Doctoral Thesis

Goal Pursuit, Motivation And The Experience Of Positive And Negative Affect

In Young People: An Experience Sampling Study

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GOAL PURSUIT, MOTIVATION AND THE EXPERIENCE OF POSITIVE AND NEGATIVE AFFECT IN YOUNG PEOPLE: AN EXPERIENCE SAMPLING STUDY

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Abstract

The study reported in this thesis aimed to test a psychological model of goal-directed behaviour in a sample of young adults, using experience sampling methods. The purpose was to assess the relationship between goal-related appraisals of success and importance, and fluctuations in both positive and negative affect as well as levels of ruminative thought. The influence of individual differences in transdiagnostic factors relating to motivation and anhedonia, as well as symptoms of depression, rumination and schizotypy were also considered.

An analogue sample of non-clinical young adults was recruited and took part in this six-day intensive, longitudinal study. Subjective reports of momentary affect, rumination, and goal appraisals were assessed five times daily for six days. Baseline measures relating to symptoms of psychopathology, motivation and anhedonia were also administered.

Using multilevel modelling, the relationship between goal appraisals and affective and ruminative responses could be analysed within the context of the days and individuals that they occurred. Results suggested that appraisals of success were associated with higher levels of momentary positive affect and lower levels of momentary negative affect and rumination. While importance was positively associated with momentary rumination, the expected interaction between success and importance was not found. Individual differences in depression symptoms and schizotypy were differentially associated with reduced momentary positive affect, whereas individual differences in trait rumination were differentially associated with increased momentary negative affect and rumination. There was some evidence that individual differences in depression symptoms were also associated with reduced overall enjoyment and goal success during the experience sampling period.

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These findings are relevant to our understanding of goal-directed behaviour, and how goal appraisals influence positive affect as well as negative affect and rumination. The results suggest that targeting appraisals of success and increasing activities that provide experiences of mastery and pleasure may be an important aspect of clinical interventions.

Acknowledgements

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This thesis is dedicated to Stephan,

who makes me feel happy no matter what I'm doing.

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Introduction

Aims and Objectives

This thesis presents the results of an experience sampling study testing a psychological model of goal-directed behaviour conducted in a sample of young adults. The aim was to investigate the relationship between goal-related appraisals and the experience of affect and ruminative thought, and how these are influenced by individual differences in factors relating to motivation and psychopathology.

Psychological models of self-control stipulate that regulating impulses, as well as staying motivated to do so, are integral to the successful implementation of goal plans (e.g. Inzlicht & Schmeichel, 2012). However, a reduction in reward processes and the motivation to pursue goals is implicated in a range of psychiatric disorders, including major depression and schizophrenia (Der-Avakian & Markou, 2012). Recent research suggests that failure to fulfil important personal goals is associated with negative affect and rumination (Moberly & Watkins, 2010). It therefore seems likely that the relationship between individual differences in motivation and personal goal pursuit may be an important transdiagnostic factor in the maintenance of psychiatric symptoms, such as low mood and social withdrawal. There is therefore a strong need to improve our understanding of the factors that contribute to successful goal pursuit, and the affective and behavioural consequences of engaging in goal behaviours.

The objectives of the study were fourfold; one, to replicate the findings of Moberly and Watkins (2010) that ruminative responses and negative affect are associated with appraisals of goal success and importance, and in particular with poor attainment of personally important goals; two, to analyse the relationship between

these goal appraisals and positive affect; three, to investigate the contribution of individual differences in reported levels of depression, schizotypy, and trait rumination on levels of momentary affect and ruminative thought during the experience sampling period; and four, to explore whether individual differences relating to psychopathology and motivation influence goal type and success.

Chapter Overview

This introductory chapter will first provide a review of research on self-control with a particular emphasis on Carver and Scheier's (1982, 1990) prominent Control Theory. Research investigating the predictions made by this model will be critically reviewed, specifically those relating to affect, rumination and motivation. Considerations will then be made of how this theoretical model applies to our understanding psychopathology and the regulation of goal-directed behaviour in clinical populations. Its implications for use in clinical practice will also be discussed. The focus will primarily be on depression and schizophrenia, given the overlapping, transdiagnostic symptom of anhedonia, and the altered motivational systems implicated in both disorders. Finally, the rationale for the current study, and the research hypotheses it addressed, will be outlined.

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Background

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Self-control

Self-control is the ability to override and control impulsive, automatic behaviour in order to engage in effortful, purposeful behaviours (Metcalfe & Mischel, 1999). It is therefore an essential component of engaging in goal-directed behaviours, as it allows individuals to forgo current temptations in favour of longer-term pursuits. Although there is some evidence that the capacity to self-regulate can be trained (e.g.

Kross, Duckworth, Ayduk, Tsukayama, & Mischel, 2011), several longitudinal studies suggest that self-control abilities are relatively stable across the lifespan. Children who are good at resisting temptations grow up to be more emotionally stable adults with lower rates of psychopathology and drug use, and with greater wealth and physical health than their more impulsive peers (Ayduk et al., 2000, 2008; Moffitt et al., 2011). Indices of self-control are comparable or better predictors of long-term success than intelligence and socio-economic factors (Duckworth & Seligman, 2005; Moffitt et al., 2011). There is some evidence that maintaining the effort and passion to follow long-term goals over the course of months and years may be a contributing factor (Duckworth, Peterson, Matthews, & Kelly, 2007). Higher levels of trait self-control in young adults are related to higher levels of self-esteem, better relationships, interpersonal skills, secure attachments, higher conscientiousness and emotional stability (Tangney, Baumeister, & Boone, 2004). This is found both in cross-sectional (e.g. Tangney et al., 2004) and in longitudinal studies (Ayduk et al., 2000, 2008; Moffitt et al., 2011), although the causal direction of these relationships is not completely clear. While it seems that good self-regulation can lead to better educational and economic outcomes (Ayduk et al., 2000, 2008; Moffitt et al., 2011), there is also evidence that early attachment experiences are crucial to the development of self-regulation and conscientiousness (Drake, Belsky, & Fearon, 2014).

The concept of self-control covers a wide array of constructs such as delayed gratification, willpower, discipline, self-regulation and impulsivity (Moffitt et al., 2011). As such, the idea of self-control ranges broadly from the moment-to-moment willpower needed to resist current temptations (e.g. Baumeister, Bratslavsky, Muraven, & Tice, 1998) to much more stable, trait-like characteristics such as conscientiousness (Moffitt, et al., 2011). That said, however self-control is defined, at

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its core is the notion of 'the self' exerting effort to override a prepotent, automatic,

habitual or impulsive thought or behaviour. It is therefore considered synonymous

with one aspect of executive function, namely inhibition (Inzlicht, Schmeichel, &

Macrae, 2014; Miyake et al., 2000). Models of inhibitory control typically depict two

opposing systems; a reflexive, impulsive, effortless, emotionally 'hot' system that

responds automatically to salient environmental cues and immediate reward

incentives, and a reflective, slower, effortful 'cool' system that requires cognitive

effort to override this impulsivity to enable strategic goal pursuit (Carver, Johnson, &

Joormann, 2009; Metcalfe & Mischel, 1999). The exertion of self-control therefore

represents the resolution of a conflict between opposing outcomes that differ in terms

of temporal and hedonic value; for example, doing what feels right in the present

moment versus what makes sense in the long run (e.g. Loewenstein, 1996; Metcalfe

& Mischel, 1999), or choosing between an immediate reward or a greater, delayed

reward (Ainslie, 1975; Mischel, Shoda, & Rodriguez, 1989).

Although by this definition self-control is generally viewed positively, it may

be possible to exert too much self-control or use self-control to the detriment of health

and wellbeing. For example, Kivetz and Keinan (2006) found that choosing long-term

gains over immediate indulgences results in increasing regret over time. Conversely,

guilt over yielding to temptations decreased with greater temporal distance from the

event. The authors suggest, therefore, that virtuous choices can lead to increasing

dissatisfaction over time. However, as participants were asked to rate their regret over

a rather limited number of events, such as behaviour during a previous winter break, it

is difficult to conclude whether individuals who consistently exert control over their

impulses experience greater overall regret. Additionally, as no measures of mood or

life satisfaction were administered, it is unknown whether this regret extends to

general poor wellbeing. Similarly, there is some evidence that self-control can lead to aggression and anger (DeWall, Baumeister, Stillman, & Gailliot, 2007). In a series of experiments, Gal and Liu (2011) found that individuals displayed signs of greater anger when they chose a virtuous reward (such as an apple) over an indulgent treat (such as a chocolate bar). A limitation of this study, however, was the underlying assumption that the individuals who chose healthier food items were actually exerting self-control, and not just choosing a preferred item, and also that there were no other differences between these individuals and those who made more indulgent choices, for example in terms of overall mood or personality constructs like neuroticism.

There may be clinical implications of exerting high levels of self-control. For example, control features heavily in psychiatric conditions such as obsessive-compulsive disorder and anorexia nervosa. Birgegård, Björck, Norring, Sohlberg, and Clinton (2009) found that self-control was an important aspect of self-image in individuals with anorexia nervosa, and that greater self-control predicted worse outcomes 36 months following treatment. Individuals who valued self-control may also have viewed regulating the urge to eat as a positive strategy to achieve personally important goals relating to weight loss and body image. Interestingly, Rawn and Vohs (2011) suggested that behaviours typically thought of as self-control failures, such as drinking, engaging in risky sexual activities, or binge eating, may represent self-control successes if these behaviours are carried out in the service of achieving an over-arching goal, such as social acceptance and inclusion. This self-control for personal harm model highlights the importance of understanding the subjective value of short- and long-term outcomes, and the nature of the higher-order goals governing momentary behaviours. For example, one individual may eat a large slice of chocolate

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cake because they were unable to stick to their diet, while another may do so in order to adhere to social norms of politeness.

With so many factors underlying the implementation of goal-directed behaviour, it is difficult to disentangle what truly constitutes self-control failure or success. For example, while restricted eating or binge drinking may represent good self-control by promoting over-arching goals relating to self-image or interpersonal acceptance, these behaviours could equally represent a failure to regulate impulsive urges to self-harm, or the misuse of self-control abilities rather than too much self-control (see Tangney et al., 2004). For example, scores on the Self Control Scale (Tangney et al., 2004), a widely used and well-validated measure of trait self-control, are negatively correlated with symptoms of eating disorders, indicating that the ability to control impulses for longer-term gains is different from the type of control implicated in eating disorders. Overall, the vast majority of evidence suggests that the ability to regulate automatic impulses and engage in behaviours which promote long-term goals is associated with positive outcome and gains. The next section will consider how self-control is implemented.

Control Theory

The exact mechanisms by which individuals are able to exert control over their automatic thoughts and behaviours are still widely debated (Inzlicht & Schmeichel, 2012; Inzlicht et al., 2014). However, in an early, influential theory, Powers (1973), as well as Carver and Scheier (1982, 1990), proposed that goal behaviours are controlled through a negative feedback loop, much like the way a thermostat controls the temperature of a room. Current behaviours are monitored and compared with a reference value for a desired goal state, in the same way that a thermostat compares a room's current temperature with the pre-programmed

temperature. If there is a discrepancy, an output, such as a thought or behaviour, is

implemented that serves to reduce the perception of this discrepancy (see Fig. 1). For

example, if a person's desired goal state is to have responded to all unread emails by

the end of the hour, and they currently have 20 unread emails, the perceived

discrepancy between their actual and ideal goal state is large. Their behavioural

output may be to increase their rate of typing or reduce the length of each reply.

Either of these behaviours should reduce the perceived difference between actual and

ideal goal state. This model applies equally to 'anti-goals', or states that individuals

wish to avoid, such as avoiding harm or perceived failure – in this case, the function

of the behaviour output is to increase the perceived discrepancy between the anti-goal

and the current state.

Additionally, it is possible for the system to be affected by environmental

disturbances, that is, external events that affect the perceived discrepancy between

actual and desired goal states. For example, if this person were to receive ten new

emails before the end of the hour, they would need to further adjust their behavioural

outputs to ensure they still meet the goal of clearing their inbox.
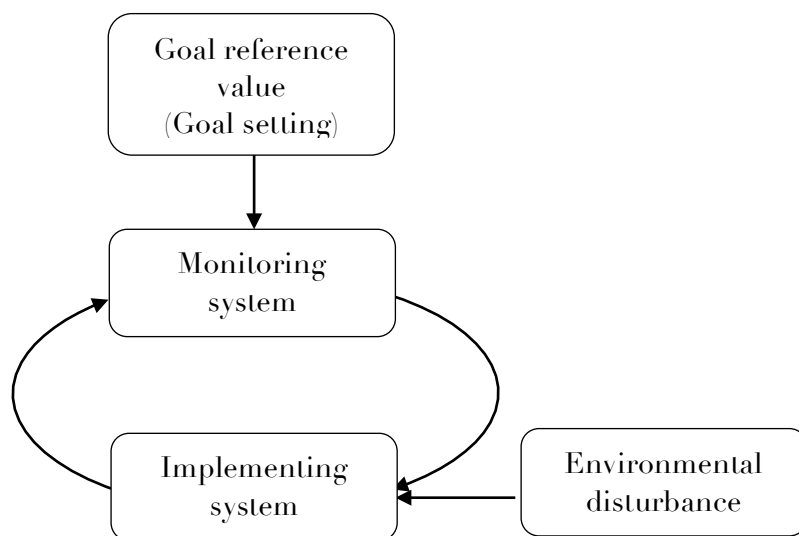
Figure 1. *A simple feedback loop, based on Carver and Scheier's (1982, 1990) Control*
Theory, and Inzlicht, Legault, & Teper (2014)

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This cybernetic model has influenced research in goal setting and self-control for over 30 years (Inzlicht, Legault, & Teper, 2014). The key cognitive processes in this feedback loop are those governing goal setting, implementation and monitoring, and like other cognitive processes, these are subject to influences such as priming, interpretive biases and selective attention. The cyclical nature of the feedback loop means these processes also reciprocally interact. In a recent review, Inzlicht et al. (2014) outlined empirical evidence supporting how each of these processes can be influenced and optimised. For example, setting specific goals that are personally meaningful increases the likelihood of achieving them (Legault, Gutsell, & Inzlicht, 2011; Locke & Latham, 2006). Forming implementation intentions ("when situation X occurs, I will carry out action Y") can improve the execution of goals (Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2011; Gollwitzer, 1999). Finally, cultivating mindfulness can increase attention towards actual-ideal goal discrepancies and goal conflicts, as well as respond to these discrepancies adaptively (Teper & Inzlicht, 2013).

In a meta-analysis, Burnette, O'Boyle, VanEpps, Pollack, and Finkel (2012) concluded that implicit, lay beliefs about the malleability of personal attributes can also affect each of the three goal-related cognitive processes. Individuals who believe that important personal attributes, such as intelligence, are malleable and can be developed (incremental theorists) are more likely to adopt learning goals, that is, goals that aim at increasing their abilities, whereas those who believe it to be fixed and uncontrollable (entity theorists) are more likely to adopt performance goals that aim to prove their abilities (Blackwell, Trzesniewski, & Dweck, 2007). When it comes to goal implementation, entity theorists are more likely to respond with helplessness-orientated strategies, whereas incremental theorists are more likely to

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respond with mastery-orientated strategies. For example, individuals who believe that

the ability to stick with a diet is unalterable may respond to the need to lose weight by

taking appetite-suppressing medication, whereas incremental theorists may be more

likely to respond by learning how to eat and exercise differently (cf Burnette et al.,

2012). Procrastination is another type of helplessness-orientated strategy, as goal

failure can then be attributed to a lack of effort rather than a lack of ability (Howell &

Buro, 2009). Finally, the interpretation of feedback relating to goal progression can be

influenced by lay beliefs about the malleability of personal traits. Entity theorists are

more likely to respond negatively to a perceived lack of goal progression as it may

signal a lack of ability to achieve the goal. Incremental theorists, on the other hand,

respond with more optimistic expectancies and lower negative affect when they

encounter difficulties in achieving goals (Burnette et al., 2012). For example, Baer,

Grant and Dweck (2005) found that the dysphoria individuals felt as a result of

difficulties in goal attainment had very different effects depending on whether the

individual believed that the ability to achieve goals was in their control or not. To

entity theorists, dysphoria seemed to signal defeat, and resulted in greater goal

disengagement, whereas for incremental theorists dysphoria had an energizing effect

on problem-solving efforts and subsequent goal achievement.

There are other factors that influence these key goal-related cognitive

processes. The adoption or rejection of particular goals can be influenced by

contextual primes as well as mood (Fishbach & Labroo, 2007). Previous efforts

directed towards difficult goals may increase the likelihood of shifting to less

effortful, more hedonic goals (Inzlicht & Schmeichel, 2012). Self-worth and self-

esteem are also important. Individuals whose self-worth is contingent on appearance

spend more time socialising, shopping and grooming than students whose self-worth

is based on academic achievements (Crocker, Luhtanen, Cooper, & Bouvrette, 2003).

These self-worth beliefs therefore motivate the adoption of goals that validate valued

personal qualities in order to bolster self-worth. Individuals with low self-esteem are

also more likely to engage in self-handicapping strategies in preparation for a difficult

task as an anticipatory, self-protective strategy (Finez & Sherman, 2012).

