who adopted a 'pure' mastery goal profile engaged in unfavourable and not favourable, social comparison suggests that they were selective in the type of normative information to which they attended and endorsed during social comparison processes. In contrast, the 'pure' performance-orientated participants were less selective 'comparers' as they incorporated both favourable and unfavourable normative information into their competence evaluations. This pattern of selective attention to normative information is by no means new in the literature and it may reflect reluctance to engage in favourable social comparisons which may stem from the belief that favourable social comparisons undermine likability (Cialdini, Borden, Thorne, & Sloan, 1976; Exline & Lobel, 1999; Paulhus, 1988; Vohs & Heatherton, 2004). Such an interpretation of findings makes sense because the

achievement goal literature has documented that individuals who pursue mastery goals are more likely to be concerned with others' opinions than individuals who pursue performance goals (Darnon, Dompnier, Delmas, Pulfrey, & Butera, 2009). Hence, the tendency of the 'pure' mastery-orientated participants to not engage in favourable social comparison may be an expression of a more fundamental tendency to avoid negative evaluations by others. The latter interpretation of findings could have been strengthened had a measure of social desirability concerns been included. Nevertheless, the mere fact that the 'pure' mastery-orientated individuals engaged in unfavourable, rather than favourable, social comparisons provides good evidence to support this position. This is because social comparisons are perceived to instigate negative evaluations by others when they are favourable rather than unfavourable (Vohs & Heatherton, 2004).

Therefore, from the applied perspective, the findings suggest that the mastery-approach goals do not prevent the students from attending to all types of social comparisons (Study 3 and 4). Practitioners (i.e., teachers) should not expect that mastery-oriented students are insensitive to all types of social information and that inducement of mastery goals can be used to avoid the effects of this information. A mindful instruction to look up for the standard (a student in the class) that is more similar to them might be a better strategy for classroom settings (Study 1).

8.4 Strengths and Limitations of the Studies

8.4.1 Strengths. Related to this, the current thesis provides some insights into the magnitude or relative importance of social comparison processes. Specifically, in previous research, social comparison processes were thought to be the dominant contributor to people's self-evaluations-overpowering tendencies to adopt self-referenced standards of comparison (Van Yperen & Leander, 2014). This tendency to engage in social comparisons

was also considered to be reinforced by social environments in which success and excellence are defined on the basis of individuals' achievements relative to others. Notably, previous studies could not ascertain the magnitude of social comparison effects for individuals who adopted a 'pure' mastery goal profile either because they did not induce a 'pure' mastery goal profile (Van Yperen & Leander, 2014) or because they did not induce both favourable or unfavourable social comparisons in the same study (Butler, 1992, 1993; Darnon et al., 2010; Régner et al., 2007) or because they did not use a discrepancy model. Hence, the fact that the 'pure' mastery-orientated individuals engaged in unfavourable, rather than favourable, social comparisons suggests that social comparison processes are less pervasive for the 'pure' mastery-orientated individuals than analogous effects observed in previous research which showed mastery-orientated individuals to engage in both favourable and unfavourable social comparisons. Finally, no previous studies examined the 'pure' mastery goal profile for social comparison effect in the natural environment.

8.4.2 Limitations. It would be remiss not to mention limitations of the present studies that provide a basis for future research. The present studies were not designed to explain why the 'pure' mastery-orientated individuals did not engage in favourable social comparisons. As it was mentioned earlier, avoidance of favourable social comparisons may be driven by social desirability concerns that characterise mastery-orientated individuals (Darnon et al., 2009). Hence, future research may address this issue by considering additional moderators. Nevertheless, the current findings are consistent with a broader conclusion that social comparison processes are more complex than it is currently assumed by achievement goal research and the studies call for research that aims to clarify social comparison processes further.

Moreover, the instructions to not endorse performance goals in Study 3 might have inadvertently led people to endorse them at some implicit level. Although this is possible it should be recognised that manipulations checks did not show that mastery-orientated participants endorsed performance goals. Despite this, it may be important to replicate findings of Study 3 by using more subtle manipulations of performance goals.

8.5 Recommendations for Future Research

The current studies provides a unique contribution to the literature by providing compelling evidence to answer a long standing question in achievement goal theory: whether individuals who adopt mastery and not performance goals would compare their performance to ones' of others. The results obtained in the current research showed that the assumption did not constitute the strawman's argument: people who adopt 'pure' mastery goals are sensitive to social information pertaining to performance of others' when they evaluate their competence. Since the cognitive mechanisms were beyond the remit of the current thesis' research, future studies should focus on exploring processes underpinning the social effects among individuals who exhibit a 'pure' mastery goals profile. Despite the contribution of the current thesis, a deeper understanding of cognitive aspects that allow mastery-oriented people to compare themselves to peers yet avoid negative consequences of such effects may be built upon in future studies.

8.5 Conclusion

The present thesis adds to achievement goal literature by demonstrating that participants who adopted a 'pure' mastery goal profile based perceptions of competence on social comparison processes. In addition, it was shown that relative to the 'pure' performance-orientated participants, the 'pure' mastery-orientated participants were more selective in the type of normative information they attended to and endorsed during social

comparison processes. That is, whereas the ‘pure’ mastery-orientated participants attended only to unfavourable normative information, the ‘pure’ performance-orientated participants were less selective ‘comparers’ as they incorporated both favourable and unfavourable normative information into their competence evaluations. Importantly, the current studies enabled an observation of the selective pattern of attention to social information only when a discrepancy model of achievement goals that captured effects associated with the ‘pure’ mastery goal profile was adopted. Hence, at methodological level, current findings suggest that statistical models affect conclusions about goal profiles and that the discrepancy model is appropriate in capturing social comparison effects associated with a ‘pure’ mastery goal profile. Finally, at a theoretical level, the current research demonstrates that social comparison effects are less overpowering for individuals who adopt a ‘pure’ mastery goal profile than analogous effects observed in previous research which showed mastery-orientated individuals to engage in both favourable and unfavourable social comparisons.

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Footnotes

[1] An analysis of variance that examined impact of distance, social information and improvement on dependent variables among mastery orientated individuals only, was also conducted. Results from this analysis revealed a statistically significant three-way interaction between distance, social information and improvement ($F(3,115) = 3.0$, $p = .03$, $\eta^2 = .07$). Post-hoc univariate analysis of the three-way interaction pointed out statistically significant effects for perceptions of competence ($F(1,117) = 4.04$, $p = .05$, $\eta^2 = .03$), happiness ($F(1,117) = 5.49$, $p = .02$, $\eta^2 = .05$) and effort ($F(1,117) = 7.88$, $p < .001$, $\eta^2 = .06$).

[2] It is important to note that the model implied by Equation 4 supports social comparison effects even if the main effects of achievement goals on perceptions of competence are not statistically significant. This is because social comparison effects are said to be general in a sense that they are not confined to individuals who adopt mastery or performance goals but they are supposed to also extend to people who do not adopt these goals (Van Yperen & Leander, 2014).

[3] In Equation 5, the main and interactive effects associated with induced goals were estimated in case induced goals exerted effects on dependent variables. In addition, following Edwards and Parry's (1993) recommendations, it was decided to examine whether higher-order models that included quadratic terms and three-way interactions between mastery goals, performance goals and normative information explained observations. However, none of those higher-order models improved the predictive validity of the model in Equation 5.

[4] In this experiment, intrinsic motivation (i.e., interest and persistence on divergent thinking) was also measured by incorporating a free-choice period during which participants could freely choose to re-engage in the divergent thinking task. However, results revealed

that over 65% of participants chose to not re-engage in the task. Although previous studies have reported similar levels of disengagement (Ryan, Koestner, & Deci, 1991), results related to intrinsic motivation are reported because they are considered to be too high to draw reliable predictions. Nevertheless, a preliminary analysis showed participants in the 'pure' mastery goal condition to report higher levels of intrinsic motivation than participants in the 'pure' performance goal condition participants.

Table 1

Descriptive Statistics and Correlations between All Psychological Variables (Study 1)

	M	SD	1	2	3	4	5
1.Performance orientation	3.87	.94	1.0				
2.Mastery orientation	4.35	.76	.38*	1.0			
3.Perceived competence	5.04	1.13	.04	.26*	1.0		
4.Perceived effort	5.60	1.22	.04	.10	.51*	1.0	
5.Perceived happiness	5.40	3.14	.03	.25*	.68*	.60*	1.0

Note. Correlations with an asterisk are statistically significant at $p < .05$ level.

Table 2

Means Scores Representing Effects of Distance, Improvement and Social Information on Perceived Competence, Perceived Happiness and Perceived Effort for Mastery and Performance-orientated Individuals (Study 1)

Distance	Improvement	Social Information		Competence	Happiness	Effort
Large	Smaller	No		4.70_a	3.98_a	5.47_a
		Yes (unfavourable comparison)		3.74_b	2.12_b	4.61_b
			d	-1.72	-.91	-.91
	Larger	No		4.87_a	4.93_a	5.71_a
		Yes (favourable comparison)		5.79_c	6.67_c	5.88_a
			d	.71	.68	.16
Small	Smaller	No		5.10_a	6.29_a	5.89_a
		Yes (unfavourable comparison)		5.47_a	6.85_a	6.10_a
			d	-.27	-.30	-.51
	Larger	No		5.63_a	6.79_a	6.13_a
		Yes (favourable comparison)		5.85_a	7.00_a	6.20_a
			d	.10	.04	-.19

Note. Parameters with different subscripts are statistically significant at $p < .05$ level. Cohen's d effect size was calculated by dividing the difference between scores observed in social information and no-social information group by the standard deviation observed in the no-social information group.

Table 3

Means, Standard Deviations, and Zero-order Intercorrelations Between all Variables (Study 2)

	M	*SD*	1	2	3	4	5	6	7	8
1. Induced achievement goals	_	_	1							
2. Mastery goals[1]	3.94	.52	.00	1						
3. Performance goals[1]	3.47	.72	.05	-.14*	1					
4. Unfavourable contrast	_	_	.00	-.04	.04	1				
5. Favourable contrast	_	_	-.01	.02	.02	-.50**	1			
6. Competence	4.40	1.11	.02	.03	.04	.33**	.04	1		
7. Happiness	3.75	3.83	.11	.06	.06	.40**	.09	.65**	1	
8. Self-esteem	6.54	1.27	.03	.07	.03	.08	-.10	.26**	.24**	1

Note. *p<.05, **p<.01. Self-set goals[1]

Table 4

Hierarchical Regression Analysis Describing Effects of Achievement Goals and Social Information on Dependent Variables (Study 2)

	Competence		Happiness with performance	
Variable	Step 1	Step 2	Step 1	Step 2
Intercept	4.40	4.40	3.73	3.72
Induced goals	.02	-.01	.47*	.37
Mastery goals	-.01	-.00	.22	.27
Performance goals	.02	.04	-.02	.02
Unfavourable social information	.55*	.58*	2.45*	2.55*
Favourable social information	.37*	.37*	1.52*	1.59*
Gender	-.02	-.03	.46	.44
Age	-.10	-.10	-.35	-.37
Self-esteem	.30*	.29*	.84*	.80*
Mastery goals x unfavourable social information		.12		.25
Mastery goals x favourable social information		.02		-.28
Performance goals x unfavourable social information		.25*		.63
Performance goals x favourable social information		.20		.45
Induced goals x unfavourable social information		-.12		-.52
Induced goals x favourable social information		-.01		-.52
SSR	160.56	152.38	1668.79	1582.98
ΔF	6.38**	1.46	11.01**	1.49
R^2	.23	.27	.34	.37

Note. The term SSR represents that sum of standardised residuals. The term *ΔF* indicates the value from the incremental *F*-test. Parameters with an asterisk are statistically significant at $p < .05$ level. *F*-values greater at 3.92 are statistically significant at $p < .002$ level. *F*-values greater than 2.92 are statistically significant at $p < .01$ level.

Table 5

Sum of Standardised Residuals and Incremental F-Values for Constrained Discrepancy Models that Tested the Social Comparison Hypothesis (Study 2)

	Mastery goals		Performance goals	
	Unfavourable normative information	Favourable normative information	Unfavourable normative information	Favourable normative information
Competence	.32	.01	.84	.73
	153.44	152.39	159.43	157.75
	1.12	.01	7.16*	5.51*
Happiness with performance	1.79	.13	4.68	3.05
	1619.75	1583.24	1699.27	1681.37
	3.68*	.03	11.09*	9.48*

Note. In each cell, the coefficients that describe social comparison effects are presented on the top row, the sum of standardised residuals on the middle row, and the incremental *F*-values on the bottom row. Parameters with an asterisk are statistically significant and suggest that the null hypothesis of no social comparison effect is rejected at $p < .05$ level. *F*-values greater than 3.92 are statistically significant at $p < .002$ level. *F*-values greater than 2.92 are statistically significant at $p < .01$ level.

Table 6

Mean Scores Associated with a Discrepancy Model that Describes Social Comparison Effects of Achievement Goals on Perceptions of Competence and Happiness with Performance (Study 2)

	Mastery goals			Performance goals		
	Unfavourable normative information	No normative information	Favourable normative information	Unfavourable normative information	No normative information	Favourable normative information
Competence	4_a	4.63_a	4.33_a	3.64_a	4.59_b	5.21_c
Happiness with performance	2.43_a	5.88_b	4.35_b	$-.09_a$	3.48_b	6.27_c

Note. Parameters with a different subscript are statistically significant at $p < .05$.

Table 7

Means, Standard Deviations, and Correlations Among Study Variables (Study 3)

	M	*SD*	1	2	3	4	5	6	7	8
1. Induced goals	_	_	1							
2.Mastery goals	3.61	.76	.36*	1						
3. Performance goals	3.21	1.03	-.49*	-.36*	1					
4. Unfavourable social information	_	_	-.01	.05	.03	1				
5. Favourable social information	_	_	.01	.01	-.06	-.50*	1			
6. Perceived competence	4.13	1.33	-.03	.18*	.01	.26*	.23*	1		
7. Happiness with performance	3.09	4.05	.02	.15*	-.09	.42*	.21*	.76*	1	
8. Self esteem	6.55	1.34	-.09	-.04	.04	.03	-.15*	.21*	.11	1

Note. Correlations with an asterisk are statistically significant at $p < .05$ level.

Table 8

Hierarchical Regression Analysis Describing Effects of Achievement Goals and Social Information on Dependent Variables (Study 3)

	Competence		Happiness with performance	
Variable	Step 1	Step 2	Step 1	Step 2
Intercept	4.37	4.38	3.58	3.55
Induced goals	-.05	-.05	-.18	-.16
Mastery goals	.27*	.29*	.51*	.56*
Performance goals	.08	.07	-.23	-.26
Unfavourable social information	.84*	.85*	3.50*	3.53*
Favourable social information	.86*	.89*	2.93*	3.01*
Gender	-.33	-.32	-.69	-.56
Age	-.01	.04	.28	.35
Self-esteem	.37*	.39*	.73*	.74*
Mastery goals x unfavourable social information		.10		.36
Mastery goals x favourable social information		-.16		.16
Performance goals x unfavourable social information		.13		.81*
Performance goals x favourable social information		.29*		1.47*
Induced goals x unfavourable social information		-.19		-.40
Induced goals x favourable social information		.04		-.00
SSR	226.16	207.77	1734.00	1504.69
ΔF	13.08*	2.70*	21.07*	4.65*
R^2	.36	.41	.47	.54

Note. The term SSR represents that sum of standardised residuals. The term *ΔF* indicates the value from the incremental *F*-test. Parameters with an asterisk are statistically significant at $p < .05$ level. *F*-values greater at 3.92 are statistically significant at $p < .002$ level. *F*-values greater than 2.92 are statistically significant at $p < .01$ level.

Table 9

Sum of Standardised Residuals and Incremental F-Values for Constrained Discrepancy Models that Tested the Social Comparison Hypothesis (Study 3)

	Mastery goals		Performance goals	
	Unfavourable normative information	Favourable normative information	Unfavourable normative information	Favourable normative information
Competence	.79	-.01	.91	1.79
	214.16	207.78	215.97	241.08
	5.60*	.01	7.18*	29.18*
Happiness with performance	2.63	.39	4.43	5.63
	1573.47	1506.56	1708.13	1837.31
	8.32*	.23	24.61*	40.23*

Note. In each cell, the coefficients that describe social comparison effects are presented on the top row, the sum of standardised residuals on the middle row, and the incremental *F*-values on the bottom row. Parameters with an asterisk are statistically significant and suggest that the null hypothesis of no social comparison effect is rejected at $p < .05$ level. *F*-values greater than 3.92 are statistically significant at $p < .002$ level. *F*-values greater than 2.92 are statistically significant at $p < .01$ level.

Table 10

Mean Scores Associated with a Discrepancy Model that Describes Social Comparison Effects of Achievement Goals on Perceptions of Competence and Happiness with Performance (Study 3)

	Mastery goals			Performance goals		
	Unfavourable normative information	No normative information	Favourable normative information	Unfavourable normative information	No normative information	Favourable normative information
Competence	4.83_a	5.62_b	5.61_b	2.15_a	3.06_b	4.85_c
Happiness with performance	4.80_a	7.43_b	7.82_b	-3.72_a	0.71_b	6.34_c

Note. Parameters with a different subscript are statistically significant at $p < .05$.

Table 11

Means, Standard Deviations, and Zero-order Intercorrelations Between Psychological Variables (Study 4)

	M	*SD*	1	2	3	4	5
1. Mastery goals	3.65	.73	1.0				
2. Performance goals	3.66	.83	-.14	1.0			
3. Comparative judgment	3.18	.91	.17*	.07	1.0		
4. Perceptions of competence	4.60	1.23	.34*	.08	.62*	1.0	
5. Ability	633.81	63.59	-.01	.07	.14	.28*	1.0

Note. Correlations with an asterisk are statistically significant at $p < .05$ level.

Table 12

Hierarchical Regression Analysis Predicting Perceptions of Competence (Study 4)

Variables	Competence
Intercept	4.59
Mastery goals	.27*
Performance goals	.09
Comparative evaluations	.65*
Mastery goals x Comparative evaluations	-.08
Performance goals x Comparative evaluations	.05
Ability	.25*
SSE	100.95
R^2	.50*
F	21.37

Note. Parameters are unstandardized egression coefficients. Parameters with an asterisk are statistically significant at $p < .05$. The term SSE refers to the sum of squared residuals. The term ΔF represents the incremental *F*-test.

Table 13

Comparisons Between Constraint and Unconstraint Models (Study 4)

Model	SSE	R^2	ΔF
Unconstraint	100.95	.50	
Constraint model 1 (No link between mastery goals and social comparison)	102.88	.49	2.47*
Constraint model 2 (No link between performance goals and social comparison)	115.53	.43	18.63*

Note. The unconstraint model was estimated through the hierarchical regression analysis. The term SSE refers to the sum of squared residuals. The term ΔF represents the incremental F test.

Table 14

Mean Scores Associated with a Discrepancy Model that Describes Social Comparison Effects of Achievement Goals on Perceptions of Competence (Study 4)

	Mastery goals			Performance goals		
	Unfavourable normative information	Neutral information	Favourable normative information	Unfavourable normative information	Neutral information	Favourable normative information
Competence	4.17_a	4.97_b	5.77_c	2.40_a	4.22_b	5.03_c

Note. Parameters with a different subscript are statistically significant at $p < .05$.

Appendix A

Clarification for Means and Constrained Discrepancy Models

Estimation of mean levels of competence and happiness with task performance

In this section, derivation of the set of equations used to estimate mean levels of competence and mean levels of happiness with task performance are explained. In Equation 5, the linear combination of coefficients on unfavourable (i.e., $b_4 + M(b_9 - b_{11})$) and favourable social information (i.e., $b_5 + M(b_{10} - b_{12})$) are simple slopes that capture effects of unfavourable and favourable social information on the dependent variables among participants who exhibit a 'pure' mastery or a 'pure' performance goal profile. The intercept and linear combination of coefficients on the term that represents mastery goals (i.e., $b_0 + M(b_2 - b_3)$) is the simple intercept of the equation. The remaining terms in Equation 5 are covariates that control for main and interactive effects of age, gender, self-esteem and induced goals on perceptions of competence or happiness with task performance. Given this, the general equation that captures effects of social information among the 'pure' mastery or the 'pure' performance-orientated participants can be written as:

$$PC \text{ or } HT = (b_4 + M(b_9 - b_{11}))\, UNI + (b_5 + M(b_{10} - b_{12}))FNI + (b_0 + M(b_2 - b_3)) \quad (5.1)$$

In Equation 5.1, a high (positive value) on the term that represents mastery goals (i.e., M = 2) yields an equation that describes effects of favourable or unfavourable normative information among individuals who exhibit a 'pure' mastery goal profile. The reason for this is that a positive value on the mastery term (M = 2) yields an equation in which the regression coefficients that describe the main effects of performance goals (i.e., b_3) or effects of interactions between performance goals and normative information (i.e., b_{11} or b_{12}) are subtracted from the coefficients that describe effects associated with mastery goals or normative information (i.e., b_2, b_4 or b_5). This is shown by solving Equation 5.1 for high values of mastery goals (M= 2) which yields:

$$PC \text{ or } HT = UNI(b_4 + 2b_9 - 2b_{11}) + FNI(b_5 + 2b_{10} - 2b_{12}) + (2b_2 - 2b_3 + b_0) \quad (5.2)$$

Likewise, the equation that describes effects of unfavourable or favourable normative information among the 'pure' performance-orientated individuals can be identified by solving Equation 5.1 for low values of mastery goals (i.e., M = -2). Solving Equation 5.1 for M = -2 yields:

$$PC \text{ or } HT = UNI(b_4 - 2b_9 + 2b_{11}) + FNI(b_5 - 2b_{10} + 2b_{12}) + (2b_3 - 2b_2 + b_0) \quad (5.3)$$

Equation 2.3 describes effects associated with the 'pure' performance goal profile because it is the main effects of mastery goals or interactions between mastery goals and normative information (i.e., b_9 and b_{10}) that are now subtracted from the coefficients that describe main or interactive effects of normative information or performance goals. In contrast, the model implied by Equation 4 does not estimate effects associated with a 'pure' performance goal profile because it does not subtract effects associated with mastery goals from effects associated with performance goals or normative information.

In the current study, Equations 5.2 and 5.3 were adopted to estimate mean levels of happiness with task performance and mean levels of competence associated with the 'pure' mastery or the 'pure' performance goal profiles in conditions of favourable or unfavourable social information. This was accomplished by substituting the regression coefficients in Equations 5.2 and 5.3 with unstandardised coefficients that we estimated from the hierarchical regression analysis and by solving these equations for values that represented membership in the favourable (FNI = 1), unfavourable (UNI = -1) or no-normative information conditions (UNI = 1).

Specification of the constrained discrepancy models

In Equations 5.2 and 5.3, the combination of coefficient on favourable or unfavourable social information capture effects of different types of normative information on perceptions of competence or happiness with task performance. Given this, it is possible to formally test whether observed differences in mean levels of competence or mean levels of happiness with performance are statistically significant by estimating a series of constrained discrepancy models that assume

these coefficients to equal zero. For instance, the null hypothesis that unfavourable or favourable normative information did not undermine levels of competence among the 'pure' mastery-orientated participants was examined by assuming the combination of coefficients on unfavourable or favourable normative information in Equation 5.2 to equal zero or:

$$b_4 + 2b_9 - 2b_{11} = 0 \quad (5.4)$$

$$b_5 + 2b_{10} - 2b_{12} = 0 \quad (5.5)$$

Analogously, the null hypothesis that unfavourable or favourable normative information did not undermine levels of competence among the 'pure' performance-orientated participants was tested by assuming the combination of coefficients on unfavourable or favourable normative information in Equation 5.3 to equal zero or:

$$b_4 - 2b_9 + 2b_{11} = 0 \quad (5.6)$$

$$b_5 - 2b_{10} + 2b_{12} = 0 \quad (5.7)$$

Following estimation of these constrained models incremental *F*-tests were used to formally test whether the constrained models produced a significant amount of misfit (larger residual variance) relative to the unconstrained model implied by Equation 4 (Edwards & Parry, 1993). The hypotheses were supported if the incremental *F*- tests were statistically significant and the residual variances of the constrained models were larger than the residual variance of the unconstrained model. Under this scenario, it was concluded that observed differences in levels of competence or happiness with task performance were statistically significant.

Appendix B

Ethical Approval (Study 1)

Curtin University

Memorandum

To	Sviatlana Kamarova
From	Moira O'Connor
Subject	Approval for form C ethics
Date	4 June 2013
Copy	Nikos Chatzisarantis

Office of Research and Development

Human Research Ethics Committee

Telephone 9266 2784
Facsimile 9266 3793
Email hrec@curtin.edu.au

Thank you for your "Form C Application for Approval of Research with Low Risk (Ethical Requirements)" for the project titled *"On the social nature of competence evaluations: Do task involved individuals compare themselves with others?"*. On behalf of the Human Research Ethics Committee, I am authorised to inform you that the project is approved.

Approval of this project is for a period of 4 years **4th June 2013** to **4th June 2017**.

Your approval has the following conditions:

(i) Annual progress reports on the project must be submitted to the Ethics Office.

(ii) It is your responsibility, as the researcher, to meet the conditions outlined above and to retain the necessary records demonstrating that these have been completed.

The approval number for your project is **PSYCH SP 2013-09**. Please quote this number in any future correspondence. If at any time during the approval term changes/amendments occur, or if a serious or unexpected adverse event occurs, please advise me immediately.