Individual differences in trait optimism have a similar impact on goal-related

cognitions as lay beliefs about the malleability of personal traits, because optimism

affects the expectancy, or confidence, an individual has in achieving their goals

(Carver, Scheier, & Segerstrom, 2010; Scheier & Carver, 1985). This is not dissimilar

to the concept of self-efficacy (Bandura, 1977, 1997), although self-efficacy

specifically refers to the beliefs an individual has in their own ability to achieve goals

or cope with adversity, whereas optimism refers to a general expectation of positive

outcomes and good things happening. Both optimism and self-efficacy are associated

with positive coping behaviours and wellbeing. For example, optimism is associated

with higher levels of engagement coping and quality of life during times of illness,

greater proactivity in protecting personal physical health and fewer health-damaging

behaviours, and increased persistence in educational settings (Carver et al., 2010). It

seems, therefore, that optimism influences the types of goals set, their

implementation, and the way feedback on goal progression is appraised. Self-efficacy

beliefs are related to academic performance (Multon, Brown, & Lent, 1991). For

example, individuals with low self-efficacy to self-regulate are less likely to regulate

their behaviours and more likely to procrastinate, thereby damaging their academic

performance (Klassen, Krawchuk, & Rajani, 2008). Self-efficacy beliefs are also

related to wellbeing in individuals with chronic illnesses (Kuijer & De Ridder, 2003).

Specifically, a large discrepancy between important desired goals and perceptions of

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their attainability is associated with low wellbeing, and self-efficacy mediates this relationship (Kuijer & De Ridder, 2003). However, optimism has itself been found to mediate the relationship of self-efficacy and social support on wellbeing, so the constructs are closely related (Karademas, 2006).

It seems, then, that there are multiple factors that influence which goals are adopted, how they are implemented, and how feedback is used to guide their continued progression. An important question remains, however, about the way goals are organised to allow individuals to select the most functionally appropriate goals, and to ensure that behaviour at any given time matches over-arching aims. Specifically, this question relates to the desired goal state specified in Figure 1, since this is what current behavioural outputs are compared with. What determines which desired goal state is currently active?

Goal organisation. Various theories of categorization, such as Action Identification Theory (Vallacher & Wegner, 1987) and Construal Level Theory (Trope & Liberman, 2003) hypothesize that individuals' actions and future goals are arranged in a hierarchy, with abstract, overarching goals at the top that are broken down into progressively more concrete sub-goals. Clearing one's inbox of unread emails could be considered an abstract goal that is served by more concrete actions of opening individual emails, formulating a response, using the mouse to click 'reply' and using the keyboard to type the message. This hierarchy of sub-goals could conceivably be extended to cover the most basic, concrete actions of the muscle movements required to type and click. Clearing ones inbox could itself be a sub-goal of the more abstract goal of being a well-organised individual or a reliable employee. Actions can therefore be identified both in terms of the precise way they are carried out, as well as by how they fulfil the requirements of super-ordinate, abstract goals.

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For example, "walking" could be conceptualised as "putting one foot in front of the other", describing how the action is carried out as a lower-level construal, or as "getting somewhere", describing why the action is carried out as a higher-level construal.

An object or event's psychological distance, meaning how remote it is temporally, physically, socially or in terms of likelihood, determines its construal level. The greater the psychological distance, the higher and more abstract the construal levels, as these are less likely to change over dimensions of distance. For example, the higher-order construal of the event 'birthday party' remains the same whether it is being hosted by a close relative or an acquaintance (changes in social dimension), or the location is around the corner or a ten-minute drive away (changes in physical dimension). Empirical tests of Construal Level Theory have indeed found that the mental representations individuals make of the distant future are more abstract and decontextualized than those of the near future (Liberman & Trope, 1998). Distant-future behaviour is predicted on the basis of more global, stable traits whereas predictions of near-future behaviours take more contextual factors into consideration (Nussbaum, Trope, & Liberman, 2003). When deciding on future actions, higher order representations, such as the desirability of the event weigh more heavily in the decision-making process than lower-level issues relating to the feasibility of implementing the action, whereas this is the opposite for near-future actions (Liberman & Trope, 1998). The construal level of a concept seems to be activated automatically, with words such as *here, friend, tomorrow* and *sure* automatically evoking a smaller psychological distance than the words *there, enemy, next year* and *maybe* (Bar-Anan, Liberman, Trope, & Algom, 2007).

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That said, the tendency to construe actions or situations at either high or low

levels can be primed; for example thinking about an action such as 'making a cup of

tea' as either the high level construal of 'having a break' or the lower level construal

of 'pouring boiling water over a teabag'. Priming individuals to think about distant

events activates a more abstract cognitive processing style, whereas thinking about

events closer in time fosters a more concrete processing style (Förster, Friedman, &

Liberman, 2004). Although a more abstract processing style can enhance creativity, it

can also hinder analytical problem solving (Förster et al., 2004) and increase negative

emotional reactivity to failure experiences (Watkins, Moberly, & Moulds, 2008).

However, self-distanced processing of a difficult event has also been found to

promote a more adaptive style of self-reflection relative to self-immersed processing

(Kross et al., 2011). Activating higher level construals has also been found to improve

self-control and reduce preferences for immediate rewards in favour of longer term

gratification (Fujita, Trope, Liberman, & Levin-Sagi, 2006).

Together, this suggests that higher level, abstract goals maintain stability over

time, help guard against distractibility and impulsivity and identify the purpose,

meaning and desirability of actions (Watkins, 2011). Concrete goals, however, are

more responsive to the environment, contextual and provide detailed information on

the feasibility of an action. Levels of goal identification work in tandem – abstract

goal representations regulate concrete actions across time and contexts, but concrete

representations enable fine-tuning and problem-solving of actions based on

environmental constraints and changes. Exerting self-control can be conceptualised as

the decision to favour higher-level goals over lower-level goals (Fujita & Han, 2009;

Fujita et al., 2006). Because individuals' highest-order sense of self revolves around

stable personality traits and personal values (see Trope & Liberman, 2010), desired

goal states at the most abstract level may therefore also represent an ideal sense of self.

These super-ordinate goals set the standards for an individuals' behaviour across

settings, and the value of sub-ordinate goals is determined by the extent to which they

enable super-ordinate goals to be achieved (Carver & Scheier, 1990). As such, in

theory, the reference value for the desired goal state for each action executed by the

feedback loop in Figure 1 is determined by the more abstract goal representation in

the level directly above. This particular feedback loop is therefore nested within a

larger feedback loop, monitoring the achievement of the more abstract goal, which

itself is monitored and so on (see Fig. 2).
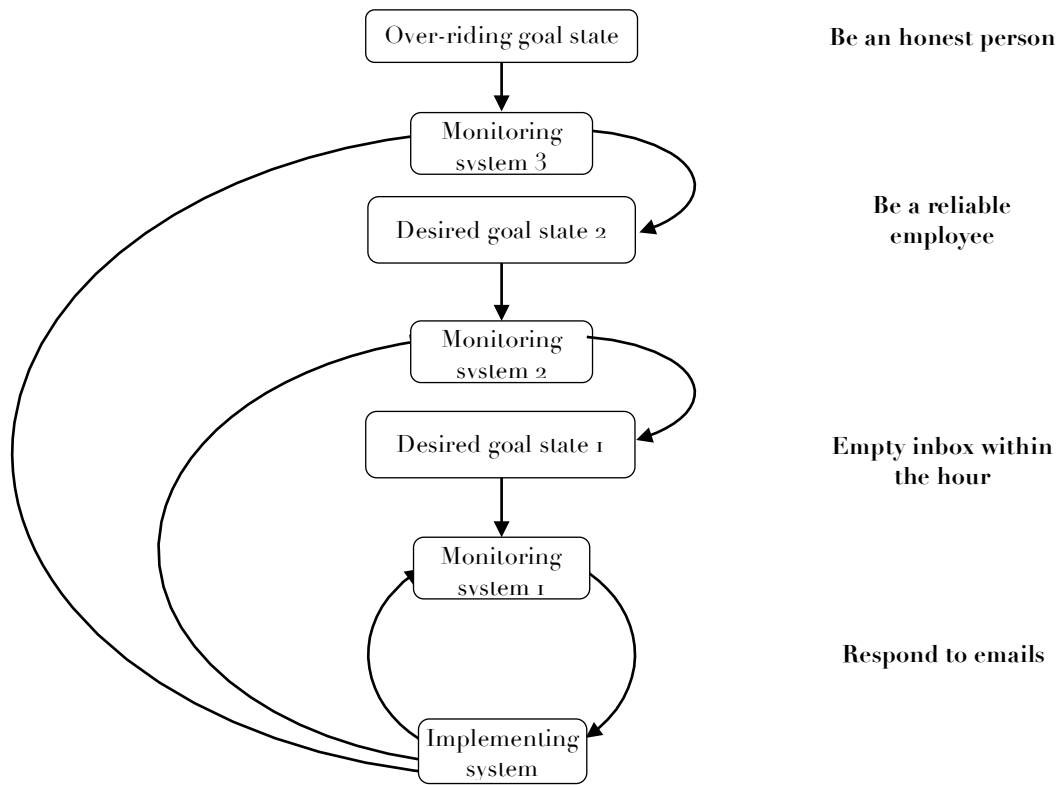
Figure 2. *A hierarchy of goal action representations and their respective feedback loops.*

Because individuals often juggle competing desires, such as to be a good

employee while maintaining a work-life balance, this hierarchy incorporates multiple

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superordinate goal states. Goal and action representations may be interlinked, such

that a particular goal can be reached through more than one particular action, but also

that enacting one action may fulfil the requirements of more than one super-ordinate

goal state (see Fig. 3). Goals may conflict as well; for example the actions that fulfil

the superordinate goal of being a good employee may conflict with those relating to

the goal of relaxing and enjoying life. Achieving long term goals therefore relies not

only on planning behaviours that are in line with higher order goals and values, but

also monitoring conflicts between lower levels of goal and action representations, and

balancing the demands of multiple desired goal states (Duckworth & Gross, 2014;

Fishbach, Zhang, & Koo, 2009). An emerging line of research suggests that there may

be a difference between those individuals who are dedicated to one particular long-

term goal, and passionately pursue this across several months or years (Duckworth et

al., 2007), and those who display a high capacity to monitor momentary goal conflicts

and resist daily temptations without necessarily putting the time or dedication into the

long term pursuit of an individual higher order goal (Duckworth & Gross, 2014).

Those individuals who show a lot of grit, and zealously pursue a narrow range of

goals for long periods of time, may be better at aligning their hierarchy of desired

goal states to match this long-term achievement, thereby minimising goal conflicts.

Those with good self-control capacity, but few long-term goals, may be more adept at

managing lower-level goal conflicts but be less directed by a dominant, superordinate

goal state (Duckworth & Gross, 2014).

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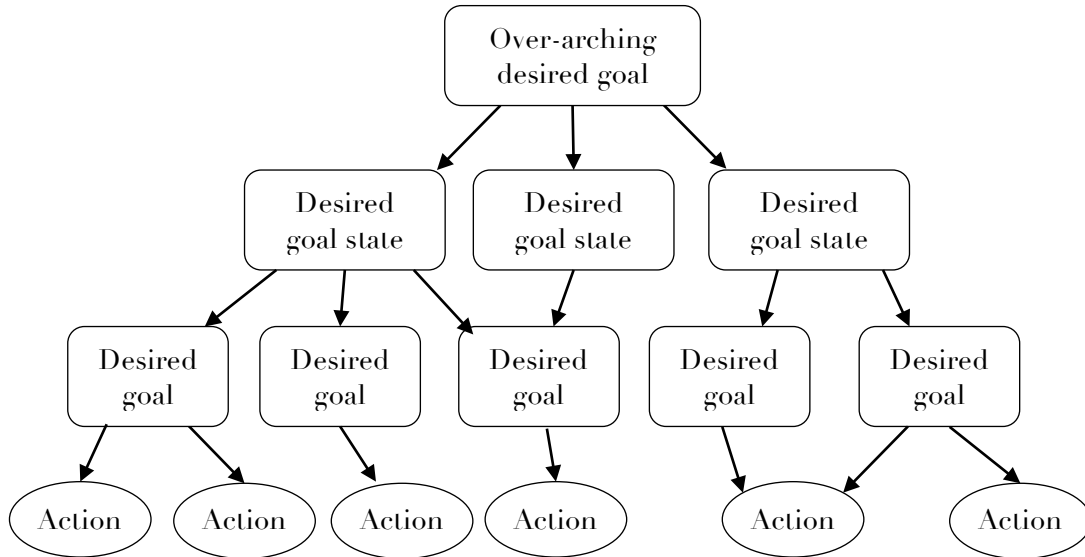
Figure 3. *A hierarchy of goals, incorporating multiple inter-linked goal and action*

representations

Role of affect. Self-control, goal attainment and the experience of emotion are

intrinsically related. Although goal attainment is in itself an important adaptive

behaviour, the speed at which these goals are achieved is equally important. Attaining

goals such as finding food, shelter and a mate can only be considered successful if

completed in a timely manner. In addition to the feedback loops that regulate goal

behaviours, Carver and Scheier (1990) proposed that a second system monitors the

rate at which goals are approached or avoided, and that the product of this second

system is the experience of emotion. If the rate at which ideal goal states are

approached is lower than expected, negative affect such as sadness, self-doubt or

frustration is experienced, whereas if the rate of approach is higher than expected, the

experience is of positive affect. If goals are progressing in line with expectations, no

affect is experienced. This second meta-monitoring system therefore employs

reference values of the expected rate of goal attainment (or avoidance, for 'anti-

goals') with which to compare the actual rate of change. As the meta-monitoring

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system is also a feedback loop, its purpose is to reduce the discrepancy between perceived and desired rate of goal progression, thereby reducing the affective output (Carver & Scheier, 1990, 1998). Although the details of the origin of these affective reference values remain more theoretical than empirical, Carver, Lawrence, and Scheier (1996) suggested that they vary across individuals and behaviours, and as a function of previous goal-related experience. However, it seems likely that individual differences in goal expectancies, such as optimism (Carver, et al., 2010), and in motives for engaging in particular goal behaviours, such as for mastery or performance purposes (cf Dweck & Leggett, 1988), may also influence rate-of-progress reference values.

The affective output of this meta-monitoring system therefore serves as a signal to alter goal-related efforts (Johnson, Carver, & Fulford, 2010). Negative affect means that goals are not being attained as quickly as they should be. A slightly lower-than-expected rate may result in feelings such as frustration or anger, which are associated with increased efforts towards goal attainment. A much lower-than-expected rate of progression could lead to feelings of sadness or even hopelessness, which could result in disengaging from the goal altogether. Lawrence, Carver and Scheier (2002) manipulated feedback goal progression on an ambiguous task such that some participants thought their performance improved over the course of several blocks of trials, whereas others thought it deteriorated, although all participants converged on a block with feedback of 50% correct. They found that individuals reported most positive affect when they thought their performance improved steeply across several trials, whereas the perception of a reduction in performance resulted in increased negative affect. This is particularly pertinent to our understanding of

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clinical presentations characterised by low mood and hopelessness, such as depression

and suicidality (Kuo, Gallo, & Eaton, 2004).

Perseverance despite difficulties in the face of negative feelings such as

boredom or frustration is a strong predictor of long-term goal success (Duckworth et

al., 2007) and feelings of frustration and anger may therefore serve an adaptive

function in increasing effort and motivation (Johnson et al., 2010). Goal

disengagement can also be an adaptive response in the case of perceived failure.

Knowing when to stop trying seems to be a function of both good inhibitory control

and high self-awareness, and is a sign of adaptive, flexible self-regulation (Barber,

Grawitch, & Munz, 2012). Indeed, it has been argued that the pessimism and low

mood association with depression may have had an evolutionarily advantageous

function by reducing risky, dangerous or potentially futile goal-directed behaviours

(Nesse, 2000). Successful disengagement from unattainable goals is also associated

with increased life satisfaction (Wrosch, Scheier, Miller, Schulz, & Carver, 2003).

One reason for this may be that if the costs of engaging in a goal-directed behaviour

outweigh the benefits then disengaging from that goal allows other achievements to

be pursued (Kurzban, Duckworth, Kable, & Myers, 2013). Re-engaging in other goals

seems to independently contribute to life satisfaction following goal disengagement,

and there is some evidence that this is especially the case when individuals have had

difficulties letting go of previous goals (Wrosch et al., 2003).

Positive affect also serves as a cue to alter goal behaviours. Although it may

seem counterintuitive that positive affect would be subject to the same down-

regulation as negative affect, it seems that is nonetheless the case. Positive feelings

signal that goals are progressing well. A modestly higher-than-expected rate of goal

progression may result in enthusiasm, which could help sustain goal efforts (Carver,

2003). If goal attainment is progressing far better than expected, the feelings may be

of joy and pleasure. This may lead to basking in the feeling or coasting, that is, a

withdrawal of efforts because they are no longer deemed necessary (Carver, 2003;

Holman, Totterdell, & Rogelberg, 2005). In this way, positive affect is a signal that

this particular goal behaviour is going well, and this frees up cognitive capacity to

approach other goals.