Dr Moira O'Connor
Senior Research Fellow
School of Psychology and Speech Pathology | Faculty of Health Sciences

Curtin University
Tel | +61 8 9266 3450
Mobile | 0415 338 546

Email | m.oconnor@curtin.edu.au

Appendix C

Ethical Approval (Study 2)

Curtin University

Memorandum

To	Professor Martin Hagger, Psychology
From	Professor Peter O'Leary, Chair Human Research Ethics Committee
Subject	Protocol Approval **HR 53/2014**
Date	8 April 2014
Copy	Ms Sviatlana Kamarova, Psychology Professor Nikos Chatzisarantis, Psychology

Office of Research and Development
Human Research Ethics Committee

TELEPHONE 9266 2784
FACSIMILE 9266 3793
EMAIL hrec@curtin.edu.au

Thank you for your application (4661) submitted to the Human Research Ethics Committee (HREC) for the project titled "*On the social nature of competence evaluations: Do task-involved individuals compare themselves to others?*". Your application has been reviewed by the HREC and is **approved**.

- You have ethics clearance to undertake the research as stated in your proposal.
- The approval number for your project is **HR 53/2014.** *Please quote this number in any future correspondence*.
- Approval of this project is for a period of 4 years **08-04-2014** to **08-04-2018**.
- Your approval has the following conditions:
  (i) Annual progress reports on the project must be submitted to the Ethics Office.
- **It is your responsibility, as the researcher, to meet the conditions outlined above and to retain the necessary records demonstrating that these have been completed.**

Applicants should note the following:

It is the policy of the HREC to conduct random audits on a percentage of approved projects. These audits may be conducted at any time after the project starts. In cases where the HREC considers that there may be a risk of adverse events, or where participants may be especially vulnerable, the HREC may request the chief investigator to provide an outcomes report, including information on follow-up of participants.

The attached **Progress Report** should be completed and returned to the Secretary, HREC, C/- Office of Research & Development annually.

Our website https://research.curtin.edu.au/guides/ethics/non_low_risk_hrec_forms.cfm contains all other relevant forms including:

- Completion Report (to be completed when a project has ceased)
- Amendment Request (to be completed at any time changes/amendments occur)
- Adverse Event Notification Form (If a serious or unexpected adverse event occurs)

Yours sincerely

Professor Peter O'Leary
Chair Human Research Ethics Committee

Appendix D

Ethical Approval: Amendment (Study 3)

Curtin University

Memorandum

To	Professor Martin Hagger, Psychology
From	Professor Peter O'Leary, Chair Human Research Ethics Committee
Subject	Protocol Amendment Approval **HR 53/2014**
Date	24 July 2014
Copy	Ms Sviatlana Kamarova, Psychology Professor Nikos Chatzisarantis, Psychology

Office of Research and Development
Human Research Ethics Committee

TELEPHONE 9266 2784
FACSIMILE 9266 3793
EMAIL hrec@curtin.edu.au

Thank you for keeping us informed of the progress of your research. The Human Research Ethics Committee acknowledges receipt of your progress report, indicating modifications / changes, for the project *"On the social nature of competence evaluations: Do task-involved individuals compare themselves to others?"*. Your application has been ***approved***.

The Committee notes the following amendments have been approved:

1. Suggested additional experiment to study 2 (n=400). It will adopt the [procedure similar to hypothetical scenarios of Study 1 and the methodology of study 2 with a difference of average being presented as a greater number. Also proposed, the use of an online design with inquisit software in order to reach for larger population and replicate previous results. Moreover, the plan is to extend the experiment by adding measures of intrinsic motivation adopted from SRQ-A (Academic Self-Regulation Questionnaire; Ryan and Connell, 1989) for improvement in scores on academic test, a survey question on perception of the improvement and an open question on a future goal for improvement.

Approval for this project remains until **08-04-2018.**

Your approval number remains **HR 53/2014,** please quote this number in any further correspondence regarding this project.

Yours sincerely

Professor Peter O'Leary
Chair Human Research Ethics Committee

Appendix E

Ethical Approval (Study 4)

Curtin Universi

Memorandum

To	Professor Nikos Chatzisarantis, Psychology and Speech Pathology
From	Professor Peter O'Leary, Chair Human Research Ethics Committee
Subject	Protocol Approval **HR 178/2014**
Date	29 August 2014
Copy	Ms Sviatlana Kamarova Psychology and Speech Pathology

Office of Research and Developmen
Human Research Ethics Commit

TELEPHONE 9266 2784
FACSIMILE 9266 3793
EMAIL hrec@curtin.edu.au

Thank you for providing the additional information for the project titled "*A field study of the Social Nature of Competence Evaluations: Do and How Task-Oriented Studies Compare?*". The information you have provided has satisfactorily addressed the queries raised by the Committee. Your application is now **approved**.

- You have ethics clearance to undertake the research as stated in your proposal.
- The approval number for your project is **HR 178/2014.** *Please quote this number in any future correspondence*.
- Approval of this project is for a period of four years **02-09-2014** to **02-09-2018**.
- Your approval has the following conditions:
  i) Annual progress reports on the project must be submitted to the Ethics Office.
- **It is your responsibility, as the researcher, to meet the conditions outlined above and to retain the necessary records demonstrating that these have been completed.**

Applicants should note the following:

It is the policy of the HREC to conduct random audits on a percentage of approved projects. These audits may be conducted at any time after the project starts. In cases where the HREC considers that there may be a risk of adverse events, or where participants may be especially vulnerable, the HREC may request the chief investigator to provide an outcomes report, including information on follow-up of participants.

The attached **Progress Report** should be completed and returned to the Secretary, HREC, C/- Office of Research & Development annually.

Our website https://research.curtin.edu.au/guides/ethics/non_low_risk_hrec_forms.cfm contains all other relevant forms including:

- Completion Report (to be completed when a project has ceased)
- Amendment Request (to be completed at any time changes/amendments occur)
- Adverse Event Notification Form (If a serious or unexpected adverse event occurs)

Yours sincerely

Professor Peter O'Leary
Chair Human Research Ethics Committee

Appendix F

Ethical Approval: Amendment (Study 4)

MEMORANDUM

Curtin University

To:	Professor Nikos Chatzisarantis
	Psychology and Speech Pathology
CC:	
From	Professor Peter O'Leary, Chair HREC
Subject	Amendment approval
	Approval number: HR178/2014
Date	17-Feb-15

Office of Research and Development
Human Research Ethics Office

TELEPHONE 9266 2784
FACSIMILE 9266 3793
EMAIL hrec@curtin.edu.au

Thank you for submitting an amendment to the Human Research Ethics Office for the project:

HR178/2014 A field study of the Social Nature of Competence Evaluations: Do and How Task-Oriented Studies Compare?

The Human Research Ethics Office approves the amendment to the project.

Amendment number: HR178/2014/AR1

Approval date: 17-Feb-15

The following amendments were approved:

Two additional measures will be included: Revised Achievement Goals measure and Attitude Strength measure

Please ensure that all data are stored in accordance with WAUSDA and Curtin University Policy.

Yours sincerely,

Professor Peter O'Leary
Chair, Human Research Ethics Committee

Appendix G

Ethical Approval: Catholic Education Office (Study 4)

CATHOLIC EDUCATION
OFFICE OF WESTERN AUSTRALIA
EXECUTIVE DIRECTOR OF CATHOLIC EDUCATION

20 October 2014

Professor Nikos Chatziasarntis
Curtin University
School of Psychology and Speech Pathology
GPO Box U1987
PERTH WA 6845

Dear Professor Chatziasarntis

RE: A FIELD STUDY OF THE SOCIAL NATURE OF COMPETENCE EVALUATIONS: DO AND HOW TASK-ORIENTED STUDENTS COMPARE?

Thank you for your completed application received 3 September 2014, whereby this study will provide empirical evidence established in natural settings on whether task oriented students compare themselves to others and what types of social standards, if any they attend to.

I give in principle support for the selected Catholic schools in Western Australia to participate in this valuable study. However, consistent with the Catholic Education Office of Western Australia (CEOWA) policy, participation in your research project will be the decision of the individual principal and staff members. A copy of this letter must be provided to principals when requesting their participation in the research.

Responsibility for quality control of ethics and methodology of the proposed research resides with the institution supervising the research. The CEOWA notes that Curtin University Human Research Ethics Committee has granted permission for this research project until 2 September 2018 (Approval Number: HR 178/2014).

Any changes to the proposed methodology will need to be submitted for CEOWA approval prior to implementation. The focus and outcomes of your research project are of interest to the CEOWA. It is therefore a condition of approval that the research findings of this study are forwarded to the CEOWA.

Further enquiries may be directed to Jane Gostelow at gostelow.jane@ceo.wa.edu.au or (08) 6380 5118.

I wish you all the best with your research.

Yours sincerely

Dr Tim McDonald

Appendix H

Information sheet, Consent Form, Debrief sheet (Study 1)

School of Psychology and Speech Pathology

Thank you for your interest in this project. Just to remind you, the data you provide in the course of this project will be treated in the strict confidence and will be used for research purposes only. Furthermore, your name will be not disclosed and your data will be anonymous in any outputs (e.g., reports, research articles) that arise from this project. No other person outside the research team will have access to the data.

CONSENT FORM for participants
(The participant should complete the whole of this sheet himself/herself.)

Title of Project: A Hypothetical Scenarios Study

Name of Researchers: Sviatlana Kamarova, Nikos Chatzisarantis, Martin Hagger

Please tick boxes

1. I confirm that I have read and understand the information sheet for the above study ☐
2. I have had opportunities to ask questions and my questions have fully been answered. ☐
3. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. ☐
4. I have received enough information about the study. ☐
5. I agree to take part in the above study. ☐

"This study has been explained to me to my satisfaction, and I agree to take part. I understand that I am free to withdraw at any time."

_____	_____	_____
Name of Participant (in block capitals)	Date	Signature

I have explained the study to the above participant and he/she has agreed to take part.

_____	_____	_____
Name of Researcher	Date	Signature

School of Psychology and Speech Pathology

Participant Information Sheet

Title of Project: A Hypothetical Scenarios Study

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being conducted and what it will involve. Please take the time to read the following information carefully and decide if you want to take part in this study. Please feel free to ask if there is anything that is not clear or if you would like more information.

This is not a study that tests your real ability. It is a study that examines tendencies to evaluate a hypothetical situation when your academic ability is tested. In the study you will be asked to participate in a laboratory-based task for an interval of time that requires reading the scenario assigned to you and imagining the situation described then you will also be asked to complete some brief questionnaire.

The study should take no longer than 20 minutes to complete. If you have any questions, please do not hesitate to ask.

Do I have to take part?

Participation in this study is totally voluntary; you are under no obligation to take part in this study. The data that you provide will be very useful for our study. If you decide to take part you will be given this information sheet to keep and will be asked to sign a consent form. You have the right to withdraw from the study at any time and without giving a reason.

For students of *Psychological Science 2013* participation in this study is worth 2 credit points. When you have completed the study you will be handed a receipt slip with your student ID indicating that you have participated in this study and the credit points awarded. Your identification number will not be linked to your responses in the survey; we will only use the number to award credit points. The researcher will then award your points on the Curtin Research Participant Pool (Sona) System. Please note it may take up to 48 hours for credit points to be processed.

What happens to the information I provide?

Participation in this study guarantees the confidentiality of the information you provide. No one apart from the researcher and principal investigator (names given below) will have access to the information you provide. Your consent form

will be kept separate from the observations collected during the course of the study. Data will be stored for a maximum of five years in accordance with Curtin University's data storage policy. Once the data is analysed a report of the findings may be submitted for publication. Only broad trends will be reported and it will not be possible to identify any individuals. A summary of the results will be available from the researcher on request once the study is complete.

If you have any questions or require any further information, please contact the researcher or research supervisors

Name of principal investigator: Sviatlana Kamarova

E-mail: *sviatlana.kamarova@curtin.edu.ac.au*

Name of research supervisor: Professor Nikos Chatzisarantis

E-mail: *nikos.chatzisarantis@curtin.edu.au*

Name of research supervisor: Professor Martin Hagger

E-mail: *martin.hagger@curtin.edu.au*

Telephone: 9266 2215

Thank you for taking the time to read this Participant Information Form and considering taking part in the study. This Participant Information Form is for you to keep. If you do wish to take part in the study, please sign the consent form.

We hope that you feel able to help us with this study.

This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number PSYCH SP 2013-09). If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845, by telephoning 9266 2784 or emailing hrec@curtin.edu.au

Curtin University

School of Psychology and Speech Pathology

Debrief sheet

Title of project: A Hypothetical Scenarios Study

Name of Researcher: Sviatlana Kamarova, Nikos Chatzisarantis, Martin Hagger

Name of Principal Investigator: Sviatlana Kamarova

Thank you for taking part in this study. Please read the following information carefully. If there is anything you would like to discuss in relation to this study, please feel free to do so. If you would like to withdraw your results from our experiment, please contact one of the researchers.