Although feedback on the rate of goal progression is important in determining

affective responses, the framing of this feedback and the perception of goal distance

are important too. For example, a diary study that directly assessed individuals' affect

and perceptions of goal distance and rate of achievement, found that the progression

rate alone did not predict changes in affect, but that goal distance was also an

important factor (Holman et al., 2005). This also found that when expectancies of

achievement were low, negative affect served to boost goal efforts, whereas positive

affect resulted in reduced efforts, indicative of a coasting effect (see Carver, 2003).

Taking a psychophysical approach, Bonezzi, Brendl and De Angelis (2011) proposed

that motivation to pursue goals is highest when goal distance is either very far or very

near, and lowest when individuals are at the mid-point between their initial state and

their desired end-state. In a series of studies, Fishbach and colleagues found that the

motivation to further pursue goals depends on whether feedback signals an increase in

goal commitment or insufficient goal progression (Fishbach, Eyal, & Finkelstein,

2010; Fishbach et al., 2009). When positive feedback relates to achieving a

superordinate goal, it motivates further goal pursuit by increasing commitment, but

undermines motivation when it relates to achieving a sub-goal. In other words, feeling

a sense of accomplishment increases motivation if this accomplishment is viewed as

being an initial step in the journey towards achieving a larger goal. In the absence of

this long-term perspective, the accomplishment is viewed as a goal achievement in

itself and efforts to continue pursuing similar goals are reduced in order to balance the

needs of achieving other sub-goals. For example, gym-goers who were primed to

think about a super-ordinate goal of staying fit and healthy showed more interest in

also eating healthily if they received positive feedback on their workout programme,

compared to those who received negative feedback, presumably because it increased

their commitment to achieving the overarching goal (Fishbach, Dhar, & Zhang,

2006). Conversely, negative feedback increased motivation to eat healthily amongst

gym goers who were not primed to think about superordinate goals, presumably

because the feedback was interpreted as signalling a lack of goal progression towards

a lower-level goal.

  Goal monitoring in psychopathology. A crucial aspect of the model is that

the benchmark standards of the rate of attainment vary between individuals, as does

the process of assessing the expectancy of goal success. Therefore, the pleasure

deriving from success and the hopelessness arising from failure will differ between

individuals and contexts (Carver & Scheier, 1990). This has particular implications

for psychopathology. Individuals with depression respond more catastrophically to

failure, and seem to be less able to use failure feedback to adjust their behaviour

(Douglas, Porter, Frampton, Gallagher, & Young, 2009; Elliott, Sahakian, Herrod,

Robbins, & Paykel, 1997). Those with a history of depression also show increased

negative affect reactivity following failure to achieve a personally important and

rewarding task compared to individuals with externalising disorders and individuals

without a history of psychopathology (Hankin, Wetter, & Flory, 2012). Evidence

suggests that individuals with schizophrenia are impaired at monitoring self-generated

activities and detecting errors, resulting in poorer task performance (Alain, McNeely,

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He, Christensen, & West, 2002). Individuals with schizophrenia are also more likely to respond to stressful events with catastrophic or self-blaming emotion regulation strategies, compared with individuals free of psychopathology (Rowland et al., 2013). It has also been suggested that the negative symptoms of schizophrenia, such as withdrawal and avolition, represent a compensatory strategy to cope with a sense of threat and anticipated goal failure (Rector, Beck, & Stolar, 2005).

Individual differences in contingent self-worth, self-efficacy and predictions of achievement also influence responses to perceptions of goal progression or failure (Baer et al., 2005; Burnette et al., 2012; Carver et al., 2010). For example, individuals who seek to *prove* their abilities in regulating their emotions report higher levels of rumination and depressive symptoms, as well as increased use of defensive strategies such as thought suppression, compared with individuals who seek to *improve* their emotion-regulation skills (Rusk, Tamir, & Rothbaum, 2011). Additionally, individuals with cognitive vulnerabilities to depression are more likely to adopt goals that seek to prove self-worth rather than learning goals, and when stressed they are more likely to narrow their focus on goals that avoid proof of worthlessness, and experience rumination or effort withdrawal (Rothbaum, Morling, & Rusk, 2009). Individuals with severe mental health difficulties, in particular schizophrenia, may also internalise public, stigmatising views about their condition, thereby experiencing self-stigma (Corrigan, Watson, & Barr, 2006; Watson, Corrigan, Larson, & Sells, 2007). Self-stigma itself reduces self-esteem and self-efficacy, and in doing so can have a detrimental impact on the types of goal behaviours individuals with mental health difficulties adopt. Having internalised negative views about their own self-worth and ability to function, individuals who experience self-stigma may be more

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likely to socially withdraw and less likely to engage in positive, rewarding behaviours (Corrigan, Larson, & Rüsch, 2009).

Control Theory posits that positive and negative affect originate from the feedback system that monitors goal behaviours and that they serve as error signals for the rate of goal attainment. As can be seen from some of the literature already reviewed, positive and negative affect also influence goal behaviours by either promoting increased efforts or goal disengagement. Affect and goal related cognitive processes are therefore reciprocally related, and a large body of research supports the impact of emotion on goal behaviours. Negative affect is associated with increased self-indulgence, such as increased eating in dieters, whereas positive affect is related to an increased preference for delayed gratification (see Schmeichel & Inzlicht, 2013, for a review). Affect also appears to influence whether goals are approached or rejected; for example, positive affect signals the adoption of accessible goals whereas negative affect leads to the rejection of accessible goals (Fishbach & Labroo, 2007). Mood also seems to affect the construal level at which goals and actions are identified, with positive mood associated with more abstract and less concrete construals in individuals free of psychopathology (Beukeboom & Semin, 2005; Watkins, Moberly, & Moulds, 2011). Likewise, construal level affects emotional responses to goal behaviours; a more concrete cognitive processing mode reduces negative emotional reactivity to the experience of failure (Watkins et al., 2008).

Control Theory and Psychopathology

There is converging evidence that rumination and the dysregulation of goal representations are themselves transdiagnostic risk factors for the onset and maintenance of symptoms of psychiatric disorders (Nolen-Hoeksema & Watkins, 2011; Nolen-Hoeksema & McLaughlin, 2011; Watkins, 2011). Research suggests that

the level of goal and action identification is dysregulated in clinical populations (see

Watkins, 2011 for a review). The evidence already reviewed on the reciprocal

relationship between affect and cognitive goal-related processes suggests that factors

that may increase vulnerability to psychopathology, such as low self-esteem, low self-

efficacy and contingent self-worth, negatively influence goal setting and coping

behaviours in response to failure (Baer et al., 2005; Burnette et al., 2012; Carver et al,

2010). Additionally, mood impacts on the adoption or rejection of goals (Fishbach &

Labroo, 2007), and the construal level at which events are processed (Beukeboom &

Semin, 2006). Flexibly switching between higher and lower construal levels is an

important aspect of successfully regulating behaviour (Fujita et al., 2006) and

managing emotional reactions to difficulties attaining goals (Watkins et al., 2008).

Drawing on a broad range of research, Watkins (2011) suggested that this flexibility

might be compromised in a number of psychological disorders. Rather than switch

smoothly between abstract and concrete goal representations according to contextual

demands, individuals suffering from psychological disorders, such as depression,

anxiety disorders, eating disorders and substance abuse disorders, are biased towards

representing goals, actions and negative events more abstractly. Being stuck in an

abstract processing mode has implications for goal setting, the interpretation of goal

progression feedback, emotional reactivity, rumination, and coping behaviours.

Goal representations and depression. The self-regulation of goal-directed

behaviours in depression is an area of great research interest. Although a full review is

beyond the scope of this thesis, a number of key findings will be highlighted.

Individuals with depression tend to generalise discrete failure experiences to global,

abstract self-concepts (e.g. Carver & Ganellen, 1983). Similarly, individuals with

depression tend to link lower-level construals, such as 'get a job' or 'have a baby',

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with higher-level, abstract goals, such as 'be happy' (Street, 2002). This type of

conditional goal setting risks widening the actual-ideal discrepancy of goal

attainment, and makes it far harder to attain abstract goals as they are contingent on

very specific lower-order goals. Conditional goal setting is related to hopelessness in

individuals with depression, in that higher levels of hopelessness are associated with

increased conditional goal setting (Hadley & MacLeod, 2010). Levels of hopelessness

and depression symptoms also affect goal appraisals. High levels of hopelessness are

associated with low beliefs in the attainability of goals (Hadley & MacLeod, 2010),

and high levels of depression are associated with appraisals of goals as being high in

stress and difficulty, and low in structure, control, perceived personal skills and

positive outcome expectancy (Lecci, Karoly, Briggs, & Kuhn, 1994). Goal

organisation structures also seem to be affected by depressive symptoms. In a sample

of adolescents, Dickson and Moberly (2010) found that depressive symptoms were

related to reduced levels of goal facilitation, that is, that goal plans were perceived as

conflicting with each other. Additionally, depressive symptoms were associated with

distress and repetitive thinking about conflicting goals. Currently-depressed

individuals generate less specific goal plans, less specific reasons for attaining

approach plans, and less specific reasons for goal non-attainment, compared with

never-depressed individuals (Dickson & Moberly, 2013). This is line with the large

evidence base on overgeneralised cognitive processing in depression (e.g. Williams et

al., 2007).

Repetitive thought. One proposed mechanism whereby negative affect

increases efforts to achieve goals is by promoting problem-solving processes. As

discussed above, abstract goals direct individuals' behaviours across contexts and are

relatively stable over time, whereas concrete goals and action representations are

more responsive to environmental cues and constraints. An adaptive cognitive response to a low rate of goal attainment would therefore be to concretely process and plan the steps necessary to avert complete failure. Evidence suggests that a more concrete processing mode reduces emotional reactivity to failure experiences and promotes problem-solving (Watkins et al., 2008; Watkins & Moulds, 2005). Likewise, repetitive thought following stressful or traumatic events that is focused on lower-level construals, such as the details of the event, is associated with better recovery and personal growth than repetitive thought focused on higher-level construals such as the personal meaning of the event (Watkins, 2008). Repetitive thought following difficult experiences can therefore be constructive if the experiences are processed in a more concrete, cognitive mode (Watkins, 2004).

However, in some cases these repetitive thoughts are overgeneral and abstract, focused on personal problems, feelings and unresolved goals (Moberly & Watkins, 2006; Watkins, 2008; Watkins & Moulds, 2005). Repetitive thought with this type of content and of this processing mode is typically defined as rumination (Nolen-Hoeksema, 1991). One consequence, therefore, of the negative affect produced by low goal progression is that it can be associated with increased rumination (Jones, Papadakis, Orr, & Strauman, 2013; Moberly & Watkins, 2008a, 2008b, 2010). It has been proposed that rumination is specifically triggered by difficulties in attaining important personal goals (Martin, Tesser, & McIntosh, 1993; Martin & Tesser, 1996). Rumination and negative affect are reciprocally causal, as each increases the likelihood, and fuels the impact, of the other (Moberly & Watkins, 2008a). It seems, therefore, that both negative affect and rumination are important outputs and feedback signals relating to goal progression, and that a vicious cycle of negative affect and rumination may ensue from the experience of goal failure.

Rumination and psychopathology. There has been a particular focus on the
relationship between rumination and depression (Raes et al., 2006; Spasojevic &
Alloy, 2001; Zetsche, D'Avanzato, & Joormann, 2012), but the impact of rumination
on psychotic symptoms is also gaining attention. Rumination contributes directly to
symptoms of depression by lowering mood (Spasojevic & Alloy, 2001); it predicts
future depressive episodes (Abela & Hankin, 2011) and increases the likelihood of
experiencing depression following stressful life events (Nolen-Hoeksema & Morrow,
1991). Increased rumination is also associated with longer periods of depression
(Nolen-Hoeksema, Morrow, & Fredrickson, 1993). The tendency to ruminate in
adolescence is also predictive of the onset and severity of future depressive episodes
(Abela & Hankin, 2011). It also increases negative thinking about the future
(Lavender & Watkins, 2004). Rumination has a direct impact on cognitive processing.
For example, while distraction can reduce overgeneral memory, induced rumination
increases and maintains it (Watkins & Teasdale, 2001). A prospective, longitudinal
study also found that rumination mediates the relationship between impaired
cognitive control for emotional information and symptoms of depression in a remitted
depressed sample at one-year follow up (Demeyer, De Lissnyder, Koster, & De
Raedt, 2012).

Currently-depressed individuals also ruminate in a more abstract way than
recovered- or never-depressed individuals (Watkins & Moulds, 2007). Rumination
prevents effective problem solving in individuals with depression (Watkins & Brown,
2002), although when experimentally induced to think more concretely, their
problem-solving abilities improve (Watkins & Moulds, 2005). While never-depressed
individuals tend to engage in increasingly concrete action identification with

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increasing sad mood, currently-depressed individuals think more abstractly when they experience sad mood (Watkins, Moberly, & Moulds, 2011).

Rumination is also relevant in psychosis. Comorbid depression occurs in approximately 50% of individuals with schizophrenia (Buckley, Miller, Lehrer, & Castle, 2009), and symptoms of depression predict psychotic symptom severity and distress, and relate to the development and persistence of symptoms, prognosis and relapse (Hartley, Barrowclough, & Haddock, 2013; Vorontsova, Garety, & Freeman, 2013). There is evidence that rumination predicts depressive symptoms in individuals with schizophrenia (Thomas, Ribaux, & Phillips, 2014). However, rumination also seems to impact directly on symptoms of psychosis. For example, it has been found to maintain paranoid thoughts (Martinelli, Cavanagh, & Dudley, 2013). Rumination and worry also predict delusional and hallucinatory experiences, as well as resultant distress, in individuals with psychosis (Hartley, Haddock, Vasconcelos, Emsley, & Barrowclough, 2014). In non-clinical populations, rumination is associated with hallucination-proneness (Jones & Fernyhough, 2009). Rumination is also associated with negative symptoms of psychosis, such as emotional withdrawal, independently of depressive symptoms (Halari et al., 2009).

It seems, therefore, that perceived goal failure and the rumination that follows can have catastrophic consequences for individuals at risk of psychiatric disorders. Evidence suggests that individuals suffering from depression are more likely to generalise from negative events, and struggle to effectively reduce negative affect through problem-solving and concrete goal identification. Rumination increases depressed mood in individuals suffering from schizophrenia, as well as the positive and negative symptoms of psychosis, and resultant distress.

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Control Theory outlines a model for how goal behaviours are selected, organised, implemented and monitored, and how the processes guiding these behaviours interact with cognitive distortions (e.g. low self-esteem, self-efficacy and optimism) and affect. The experience of affect serves as a signal to guide goal behaviours, and also influences the adoption or rejection of particular goals. In addition, processes relating to motivation and the anticipation of reward are crucial in understanding goal-directed behaviour.

Role of Motivation in Goal Behaviours

The emphasis on approaching and avoiding goals, as well as the putative role of positive and negative affect in guiding goal efforts, places Control Theory within the broader context of motivationally guided goal-behaviour systems, in line with earlier work on punishment- and reward-driven motivational systems (e.g. Gray, 1982). Models of approach and avoidance motivation hypothesise that behaviour is guided by the possibility of experiencing either rewards or punishment, and that individuals tend to approach rewards and avoid punishment. However, individuals may vary in their reward sensitivity, and may therefore also vary in the extent to which they tend to avoid or approach goals (e.g. Carver & White, 1994; Elliot & Thrash, 2002). Motivational systems are therefore thought to underlie major personality constructs such as neuroticism and extroversion, and ultimately, goal achievements (Elliot & Thrash, 2002).

Motivational systems are important to goal behaviours because reward appraisals determine the hedonic value of a behaviour; that is, how much pleasure an individual expects to experience, and actually experiences, when engaging in a behaviour (Klein, 1989; Vancouver, Weinhardt, & Schmidt, 2010). Disruptions to

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reward processes therefore impact on goal-directed behaviours; without the

anticipation of a future reward, fewer goal behaviours may be initiated.

Motivation and psychopathology. Altered motivation systems are implicated

in a number of psychiatric disorders (Der-Avakian & Markou, 2012; Gard, Kring,

Gard, Horan, & Green, 2007). Anhedonia, the loss of interest or pleasure in

previously enjoyable activities, is a core symptom of both depression and psychosis,

and neuroimaging studies indicate that areas associated with processing reward and

pleasure, such as the ventral striatum and the orbitofrontal cortex, are less active in

individuals with schizophrenia and depression (Harvey, Armony, Malla, & Lepage,

2010; Park et al., 2009). Altered neural activity in reward processing areas is seen in

young girls who are at risk of depression but who have not yet experienced an

episode, suggesting this may be an important risk-factor (Gotlib et al., 2010). This

similarity between the two disorders does not appear to be accounted for by the high

levels of comorbid depression in schizophrenia (Pelizza & Ferrari, 2009).

Schizophrenia and depression are also both characterised by impairments in using

reward-related information in guiding behaviour. For example, Pizzagalli, Iosifescu,

Hallett, Ratner, and Fava (2008) found that individuals with major depressive disorder

did not show a bias in their response behaviour towards greater rewards, indicating

reduced responsiveness to positive reinforcers. Similarly, Morris, Quail, Griffiths,

Green, and Balleine (2014) found that individuals with schizophrenia showed

impairments in using reward-related cues to guide actions. The reward-related

symptoms of anhedonia and amotivation are therefore of clinical interest from a

transdiagnostic perspective.