The purpose of this study is to examine whether task-oriented people compare themselves to others and the impact of comparisons on competence evaluations, happiness and effort. This experiment focuses on a hypothetical situation where individuals improve a skill but then can be provided with social information or not.

It is important to stress at this juncture that the feedback as well as the manipulated situation is not true but false. This feedback does not relate to your real life academic abilities. We used either positive or negative feedback in a hypothetical way so that we were able to induce feelings of loss or feelings related to gains.

Now that you know that we did not fully reveal the purpose of the experiment at the beginning of the study, do you wish to withdraw your information from the study? This is entirely voluntary and up to you, it is not part of the study, it is for ethical reasons. Please let the researcher know if you wish to do so.

Thank you again for taking part. If you have any further questions or concerns, please speak to the experimenter and he will endeavour to help you. If you would like to obtain a summary of the results please contact the researchers.

Name of Principal Investigator: Sviatlana Kamarova

E-mail: *sviatlana.kamarova@curtin.edu.au*

Name of Research Supervisor 1: Professor Nikos Chatzisarantis

E-mail: *nikos.chatzisarantis@curtin.edu.au*

Name of Research Supervisor 2: Professor Martin Hagger

E-mail: *martin.hagger@curtin.edu.au*

Appendix I

Information sheet, Consent Form, Debrief sheet (Study 2)

School of Psychology and Speech Pathology

Thank you for your interest in this project. Just to remind you, the data you provide in the course of this project will be treated in the strict confidence and will be used for research purposes only. Furthermore, your name will be not disclosed and your data will be anonymous in any outputs (e.g., reports, research articles) that arise from this project. No other person outside the research team will have access to the data.

CONSENT FORM for participants
(The participant should complete the whole of this sheet himself/herself.)

Title of Project: An Attention Study

Name of Researchers: Sviatlana Kamarova, Nikos Chatzisarantis, Martin Hagger

Please tick boxes

6. I confirm that I have read and understand the information sheet for the above study ☐

7. I have had opportunities to ask questions and my questions have fully been answered. ☐

8. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. ☐

9. I have received enough information about the study. ☐

10. I agree to take part in the above study. ☐

"This study has been explained to me to my satisfaction, and I agree to take part. I understand that I am free to withdraw at any time."

_____ _____ _____

Name of Participant (in block capitals) | Date | Signature

I have explained the study to the above participant and he/she has agreed to take part.

_____	_____	_____
Name of Researcher	Date	Signature

School of Psychology and Speech Pathology

Participant Information Sheet

Title of Project: An Attention Study

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being conducted and what it will involve. Please take the time to read the following information carefully and decide if you want to take part in this study. Please feel free to ask if there is anything that is not clear or if you would like more information.

This is not a study that tests your attention. It is a study that examines tendencies to sustain attention on a target for an interval of time. In the study you will be asked to participate in a laboratory-based task for an interval of time that requires figure tracing using computer mouse. The task will be challenging. You will also be asked to complete some brief questionnaires.

The study should take no longer than 30 minutes to complete. If you have any questions, please do not hesitate to ask.

Do I have to take part?

Participation in this study is totally voluntary; you are under no obligation to take part in this study. The data that you provide will be very useful for our study. If you decide to take part you will be given this information sheet to keep and will be asked to sign a consent form. You have the right to withdraw from the study at any time and without giving a reason.

For students of *Psychological Science 2013/4* participation in this study is worth 2 credit points. When you have completed the study you will be handed a receipt slip with your student ID indicating that you have participated in this study and the credit points awarded. Your identification number will not be linked to your responses in the survey; we will only use the number to award credit points. The researcher will then award your points on the Curtin Research Participant Pool (Sona) System. Please note it may take up to 48 hours for credit points to be processed.

What happens to the information I provide?

Participation in this study guarantees the confidentiality of the information you provide. No one apart from the researcher and principal investigator (names given below) will have access to the information you provide. Your consent form will be kept separate from the observations collected during the course of the

study. Data will be stored for a maximum of five years in accordance with Curtin University's data storage policy. Once the data is analysed a report of the findings may be submitted for publication. Only broad trends will be reported and it will not be possible to identify any individuals. A summary of the results will be available from the researcher on request once the study is complete.

If you have any questions or require any further information, please contact the researcher or research supervisors

Name of principal investigator: Sviatlana Kamarova

E-mail: *sviatlana.kamarova@curtin.edu.ac.au*

Name of research supervisor: Professor Nikos Chatzisarantis

E-mail: *nikos.chatzisarantis@curtin.edu.au*

Name of research supervisor: Professor Martin Hagger

E-mail: *martin.hagger@curtin.edu.au*

Telephone: 9266 2215

Thank you for taking the time to read this Participant Information Form and considering taking part in the study. This Participant Information Form is for you to keep. If you do wish to take part in the study, please sign the consent form.

We hope that you feel able to help us with this study.

This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR53/2014 xxxx). If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845, by telephoning 9266 2784 or emailing hrec@curtin.edu.au

School of Psychology and Speech Pathology

Debrief sheet

Title of project: An Attention Study

Name of Researcher: Sviatlana Kamarova, Nikos Chatzisarantis, Martin Hagger

Name of Principal Investigator: Sviatlana Kamarova

Thank you for taking part in this study. Please read the following information carefully. If there is anything you would like to discuss in relation to this study, please feel free to do so. If you would like to withdraw your results from our experiment, please contact one of the researchers.

The purpose of this study is to examine whether task-involved people compare themselves to others and the impact of comparisons on competence evaluations and persistence in a monotonous task. This experiment focuses on a situation where individuals improve a skill more than their peers and their larger improvement allows them surpass their peers.

It is important to stress at this juncture that the feedback we gave you about how well you were doing at the figure tracing task is not true but false. This feedback does not mean that your attention is good or bad. We used either positive or negative feedback so that we were able to induce feelings of loss or feelings related to gains.

Now that you know that we did not fully reveal the purpose of the experiment at the beginning of the study, do you wish to withdraw your information from the study? This is entirely voluntary and up to you, it is not part of the study, it is for ethical reasons. Please let the researcher know if you wish to do so.

Thank you again for taking part. If you have any further questions or concerns, please speak to the experimenter and he will endeavour to help you. If you would like to obtain a summary of the results please contact the researchers.

Name of Principal Investigator: Sviatlana Kamarova

E-mail: *sviatlana.kamarova@curtin.edu.au*

Name of Research Supervisor 1: Professor Nikos Chatzisarantis

E-mail: *nikos.chatzisarantis@curtin.edu.au*

Name of Research Supervisor 2: Professor Martin Hagger

E-mail: *martin.hagger@curtin.edu.au*

Appendix J

Information Sheet, Consent Form, Debrief Sheet (Study 3)

Curtin University

School of Psychology and Speech Pathology

Thank you for your interest in this project. Just to remind you, the data you provide in the course of this project will be treated in the strict confidence and will be used for research purposes only. Furthermore, your name will be not disclosed and your data will be anonymous in any outputs (e.g., reports, research articles) that arise from this project. No other person outside the research team will have access to the data.

CONSENT FORM for participants
(The participant should complete the whole of this sheet himself/herself.)

Title of Project: A Circles Task Study

Name of Researchers: Sviatlana Kamarova, Nikos Chatzisarantis, Martin Hagger

Please tick boxes

1. I confirm that I have read and understand the information sheet for the above study ☐
2. I have had opportunities to ask questions and my questions have fully been answered. ☐
3. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. ☐
4. I have received enough information about the study. ☐
5. I agree to take part in the above study. ☐

"This study has been explained to me to my satisfaction, and I agree to take part. I understand that I am free to withdraw at any time."

_____	_____	_____
Name of Participant (in block capitals)	Date	Signature

I have explained the study to the above participant and he/she has agreed to take part.

_____	_____	_____
Name of Researcher	Date	Signature

School of Psychology and Speech Pathology

Participant Information Sheet

Title of Project: A Circle Task Study

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being conducted and what it will involve. Please take the time to read the following information carefully and decide if you want to take part in this study. Please feel free to ask if there is anything that is not clear or if you would like more information.

This is a study that offers you to participate in a task that develops creativity. In the study you will be asked to participate in a laboratory-based task that requires you to generate ideas by drawing and adding lines to the circles provided to you pictures using one or more circles each time, draw original and detailed pictures. There are no 'right' or 'wrong' pictures. The tasks will be challenging. You will also be asked to complete some brief questionnaires.

The study should take no longer than 30 minutes to complete. If you have any questions, please do not hesitate to ask.

Do I have to take part?

Participation in this study is totally voluntary; you are under no obligation to take part in this study. The data that you provide will be very useful for our study. If you decide to take part you will be given this information sheet to keep and will be asked to sign a consent form. You have the right to withdraw from the study at any time and without giving a reason.

For students of *Psychological Science 2014* participation in this study is worth 3 credit points. When you have completed the study you will be handed a receipt slip with your student ID indicating that you have participated in this study and the credit points awarded. Your identification number will not be linked to your responses in the survey; we will only use the number to award credit points. The researcher will then award your points on the Curtin Research Participant Pool (Sona) System. Please note it may take up to 48 hours for credit points to be processed.

What happens to the information I provide?

Participation in this study guarantees the confidentiality of the information you provide. No one apart from the researcher and principal investigator (names given below) will have access to the information you provide. Your consent form will be kept separate from the observations collected during the course of the

study. Data will be stored for a maximum of five years in accordance with Curtin University's data storage policy. Once the data is analysed a report of the findings may be submitted for publication. Only broad trends will be reported and it will not be possible to identify any individuals. A summary of the results will be available from the researcher on request once the study is complete.

If you have any questions or require any further information, please contact the researcher or research supervisors

Name of principal investigator: Sviatlana Kamarova

E-mail: sviatlana.kamarova@curtin.edu.ac.*au*

Name of research supervisor: Professor Nikos Chatzisarantis

E-mail: *nikos.chatzisarantis@curtin.edu.au*

Name of research supervisor: Professor Martin Hagger

E-mail: martin.hagger@curtin.edu.au

Telephone: 9266 2215

Thank you for taking the time to read this Participant Information Form and considering taking part in the study. This Participant Information Form is for you to keep. If you do wish to take part in the study, please sign the consent form.

We hope that you feel able to help us with this study.

This study has been approved by the Curtin University Human Research Ethics Committee (HR 53/2014). If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845, by telephoning 9266 2784 or emailing hrec@curtin.edu.au

School of Psychology and Speech Pathology

Debrief sheet

Title of project: A Circles Task Study

Name of Researcher: Sviatlana Kamarova, Nikos Chatzisarantis, Martin Hagger

Name of Principal Investigator: Sviatlana Kamarova

Thank you for taking part in this study. Please read the following information carefully. If there is anything you would like to discuss in relation to this study, please feel free to do so. If you would like to withdraw your results from our experiment, please contact one of the researchers.

The purpose of this study is to examine whether task-involved people compare themselves to others and the impact of comparisons on competence evaluations and persistence. The experiment addresses a situation where task-involved people improve more than others and their improvement leads to the outcome equivalent to final outcome achieved by others. Task appealing to interest and creativity was chosen for this purpose.

It is important to stress at this juncture that the feedback we gave you about how well you were doing at the Circles task (divergent thinking task) is not true but false. This feedback does not mean that your performance is good or bad. We used either positive or negative feedback so that we were able to induce feelings of improvement or feelings of stagnation.

Now that you know that we did not fully reveal the purpose of the experiment at the beginning of the study, do you wish to withdraw your information from the study? This is entirely voluntary and up to you, it is not part of the study, it is for ethical reasons. Please let the researcher know if you wish to do so.

Thank you again for taking part. If you have any further questions or concerns, please speak to the experimenter and he will endeavour to help you. If you would like to obtain a summary of the results please contact the researcher.

Name of Principal Investigator: Sviatlana Kamarova

E-mail: *sviatlana.kamarova@curtin.edu.au*

Name of Research Supervisor: Professor Nikos Chatzisarantis

E-mail: *nikos.chatzisarantis@curtin.edu.au*

Name of Research Supervisor: Professor Martin Hagger

E-mail: *martin.hagger@curtin.edu.au*

Appendix K

Consent Forms and Information Sheets for Parents and Students (Study 4)

Information Letter for High School Students

School of Psychology and Speech Pathology

Dear Student,

My name is Sviatlana Kamarova and I am from Curtin University. I would like to invite you to take part in a research project that I am doing. It is about your self-evaluations in class.

I am asking for your help with the project because I am interested in examining your self-evaluations in mathematics. I will be asking students in [number] schools in Western Australia to be involved.

What would I be asked to do?
If you agree to take part, you will be asked to fill the questionnaires at two times within a month. Maximum of 15 minutes will be required for each time of data collection.

Do I have to take part?
You are free to say yes or no. I will respect your decision whichever choice you make, and I will not question it.