However, pinpointing the exact nature of these reward deficits has proved

difficult. Although the behaviour of individuals with schizophrenia and depression

seems to be less sensitive to reward salience and reinforcement, this may not translate

into the subjective hedonic experience of these individuals. For example, while

individuals with schizophrenia report increased anhedonia in self-report and interview

measures compared to controls, they report no difference in real-time experience of

pleasure during actual events (Foussias & Remington, 2010; Gard et al., 2007). The

same finding has been found with individuals with depression (Sherdell, Waugh, &

Gotlib, 2012). There are a number of reasons why this might be the case. Reporting

previous or expected pleasure is subject to cognitive distortions such as beliefs and

expectations. In healthy individuals, expectations of pleasure in the future and reports

of pleasure in the past tend to be higher than current experiences of pleasure (Gilbert

& Wilson, 2007), but individuals with schizophrenia do not seem to exhibit these

biases in retrospective and prospective reports (Strauss, 2013). There is some

evidence that this type of 'affective forecasting' is also biased in depression (see

Dunn, 2012), which may also relate to a general attenuation of positivity biases

normally displayed by individuals without psychopathology (Dunn, Stefanovitch,

Buchan, Lawrence, & Dalgleish, 2009). However, some of the uncertainty about the

role of reward processes could also stem from failing to appreciate the difference

between 'wanting' and 'liking' a reward (Treadway & Zald, 2011). The experience of

reward and pleasure can be differentiated into anticipatory and consummatory

components and different areas of the brain are associated with processing these

different components (Dillon et al., 2008). Studies suggest that both depression and

psychosis are primarily characterised by reduced anticipatory pleasure but intact

consummatory pleasure (Gard et al., 2007; Sherdell et al., 2012) and that this

anhedonic anticipatory motivation may impact on the likelihood of these individuals

engaging in rewarding activities. For example, while both currently- and never-

depressed individuals report similar levels of consummatory pleasure, this only

affects motivation to work for further rewards in never-depressed individuals

(Sherdell et al., 2012). Additionally, an important component of the cognitive model

of the negative symptoms of schizophrenia is poor expectancies of success and

pleasure in goal-related activities (Rector et al., 2005). Despite purportedly intact

consummatory reward experiences, the anticipation of failure and low pleasure

increases the likelihood of disengagement and withdrawal, thereby fuelling

symptoms.

It has also been suggested that while healthy individuals tend to approach

goals, individuals with depression automatically tend to avoid engaging in goal-

directed behaviours, and must therefore exert executive control to override this deficit

in approach motivation, further reducing the chances of initiating rewarding goal

behaviours (Carver et al., 2009). Approach and avoidance processes are thought to

play an integral role in limiting positive and rewarding experiences in individuals

with depression, thereby maintaining negative mood (Trew, 2011). In an EEG study,

Shankman, Klein, Tenke and Bruder (2007) found evidence of relatively decreased

neural activity associated with approach motivation in individuals with early-onset

depression, but not in those with late-onset depression or with no history of

depression. The difference in early- and late-onset depression suggests that a deficit in

approach motivation may either be the product of a cognitive 'scar' of experiencing

depression early in life, or a particular risk factor for early-onset depression.

However, there may also be a distinction here between studies assessing

neural activity and reinforcement behaviour and those looking at the subjective

reports of goal behaviours. For example, Dickson, Moberly, and Kinderman (2011)

found that currently depressed individuals reported a similar number of approach and

avoidance goals as never-depressed individuals. However, they differed in their appraisals of these goals. Individuals with depression perceived their approach goals as less likely to happen, and reported less likelihood of success on their avoidance goals, compared to the control group, and they also showed a reduced sense of control over these outcomes. Similarly, Sherratt and MacLeod (2013) found no difference in the number of approach and avoidance goals between currently- and never-depressed individuals, but evidence of reduced approach motivation and increased avoidance motivation in relation to the approach goals of individuals with depression. However, a diary study found that individuals with mild depression reported fewer numbers of social, physical and educational activities, and more employment-related activities than non-depressed individuals (Hopko & Mullane, 2008). These results highlight a qualitative difference in the activities individuals with depression engage in that may not be readily captured by retrospective or prospective reports. Gaining a better understanding of how motivation impacts on the pursuit of everyday goal behaviours and the experience of emotion is therefore a high priority. In particular, it would be valuable to investigate the way individual differences in motivational processing influence the regulation of goal-directed behaviour within the framework of Control Theory.

Clinical Implications of Control Theory

The predictions made by Control Theory have many implications for clinical practice. The cognitive processes guiding goal setting, organisation, implementation and monitoring are all subject to the influence of biases in self-perception (e.g. self-esteem, self-efficacy and self-stigma) and expectations of the future (e.g. optimism). The way affective and hedonic reactions to failure and achievement are incorporated into goal planning is also important. The effect of cognitive biases and affective

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reactivity on the behaviours individuals engage in is a core feature of cognitive-behavioural approaches in clinical practice (Hawton, Salkovskis, Kirk, & Clark, 1989). Control Theory provides a practical framework for understanding the feedback and reciprocal relationships between cognitive goal planning and monitoring inputs, and behavioural and affective outputs. The theory therefore also offers a scaffold for guiding clinical interventions aimed at reducing the impact of goal-behaviours on the maintenance of clinical symptoms. For example, preventative approaches could target goal planning, by addressing conditional goal setting (Hadley & MacLeod, 2010) and the effects of contingent self-worth (Alloy & Abramson, 1979; Crocker, Brook, Niiya, & Villacorta, 2006). Research differentiating anticipatory and consummatory pleasure is important in guiding behavioural activation and reconnection with pleasurable experiences in clinical disorders characterised by anhedonia and low motivation, such as depression and schizophrenia (e.g. Dunn, 2012; Gard et al., 2007). The methods individuals employ for implementing goals and responding to perceived failures can also be targeted, for example by applying the findings relating to the use of mastery-vs. helplessness-orientated strategies in planning, implementing and monitoring goals (Burnette et al., 2012). The role of rumination in the feedback processes outlined by Control Theory is also a key intervention target, with evidence suggesting it heightens symptoms of depression and schizophrenia, and reduces the problem-solving capacity necessary for goal progression (Halari et al., 2009; Hartley et al., 2014; Martinelli et al., 2013; Spasojevic & Alloy, 2001; Watkins & Brown, 2002)

Gaps in The Literature

The framework of Control Theory has guided a huge body of research that has great theoretical and clinical value. There are still a number of areas that warrant further exploration and empirical evaluation. Given that much of the evidence

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reviewed in this chapter in support of models of self-control and goal-behaviours has been derived from laboratory-based studies of self-reported retrospective or prospective goal plans and actions, it seems important to use methods that consider real-time, everyday fluctuations in mood and the achievement or failure of personal goals. An advantage of laboratory-based studies is that environmental variables can be controlled and cognitive processes can be isolated for study. Additionally, laboratory-based studies allow for the experimental manipulation of variables such as cognitive processing mode (Watkins et al., 2008) or mood (Joormann, Cooney, Henry, & Gotlib, 2012). This method is therefore invaluable in the fine-tuning and empirical validation of psychological theories. However, a disadvantage of laboratory-based studies is that the generalizability of the results may be limited, due to the un-ecological nature of the testing environment. Laboratory also studies tend to be cross-sectional and time-limited. Ecologically valid, longitudinal methods have the advantage of capturing data from participants' real, everyday lives across a longer period of time. This makes it possible to assess the relationship between variables such as goal appraisals and affective responses as they play out in real life, which is particularly relevant when testing a model of goal-directed behaviour such as Control Theory. Given that this model makes predictions about the affective, ruminative and behavioural consequences of the achievement of personally meaningful goals, it seems particularly important to test these predictions outside of the laboratory and across a longer time-period. However, a limitation of such methods is that they are non-experimental, in that variables tend not to be experimentally manipulated.

The experience sampling method (ESM) is an intensive, longitudinal method that collects self-report data from participants several times a day, for several days or weeks. Since its development in the 1970s (Csikszentmihalyi, Larson, & Prescott,

1977), this method has gained increasing popularity in the areas of psychology, social

psychology, and organisational research (Scollon & Kim-Prieto, 2003). As a

naturalistic method, it allows rich data to be collected on the context of behaviour as

well as associated cognitions and emotions, and is therefore of greater value and

validity than behavioural observation studies. Since moment-to-moment perceptions

of daily life can be captured, it is possible to analyse fluctuations in subjective

experience and link these to external contexts (Hektner, Schmidt, & Csikszentmihalyi,

2007). The method also removes the problem of relying on potentially biased and

inaccurate retrospective reports. It therefore provides a powerful method of observing

psychological phenomena in individuals' everyday lives, and through the use of

multi-level regression analyses, can make predictive and causal inferences about

psychological and environmental events.

Holman et al. (2005) used a daily diary method to assess the affective

experience of goal progression, and in particular the velocity of progression and

distance to important goals. However, as diaries were completed once per day at the

end of the working day, and the goals reported were selected at the start of the four-

week study period, this investigation was unable to answer questions about intra-day

fluctuations in goal behaviours and affective responses. In an occupational setting,

Harris, Daniels and Briner (2003) found that the attainment of work-related goals was

associated with increased positive affect, and that this interacted with goal importance

such that positive affect and wellbeing were highest when important goals had been

attained. However, this study was also less able to assess fine-grained fluctuations in

affect as sampling was conducted only twice daily.

Daniels et al. (2012) used ESM and found that end-of-day feelings of anxiety

were related to negative beliefs about workload demands during the day, and that the

perception of these demands was associated with reductions in motivated pleasant

affect. Moberly and Watkins (2008a, 2008b) used ESM to investigate the relationship

between negative affect and rumination, and later to investigate how these relate to

goal failures as a direct test of the affective and cognitive outputs predicted by

Control Theory (Moberly & Watkins, 2010). Hartley et al. (2014) used the same

method to investigate daily fluctuations in rumination and symptoms of psychosis.

They found that fluctuations in ruminative thought and worry predicted persecutory

delusional ideation and auditory hallucinations. Additionally, rumination predicted

the distress caused by this increase in symptoms. Gard et al. (2007) used ESM to

distinguish between anticipatory and consummatory pleasure in individuals with

schizophrenia, and found that symptoms of schizophrenia were differentially

associated with deficits in anticipatory, and not consummatory, pleasure. Recently,

Gard et al. (2014) used an ecological momentary assessment method to investigate

anticipatory and consummatory pleasure processes in schizophrenia, and how these

relate to the types of goals individuals engaged in, and their expectations of effort.

This method involved conducting short, semi-structured telephone interviews several

times a day, to gather data on what individuals were doing, who they were with, how

much they were enjoying their current activity, how effortful it was, what their goal

plans were for the next few hours, and what their anticipations were of enjoyment and

effort for future plans. They found that compared with a non-clinical sample,

individuals with schizophrenia engaged in lower effort activities and made lower

effort goal plans, although there were no differences in the quantity of activities and

goals reported. They also showed some inaccuracies in predicting the effort involved

in activities. The types of activities they reported were independently rated as having

less long-term benefit. Surprisingly, and contrary to previous research, they found that

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individuals with schizophrenia anticipated greater pleasure for future activities than

the non-clinical sample, and also engaged in more pleasure-based activities. Based on

these results, Gard et al. (2014) proposed that the goal-directed behaviour of

individuals with schizophrenia is affected more by difficulties in judging effort than

by deficits in anticipating pleasure. They outlined routes for translating these findings

to clinical practice by helping individuals break down larger goals into smaller steps

that are clearly associated with specific rewards.

By using ESM, Moberly and Watkins (2008a) found that negative affect was

associated with increased rumination. Additionally, by examining the temporal profile

of ruminative and affective responses, they found that negative affect was related to a

subsequent increase in rumination. Rumination also increased subsequent negative

affect, indicating a reciprocal relationship between the two constructs. Additionally,

negative affect is associated with the experience of negative life events, and the

emotional reactivity to negative events seems to be determined by ruminative

tendencies (Moberly & Watkins, 2008b). It also seems that the subjective experience

of goal progression is an important determinant of negative affect and rumination, in

line with the predictions made by Control Theory. Moberly and Watkins (2010) found

that the extent to which individuals perceived they were succeeding at their current

goals predicted negative affect and rumination. Perceived success interacted with the

personal importance of individual goals, such that rumination and negative affect

were highest when individuals reported low success for important goals. Momentary

affective and ruminative responses were associated with trait rumination, whereas

momentary reports of negative affect were independently associated with

dispositional levels of depressive symptoms.

These are valuable contributions to our understanding of the regulatory

processes underlying goal pursuit by elucidating the impact of anticipatory pleasure,

the temporal profile of negative affect and rumination, and how these are reciprocally

related as well as to the appraisal of goal behaviours. There are nonetheless several

key elements of the theoretical framework of Control Theory that have yet to be

tested. For example, the Moberly and Watkins (2008a, 2008b, 2010) studies

considered only negative affect. Rather than represent the opposite ends of a

spectrum, positive and negative affect are thought to be separate, orthogonal

constructs (Watson, Clark, & Tellegen, 1988). It would therefore be important to

assess the relationship between goal achievement and positive affect and how these

relate to individual differences in anticipatory pleasure. Since disruption to goal-

regulation processes are thought to be a transdiagnostic factor, gaining a better

understanding of these mechanisms has the potential to impact on our

conceptualisation of multiple psychiatric disorders (Watkins, 2011). It is also

important to verify whether goal progression independently influences positive and

negative affect. To our knowledge, the relationship between positive affect and

rumination has not been studied to date using intensive, naturalistic methods. The

study reported in this thesis therefore addressed this gap by investigating the

relationship between appraisals of the importance and success of goal behaviours on

resultant positive affect, as well as negative affect and rumination, using ESM.

Additionally, disrupted motivational processes are another transdiagnostic

factor influencing goal plans that have only recently been investigated using

naturalistic methods (e.g. Gard et al., 2014, 2007). These studies only considered

these processes in the context of schizophrenia, however. Conversely, Watkins (2011)

transdiagnostic account of goal and action dysregulation in clinical disorders did not

consider schizophrenia. There is therefore a need to address transdiagnostic aspects of

goal-directed behaviours across mood disorders as well as those characterised by

psychosis. This study addressed this limitation in the evidence base by taking a

transdiagnosic, dimensional approach to anhedonia and the anticipation and actual

experience of pleasure. Individual differences in symptoms of anhedonic depression

and schizotypy were assessed at baseline. Schizotypy refers to a spectrum of

personality traits experienced by non-clinical samples that are associated with

elevated risked for schizophrenia-spectrum disorders (Kelleher & Cannon, 2011).

Differences in trait anticipatory and consummatory pleasure were also assessed prior

to the experience sampling period, and consummatory pleasure (enjoyment) was

assessed during the sampling period.

Study Rationale

The study employed intensive, longitudinal experience sampling methods

(ESM), using an analogue, non-clinical sample, and took a dimensional approach to

symptoms of depression, low motivation and schizotypy. The study used a signal-

contingent design. In signal-contingent designs, participants are alerted at pseudo-

random time-points throughout the day to complete sampling measures. Other ESM

designs are interval-contingent, where participants complete measures at pre-specified

intervals such as every hour, and event-contingent, where participants complete

measures based on the occurrence of specific events such as social interactions

(Scollon & Kim-Prieto, 2003). The advantage of signal-contingent designs is that they

reduce the anticipation participants have of completing measures, which may bias

their perceptions of events, as well as the burden on participants to remember when to

complete the questionnaires.

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As symptoms of depression, low motivation and schizotypy are experienced to varying degrees in the general population, this design assessed the influence of these specific symptoms on goal regulation while ruling out the impact of disease-specific processes, which would not be possible using clinical samples. Analogue studies are widely used to supplement clinical research and much evidence suggests that the results of such studies are generally similar to those obtained using clinical groups (Vredenburg, Flett, & Krames, 1993). Given that dysregulation of goal representations appears to be a transdiagnostic factor, there is also a rationale for initially testing the theory in an analogue group before translating to a clinical sample.

The recruitment strategy was aimed towards individuals aged between 18 and 25 years. This age range was interesting for a number of reasons. Since most adult cases of psychiatric disorders have their onset during adolescence or early adulthood, this stage of development may represent a particularly vulnerable period (Gogtay, Vyas, Testa, Wood, & Pantelis, 2011; Shih, Belmonte, & Zandi, 2004). Sub-clinical symptoms, such as low self-esteem and negative cognitions, during this period also predict later psychological difficulties (Carter & Garber, 2011; Sowislo, Orth, & Meier, 2014). In particular, the interaction of negative cognitions with the stress associated with difficult achievement events, such as exams, is relevant to the subsequent onset of depressive symptoms (Carter & Garber, 2011). It is also the age at which most young people experience a dramatic increase in independence, responsibility and control over their daily activities. Finally, the frontal lobe, which is associated with self-control functioning, continues to mature until the age of 25 (Sowell, Thompson, Holmes, Jernigan, & Toga, 1999). Together this makes the early adult stage a particularly interesting age to investigate in terms of goal-directed behaviours.

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A number of baseline measures assessed trait anticipatory pleasure, approach and avoidance motivation, ruminative tendencies, as well as measures of schizotypal personality and current levels of depressive symptoms. The rationale for each of these measures will be discussed in more detail in the Methods section, but briefly, they were chosen to comprehensively measure individual differences in both state and trait factors that may impact on the approach and control of goal behaviours. Although this study recruited a non-clinical sample, it is important to measure levels of depression and schizotypy because of the impact of these symptoms on anticipatory pleasure. Likewise, the consequences of goal failures, increased negative affect and rumination (Moberly & Watkins, 2010), may differentially affect those already at risk.

At each time-point, participants responded to questions about their current mood, thoughts and behaviours. Specifically, they rated their positive and negative affect, and the extent to which they were ruminating about their thoughts and feelings. They also reported their current activity or goal, and rated their appraisals this activity on scales of importance and success. Consummatory pleasure was assessed through ratings of enjoyment. In line with Moberly and Watkins (2010), the ruminative and affective responses to goal attainment were investigated using multi-level modelling analyses. Reported activities were later independently categorized as being personal, social or task-related goals, which allowed associations to be made between the nature of goal-directed activities and baseline measures of motivation, schizotypy and depression.

ESM methods were chosen over other methods, such as daily diary methods, to allow the intra- and inter-day fluctuations in momentary affect and rumination to be investigated. This method was also used to avoid biases in retrospective reporting of activities, goal appraisals, affect and rumination.

Research hypotheses

This study aimed to replicate Moberly and Watkins' (2010) ESM study, which

found that low success of important goals led to increases in negative affect and goal

rumination. However, the current study also aimed to expand on the findings of

Moberly and Watkins (2010) in a number of respects. First, the study measured not

only momentary negative affect but also positive affect. Second, baseline measures of

anticipatory and consummatory pleasure were collected in order to assess the

relationship between individual differences in motivation to engage in goal-

behaviours and goal progression. Third, trait levels of schizotypy were also measured

at baseline, to increase the transdiagnostic validity of the study. Fourth, participant-

reported activities were independently categorised in order to investigate the influence

of baseline measures of depressive symptoms, rumination, schizotypy and rumination

on the types of activities participants engaged in, and the success with which they did

so.

Hypothesis 1: Goal Progression Influences the Experience of Affect And Rumination

This two-pronged hypothesis considered within-subject (Level 1) data, and the

analysis replicated that reported by Moberly and Watkins (2010). In line with

previous research, it was hypothesised that low goal success would be associated with

an increase in negative affect and rumination. It was expected that low goal success

would be associated with a decrease in positive affect. The success by importance

interaction found by Moberly and Watkins (2010) was also expected, such that

negative affect and rumination would be highest when participants reported low

success on personally important goals. It was thought this interaction would also be

found with regards to positive affect, such that positive affect would be lowest under
these circumstances.

Exploratory, supplementary hypotheses relating to the relationship of
consummatory pleasure (enjoyment) on positive and negative affect, and rumination
were also considered. It was thought that enjoyment would be positively associated
with momentary positive affect, and negatively associated with momentary negative
affect. The relationship between rumination and consummatory pleasure has not been
assessed previously, but it was expected that enjoyment would reduce rumination in a
similar way to reducing negative affect.

**Hypothesis 2: Individual Differences in Depressive Symptoms, Trait Rumination
and Schizotypy Affect Momentary Responses to Goal Progression**

Baseline measures of depressive symptoms and trait rumination were expected
to explain part of the variability in the findings of Hypothesis 1; specifically, it was
expected that depressive symptoms would be associated with momentary negative
affect, and trait rumination would be associated with both momentary negative affect
and ruminative responses. It was thought that depressive symptoms and trait
rumination would also be negatively associated with momentary positive affect.
Baseline measures of schizotypy were hypothesised to be positively associated with
momentary negative affect and ruminative responses, and negatively associated with
momentary positive affect.

Exploratory hypotheses relating to consummatory pleasure predicted that
individual differences in symptoms of depression and schizoptypy would not be
associated with momentary enjoyment.

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Hypothesis 3: Individual Differences in Motivation, Rumination and Symptoms Of Depression and Schizotypy are Associated with Goal Activities and Progression

These hypotheses considered between-subject (Level 3) data, as they assessed the relationship between individual differences on the baseline measures and outcomes measures throughout the week of ESM data collection. It was predicted that increased levels of approach motivation would be correlated with greater success and enjoyment of activities, as well as fewer reports of struggling to accomplish tasks. Given that the sample was non-clinical it was thought that trait consummatory pleasure would correlate with actual enjoyment reported during the experience sampling period, and that trait anticipatory pleasure would be correlated with daily ratings of how much individuals were looking forward to the next day's activities. Given previous findings on the non-correlation between expected and actual pleasure in non-clinical samples (Gilbert & Wilson, 2007), it was thought that trait anticipatory pleasure would not correlate with actual enjoyment reported during the experience sampling period. In other words, trait anticipatory pleasure was expected to correlate with measures of anticipatory pleasure during the experience sampling period, but not to the consummatory pleasure reported during the week. It was thought trait consummatory pleasure would relate to reported enjoyment.

Trait rumination, depressive symptoms and schizotypy were expected to correlate with reduced success and enjoyment of activities, and more occasions of reported goal struggles. It was also thought that symptoms of schizotypy and depression would influence the types of activities participants reported; in particular it was thought that higher scores on these constructs would be related to fewer social goals (Markowitz & Weissman, 2012; Rector et al., 2005; Uebelacker et al., 2008).

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Methods

Design

The study employed intensive, longitudinal experience sampling methods

(ESM) with a signal-contingent design. Participants completed baseline measures of

symptoms of depression, schizotypy, anticipatory pleasure, rumination, and approach

and avoidance motivation. They also completed brief ESM measures at the beginning

and end of the day, as well as at five pseudo-random time-points throughout the day,

for six consecutive days. Participants were prompted at these pseudo-random time-

points by text message alerts. This design enabled both within- and between-subject

analyses of differences in affect, rumination and goal progression.

Sample size calculation. Sample size calculations are not routinely conducted

for ESM studies, and most studies do not report effect sizes. It was therefore not

possible to conduct a formal power analysis for this study. However, based on

previous research and theoretical papers on power in ESM studies, it was determined

that 50 participants represented the optimum solution to the constraints imposed by

achieving sufficient power while still setting realistic expectations for recruitment and

remaining within budgetary constraints (Maas & Hox, 2005; Ohly, Sonnentag,

Niessen, & Zapf, 2010). Simulation studies have found that sample sizes of 30 or less

can lead to biased estimates of effect sizes (Maas & Hox, 2005), and also that

increasing the number of participants has a greater impact on power than increasing

the number of sampling points (Scherbaum & Ferreter, 2008). Based on these

findings, Ohley et al. (2010) recommend a minimum of 50 participants, as the best fit

between the requirements of statistical power and the constraints of recruitment.

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Participants

Recruitment strategy. Information about the study was advertised to students at the University of East Anglia via email bulletins to the entire student body, as well as specifically to the Schools of Medicine, Psychology, Business, Social Work, Environmental Sciences, Biology, Pharmacy, Politics Philosophy and Language, International Development, and Education, and the International Students mailing list. Posters and flyers were placed in the buildings of six departments and in the main library (see Appendix A). Flyers were also distributed at a Welcome Event for undergraduates in the first week of term. In addition, information about the study was included on the University intranet pages for the Medical School undergraduate students and advertisements were posted on the Medical School and the Doctoral Programme for Clinical Psychology Facebook pages. The University of Cambridge and Anglia Ruskin University were also approached, and information about the study was included on the University of Cambridge Graduate Students' website. Posters were placed at several departments and colleges at the University of Cambridge, as well as at Anglia Ruskin University. Information about the study was also spread through word of mouth. Advertisements included a link to the study website which contained information about the study (http://goo.gl/aUyTGX). The recruitment window lasted from April 2014 to March 2015.

Inclusion criteria were speaking fluent English, owning a mobile phone, and being available for a duration of eight consecutive days to complete the study (six days of ESM data collection as well as pre- and post-study briefing sessions). Exclusion criteria were scoring above the cut-off for depressed mood on the Anhedonic Depression sub-scale of the MASQ (21 points; Bredemeier et al., 2010).

Seventy-four individuals expressed interest in the study and received the

information sheet. Of these, 47 individuals (34 females) consented to take part.

Thirty-nine of these were students. Three participants were excluded at the initial

briefing session due to their scores on the Anhedonic Depression subscale of the 90-

item MASQ falling above the cut-off score of 21 (Bredemeier et al., 2010). Data were

excluded from one further participant who withdrew from the study early. Standard

guidance stipulates that participants should be excluded if they complete less than one

third of time-point measures (Delespaul, 1995). However, all participants completed

at least 40% of the time-point questionnaires, and over 50% of all questions in the

booklets, so none were excluded on this basis. It was not possible to exclude

participants on the basis of late entries, as they had been briefed to complete the time-

point measures as soon as they noticed the text alert and to complete them as if they

had just received the message, even if there was a delay of more than 15 minutes

between receiving and noticing the text message.

Measures

    Baseline measures. Copies of the baseline measures can be found in

Appendix B.

    Depression. Current depression symptoms were assessed using the Mini

Mood and Anxiety Symptom Questionnaire (Mini-MASQ; Casillas & Clark, 2000).

The MASQ (Watson, Clark, et al., 1995; Watson, Weber, et al., 1995) is a 90-item

questionnaire created to test the tripartite model of depression and anxiety. The scale

differentiates between symptoms of anxious arousal (specific to anxiety), anhedonic

depression (specific to depression) and general distress (experienced in both

disorders). The Mini-MASQ has 26 items and shows good convergent validity with

other measures of negative and positive temperament, as well as good discriminative

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validity between the specific scales. Casillas and Clark (2000) found internal

consistency coefficient alphas for the individual scales in the mid 0.80s.

This measure was chosen because it differentially measures symptoms of

anhedonic depression, such as "felt like nothing was very enjoyable" and "felt really

slowed down". Given the key research questions about the impact of individual

differences in motivational processes, this makes it more suited than other, copyright-

free measures of depressed mood such as the Patient Health Questionnaire (PHQ-9;

Kroenke, Spitzer, & Williams, 2001). Scores on the Anhedonic Depression sub-scale

range from 8 to 32 and high scores indicate elevated anhedonia.

The Anhedonic Depression subscale of the full 90-item MASQ was used as a

screening measure for elevated levels of depression. This subscale consists of 22

items relating to anhedonic depression, and responses load on two factors; one of

which considers depressed mood and low motivation, and the other of which

considers the experience of pleasant emotions, where responses are reverse-scored

(Nitschke, Heller, Imig, McDonald, & Miller, 2001). Participants scoring greater than

21 points (out of 32 maximum) on the eight items loading on the depressed mood/low

motivation items were excluded from the study, as this has previously been found to

be a predictor of major depression (Bredemeier et al., 2010).

Schizotypy. Psychotic experiences are not confined to clinical populations,

but experienced by individuals in the general population (Kelleher & Cannon, 2011).

The proneness to these experiences was measured using the Brief Schizotypal

Personality Questionnaire, which is designed for use in the general population (SPQ-

B; Raine & Benishay, 1995). It yields a total score of up to 22 (high scores indicate

high levels of schizotypy) as well as scores for three subscales: Cognitive-Perceptual

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Deficits (range of scores 0-8), Interpersonal Deficits (range of scores 0-8) and

Disorganisation (range of scores 0-6).

The SPQ-B was chosen because it is one of the most frequently used measures

of schizotypy, shows good internal reliability (Coefficient alphas ranging from 0.72-

0.80 for the full measure and the three subscales) and good test-retest reliability (Test-

retest reliability coefficients ranging from 0.86-0.95). The scale has also been

validated on adolescent populations (Fonseca-Pedrero, Paíno-Piñeiro, Lemos-

Giráldez, Villazón-García, & Muñiz, 2009). Subscales relating to negative

schizotypy, e.g. the Interpersonal Deficits subscale, were of particular interest, due to

the relationship between these symptoms, anticipatory pleasure, and goal-directed

activity.

Anticipatory and consummatory pleasure. The Temporal Experience of

Pleasure Scale (TEPS; Gard, Gard, Kring, & John, 2006) was used to measure

anticipatory pleasure. This scale is the only questionnaire-based measure of both

anticipatory and consummatory constructs (Der-Avakian & Markou, 2012). It consists

of 18 items (10 for anticipatory pleasure, 8 for consummatory pleasure), and scores

range from 10-60 for the anticipatory pleasure subscale, and from 8-48 for the

consummatory pleasure subscale. High scores indicate high levels of pleasure. It

shows good internal consistency (Cronbach's alphas of .79, .74, and .71 for the total

scale, anticipatory scale, and consummatory scale, respectively) and test-rest

reliability (anticipatory scale: r=0.80 [*p*<.001]; consummatory scale: r=.75 [*p*<.001];

total scale: r=.81 [*p*<0.001]; Gard et al., 2006).

Rumination. Ruminative tendencies were assessed using the Ruminative

Responses Scale (RRS; Treynor, Gonzalez, & Nolen-Hoeksema, 2003), which is a

shorter version of the original Response Styles Questionnaire (Nolen-Hoeksema &

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Morrow, 1991). This questionnaire consists of 22 items and high scores indicate high levels of trait rumination (scores range from 22 to 88). The short form has good internal consistency (Cronbach's alpha=0.87) and correlates well with scores on the Beck Depression Inventory (r=0.54; $p<0.001$) and on the Hamilton Rating Scale for Depression (r=0.44; p<0.001; Feldner, Leen-Feldner, Zvolensky, & Lejuez, 2006).

Approach and avoidance motivation. The Behavioural Inhibition/Approach Sensitivity Scales (BIS/BAS; Carver & White, 1994) measure sensitivity to behavioural inhibition and activation, which correspond to avoidance and approach motivation, respectively. The measure provides four scales, one of inhibition (BIS) and three of approach motivation (Drive, Reward Responsiveness and Fun Seeking; BAS). These scales are relatively independent of each other, and have good external and discriminant validity (Carver & White, 1994). For example, the BIS scale correlates well with the Susceptibility to Punishment Scale (r=.39, $p<0.001$), whereas the approach motivation scales do not (Carver & White, 1994). The scales are also related to constructs such as Neuroticism, Extroversion, and Positive and Negative Affectivity (Heubeck, Wilkinson, & Cologon, 1998). Scores range from 4-16 for BAS Drive and BAS Fun Seeking, from 5-20 for BAS Reward Responsiveness, and 7-28 for the BIS subscale. High BAS scores indicate high levels of approach motivation, and high BIS scores indicate high levels of avoidance motivation.

Time-point measures. Participants could choose to answer the time-point questionnaires in a small booklet or as an online questionnaire, hosted by SurveyGizmo (www.surveygizmo.com) on their mobile phones (see Appendix C). Each text alert contained a secure link to the online questionnaire. Time-point questionnaires took less than two minutes to complete. Participants were asked to complete questionnaires immediately after receiving the text alert, and, if using the

booklet, to mark the time they completed each questionnaire. Online responses were

automatically time-stamped. In order to minimise disruption to students' lectures, text

alerts were timed, where possible, to fall in the break between lectures. Where this

was not possible, due to unknown schedules or different schedules of participants

taking part simultaneously, participants were briefed to complete the time-point

measures as soon as they noticed the text alert on their phones. They were asked to

complete the measures as if they had just received the text alert, but to complete the

time-stamping section accurately. If they had been unable to look at their phone for a

long time and then found that two text alerts had arrived since last checking, they

were told to respond to one alert and ignore the other.

　　　Positive and negative affect. Based on Moberly and Watkins (2008a, 2010),

negative affect was measured by asking participants to rate their levels of sadness,

anxiety and irritation on a scale of 1 to 7, where 1 was anchored at 'not' and 7 was

anchored at 'very'. Likewise, positive affect was measured by ratings of happiness,

enthusiasm and interest using the same scale. The items 'enthusiastic' and 'interested'

were drawn from the Positive and Negative Affect Scales (Watson et al., 1988), a

widely used and validated measure of the orthogonal scales of positive and negative

affect (Crawford & Henry, 2004).

　　　Rumination. In line with Moberly and Watkins (2010), rumination was

assessed by two items, asking participants to rate the extent to which they were

thinking about their problems and their feelings, also on scales of 1 to 7.

　　　Goal descriptions and appraisals. Goal appraisals were also measured

similarly to the Moberly and Watkins (2010) study. Participants were asked to report

what they were doing when they received the alert. This activity was then rated for

importance, success and enjoyment on scales from -3 to +3, where -3 was anchored at

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'not at all' and +3 was anchored at 'definitely'. Additionally, participants responded to a Yes/No question about whether they had struggled to achieve any goals since the last alert.