Participating in this research will not affect your grades, your relationship with your teacher, or with your school.

What if I wanted to change my mind?
If you say no, but then change your mind and want to take part, contact me and I will let you know if you can still join in.

If you say yes, but then want to stop participating, that's OK. Just let your teacher or me know and you can withdraw any time.

What will happen to the information I give - is it private and confidential?
Information that identifies you will be removed from the data collected. The data is then stored securely in the cabinet and can only be accessed by researchers. The data will be stored for a minimum period of 7 years after publication. Records are destroyed immediately after this period, unless the law requires them to be held longer. This will be done by deleting the records using approved deletion software leaving no accessible trace.

After I have collected all the information for the project and analysed all of it, I intend to examine the student's motives, academic self-evaluation, and goals. I will write about what I found and then I will publish it in a journal, which is like a magazine, so that other people can read about it. When I do this, I won't write or tell anyone your name, or the names of any other students or your school.

A summary of the project will be made available to your school when it is completed. You can also ask for a copy by your class teacher. The summary should be available at the end of this year.

The information you provide for this project will be used only for this project, and will not be used in any future research without first asking you and your parents/carers if I can use it again.

Will you tell anyone what I say while I am contributing to the project?

In most situations, I will treat what you tell me as being private and confidential (I won't tell anyone unless you agree that I should). If you tell me something that I need to tell someone else because the law requires me to do so, then I will have to. I may also have to reveal something you say to me if I think that you might be being mistreated by someone. If this happens I will make sure that someone will come and talk with you about it.

Is this research approved?
The research has been approved by Human Research Ethics Committee (approval number: HR 178/2014), and has met the policy requirements of Catholic Education Office of Western Australia.

Who do I contact if I wish to talk about the project further?
Please talk about the project with your parents first. Then, if you would like to talk with me more, please contact the researcher on the number provided below. If, at any time, you wish to speak with a person who is not involved in the project about how something was handled, please contact Professor Stephan Millett, Chair, Human Research Ethics Committee (Ph: 92662784, Email: hrec@curtin.edu .au).

OK – so how do I become involved?
You have already discussed the project and what it means to take part with at least one of your parents. Now you can say for yourself.

If you **do** want to be a part of the project, the please read the next page and write your name in the space provided.

This letter is for you to keep.

(signature) (signature)
Researcher: Sviatlana Kamarova **Research Supervisor:** Professor Nikos Chatzisarantis
Phone number: 0435796165 Phone Number: 0401359502
Emails: *sviatlana.kamarova@postgrad.curtin.edu.au*,
nikos.chatzisarantis@curtin.edu.au

Consent Form Template for Lower High School Students

School of Psychology and Speech Pathology

Consent Form

- I know that I don't have to be involved in this project, but I would like to be.
- I know that I will be asking to fill the questionnaires as part of the project.
- I understand I am free to stop and withdraw from the project at any time during the study without any penalty.
- I understand that participating in this project will not affect my grades, my relationship with my teacher(s) or with my school.
- I understand that I need to sign my name in the space below, before I can be a part of the project.

Name of Participant (printed): _____

Signature of Participant: _____ Date: / /

School of Psychology and Speech Pathology

Participant Information Sheet

Title of Project: Achievement goals and self-evaluations in classroom environment

You are being invited to take part in a research study. Please take the time to read the following information about what your participation in this study would involve and why the research is being conducted before deciding to participate.

Aim

The main objective of this study is to examine your achievement goals and self-evaluations in classroom environment

What does being a participant involve?

If you choose to take part, you will be asked to complete questionnaires at two / three points in time starting today. The questions will be about your achievement goals and self-evaluations in classroom environment. The questions are all about opinions, so there is no right or wrong answer and your answer will probably be different to someone else's. The questionnaires may take up to 15 minutes to complete. If you consent to participate in the study you will receive a questionnaire. To maintain your anonymity, we will not ask you for your name.

The data you provide will be highly useful to our study. Your participation is entirely voluntary and you are free to withdraw at any time without being asked to provide a reason.

What happens to my information?

Every effort will be made to keep your data unidentifiable. The researchers will make every attempt to maintain your anonymity so that you remain unidentifiable from the report. The information you provide in questionnaires will be used for research purposes only. Only the researchers and research supervisor will have access to your data. Data will be stored for a maximum of seven years in a secure location, in accordance with publication guidelines and the Western Australian University Sector Disposal Authority (WAUSDA).

If you have any further questions about this study please feel free to contact the researchers or research supervisor. A summary of the results will also be available from the researchers on request.

Researcher: Sviatlana Kamarova

Email: *sviatlana.kamarova@postgrad.curtin.edu.au,*

Research Supervisor: Professor Nikos Chatzisarantis

Email: *nikos.chatzisarantis@curtin.edu.au*

Thank you for taking the time to read this participant information sheet and considering taking part in this study. If you wish to take part in this study please click through to the consent form on the next page.

This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 178/2014). The Committee is comprised of members of the public, academics, lawyers, doctors and pastoral carers. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au

(PARENTS' INFORMATION LETTER FOR RESEARCH INVOLVING YOUNG PEOPLE WITHIN THE SCHOOL SYSTEM)

School of Psychology and Speech Pathology

Dear Parent(s) or Guardian(s):

I am writing to ask your permission for your child to participate in a research project on young people's achievement goals and self-evaluations in learning environment. This project will be conducted at ***(name of assigned school will be entered)*** School over the next few months. We are interested in knowing how adolescent's achievement goals in the context of class affect their self-evaluations and performance. The project will help us to understand more about children's motives, achievement goals, and the adaptive strategies that can be useful for improving learning.

The project in which your child has been invited to participate is expected to be an enjoyable experience. However, the decision regarding your child's participation is yours. To help you in this decision, a brief description of the project is provided. Children will meet with the researchers during class time on two occasions and your child will be asked to complete questionnaires at each meeting. The questions will be about your child's achievement goals and academic self-evaluations. The questions will ask for your child's about opinions, so there are no right or wrong answers. The questionnaires may take up to 15 minutes to complete and will be administered twice.

To maintain your child's anonymity, we will not use any names during the course of the research. All children's responses are considered confidential and individual results will not be shared with school staff. However, information based on the results of the group of participants will be provided. Only children who will have parental permission, and who also agree to participate, will be involved in the study. Also, parents may withdraw their permission for their child to participate at any time during the study without penalty by indicating their decision to the researcher (contact details follow). There are no known or anticipated risks to participation in this study.

This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 178/2014). The Committee is comprised of members of the public, academics, lawyers, doctors and pastoral carers. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au

In addition, it has been approved by, and has the support of, the principal at your child's school. However, the final decision about participation is yours.

We would appreciate if you would permit your child to participate in this project, as we believe it will contribute to furthering our knowledge of young people's achievement goals and self-evaluations, and further their learning and well-being.

In the space at the bottom of this letter, please indicate whether you **do or do not** want your child to participate in this project and return this note to your child's teacher before (date). Please keep the second copy of this form for your records.

If you have any questions about the study, or if you would like additional information to assist you in reaching a decision, please feel free to contact the researchers on this project, Prof. Nikos Chatzisarantis and/or Sviatlana Kamarova. Thank you in advance for your interest and support of this project.

Yours sincerely,

(signature)
Researcher: Sviatlana Kamarova

Phone Number: 0435796165
sviatlana.kamarova@postgrad.curtin.edu.au

(signature)
Research Supervisor: Prof. N.Chatzisarantis

Phone Number: 0401359502
nikos.chatzisarantis@curtin.edu.au

****

I do/do not (circle one) give permission for my child _____ (name of child) to participate in the research project described above.

_____

(Print) Parent's name

_____ _____

Parent's signature Date

Appendix L

Methodological File (Study 1)

Age:_____

Gender: Male Female (please circle)

Please read the following scenario and then answer the following question.

Scenario: Academic ability includes a set of important skills that can be extended and improved through effort. The Academic Potential Index (API) is a measure of academic ability. The highest the API indicates better skills.

Now imagine that your goal is to improve your API to 1200 points and that after a period of studying hard you manage to improve your API to 1200 points.

Other students who also took the test improved their API to 700 points.

Here we would like to know when you usually feel most successful. Consider the statement "I feel most successful if…" and read each of the questions on the questionnaire below and indicate how much you personally agree with each statement by entering, next to each statement, an appropriate score where:

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

I would feel most successful if…

1.If I achieve one of highest API scores relative to others

2.If I learn more about academic ability and it makes me want to practice more

3.If I do better than my friends

4.If the others could not do as well as me

5.If I learn something that is fun to do

6.If others mess up but I do not

7.If I learn something new about academic skills by trying hard

8.If I work really hard

9.If I score the most API points

10.If what I learn make me want to practice more

11.If I achieve the best API scores

12.If what I learned about academic ability feels right

13.If I do my best

Now imagine that. Now please answer the following questions. Please try to provide accurate responses.

How happy would you be if you improved your API to 1200 points?

Very Unhappy **Neutral** **Very Happy**

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9

I would feel that my academic skills were effective if I improved my API to 1200 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would feel pretty competent if I improved my API to 1200 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would think that my academic skills were in a good shape if I improved my API to 1200 points.

Not At All True **Very True**

1 2 3 4 5 6 7

The following questions ask you report how hard would you try to improve your academic skills even further if you are asked to do so. Please be honest and accurate.

I would put lots of effort into trying to improve my academic skills even further if I improved my API to 1200 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would try hard to improve my API score even further if I learnt that I improved my API to 1200 points

Not At All True **Very True**

1 2 3 4 5 6 7

Age:_____

Gender: Male Female (please circle)

Please read the following scenario and then answer the following question.

Scenario: Academic ability includes a set of important skills that can be extended and improved through effort. The Academic Potential Index (API) is a measure of academic ability. The highest the API indicates better skills.

Now imagine that your goal is to improve your API to 1200 points and that after a period of studying hard you manage to improve your API to 1200 points.

Here we would like to know when you usually feel most successful. Consider the statement "I feel most successful if…" and read each of the questions on the questionnaire below and indicate how much you personally agree with each statement by entering, next to each statement, an appropriate score where:

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

I would feel most successful if…

1.If I achieve one of highest API scores relative to others

2.If I learn more about academic ability and it makes me want to practice more

3.If I do better than my friends

4.If the others could not do as well as me

5.If I learn something that is fun to do

6.If others mess up but I do not

7.If I learn something new about academic skills by trying hard

8.If I work really hard

9.If I score the most API points

10.If what I learn make me want to practice more

11.If I achieve the best API scores

12.If what I learned about academic ability feels right

13.If I do my best

Now imagine that. Now please answer the following questions. Please try to provide accurate responses.

How happy would you be if you improved your API to 1200 points?

Very **Very**

Unhappy **Neutral** **Happy**

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9

I would feel that my academic skills were effective if I improved my API to 1200 points

Not

At All True **Very True**

1 2 3 4 5 6 7

I would feel pretty competent if I improved my API to 1200 points

Not

At All True **Very True**

1 2 3 4 5 6 7

I would think that my academic skills were in a good shape if I improved my API to 1200 points.

Not

At All True **Very True**

1 2 3 4 5 6 7

The following questions ask you report how hard would you try to improve your academic skills even further if you are asked to do so. Please be honest and accurate.

I would put lots of effort into trying to improve my academic skills even further if I improved my API to 1200 points

Not

At All True **Very True**

1 2 3 4 5 6 7

I would try hard to improve my API score even further if I learnt that I improved my API to 1200 points

Not

At All True **Very True**

1 2 3 4 5 6 7

Age:_____

Gender: Male Female (please circle)

Please read the following scenario and then answer the following question.

Scenario: Academic ability includes a set of important skills that can be extended and improved through effort. The Academic Potential Index (API) is a measure of academic ability. The highest the API indicates better skills.

Now imagine that your goal is to improve your API to 700 points and that after a period of studying hard you manage to improve your API to 700 points.

Other students who also took the test improved their API to 1200 points.

Here we would like to know when you usually feel most successful. Consider the statement "I feel most successful if…" and read each of the questions on the questionnaire below and indicate how much you personally agree with each statement by entering, next to each statement, an appropriate score where:

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

I would feel most successful if…

1.If I achieve one of highest API scores relative to others

2.If I learn more about academic ability and it makes me want to practice more

3.If I do better than my friends

4.If the others could not do as well as me

5.If I learn something that is fun to do

6.If others mess up but I do not

7.If I learn something new about academic skills by trying hard

8.If I work really hard

9.If I score the most API points

10.If what I learn make me want to practice more

11.If I achieve the best API scores

12.If what I learned about academic ability feels right

13.If I do my best

Now imagine that. Now please answer the following questions. Please try to provide accurate responses.

How happy would you be if you improved your API to 700 points?

Very Unhappy **Neutral** **Very Happy**

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9

I would feel that my academic skills were effective if I improved my API to 700 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would feel pretty competent if I improved my API to 700 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would think that my academic skills were in a good shape if I improved my API to 700 points.