Morning/evening measures. Participants also completed a brief questionnaire when they woke up in the morning and before going to sleep at night. These could only be completed in the paper booklets. In the morning participants were asked to report their sleep quality. In the evening, participants were asked to report their overall mood and levels of rumination during the day; how successful they felt they had been in achieving their goals for the day; and the extent to which they were looking forward to their activities planned for the next day. Participants also rated whether this was a typical day and if they had been disturbed by the text alerts. These data were collected to allow for the possibility of contextual factors to be included in analyses. Only the evening reports of looking forward to the next day's activities were included in the analyses reported in this thesis.

These questionnaires also took a maximum of two minutes to complete. An example of the booklet measures as well as the baseline questionnaires can be found in Appendices B and C.

Procedure

A flowchart outlining the procedure is shown in Figure 4. The procedure was based on published guidance from running ESM studies (Fisher & To, 2012).

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Recruitment Phase

Study advertised via email bulletins, UEA website, and social media

Interested individuals respond via email, providing their telephone number

Researcher emails Information Sheet and schedules a phone call to answer questions

Data Collection Phase

Briefing session
Study explained to participants
Hypothetical time point demonstrated
Informed consent received
Baseline measures administered: Mini-MASQ, SPQ-B, RRS, TEPS, BIS/BAS
Exclusion criteria applied

Telephone call: inclusion criteria applied. Eligible participants invited to briefing session

Six days of ESM data collection
Participants complete morning questionnaire
Prompted 5 times during the day by text message to complete time-point measures
Evening questionnaire completed
Mid-week phone calls to answer questions and motivate compliance
2 minutes per questionnaire

Follow up session
Immediately following the six ESM days.
Participants return questionnaire booklets.
Debriefed on purpose of the study.
Opportunities to ask questions
15 minutes

Figure 4. *Flowchart outlining the study procedure*

Baseline session. The first point of contact was when the individual responded by email to the study advert. The information sheet was then emailed to the individual, and a convenient time for a brief telephone conversation about the nature of the study was arranged. Inclusion criteria were applied at the time of the phone call. Following this, a briefing session was arranged, to last about an hour. At least 48 hours, and in many cases several days, passed between participants receiving the information sheet

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via email and the briefing session. As far as possible, this briefing session was arranged jointly with other interested individuals, so that up to five individuals could be briefed simultaneously. During this session, a description of the procedure was given, and a hypothetical time-point demonstrated using both the paper booklets and the online questionnaire formats. Informed consent was obtained from individuals willing to take part, and following this, baseline measures were administered. Scores on the Anhedonic Depression sub-scale of the MASQ were calculated to ensure participants did not violate exclusion criteria; if not, this was discussed and participants were withdrawn from the study, and given the debriefing document. Finally, mid-week phone calls were scheduled with each of the participants. These phone calls allowed the investigator to check for any difficulties, assess motivation to continue and answer any questions. From the next day onwards following the briefing session, participants completed six experience sampling days.

Experience sampling period. For the experience sampling days, participants were alerted at five pseudo-random time-points during the sampling period of 9am-9pm, which were constrained so that two consecutive alerts did not occur within 15 minutes of each other. The 12-hour period was divided into five equal segments, each of 144 minutes, in which each alert occurred. The timing of these alerts was calculated by the SurveySignal website. Depending on the timetable of the participants, the timing of the alerts in each of these sections was either randomised or constrained to fall in the 10-minute break between lectures on weekdays. In addition to these five time-points, participants completed questionnaires first thing in the morning and last thing in the evening.

Following the six days of data collection, participants returned for a scheduled de-briefing session where they returned the questionnaire booklets and were able to

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ask questions. They were also given a debriefing document at this session (see

Appendix D). This meant that if a participant attended a briefing session on a

Monday, and consented to take part, they completed the baseline measures that day,

carried out six days of experience sampling (Tuesday-Sunday) and returned the

following Monday for the debriefing session.

Ethical Considerations

Ethical approval was granted by the University of East Anglia Faculty of

Medicine and Health Sciences Research Ethics Commiittee on 6th March 2014 (ref

2013/2014 -31; see Appendix E).

Confidentiality. Confidentiality was maintained by assigning each participant

a randomly generated code. This code was used to mark all baseline measures as well

as the experience sampling questionnaire booklets. Data were stored according to

UEA confidentiality code of practice as well as the Data Protection Act (UK

Parliament, 1998). Participants were informed of this prior to giving consent. If

participants chose to reply to the text messages rather than use the booklets, the text

responses were anonymous (by using participant codes) and data were stored securely

on the SurveyGizmo database.

Consent. Participants were sent an information sheet by email when they first

expressed interest in taking part in the study (Appendix F). They also provided their

telephone number so the primary researcher could schedule a phone call for the

participant to ask questions or receive clarification of the information. Following this,

a briefing session was arranged for them to meet the primary researcher. At this

briefing session, all the materials and procedure were explained, and they were again

offered the opportunity to ask questions. A hypothetical time-point measurement was

run through to ensure participants understood how to respond to time-point alerts.

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Finally, once everything was explained, and the participant was still keen to take part, informed consent was obtained (Appendix G).

Coercion. Utmost care was taken to ensure that the weeklong study period fell at a convenient time for the participant. The timing of the study period was discussed during the initial telephone call with the primary researcher. Likewise, participants were informed of the intensive nature of the study before giving consent. Participants were offered an incentive to take part, which was a prize draw for three Amazon vouchers of £25 each. It was also stressed to participants that they could withdraw at any point during the study, although only participants who completed the study and returned the booklets were entered into the prize draw.

Other ethical issues. It was possible, although unlikely, that participants would become distressed or unsettled by answering questions of an emotional nature, such as the depression and rumination measures, as well as the affect questions for each time-point. To protect against this, the baseline materials were completed by the participant in the presence of the primary researcher, and therefore any emotional distress could be dealt with at the time. Additionally, the participant was given contact details for getting in touch with the investigator during the week of data collection. Participants were encouraged to email the investigator for minor concerns (e.g. technical problems with the text alerts, or points of clarification about the procedure), but were also told they could send a text message or phone the study mobile phone for any major issues (e.g. in the unlikely event of feeling distressed as a direct result of taking part in the study). The study mobile was monitored from 9am to 6pm daily, and messages and phone calls were responded to within a half working day. If participants became distressed, they were offered the opportunity to withdraw from the study and were signposted to the University Counselling Service or Nightline, as

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appropriate. None of the participants reported any distress at responding to any of the measures.

The main risk lay with participants with high scores on the screening measure of anhedonic depression. When this occurred (on three occasions) the primary researcher conducted a risk assessment, with a specific emphasis on risk of self-harm. If the risk was deemed high, the primary researcher was to seek the advice of a clinical member of staff as well as advise the participant on options for care, such as contacting their GP or the University Counselling Service. Participants scoring above the cut-off score of 21 were not included in the study, and were therefore debriefed and thanked at the briefing session.

Debriefing. Following the experience sampling days, participants were met again for a brief session to hand back the booklets and receive the debriefing document (Appendix D). Participants were encouraged to ask any final questions about the study and were informed that their involvement was now over. They were also told they could receive a summary of the main findings if they were interested.

Analysis Plan

Data cleaning. To prepare the data for analysis, the raw data were processed using SPSS Version 22 (IBM Corp., 2013) to calculate the scores for the scales and subscales outlined above and the descriptive data reported in the Results section. Scores on the baseline measures were explored to test for normality and to ascertain whether any of these measures covaried with age or sex. The percentage of missing data was also calculated for each participant, to determine whether any participants had completed less than one third of the time-point measures. Finally, the data file was rearranged from wide to long format to reflect the nested structure of the dataset.

Coding activities. The activities that participants reported at each time-point

were coded into one of three categories, based on the classifications of goal-directed

behaviour developed by Ford and Nichols (1991), which is considered to be the most

comprehensive goal taxonomy model (Boekaerts, Koning, & Vedder, 2010).

Although Ford and Nichols (1991) specify 24 different goal categories, these are

subdivided into over-arching categories of goals relating to the interaction between

the person and their environment, and goals referring to just the person in isolation.

The person-environment goals are also broadly divided into social and task-related

goals. For the purposes of this study, three broad categories of social, task and

personal goals were chosen, as further sub-division and classification of activities

would not be possible or reliable without more detailed self-report from the

participants. Activity classifications are presented in Table 1.

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Table 1.

Classification of participant-reported activities, based on Ford and Nichols (1991).

Category	Definition	Example
Social	Any non-work related interaction with one or more other individuals, including via social media if the interaction was explicit.	'Talking to housemates' 'Chatting to a friend on Facebook'
Task	Activities that required planning, had a clear outcome, and were not essential to survival such as eating or sleeping.	'Shopping in supermarket' 'On the train home'
Personal	Necessary activities (eating and sleeping), and solitary rest, entertainment or procrastination.	'Watching TV' 'On a break from work'

If the participant indicated that they had just finished a task, or were passively waiting for another to begin, this was also coded as 'personal'. In total, 1118 activities were reported and of these, ca. 20% (n=225) were randomly selected for coding by both TD and JH to determine inter-rater reliability, which was found to be Kappa=.902 (p<.001, 95% CI [.96, .85]). Where there were disagreements, the coding definitions were refined to clarify any ambiguities. TD coded the remainder of the activities.

In line with Moberly & Watkins (2010), the momentary ratings of affect (anxious, sad, irritated, happy, interested and enthusiastic) and of rumination (thinking about feelings and problems) were standardised across individuals and time-

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points. Using standard scores meant that the different distributions corresponding to
ratings of momentary negative affect, positive affect and rumination could be
compared in subsequent analyses. Composite scores for negative affect and positive
affect were calculated by summing the resultant z scores for anxious, sad and irritated
ratings (α=.70), and happy, interested and enthusiastic ratings (α=.89), respectively. A
composite score for rumination was calculated by summing the z scores for
momentary ratings of thinking about feelings and problems (α=.69).

Statistical model. The dataset comprised three levels: time-points (Level 1)
nested within days (Level 2), which were nested within individuals (Level 3). Since
multilevel modelling is an extension of linear regression modelling, similar
assumptions must be met (Snijders & Bosker, 1999). These include assumptions of
normality and linearity, that is, that the Level 1 residuals are normally distributed and
that the relationship between variables is linear. Because data from time-points are
nested within days and individuals, the assumption of independence cannot be met;
momentary affect and rumination ratings are likely to be more similar within
individuals than between individuals, and within days than between days. This
presents the problem of autocorrelation, although there is some evidence that
sampling intervals that are greater than 30 minutes do not tap into the same emotional
processes and are therefore statistically independent (Ebner-Priemer & Sawitzki,
2007). Nonetheless, an advantage of using multilevel models rather than linear
regression models is that variation is estimated at each level of the model, thereby
accounting for the violation of independence (Palmier-Claus et al., 2011). Another
advantage of multilevel modelling is that between-subjects random effects can be
estimated, that is, that the individual differences in within-subject processes (Bolger
& Laurenceau, 2013).

Multilevel modelling was therefore used to test the first and second study

hypotheses without violating assumptions of independence, whereas correlational

analyses were used to test the third study hypothesis. Separate models were

constructed to test each of the three main study hypotheses. The software Mplus 7

(Muthén & Muthén, 1998-2012) was used to analyse the data for Hypotheses 1 and 2.

The intercepts of the model were allowed to vary randomly, to reflect variation

between and within individuals and days. The model for Hypothesis 1 was built in a

series of steps, starting with a null model, which included only the outcome variables

of momentary negative affect, positive affect and rumination. This was to calculate

the intraclass correlation, or the amount of variance present at each level of the model

and thereby determine whether multilevel modelling was warranted (Peugh, 2010).

The intraclass correlation is also an estimate of the correlation between the ratings

reported at two randomly chosen time-points from the same individual (Moberly &

Watkins, 2008a; Peugh, 2010). Following this, variables coding for time and day were

added, and subsequently predictor variables relating to goal appraisals were included

in the model. At each step the improvement in model fit was calculated to determine

whether the inclusion of further variables could explain a greater amount of variance,

and to assess how well the hypothesised model fit the structure of the data (Heck,

Thomas, & Tabata, 2010; Ryu, 2014).

To test the third hypothesis, a correlation matrix was created using IBM SPSS

Version 22 (IBM Corp., 2013). Scores from the baseline measures of

approach/avoidance motivation (BIS/BAS scales), anticipatory/consummatory

pleasure (TEPS scales), schizotypy (SPQ-B scales), depression symptoms (Mini-

MASQ AD), and rumination (RRS) were correlated with outcome variables collected

during the experience sampling period. These were mean aggregate momentary

ratings of activity success and enjoyment, and the total number of occasions that each

participant reported having struggled to accomplish a task and the total number of

activities in each category (social, task and personal) reported across the sampling

period. Aggregate evening reports of looking forward to the next day's activities were

also included. These analyses were exploratory as the sample size was small for this

correlation analysis. Using statistical rules of thumb suggest that the sample should

have included between around 100 to several hundred individuals for power to be

achieved with a medium effect size (Green, 1991; VanVoorhis & Morgan, 2007).

Post-hoc Bonferroni corrections were applied to correct for multiple testing.

Person-level variables were grand-mean centred across individuals, and day-

and occasion-level variables across individuals and days. To grand-mean centre a

variable, the grand mean (i.e. the mean of all the values across all individuals and

days for that particular variable) is subtracted from each score. The mean of each

variable is then 0 although the standard deviation remains unchanged. Scores that are

below the average are then negative, and those above average are positive, which

makes it easier to interpret results (Aiken & West, 1991). This is also known as

'choosing a zero point', and it is important because it provides an estimate, or

intercept, of the dependent variable when the predictor variable is at its typical value

(Bolger & Laurenceau, 2013, pp. 37-39). Some authors question whether variables

should be centred in multilevel modelling, as it can influence the results of the

analysis (Hofmann & Gavin, 1998; Snijders & Bosker, 1999). However, there are

many factors that weigh into the choice of whether, and how, to centre variables, and

the decision should therefore be made based on the "conceptual paradigm and

research question under investigation" (Hofmann & Gavin, 1998, p. 638). Heck and

Thomas (2009, p. 145) argue: "In some cases, grand-mean centering has a technical

advantage over centering on the raw metric because grand-mean centering tends to

reduce the correlation between intercept and slope estimates across groups, which can

reduce the presence of multicollinearity". Reducing multicollinearity, the degree to

which two or more predictor variables are correlated, was an important consideration,

given the close relationship between negative affect and rumination (Moberly &

Watkins, 2008a, 2010). Additionally, using the same centring procedures Moberly

and Watkins (2010) facilitated comparisons between their findings and the results of

this study.

The time participants reported responding to the text alerts was converted into

fractional hours, and centred on the mean time of day (15:22). Days were centred on

3.5 (halfway point of the six experience sampling days).

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Results

Data Cleaning

In total, data from 43 participants (32 females) were included in the analysis (age range = 18-29 years; M = 23.06; SD = 2.95). The mean completion rate of the time-point measures was 85.95% (SD = 12.84), and of all the questionnaires in the booklet it was 87.70% (SD = 11.33). The mean response time to the text alerts was 14.09 minutes (SD = 28.00). In total, data from 1107 time-points were analysed. Most participants chose to complete the time-point measures in the booklets. However, eight participants used the online form to fill in time-point questionnaires, with a total of 70 time-points being completed online (range: 1-25 per participant). Age and sex were not associated with any of the baseline measures, with two exceptions: age was significantly negatively correlated with the Anxious Arousal subscale of the mini-MASQ (r[41]=-.33, p<.05), and females scored significantly higher than males on the Anticipatory Pleasure subscale of the TEPS (F[1]=6.39; p<.05). However, given that only one baseline variable out of twelve was associated with either age or sex, we chose not to control for age or sex in any of the analyses.

Of the 11 baseline subscales, seven (mini-MASQ AD, all three BSPQ subscales, and the three BAS subscales) were significantly non-normal and were therefore root-transformed to counter this.

Descriptive Data

The untransformed means and standard deviation of scores on the baseline measures are summarised in Table 2. As can be seen, the scores for baseline anhedonic depression, rumination and schizotypy were fairly low. The scores for anhedonic depression were in line with those found in other samples taken from the general population (Casillas & Clark, 2000).

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Table 2.

Descriptive statistics for the baseline measures

	Mean	*SD*	Median	Min	Max
Mini-MASQ AD	17.63	3.79	12.00	10.00	26.00
Ruminative Responses Scale	43.33	10.29	42.00	25.00	68.00
BAS: Drive	11.40	2.40	11.00	6.00	16.00
BAS: Fun seeking	12.77	2.23	13.00	8.00	16.00
BAS: Reward responsiveness	18.18	2.23	18.00	15.00	20.00
BIS	22.19	3.77	23.00	10.00	27.00
TEPS Anticipatory Scale	42.74	5.76	42.00	31.00	54.00
TEPS Consummatory Scale	31.28	5.67	31.00	16.00	43.00
SPQ-B: Cognitive Perception Deficits	2.00	1.72	2.00	0.00	6.00
SPQ-B: Interpersonal Deficits	2.60	2.53	2.00	0.00	8.00
SPQ-B: Disorganisation	2.00	1.72	2.00	0.00	6.00

Note: mini-MASQ AD = Mini Mood and Anxiety Symptom Questionnaire Anhedonic Depression subscale, BAS = Behaviour Activation Scale, BIS = Behaviour Inhibition Scale, TEPS = Temporal Experience of Pleasure Scale, SPQ-B = Brief Schizotypal Personality Questionnaire.

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Table 3. A correlation matrix of scores on the baseline measures

	Mini-MASQ AD	RRS	BAS: Drive	BAS: FS	BAS: RR	BIS	TEPS: Ant	TEPS: Cons	SPQ-B: Cogn-Perc	SPQ-B: Interpers. Deficits
RRS	0.17									
BAS: Drive	-0.33*	-0.21								
BAS: Fun seeking	-0.21	-0.13	0.54**							
BAS: Reward responsiveness	-0.22	0.15	0.48**	0.22						
BIS	0.40**	0.28	-0.31*	-0.20	0.02					
TEPS: Ant	-0.41**	-0.10	0.18	0.08	0.36*	0.03				
TEPS: Cons	-0.24	0.05	0.39**	0.17	0.42**	0.17	0.50**			
SPQ-B: Cogn-Perc	0.08	0.30	0.09	0.03	0.14	-0.21	0.01	0.22		
SPQ-B: Interpers. Deficits	0.23	0.51**	-0.30	-0.34*	-0.08	0.01	-0.31*	-0.21	0.43**	
SPQ-B: Disorg	0.10	0.32*	0.14	0.17	0.13	-0.02	-0.04	.032*	0.61**	0.47**

Note: mini-MASQ AD = Mini Mood and Anxiety Symptom Questionnaire Anhedonic Depression subscale, RRS = Ruminative Response Scale, BAS = Behaviour Activation Scale (RR = Reward Responsiveness), BIS = Behaviour Inhibition Scale, TEPS = Temporal Experience of Pleasure Scale (Ant = Anticipatory, Cons = Consummatory), SPQ-B = Brief Schizotypal Personality Questionnaire (Cogn-Perc = Cognitive Perception Deficits, Interpers = Interpersonal Deficits, Disorg = Disorganisation)

**$p < 0.01$, two-tailed. *$p < 0.05$, two-tailed.

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Table 3 depicts a correlation matrix between the baseline measures, reporting Pearson's correlation coefficients. As expected, the three BAS scales were positively correlated, although only BAS Drive correlated negatively with BIS. BAS Reward Responsiveness was positively associated with both consummatory and anticipatory pleaure. The three subscales of the SPQ-B were also positively associated with each other. Interestingly, depressive symptoms were not associated with trait ruminative tendencies or trait schizoptypy, whereas trait rumination was positively associated with two of the SPQ-B subscales. The Interpersonal Deficits subscale of the SPQ-B was negatively associated with fun seeking and anticipatory pleasure. Depression symptoms were negatively associated with anticipatory pleasure and BAS Drive. This is in line with previous research on the reduction of self-reported anticipatory pleasure and reward-seeking behaviours in schizophrenia and depression (Gard et al., 2007; Sherdell et al., 2012). Depressive symptoms were positively associated with avoidance motivation (BIS), which lends some support to the evidence base on increased avoidance motivation in depression (Dickson & MacLeod, 2006; Vergara & Roberts, 2011).

The momentary variables reported at each time-point were also explored and are summarised in Table 4. The momentary variables for rumination, negative affect and positive affect are the composite scores that were calculated from the z scores of the individual time-point questionnaire items, which is why the means are all 0. The variables for important, successful and enjoying are the standardised scores of the time-point questionnaire items; standardising a score yields a mean of 0 and a standard deviation of 1, so the areas of interest on Table 4 are the values for median, maximum and minimum scores.

Table 4.

Descriptive statistics for momentary variables

	Mean	*SD*	Median	Minimum	Maximum
Rumination	0.00	1.75	-0.33	-1.59	5.96
Negative affect	0.00	2.37	-1.13	-1.89	12.33
Positive affect	0.00	2.72	-0.22	-5.88	5.42
Important	0.00	1.00	0.35	-3.04	1.03
Successful	0.00	1.00	0.13	-3.80	0.92
Enjoying	0.00	1.00	-0.02	-2.48	1.20

Note: Rumination, Negative affect and Positive affect are composite scores. Important, Successful and Enjoying scores are *z* scores.

Kolmogorov-Smirnoff tests showed that the composite scores of rumination, positive and negative affect were all significantly non-normally distributed ($ps<0.001$). This was also the case for the standardised scores of importance, success and enjoyment ($ps<0.001$). Rumination and negative affect were positively skewed, as participants reported low ratings for both of these constructs on the majority of occasions. Positive affect ratings were negatively skewed, as the ratings were high for the majority of occasions. However, the data were not transformed before analysis.

Of the activities reported at each time-point, 12.16% were coded as social (N=136), 33.64% were personal (N=365) and 55.19% were task-related (N=617).

Hypothesis 1

The first study hypothesis considered within subject data and explored the relationship between importance and success ratings and ratings of rumination, negative affect and positive affect. It was expected that success ratings would predict

negative affect and rumination, and that the impact of success would be greater for

more important goals. That is, rumination and negative affect ratings would be

highest when individuals reported low success for important goals. It was thought that

low success at important goals would predict lower ratings of positive affect, although

because positive and negative affect are orthogonal constructs, rather than rather than

two poles of a bipolar scale, this prediction was tentative.

Specifically, in line with Moberly and Watkins (2010), it was hypothesised

that success ratings would be negatively associated with rumination and negative

affect, and, based on their results, that importance ratings would be positively

associated with rumination and negative affect. These outcomes would also be

predicted by an importance by success interaction. For the additional variable of

positive affect, it was thought that importance and success would also be positively

associated with positive affect. The interaction between importance and success was

tentatively predicted for positive affect, as it was expected that ratings of positive

affect would be highest when participants reported high success at important activities.

The construction of this model was based on that reported by Moberly and

Watkins (2010). Negative affect, positive affect and rumination were modelled

simultaneously as a function of day- and person-level data.

Null model. In order to estimate the variance in each level, an empty

multilevel regression model was run which included rumination, negative affect and

positive affect. An empty model is the multilevel model without any of the

explanatory variables (Heck, Thomas, & Tabata, 2010; Snijders & Bosker, 1999, pp.

200-206). This allows the variance at each level to be partitioned into its within- and

between-group components (Hox, 2002). The intraclass correlation between

individuals was .29 for rumination, .26 for negative affect, and .29 for positive affect,

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suggesting modest levels of consistency in these variables across time (cf. Moberly &

Watkins, 2008). Most of the variance for each of these variables occurred within

individuals and within days (ICC Rumination = .59; NA = .65; PA = .59), and a small

amount occurred between days within individuals (ICC Rumination = .11; NA = .09;

PA = .12). The results of the null model also showed that intercepts of these outcome

variables varied significantly across days for rumination (Wald $Z = 3.71$, $p<.001$),

negative affect (Wald $Z = 2.87$, $p<.005$) and positive affect (Wald $Z = 4.65$, $p<.001$).

Intercepts also varied significantly across individuals (rumination Wald $Z = 4.30$,

$p<.001$; negative affect Wald $Z = 4.92$, $p<.001$; positive affect Wald $Z = 4.80$,

$p<.001$). There was also significant variance within days for rumination (Wald $Z =$

7.36, $p<.001$), negative affect (Wald $Z = 6.68$, $p<.001$) and positive affect (Wald $Z =$

10.11, $p<.001$). Because there was a significant amount of variance within each

grouping structure, these results suggest that multilevel modelling with three levels

was warranted. If there had been little or no variation between individuals or days, it

would not have been necessary to partition the data into three levels, and either a two-

level model (time-points nested in individuals) or a single level ordinary least squares

regression analysis would have been more appropriate (Heck et al., 2010).

Adding effects of time and day. To test whether rumination, negative affect

and positive affect varied over the course of the day or across days, the model was

expanded to include linear and quadratic effects of time, and linear effects of day.

There was a significant linear effect of time on rumination ($B = -.64$, $SE = .28$, $p<.05$)

and positive affect ($B = 2.01$, $SE = .56$, $p<.001$), suggesting that ruminative self-focus

decreased and positive affect increased as the day progressed. There were no

significant quadratic effects of time, or linear effects of day. Entering the time and

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day variables significantly improved the fit of the model over that of the null model, change in log-likelihood $\chi^2(15) = 511.54$, $p<.001$.

Including outcome variables. In order to test Hypothesis 1, importance and success ratings, and the importance by success interaction were entered into the model. Results are reported in Table 5. In line with predictions, importance was positively associated with ratings of positive affect. However, the association between importance and rumination, and importance and negative affect did not reach significance (p values >0.40). As predicted, success ratings were negatively associated with rumination, negative affect and positively associated with positive affect. Surprisingly, the importance by success interaction did not reach significance for any of the affect or rumination variables. (p values >.50). Including ratings of importance, success and the interaction in the model significantly improved model fit, change in log-likelihood $\chi^2(9) = 115.57$, $p<.001$.

Exploration of the data gave some clues as to why the hypothesised importance by success interaction was not found. The ratings for importance and success were both significantly non-normally distributed, and both were negatively skewed. While participants rated more than 80% of their activities as having greater than neutral importance, only around 15% of their activities were rated as having neutral to low success. An interaction between success and importance would be driven by the affective and ruminative response to low ratings of success in the context of important goals; however only 98 out of the 1107 occasions (<9%) included in the analysis were simultaneously rated as higher than neutral for importance, and neutral or lower for success.

Table 5.

*Fixed effect unstandardised coefficients (*SE*) for multivariate multilevel model*

	Criterion variable		
Predictor	Rumination	Negative affect	Positive affect
Importance	0.05 (0.06) *ns*	0.04 (0.09) *ns*	0.34 (0.11)**
Success	-0.24 (0.06)***	-0.60 (0.11)***	0.64 (0.11)***
Importance success	-0.02 (0.05) *ns*	-0.04 (0.07) *ns*	0.03 (0.07) *ns*

Note: Analysis included 1107 occasions, as well as linear and quadratic effects of time, and linear effects of day.

***$p<0.001$, two-tailed. **$p<0.01$, two-tailed.

Exploratory analyses. To explore the relationship between rumination, affect and appraisals of consummatory pleasure, ratings of momentary enjoyment were also added to the model (see Table 6). This was to specifically analyse the influence of perceived reward on momentary affect and rumination. Enjoyment was negatively associated with rumination and negative affect, and positively associated with positive affect, such that higher levels of enjoyment in relation to goals were associated with reduced rumination and negative affect and increased positive affect. With enjoyment included in the model, importance was positively associated with rumination, negative affect, as well as positive affect. Success was negatively associated with rumination and negative affect, and positively associated with positive affect. Adding ratings of enjoyment to the model significantly improved model fit, change in log-likelihood $\chi^2(3) = 207.46$, $p<.001$.

Table 6.

*Fixed effect unstandardised coefficients (*SE*) for multivariate multilevel model with enjoyment
included*

		Criterion variable	
Predictor	Rumination	Negative affect	Positive affect
Importance	0.09 (0.05) †	0.15 (0.07)*	0.20 (0.10)*
Success	-0.10 (0.06)†	-0.27 (0.10)**	0.21 (0.10)*
Enjoyment	-0.33 (0.06)***	-0.80 (0.09)***	1.04 (0.08)***
Importance success	0.00 (0.05) *ns*	-0.00 (0.07) *ns*	-0.02 (0.08) *ns*

Note: Analysis included 1107 occasions, as well as linear and quadratic effects of time, and
linear effects of day.

***$p<0.001$, two-tailed. **$p<0.01$, two-tailed. *$p<0.05$, two-tailed. †$p<0.05$, one-tailed.

To assess whether intrinsic reward (enjoyment) interacted with feelings of
success (achievement-related reward), a success by enjoyment interaction was
subsequently entered into the model. Results are displayed in Table 7. This interaction
was significantly associated with positive affect, but not rumination or negative affect.
That is, levels of momentary positive affect were highest when participants were
successfully completing enjoyable activities. This interaction is displayed in Figure 5.
Including the success by enjoyment interaction significantly improved model fit $\chi^2(3)$
= 20.82, $p<.001$.

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Table 7.

*Fixed effect unstandardised coefficients (*SE*) for multivariate multilevel model with enjoyment
included*

	Criterion variable		
Predictor	Rumination	Negative affect	Positive affect
Importance	0.10 (0.05) *	0.13 (0.07)†	0.17 (0.09)†
Success	-0.11 (0.05)*	-0.20 (0.09)*	0.31 (0.11)**
Enjoyment	-0.33 (0.06)***	-0.80 (0.09)***	1.05 (0.07)***
Importance success	0.01 (0.05) *ns*	-0.02 (0.07) *ns*	-0.04 (0.07) *ns*
Success enjoyment	-0.01 (0.04) *ns*	0.12 (0.07) *ns*	0.19 (0.07)**

Note: Analysis included 1107 occasions, as well as linear and quadratic effects of time, and
linear effects of day.

***$p<0.001$, two-tailed. **$p<0.01$, two-tailed. *$p<0.05$, two-tailed. †$p<0.05$, one-tailed.

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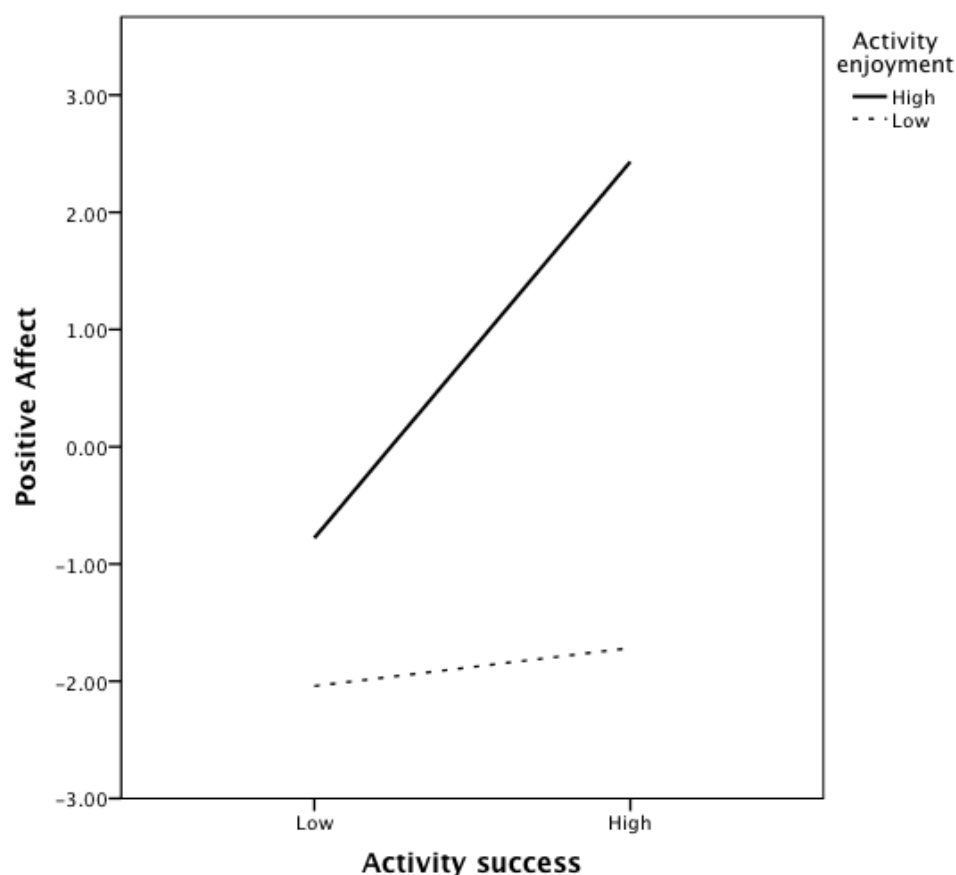
Figure 5. *Relationship between activity enjoyment and success, and positive affect. Enjoyment and success are plotted at values 0.75 SD above and 0.75 SD below their respective means.*

To assess whether the individual rating scales that had been combined to form the composite scores of rumination, negative affect and positive affect differentially influenced the model, this analysis was repeated with the scales deconstructed into their individual items. These analyses are shown in Appendix H. Overall, the results were similar to those above, with a few exceptions. Importance was not associated with thinking about feelings, sadness, irritation or happiness. The enjoyment by success interaction was also significantly negatively associated with thinking about problems. Thinking about problems was more strongly associated with positive and negative affect than thinking about feelings.

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Hypothesis 2

The second study hypothesis was that baseline measures of depression symptoms, trait rumination and schizotypy would impact on momentary reports of positive and negative affect. Specifically, it was predicted that higher baseline levels of depressive symptoms, trait rumination and schizotypy would predict higher levels of negative affect and lower levels of positive affect throughout the experience sampling week. To address this, mini-MASQ-AD, RRS and SPQ-B total scores were included as person-level variables in the multilevel model constructed for Hypothesis 1, to account for individual differences in depression levels, trait rumination and trait schizotypy (see Table 8). Symptoms of depression were negatively associated with momentary levels of positive affect, but not with momentary rumination or negative affect. Trait rumination levels were positively associated with momentary rumination and negative affect, but not with positive affect. Trait schizotypy was negatively associated with momentary positive affect, but not negative affect or rumination. With the person-level variables included in the model, the relationship between momentary negative affect and the success by enjoyment interaction reached significance, albeit marginally. All other significant associations remained. Model fit was significantly improved, $\chi^2(12) = 43.59$, $p < .001$.