Not At All True **Very True**

1 2 3 4 5 6 7

The following questions ask you report how hard you would try to improve your academic skills even further if you are asked to do so. Please be honest and accurate.

I would put lots of effort into trying to improve my academic skills even further if I improved my API to 700 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would try hard to improve my API score even further if I learnt that I improved my API to 700 points

Not At All True **Very True**

1 2 3 4 5 6 7

Age:_____

Gender: Male Female (please circle)

Please read the following scenario and then answer the following question.

Scenario: Academic ability includes a set of important skills that can be extended and improved through effort. The Academic Potential Index (API) is a measure of academic ability. The highest the API indicates better skills.

Now imagine that your goal is to improve your API to 700 points and that after a period of studying hard you manage to improve your API to 700 points.

Here we would like to know when you usually feel most successful. Consider the statement "I feel most successful if…" and read each of the questions on the questionnaire below and indicate how much you personally agree with each statement by entering, next to each statement, an appropriate score where:

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

I would feel most successful if…

1.If I achieve one of highest API scores relative to others

2.If I learn more about academic ability and it makes me want to practice more

3.If I do better than my friends

4.If the others could not do as well as me

5.If I learn something that is fun to do

6.If others mess up but I do not

7.If I learn something new about academic skills by trying hard

8.If I work really hard

9.If I score the most API points

10.If what I learn make me want to practice more

11.If I achieve the best API scores

12.If what I learned about academic ability feels right

13.If I do my best

Now imagine that. Now please answer the following questions. Please try to provide accurate responses.

How happy would you be if you improved your API to 700 points?

Very Unhappy **Neutral** **Very Happy**

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9

I would feel that my academic skills were effective if I improved my API to 700 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would feel pretty competent if I improved my API to 700 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would think that my academic skills were in a good shape if I improved my API to 700 points.

Not At All True **Very True**

1 2 3 4 5 6 7

The following questions ask you report how hard you would try to improve your academic skills even further if you are asked to do so. Please be honest and accurate.

I would put lots of effort into trying to improve my academic skills even further if I improved my API to 700 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would try hard to improve my API score even further if I learnt that I improved my API to 700 points

Not At All True **Very True**

1 2 3 4 5 6 7

Age:_____

Gender: Male Female (please circle)

Please read the following scenario and then answer the following question.

Scenario: Academic ability includes a set of important skills that can be extended and improved through effort. The Academic Potential Index (API) is a measure of academic ability. The highest the API indicates better skills.

Now imagine that your goal is to improve your API to 1200 points and that after a period of studying hard you manage to improve your API to 1200 points.

Other students who also took the test improved their API to 1400 points.

Here we would like to know when you usually feel most successful. Consider the statement "I feel most successful if…" and read each of the questions on the questionnaire below and indicate how much you personally agree with each statement by entering, next to each statement, an appropriate score where:

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

I would feel most successful if…

1.If I achieve one of highest API scores relative to others

2.If I learn more about academic ability and it makes me want to practice more

3.If I do better than my friends

4.If the others could not do as well as me

5.If I learn something that is fun to do

6.If others mess up but I do not

7.If I learn something new about academic skills by trying hard

8.If I work really hard

9.If I score the most API points

10.If what I learn make me want to practice more

11.If I achieve the best API scores

12.If what I learned about academic ability feels right

13.If I do my best

Now imagine that. Now please answer the following questions. Please try to provide accurate responses.

How happy would you be if you improved your API to 1200 points?

Very Unhappy **Neutral** **Very Happy**

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9

I would feel that my academic skills were effective if I improved my API to 1200 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would feel pretty competent if I improved my API to 1200 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would think that my academic skills were in a good shape if I improved my API to 1200 points.

Not At All True **Very True**

1 2 3 4 5 6 7

The following questions ask you report how hard you would try to improve your academic skills even further if you are asked to do so. Please be honest and accurate.

I would put lots of effort into trying to improve my academic skills even further if I improved my API to 1200 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would try hard to improve my API score even further if I learnt that I improved my API to 1200 points

Not At All True **Very True**

1 2 3 4 5 6 7

Age:_____

Gender: Male Female (please circle)

Please read the following scenario and then answer the following question.

Scenario: Academic ability includes a set of important skills that can be extended and improved through effort. The Academic Potential Index (API) is a measure of academic ability. The highest the API indicates better skills.

Now imagine that your goal is to improve your API to 1200 points and that after a period of studying hard you manage to improve your API to 1200 points.

Here we would like to know when you usually feel most successful. Consider the statement "I feel most successful if…" and read each of the questions on the questionnaire below and indicate how much you personally agree with each statement by entering, next to each statement, an appropriate score where:

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

I would feel most successful if…

1.If I achieve one of highest API scores relative to others

2.If I learn more about academic ability and it makes me want to practice more

3.If I do better than my friends

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6.If others mess up but I do not

7.If I learn something new about academic skills by trying hard

8.If I work really hard

9.If I score the most API points

10.If what I learn make me want to practice more

11.If I achieve the best API scores

12.If what I learned about academic ability feels right

13.If I do my best

Now imagine that. Now please answer the following questions. Please try to provide accurate responses.

How happy would you be if you improved your API to 1200 points?

Very **Very**

Unhappy **Neutral** **Happy**

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9

I would feel that my academic skills were effective if I improved my API to 1200 points

Not

At All True **Very True**

1 2 3 4 5 6 7

I would feel pretty competent if I improved my API to 1200 points

Not

At All True **Very True**

1 2 3 4 5 6 7

I would think that my academic skills were in a good shape if I improved my API to 1200 points.

Not

At All True **Very True**

1 2 3 4 5 6 7

The following questions ask you report how hard would you try to improve your academic skills even further if you are asked to do so. Please be honest and accurate.

I would put lots of effort into trying to improve my academic skills even further if I improved my API to 1200 points

Not

At All True **Very True**

1 2 3 4 5 6 7

I would try hard to improve my API score even further if I learnt that I improved my API to 1200 points

Not

At All True **Very True**

1 2 3 4 5 6 7

Age:_____

Gender: Male Female (please circle)

Please read the following scenario and then answer the following question.

Scenario: Academic ability includes a set of important skills that can be extended and improved through effort. The Academic Potential Index (API) is a measure of academic ability. The highest the API indicates better skills.

Now imagine that your goal is to improve your API to 1400 points and that after a period of studying hard you manage to improve your API to 1400 points.

Other students who also took the test improved their API to 1200 points.

Here we would like to know when you usually feel most successful. Consider the statement "I feel most successful if…" and read each of the questions on the questionnaire below and indicate how much you personally agree with each statement by entering, next to each statement, an appropriate score where:

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

I would feel most successful if…

1.If I achieve one of highest API scores relative to others

2.If I learn more about academic ability and it makes me want to practice more

3.If I do better than my friends

4.If the others could not do as well as me

5.If I learn something that is fun to do

6.If others mess up but I do not

7.If I learn something new about academic skills by trying hard

8.If I work really hard

9.If I score the most API points

10.If what I learn make me want to practice more

11.If I achieve the best API scores

12.If what I learned about academic ability feels right

13.If I do my best

Now imagine that. Now please answer the following questions. Please try to provide accurate responses.

How happy would you be if you improved your API to 1400 points?

Very Unhappy **Neutral** **Very Happy**

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9

I would feel that my academic skills were effective if I improved my API to 1400 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would feel pretty competent if I improved my API to 1400 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would think that my academic skills were in a good shape if I improved my API to 1400 points.

Not At All True **Very True**

1 2 3 4 5 6 7

The following questions ask you report how hard you would try to improve your academic skills even further if you are asked to do so. Please be honest and accurate.

I would put lots of effort into trying to improve my academic skills even further if I improved my API to 1400 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would try hard to improve my API score even further if I learnt that I improved my API to 1400 points

Not At All True **Very True**

1 2 3 4 5 6 7

Age:_____

Gender: Male Female (please circle)

Please read the following scenario and then answer the following question.

Scenario: Academic ability includes a set of important skills that can be extended and improved through effort. The Academic Potential Index (API) is a measure of academic ability. The highest the API indicates better skills.

Now imagine that your goal is to improve your API to 1400 points and that after a period of studying hard you manage to improve your API to 1400 points.

Here we would like to know when you usually feel most successful. Consider the statement "I feel most successful if…" and read each of the questions on the questionnaire below and indicate how much you personally agree with each statement by entering, next to each statement, an appropriate score where:

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

I would feel most successful if…

1.If I achieve one of highest API scores relative to others

2.If I learn more about academic ability and it makes me want to practice more

3.If I do better than my friends

4.If the others could not do as well as me

5.If I learn something that is fun to do

6.If others mess up but I do not

7.If I learn something new about academic skills by trying hard

8.If I work really hard

9.If I score the most API points

10.If what I learn make me want to practice more

11.If I achieve the best API scores

12.If what I learned about academic ability feels right

13.If I do my best

Now imagine that. Now please answer the following questions. Please try to provide accurate responses.

How happy would you be if you improved your API to 1400 points?

Very Unhappy **Neutral** **Very Happy**

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9

I would feel that my academic skills were effective if I improved my API to 1400 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would feel pretty competent if I improved my API to 1400 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would think that my academic skills were in a good shape if I improved my API to 1400 points.

Not At All True **Very True**

1 2 3 4 5 6 7

The following questions ask you report how hard you would try to improve your academic skills even further if you are asked to do so. Please be honest and accurate.

I would put lots of effort into trying to improve my academic skills even further if I improved my API to 1400 points

Not At All True **Very True**

1 2 3 4 5 6 7

I would try hard to improve my API score even further if I learnt that I improved my API to 1400 points

Not At All True **Very True**

1 2 3 4 5 6 7

Appendix M

Methodological File (Study 2)

Age:_____

Gender: Male Female (please, circle)

Please, read the description of the task, followed by the scenario and answer the questions.

Scenario: The Attention Sustainment Index (ASI) is an index that reflects a set of skills related to ability to stay focused on a target for a long interval of time. Attention is an important skill as it facilitates learning and performance in many different areas of life such as education, sport, workforce, etc. one characteristic of attention skills is that they can be extended and improved through effort. Today you will be provided with an opportunity to improve your attention skills by using the figure tracing task. The figure tracing task is a valid and reliable task that helped many people like you to improve their attention skills. To improve your attention skills you need to work on the figure tracing task twice. At the end of the first trial, you will learn your current ASI and how much you can improve the skills today. During the second trial you should try to improve your attention level by exerting effort at the figure tracing task. At the end of the second trial, you will learn how much your attention skills have been improved.

Here we would like to know when you would feel more successful at the figure tracing task. Consider the statement "I will feel most successful at the figure tracing task if…" and read each of the items below to indicate how much you personally agree with each of the item, by entering an appropriate score next to them, where:

1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree

I will feel most successful in the figure tracing task if…

1. If I achieve one of the highest ASI scores relative to others.
2. If I learn more about attention skills and it makes me want to practice more.
3. If I do better than others.
4. If others could not do as well as me.
5. If I learn something that is fun to do.
6. If others mess up but I do not.
7. If I learn something new about attention skills by trying hard.
8. If I work really hard.
9. If I score the most ASI points.
10. If what I learn makes me want to practice more.
11. If I achieve the best ASI scores.

12. If what I learned about attention skills feels right.

13. If I do my best.

Now you can start working on the task.

How happy are you with your performance at the figure tracing task? Please, circle a number.

Very Very

Unhappy Neutral Happy

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9

Please indicate how true each of the following statement is for you. Please use the following scale in response to the items.

1 2 3 4 5 6 7

strongly disagree somewhat strongly agree

1. I think I was pretty good at the figure tracing task.
2. I am satisfied with my performance at the figure tracing task.
3. I feel pretty competent with my performance at the figure tracing task.
4. I was pretty skilled at the figure tracing.
5. I did not do well at the figure tracing task.

Now we would like to know why you answered the previous questions the way you did. Please be accurate and honest.

When answering the previous questions I took into consideration the average ASI score that is achieved by others.

1 2 3 4 5 6 7

not at all true somewhat very true

Thinking about the average ASI score achieved by others affected the way I answered the previous questions.

1 2 3 4 5 6 7

not at all true somewhat very true

I did not take into consideration the average ASI score of others, when I was answering the previous questions.

1 2 3 4 5 6 7

not at all true somewhat very true

The following questions ask you to report how much effort you put into the figure tracing task, the last time you engaged in that task.

The last time I tried the figure tracing task, I put lots of effort into the figure tracing task.

1 2 3 4 5 6 7

not at all true somewhat very true

The last time I engaged in the figure tracing task, I tried hard during the figure tracing task.

1 2 3 4 5 6 7

not at all true somewhat very true

These statements asking about what you think about yourself in general. Please reply to the following statements by using the scale.

1 2 3 4 5 6 7 8 9

strongly disagree somewhat strongly agree

1. I feel that I am a person of worth, at least on an equal plane with others.
2. I feel that I have a number of good qualities.
3. All in all, I am inclined to feel that I am a failure.
4. I am able to do things as well as most other people.
5. I feel I do not have much to be proud of.
6. I take a positive attitude toward myself.
7. On the whole, I am satisfied with myself.
8. I wish I could have more respect for myself.
9. I certainly feel useless at times.
10. At times I think I am no good at all.

Here we would like to offer you opportunity to re-engage in the figure tracing task. It is not compulsory and you may decide not to try the figure tracing task again. Please report below for how many minutes you wish to work on the figure tracing task. You can choose a time from 0 to 20 min. Please report your preferred time here _____

Age:_____

Gender: Male Female (please, circle)

Please, read the description of the task, followed by the scenario and answer the questions.

Scenario: The Attention Sustainment Index (ASI) is an index that reflects a set of skills related to ability to stay focused on a target for a long interval of time. Attention is an important skill as it facilitates learning and performance in many different areas of life such as education, sport, workforce, etc. The figure tracing task is a valid and reliable measure of individuals' attention level. Today you will find out whether or not your attention level is better than others. Therefore, your goal is to do better than others on the figure tracing task. To achieve this objective, you need to work on the figure tracing task twice. At the end of the second trial, you will be informed about your current ASI. Your attention level is better than others if your best score at the figure tracing task is greater than scores achieved by others.

Here we would like to know when you would feel more successful at the figure tracing task. Consider the statement "I will feel most successful at the figure tracing task if…" and read each of the items below to indicate how much you personally agree with each of the item, by entering an appropriate score next to them, where:

1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree

I will feel most successful in the figure tracing task if…

1. If I achieve one of the highest ASI scores relative to others.
2. If I learn more about attention skills and it makes me want to practice more.
3. If I do better than others.
4. If others could not do as well as me.
5. If I learn something that is fun to do.
6. If others mess up but I do not.
7. If I learn something new about attention skills by trying hard.
8. If I work really hard.
9. If I score the most ASI points.
10. If what I learn makes me want to practice more.
11. If I achieve the best ASI scores.
12. If what I learned about attention skills feels right.
13. If I do my best.

Now you can start working on the task.

How happy are you with your performance at the figure tracing task? Please, circle a number.

Very Very

Unhappy Neutral Happy

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9

Please indicate how true each of the following statement is for you. Please use the following scale in response to the items.

1 2 3 4 5 6 7

strongly disagree somewhat strongly agree

6. I think I was pretty good at the figure tracing task.
7. I am satisfied with my performance at the figure tracing task.
8. I feel pretty competent with my performance at the figure tracing task.
9. I was pretty skilled at the figure tracing.
10. I did not do well at the figure tracing task.

Now we would like to know why you answered the previous questions the way you did. Please be accurate and honest.

When answering the previous questions I took into consideration the average ASI score that is achieved by others.

1 2 3 4 5 6 7

not at all true somewhat very true

Thinking about the average ASI score achieved by others affected the way I answered the previous questions.

1 2 3 4 5 6 7

not at all true somewhat very true

I did not take into consideration the average ASI score of others, when I was answering the previous questions.

1 2 3 4 5 6 7

not at all true somewhat very true

The following questions ask you to report how much effort you put into the figure tracing task, the last time you engaged in that task.

The last time I tried the figure tracing task, I put lots of effort into the figure tracing task.

1 2 3 4 5 6 7

not at all true somewhat very true

The last time I engaged in the figure tracing task, I tried hard during the figure tracing task.

1 2 3 4 5 6 7

not at all true somewhat very true

These statements asking about what you think about yourself in general. Please reply to the following statements by using the scale.

1 2 3 4 5 6 7 8 9

strongly disagree somewhat strongly agree

11. I feel that I am a person of worth, at least on an equal plane with others.
12. I feel that I have a number of good qualities.
13. All in all, I am inclined to feel that I am a failure.
14. I am able to do things as well as most other people.
15. I feel I do not have much to be proud of.
16. I take a positive attitude toward myself.
17. On the whole, I am satisfied with myself.
18. I wish I could have more respect for myself.
19. I certainly feel useless at times.
20. At times I think I am no good at all.

Here we would like to offer you opportunity to re-engage in the figure tracing task. It is not compulsory and you may decide not to try the figure tracing task again. Please report below for how many minutes you wish to work on the figure tracing task. You can choose a time from 0 to 20 min. Please report your preferred time here _____

Appendix N

Methodological File (Study 3)

Age:_____

Gender: Male Female (please, circle)

Please, read the description of the task, followed by the scenario and answer the questions.

Description of the Circles Creativity task. You are about to engage into the Circles Creativity task, which consists of a set of circles. You can see these circles printed in the page in front of you. This task requires from you to draw original and detailed pictures by using one or more circles each time. There are no 'right' or 'wrong' pictures; success on the test depends on the quality and uniqueness of your pictures.

Scenario: We know that everyone is capable of being imaginative and creative but does not always have the chance to express these capacities. The Circles Creative task which you are about to perform shown in previous research to help express imagination and develop new ways of looking at everyday events. It is a reliable and valid task that develops creative skills. This is very important that you actually understand the aim of this experiment. You are here to acquire new knowledge and extend your creative skills. To improve your creative skills you need to work on the Circle Creative task twice and then, you will be evaluated in order to know whether you personally improved on this experiment. Thus your goal should be to progress along the experiment. More specifically, you should try to acquire new knowledge that could be useful for you. In other words, what we ask here is for you to learn.

Here please indicate when you would feel more successful at the Circle Creativity task. Consider the statement "I will feel most successful at the creativity task if…" and read each of the items below to indicate how much you personally agree with each of the item, by entering an appropriate score next to them, where:

1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree

Before you answer the questions we need to provide some additional information. This challenge is not about your actual performance relative to your peers. Previous research has shown that creativity is a skill and it can be extended and improved over. Therefore, your creativity score in comparison to other students is inconsequential and it does not mean that you are developing your skill. You can call yourself creative, only if you are working hard and making progress in your creative skills. At the end of your trials, we will evaluate your performance so you will know about how you improved. Now please answer the following questions.

I will feel most successful at the Circles Creativity task if…

1. If I score more points relative to other *[participating University]* undergraduate students, who are of the same age, gender, attendance year as me.
2. If I learn through the Circles Creative task a new creative skill and it makes me want to practice more.

3. If I do better than other *[participating University]* undergraduate students, who is of the same age, gender, attendance year as me.
4. If other *[participating University]* undergraduate students, who are similar to me in age, gender, attendance year, could not perform the Circle Creativity task as well as me.
5. If I learn something that is fun while I am engaging in the Circles Creative task.
6. If other *[participating University]* undergraduate students, who are of the same age, gender, attendance year as me, mess up but I do not.
7. If I learn something new by trying hard.
8. If I work really hard.
9. If I score the most points at the Circles Creativity task.
10. If what I learn makes me want to practice the Circles Creative task more.
11. If I achieve the best results at the Circles Creativity task.
12. If what I learned about creativity feels right.
13. If I do my best.

Now you can start working at the Circles Creativity task.

How happy are you with your performance at the Circles Creativity task? Please, circle a number.

Very Very

Unhappy Neutral Happy

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9

How happy are you with your score at the Circles Creativity task? Please, circle a number.

Very Very

Unhappy Neutral Happy

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9

Please indicate how true each of the following statement is for you. Please use the following scale in response to the items.

1 2 3 4 5 6 7

strongly disagree somewhat strongly agree

11. I think I was pretty good at the Circles Creativity task.
12. I am satisfied with my performance at the Circles Creativity task.
13. I feel pretty competent with my performance at the Circles Creativity task.
14. I was pretty skilled at the Circles Creativity task.
15. I did not do well at the Circles Creativity task.

Now we would like to know why you answered the previous questions the way you did. Please be accurate and honest.

When answering the previous questions I was wondering how well other *[participating University]* undergraduate students, who are of the same age, gender and attendance year as me, did at the task.

1 2 3 4 5 6 7

not at all true somewhat very true

Thinking about the performance of other *[participating University]* undergraduate students, who are of the same age, gender and attendance year as me, affected the way I answered the previous questions.

1 2 3 4 5 6 7

not at all true somewhat very true

I did not take into consideration the scores of other *[participating University]* undergraduate students, who are of the same age, gender and attendance year as me, when I was answering the previous questions.

1 2 3 4 5 6 7

not at all true somewhat very true

The following questions ask you to report how much effort do you intend to put into the task in the future.

If I had the chance to do the task again I would put lots of effort into the Circles Creativity task.

1 2 3 4 5 6 7

not at all true somewhat very true

If I had the chance to do the Circles Creativity task again, I would try hard to do well at the task.

1 2 3 4 5 6 7

not at all true somewhat very true

These statements asking about what you think about yourself in general. Please reply to the following statements by using the scale.

1 2 3 4 5 6 7 8 9

strongly disagree somewhat strongly agree

21. I feel that I am a person of worth, at least on an equal plane with others.
22. I feel that I have a number of good qualities.
23. All in all, I am inclined to feel that I am a failure.
24. I am able to do things as well as most other people.
25. I feel I do not have much to be proud of.
26. I take a positive attitude toward myself.
27. On the whole, I am satisfied with myself.
28. I wish I could have more respect for myself.
29. I certainly feel useless at times.
30. At times I think I am no good at all.

Here we would like to offer you opportunity to re-engage in the creativity task. It is not compulsory and you may decide not to try it again. Please report below for how many minutes you wish to work on the creativity task. You can choose a time from 0 to 20 min. Please report your preferred time here _____

Age:_____

Gender: Male Female (please, circle)

Please, read the description of the task, followed by the scenario and answer the questions.

Description of the Circles Creativity task. You are about to engage into the Circles Creativity task, which consists of a set of circles. You can see these circles printed in the page in front of you. This task requires from you to draw original and detailed pictures by using one or more circles each time. There are no 'right' or 'wrong' pictures; success on the test depends on the quality and uniqueness of your pictures.

Scenario: We know that people differ in creative ability. The Circles Creativity task is a valid and reliable measure of creativity. Previous research has shown that people differ in their ability to create novel or unique solutions. Students who did well on the Circles Creativity task are more creative than ones who did poorly. After you completed the task twice, your creativity will be evaluated. Note, this is a competition, and your performance is good if your best creative score is higher than the score that is achieved by other undergraduate students who are of the same age, gender, and attendance year at University as you. It is very important for you to actually understand the aim of this experiment. You are here to be a performer and to demonstrate that you are a creative individual. More specifically, you should try to perform better than majority of other undergraduates who are of the same age, gender, and attendance year as you. In other words, what we ask you here is to demonstrate that you are the most creative person.

Here please indicate when you would feel more successful at the Circle Creativity task. Consider the statement "I will feel most successful at the creativity task if…" and read each of the items below to indicate how much you personally agree with each of the item, by entering an appropriate score next to them, where:

1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree

Before you answer the questions we need to provide some additional information. This competition is not about improving your creativity skills or learning. Previous research showed that creativity is an inherited trait and it is fixed trait and stable over time. Therefore, how much you improve (if you improve) your creativity score is inconsequential and it does not mean that you are creative. You can call yourself creative, only if you outperform other students of the same age and gender as you who took the test. At the end of your trial we will evaluate it so you will know about how your performance compares to performance achieved by your peers. Now please answer the following questions.

I will feel most successful at the Circles Creativity task if…

1. If I score more points relative to other *[participating University]* undergraduate students, who are of the same age, gender, attendance year as me.
2. If I learn through the Circles Creative task a new creative skill and it makes me want to practice more.

3. If I do better than other *[participating University]* undergraduate students, who is of the same age, gender, attendance year as me.
4. If other *[participating University]* undergraduate students, who are similar to me in age, gender, attendance year, could not perform the Circle Creativity task as well as me.
5. If I learn something that is fun while I am engaging in the Circles Creative task.
6. If other *[participating University]* undergraduate students, who are of the same age, gender, attendance year as me, mess up but I do not.
7. If I learn something new by trying hard.
8. If I work really hard.
9. If I score the most points at the Circles Creativity task.
10. If what I learn makes me want to practice the Circles Creative task more.
11. If I achieve the best results at the Circles Creativity task.
12. If what I learned about creativity feels right.
13. If I do my best.

Now you can start working at the Circles Creativity task.

How happy are you with your performance at the Circles Creativity task? Please, circle a number.

Very Very

Unhappy Neutral Happy

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9

How happy are you with your score at the Circles Creativity task? Please, circle a number.

Very Very

Unhappy Neutral Happy

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9

Please indicate how true each of the following statement is for you. Please use the following scale in response to the items.

1 2 3 4 5 6 7

strongly disagree somewhat strongly agree

16. I think I was pretty good at the Circles Creativity task.
17. I am satisfied with my performance at the Circles Creativity task.
18. I feel pretty competent with my performance at the Circles Creativity task.
19. I was pretty skilled at the Circles Creativity task.
20. I did not do well at the Circles Creativity task.

Now we would like to know why you answered the previous questions the way you did. Please be accurate and honest.

When answering the previous questions I was wondering how well other *[participating University]* undergraduate students, who are of the same age, gender and attendance year as me, did at the task.

1 2 3 4 5 6 7

not at all true somewhat very true

Thinking about the performance of other *[participating University]* undergraduate students, who are of the same age, gender and attendance year as me, affected the way I answered the previous questions.

1 2 3 4 5 6 7

not at all true somewhat very true

I did not take into consideration the scores of other *[participating University]* undergraduate students, who are of the same age, gender and attendance year as me, when I was answering the previous questions.

1 2 3 4 5 6 7

not at all true somewhat very true

The following questions ask you to report how much effort do you intend to put into the task in the future.

If I had the chance to do the task again I would put lots of effort into the Circles Creativity task.

1 2 3 4 5 6 7

not at all true somewhat very true

If I had the chance to do the Circles Creativity task again, I would try hard to do well at the task.

1 2 3 4 5 6 7

not at all true somewhat very true

These statements asking about what you think about yourself in general. Please reply to the following statements by using the scale.

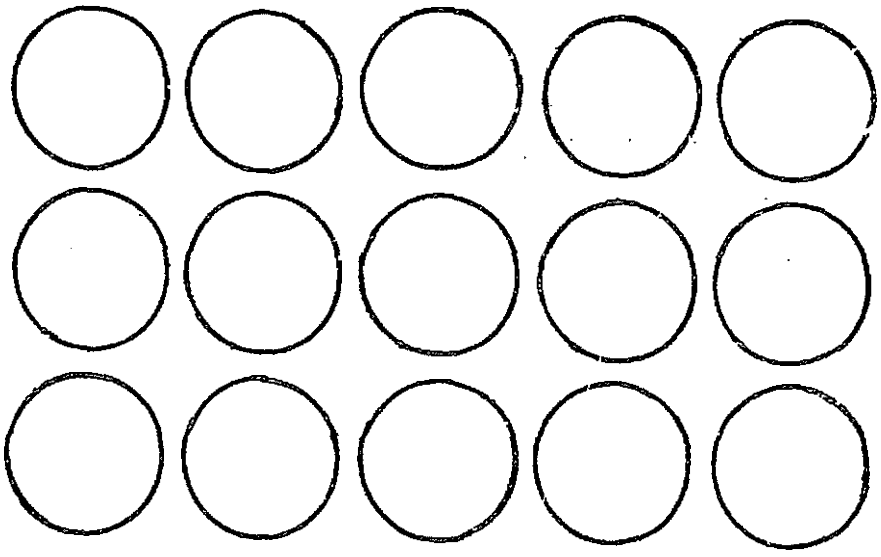
1 2 3 4 5 6 7 8 9

strongly disagree somewhat strongly agree

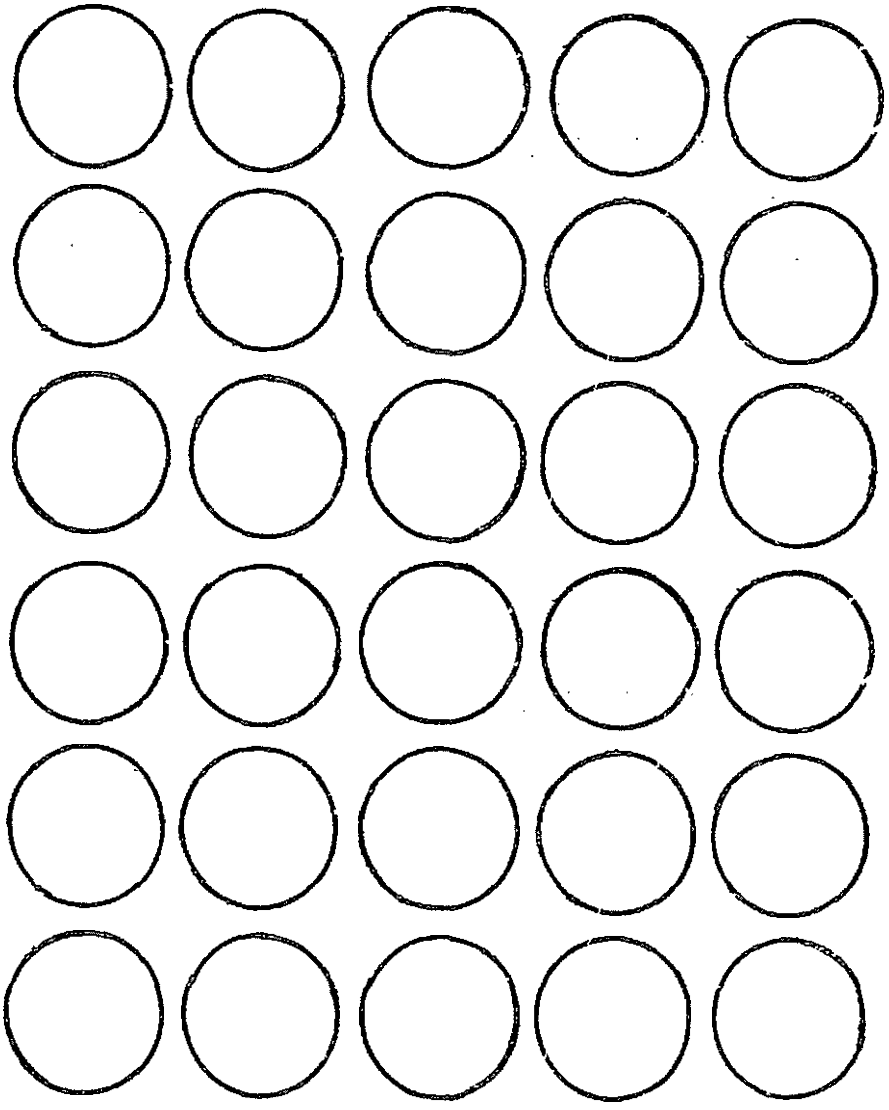
14. I feel that I am a person of worth, at least on an equal plane with others.
15. I feel that I have a number of good qualities.
16. All in all, I am inclined to feel that I am a failure.
17. I am able to do things as well as most other people.
18. I feel I do not have much to be proud of.
19. I take a positive attitude toward myself.
20. On the whole, I am satisfied with myself.
21. I wish I could have more respect for myself.
22. I certainly feel useless at times.
23. At times I think I am no good at all.

Here we would like to offer you opportunity to re-engage in the creativity task. It is not compulsory and you may decide not to try it again. Please report below for how many minutes you wish to work on the creativity task. You can choose a time from 0 to 20 min. Please report your preferred time here _____

You need to make original objects from the circles below. A circle should be the main part of whatever you make. With a pencil, add lines to the circles to complete your picture. Your lines can be inside, outside the circle, or both inside and outside the circle. Try to think of things that no one else will think of. Make as many things as you can and put as many ideas as you can in each one. Add names or titles to clearly state what the objects are.



You need to make original objects from the circles below. A circle should be the main part of whatever you make. With a pencil, add lines to the circles to complete your picture. Your lines can be inside, outside the circle, or both inside and outside the circle. Try to think of things that no one else will think of. Make as many things as you can and put as many ideas as you can in each one. Add names or titles to clearly state what the objects are.



Now please respond to the following questions:

1. **How much did you enjoy the time you have spent on the task?**

1 2 3 4 5 6 7

not at all somewhat very much

2. **How interesting to you was the time you have spent on the task?**

1 2 3 4 5 6 7

not at all somewhat very much

Appendix O

Methodological File (Study 4)

Date of Birth: _____ Gender: male female (please, circle)

Nationality (country):_____

1. Here we want to know how good you think you are compared to most of your classmates in mathematics.

Much worse **The same** **Much better**

1 2 3 4 5

2. Do you have a classmate with whom you prefer to compare your grades in mathematics?

YES / NO (circle the answer)

Please DO NOT report the name of your classmate!!!

3. What is the average grade of your classmate in mathematics? If you do not compare yourself to a classmate choose one classmate now and respond to the questions. Please report the grade of your classmate here:_____

4. How frequently does your classmate that you compare yourself to get the same grades in mathematics as you? Please respond to the following questions.

How often does the classmate get the same grades in maths as you?

Never sometimes one time out of two often always

1 2 3 4 5

5. How good you think you are in mathematics and other subjects relative to your chosen classmate

How good are you, compared to the classmate in maths?

Much worse **The same** **Much better**

1 2 3 4 5

In the scale below please rate how good you think your classmate is in mathematics

6. In mathematics, I think that my classmate is …

Not good at all **Average** **Excellent**

1 2 3 4 5

Now please rate how good you are in mathematics relative to your classmate. To do this, you need to give yourself a score (in the scale below) that is higher than the score that you just gave to your classmate if you think that you are better than your classmate in mathematics. If you think that you

are worse than your classmate in mathematics then you need to give yourself a score that is lower than the score that you assigned to your classmate. If you think that your mathematic skills are as good as your classmates' then you need to give yourself the same score as you just gave to your classmate.

In the scale below please rate how good you think you are relative to your classmate is in mathematics

7. Relative to my classmate I think that I am … in mathematics

Not good at all **Average** **Excellent**

1 2 3 4 5

Please respond to the following items

a. I learn things quickly in mathematics

Strongly disagree Strongly agree

1 2 3 4 5 6

b. I am hopeless when it comes to mathematics

Strongly disagree Strongly agree

1 2 3 4 5 6

c. I get good grades in mathematics

Strongly disagree Strongly agree

1 2 3 4 5 6

d. Compared to others of my age I am good in mathematics

Strongly disagree Strongly agree

1 2 3 4 5 6

e. I have always done well in other subjects rather than mathematics

Strongly disagree Strongly agree

1 2 3 4 5 6

8. What grade did you achieve the last semester? _____

9. What grade do you expect to achieve this upcoming semester? _____

Here we would like to know when you would feel more successful in mathematics. Consider the statement "I will feel most successful if…" and read each of the questions below to indicate how much you personally agree with each statement by entering next to each item, an appropriate score where:

1= strongly disagree, 2= disagree, 3=neutral, 4= agree, 5=strongly agree

I will feel most successful in mathematics if….

1. If I achieve one of highest grades relative to others
2. If I learn more about mathematics and it makes me want to practice more
3. If I do better than others
4. If others could not do as well as me
5. If I learn something that is fun to do
6. If others mess up but I do not
7. If I learn something new about mathematics by trying hard
8. If I work really hard
9. If I score the highest grade
10. If what I learn make me want to practice more
11. If I achieve the best grade
12. If what I learned about mathematics feels right
13. If I do my best

Please indicate how true each of the following statement is for you. Please use the following scale in responding to the items.

1 2 3 4 5 6 7
strongly disagree somewhat strongly agree

1. I think I am pretty good at mathematics.
2. I am satisfied with my performance at mathematics.
3. I feel pretty competent with my performance at mathematics.
4. I am pretty skilled at mathematics.
5. I do not do very well at mathematics.

Please indicate how true each of the following statement is for you. Please use the following scale in responding to the items.

1 2 3 4 5 6 7

strongly disagree somewhat strongly agree

1. It is important for me to do better than other students.
2. It is important for me to do well compared to others in my maths class.
3. My goal in maths class is to get a better grade than most of the other students.

4. I worry that I may not learn all that I possibly could in maths class.

5. Sometimes I'm afraid that I may not understand the content of maths class as thoroughly as I'd like.

6. I am often concerned that I may not learn all that there is to learn in maths class.

7. I want to learn as much as possible from maths class.

8. It is important for me to understand the content of maths course as thoroughly as possible.

9. I desire to completely master the material presented in maths class.

10. I just want to avoid doing poorly in maths class.

11. My goal in maths class is to avoid performing poorly.

12. My fear of performing poorly in maths class is often what motivates me.

The following questions refer to what you think about self-improvement. There are no correct or incorrect answers so please respond to the items as honestly as possible.

1. **How likely are you to change your opinions about self-improvement?**

Very unlikely Very likely

-4 -3 -2 -1 0 1 2 3 4

2. **How sure are you that your opinions about self-improvement are right?**

Not at all Very much

-4 -3 -2 -1 0 1 2 3 4

3. **How important to you personally is the issue of self-improvement?**

Not at all Very much

-4 -3 -2 -1 0 1 2 3 4

4. **How central is your attitude toward self-improvement to your self-image?**

Not at all Very much

-4 -3 -2 -1 0 1 2 3 4

5. **How representative of your values is your attitude toward self-improvement?**

Not at all Very much

-4 -3 -2 -1 0 1 2 3 4

6. **How knowledgeable are you about self-improvement?**

Not at all Very much

-4 -3 -2 -1 0 1 2 3 4

7. **What is your attitude toward self-improvement in general?**

Extremely oppose Neutral Extremely favour

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8