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Table 8.

*Fixed effect unstandardised coefficients (*SE*) for multivariate multilevel model with person-level variables included*

	Criterion variable		
Predictor	Rumination	Negative affect	Positive affect
Momentary variables			
Importance	0.96 (0.05)*	0.13 (0.07)†	0.17 (0.09)†
Success	-0.09 (0.05)†	-0.17 (0.09)*	0.30 (0.11)**
Enjoyment	-0.33 (0.06)***	-0.80 (0.09)***	1.06 (0.07)***
Importance success	0.00 (0.05) *ns*	-0.02 (0.07) *ns*	-0.04 (0.07) *ns*
Success enjoyment	-0.01 (0.04) *ns*	0.13 (0.07)†	0.178 (0.07)**
Person-level variables			
Mini-MASQ AD	0.02 (0.30) *ns*	0.46 (0.46) *ns*	-1.12 (0.36)**
RRS	0.05 (0.01)***	0.06 (0.02)***	-0.01 (0.03) *ns*
SPQ-B Total	-0.00 (0.07) *ns*	-0.05 (0.08) *ns*	-0.23 (0.10)*

Note: Analysis included 1107 occasions, as well as linear and quadratic effects of time, and linear effects of day.

***$p<0.001$, two-tailed. **$p<0.01$, two-tailed. *$p<0.05$, two-tailed. †$p<0.05$, one-tailed.

Hypothesis 3

The third hypothesis considered the relationship between individual differences in baseline measures of approach motivation, anticipatory pleasure and schizotypy and self-reported goal progression, enjoyment and type of activities engaged in. This analysis only considered between-subjects data, and multilevel modelling was therefore not necessary. The correlations between the scores on the baseline measures and outcome measures from the experience sampling period were

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investigated. The baseline measures were of approach/avoidance motivation

(BIS/BAS scales), anticipatory/consummatory pleasure (TEPS scales), schizotypy

(SPQ-B scales), depression symptoms (Mini-MASQ AD), and rumination (RRS). The

outcome measures were the total number of occasions that each participant reported

having struggled to accomplish a task, the total number of activities in each category

(social, task and personal) reported across the sampling period, and aggregate

momentary ratings of activity success and enjoyment, as well as aggregate evening

reports of looking forward to the next day's activities.

Results should be interpreted with caution, as the sample size was low for this

type of analysis and thus the analysis was somewhat exploratory. It was predicted that

high baseline approach motivation (high BAS scores and low BIS score), high

anticipatory and consummatory pleasure (TEPS scores) and low levels of schizotypy

(SPQ-B scores) would correlate with higher success ratings, fewer occasions of

struggling, and a greater number of reported task-related activities. High levels of trait

rumination and symptoms of depression were expected to correlate with low levels of

success and enjoyment of activities. It was also expected that both anticipatory and

consummatory pleasure would be positively associated with momentary ratings of

activity enjoyment.

As can be seen in Table 9, mean aggregate success ratings were negatively

correlated with symptoms of depression. Mean aggregate ratings of momentary

enjoyment were not correlated with either trait anticipatory or consummatory pleasure,

but they were negatively correlated with symptoms of anhedonic depression. Mean

aggregate scores of how much participants were looking forward to the next day's

activities were also unrelated to trait anticipatory and consummatory pleasure, but

were negatively associated with trait rumination. The number of occasions when

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participants reported struggling with a task was positively correlated with reward responsiveness, consummatory pleasure, and trait rumination. The types of activities participants reported were not strongly correlated with any of the baseline measures.

With 77 correlations performed, the Bonferroni-corrected alpha level was 0.05 ÷ 77 = 0.00065. None of the correlations remained significant once this correction was applied.

Table 9.
Correlation matrix of baseline measures and outcome measures from experience sampling period. Pearson correlation coefficients reported

Baseline measure	Success	Struggled	Enjoying	Looking forward	Activity categories		
					Task	Social	Personal
BAS: Drive	0.09	-0.07	0.09	-0.02	0.06	-0.02	0.11
BAS: Fun seeking	-0.05	-0.14	0.18	-0.03	-0.02	-0.10	0.20
BAS: Reward responsiveness	0.10	0.33*	0.12	-0.22	-0.07	0.15	0.04
BIS	0.21	-0.08	0.13	-0.17	0.03	0.22	0.19
TEPS Anticipatory Scale	0.14	0.08	0.08	0.00	0.27†	0.27†	-0.15
TEPS Consummatory Scale	-0.28†	0.39**	-0.20	-0.07	0.07	-0.05	0.05
SPQ-B: Cognitive Perception	0.00	0.00	0.09	-0.03	-0.18	0.05	0.23
SPQ-B: Interpersonal	-0.18	0.04	-0.06	-0.06	-0.24	-0.12	0.28†
SPQ-B: Disorganised	-0.22	-0.10	0.05	-0.02	-0.23	-0.10	0.28†
Mini-MASQ-AD	-0.35*	0.25	-0.34*	-0.29	-0.17	-0.28†	0.19
RRS	-0.11	0.46**	-0.07	-0.34*	0.12	0.04	-0.09

Note: BAS = Behaviour Activation Scale, BIS = Behaviour Inhibition Scale, TEPS = Temporal Experience of Pleasure Scale, SPQ-B = Brief Schizotypal Personality Questionnaire, Mini-MASQ AD = Mini Mood and Anxiety Symptom Questionnaire Anhedonic Depression subscale, RRS = Ruminative Responses Scale

**p<0.001, two-tailed. **p<0.01, two-tailed. *p<0.05, two-tailed. †p<0.05, one-tailed.

Discussion

This study aimed to replicate and expand on the findings of Moberly & Watkins
(2010), using a younger sample. Their study was the first direct test of the hypothesis that
rumination fluctuates as a function of difficulties achieving personally important goals. In
addition to replicating their findings, this study sought to expand on them in a number of
ways. First, the dimension of positive affect was included with the variables collected during
the experience sampling period. The absence of positive affect in their study was noted as a
limitation by Moberly and Watkins (2010). It seems particularly important to assess the
influence of goal appraisals on the experience of positive affect, as well as its relationship
with rumination, since previous research suggests positive and negative affect are the two
dominant dimensions of mood and represent independent factors accounting for emotion
experience (Watson & Clark, 1994). Positive affect reflects the extent to which individuals
feel pleasurable engagement with the environment, with high positive affect characterized by
enthusiasm and alertness, and low positive affect being a lack of positive engagement, such
as sadness. Conversely, negative affect represents non-pleasurable engagement such that high
negative affect is characterised by distress, anxiety or anger, and low negative affect would
be the opposite, such as calmness. Studies also suggest that psychological disorders such as
depression and schizophrenia are characterised by lower levels of positive affect and pleasure,
independently of levels of negative affect (Dunn et al., 2009; Strauss, 2013).

Additionally, this study took a transdiagnostic approach to symptoms associated with
anhedonia and motivation by assessing baseline measures of schizotypy and motivational
constructs including approach and avoidance, and anticipatory and consummatory motivation.
This enabled the exploration of hypotheses concerning the relationship between hedonic and
reward processes, and reported goal progression, the types of activities engaged in, and real-

time ratings of enjoyment. The classification of the activities and goals participants reported during the experience sampling period as either social, task or personal goals was a third important addition to this study.

Finally, a younger sample was recruited as late adolescence and early adulthood constitutes a particularly vulnerable period with regards to the onset of psychiatric disorders (Gogtay et al., 2011; Shih et al., 2004). Transdiagnostic constructs, such as low self esteem and negative cognitions, experienced during this time can increase the likelihood of later psychological difficulties, particularly in the context of negative events and achievement-related stress (Carter & Garber, 2011; Sowislo et al., 2014). Although the mean age was not much less than that of the sample in Moberly and Watkins (2010), the range was considerably smaller.

First the main findings relating to each of the study hypotheses will be summarised and interpretations of these results will be made in the context of previous research. The clinical implications of the study findings will then be discussed, with a particular emphasis on translating these findings into clinical practice. Finally, the strengths and limitations of the study will be reviewed, and areas for future research explored.

Summary of Main Findings

Three main hypotheses were addressed in this study. First, it was predicted that low success ratings in relation to activities would be associated with increased momentary negative affect and rumination, and that this association would be greater when importance ratings for activities were high. Furthermore, high success ratings in relation to activities were expected to be associated with high momentary positive affect, and positive affect was expected to be lowest when participants reported low success for important activities. Second, it was predicted that individual differences in depression symptoms, trait rumination and schizotypy would be associated with levels of rumination, positive and negative affect

reported throughout the experience sampling period. Specifically, higher levels of baseline

depression, ruminative tendencies and schizotypy were expected to be associated with higher

momentary negative affect and rumination, and lower momentary positive affect. Third,

individual differences in anticipatory, consummatory and approach/inhibitory motivation,

and schizotypy were expected to be associated with the extent to which participants

succeeded and enjoyed tasks, struggled to achieve goals, and the type of activities they

engaged in.

Hypothesis 1. In line with predictions, the results of this study found that momentary

ratings of success were negatively associated with momentary rumination and negative affect

and positively associated with ratings of momentary positive affect. However, there was no

association between importance ratings and either rumination or negative affect. Importance

was, however, positively associated with positive affect. The expected importance by success

interaction was not found for either rumination, negative or positive affect. There was

therefore only partial support for the first hypothesis.

The extent to which participants enjoyed the activity they were currently engaged in

was also measured at each time-point. When exploratory analyses were conducted in which

ratings of enjoyment were added to the multilevel model, the associations between

importance and rumination, negative and positive affect did reach significance. Interestingly,

this association was positive for all three outcome variables. The association between the

momentary ratings of rumination and affect remained the same. Momentary ratings of

enjoyment were negatively associated with rumination and negative affect, and positively

associated with positive affect. This association was strong, and including ratings of

enjoyment to the model significantly improved model fit.

To further explore the influence of activity enjoyment on ruminative and affective

responses, a success by enjoyment interaction was subsequently included in the model.

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Positive affect was significantly associated with this interaction, indicating that levels of positive affect were highest when participants were engaged in activities that they enjoyed and succeeded in. The interaction was not associated with negative affect or rumination.

Hypothesis 2. To address the second hypothesis, that is, whether individual differences in depression symptoms, trait rumination and schizotypy were related to momentary ratings of rumination and affect, baseline measures of anhedonic depression (mini-MASQ AD scores), ruminative style (RRS scores) and trait schizotypy (SPQ-B total scores) were included in the model. Baseline levels of depression were negatively associated with momentary levels of positive affect, but were not associated with momentary levels of rumination or negative affect. Trait rumination was positively associated with momentary levels of rumination and negative affect, but was not associated with positive affect. Trait schizotypy was negatively associated with positive affect, but not with negative affect and rumination. With these individual differences controlled, the association between negative affect and the success by enjoyment interaction reached significance, albeit marginally.

Hypothesis 3. With regards the third and final hypothesis, the results were mixed and should be interpreted cautiously and tentatively, as they did not hold up once corrections had been made for multiple testing. Mean activity success ratings from the experience sampling period were negatively correlated with symptoms of depression. The number of occasions when participants reported having struggled with a task was positively correlated with baseline levels reward responsiveness (a type of approach motivation), consummatory pleasure, as well as trait rumination. The types of activities participants reported were not strongly correlated with any of the baseline measures. With regards to measures of anticipatory and consummatory pleasure, the baseline measures of both these constructs did not correlate with in-vivo measurements of consummatory pleasure (mean enjoyment ratings) or with daily measures of anticipated pleasure for the next day's activities (mean looking

forward ratings). However, mean ratings of activity enjoyment ratings were negatively

correlated with symptoms of anhedonic depression, suggesting a relationship between

elevated levels of depression and reduced consummatory pleasure. Ratings of looking

forward to the next day's activities were negatively correlated with trait rumination.

The relationships between the baseline measures and the types of activities

individuals engaged in did not reach significance.

Interpretation of study findings

Within-person analyses of affective and ruminative responses to goal behaviours.

This study found evidence supporting the prediction that ruminative and affective responses

would be greatest (more negative and less positive) when participants reported low success in

achieving daily activities. However, there was no evidence that the importance of daily

activities interacted with success to predict affective and ruminative responses. Overall,

activity success was a better predictor of rumination and affect than activity importance, in

that individuals reported relatively greater negative affect and rumination and lower positive

affect at times when they were succeeding. When individuals engaged in important tasks,

they reported elevated levels of negative affect and rumination, as well as positive affect,

although the association between importance and rumination was strongest. It is possible that

engaging in important tasks was associated with a general increase in affective arousal, but it

seems this was also related to an increase in ruminative thoughts.

Given the robustness of Moberly and Watkins' (2010) findings, the failure to replicate

the success by importance interaction was surprising. Exploring the data gave some

indication as to why it was not found, because of all the occasions included in the analysis,

less than 9% were simultaneously rated high for importance and low for success. This leaves

very few occasions to drive the expected interaction. It is possible, therefore, that the

activities reported by the participants in this study, and the appraisals made of these activities,

were different to those in the Moberly & Watkins (2010) study. Although study limitations

will be discussed in more detail below, it seems worth noting that differences in recruitment

may also have affected the data collected. The mix of students and community participants

was similar to that of Moberly and Watkins (2008a, 2010). However, the recruitment strategy

was different, as Moberly and Watkins (2008a, 2010) specifically advertised for "volunteers

both who were and were not prone to sad moods and depression" (Moberly & Watkins, 2008,

p. 316), and participants therefore reported a wide range of baseline symptoms of depression.

For this study participants were screened to ensure they did not exceed a previously

established cut-off for major depression on the 90-item MASQ AD scale (Bredemeier, et al.,

2010). This limited the range of individual differences in baseline depression scores, and

presumably had a knock-on effect on baseline levels of trait rumination and schizotypy as

well. Although baseline levels of depression and rumination were controlled in both studies,

it is quite likely this difference will have impacted on the activity appraisals participants

made. For example, Teasdale's (1988) differential activation hypothesis posits that when

individuals experience an episode of depression, associations are made between low mood

and negative cognitive processing styles. While in episode, a positive feedback cycle between

depressed mood and depressive cognitive biases increases the accessibility of negative,

depressive interpretations and biased thought patterns (Teasdale & Barnard, 1993). However,

with an established association between negative mood and depressive thought patterns, the

experience of low mood in remission would easily activate negative cognitive biases.

Individuals with a history of depression would therefore exhibit greater cognitive reactivity to

stress, such as perceived failure, and negative affect relative to never-depressed individuals.

Likewise, behavioural and imaging data suggest that individuals with depression tend to

show a 'catastrophic response' to negative task feedback, in that they are more likely to make

consecutive errors when feedback is given, relative to never-depressed controls (Douglas et

al., 2009, Elliott et al., 1997; 1996). Although the evidence from imaging studies is mixed, it seems that individuals with depression are more sensitive to negative feedback and are less able to use this feedback to correct their task-related behaviour.

Neither this study nor the Moberly and Watkins (2008a, 2010) studies assessed the psychiatric histories of participants, but it seems plausible that more individuals with a history of sub-clinical or clinical depression may have been included in the Moberly and Watkins (2008a, 2008b, 2010) studies. It is possible that these individuals may have been more self-critical, and therefore given lower success ratings, or may have reacted more catastrophically to perceived low success, and experienced greater negative affect and rumination.

In exploratory analyses, it was found that activity enjoyment, a measure of consummatory pleasure, was a strong predictor of rumination and affect. Interestingly, enjoyment more robustly predicted ruminative and affective responses than either success or importance ratings. Higher ratings of enjoyment predicted lower levels of rumination and negative affect, and higher ratings of positive affect. Although an association between positive and negative affect and reward (enjoyment) would be expected, it is interesting that enjoyment was so strongly related to rumination as well. The analyses conducted were not able to determine whether this relationship was mediated by affective responses, or if enjoyment and rumination were directly related. Unsurprisingly, momentary levels of positive affect were highest when participants were engaged in activities they enjoyed and that they were also succeeding in. There was some evidence that under these circumstances participants also reported thinking less about their problems, and lower levels of anxiety. Paradoxically, when individual differences in baseline depression and trait rumination were controlled, there was also some evidence that individuals also reported more overall negative affect when they were successfully achieving enjoyable goals. It is possible this increase in

both positive and negative affect in may represent a general increase in arousal in response to both success and enjoyment.

Fishbach, Shah & Kruglanski (2004) investigated affective transfer within goal systems and found that the pleasant or aversive experience of attaining goals is transferred by cognitive association to the process of attaining goals. In other words, through previous experience or simply anticipation, the affect associated with a desired goal end point becomes associated with the journey towards that goal. Positive feelings, such as enjoyment, during an activity arise when the activity is appraised as representing a strong means to achieving a desirable superordinate goal. The degree of association between a goal and its means shapes how enjoyable and gratifying the activity is. In other words, the sense of enjoyment associated with an activity is diluted if there are several means of achieving a superordinate goal, compared with the process of moving towards a superordinate goal that can only be achieved through a limited number of means. They found that the extent of emotional investment (i.e. the importance of the goal) also impacted on the enjoyment and gratification of an activity. This suggests that enjoyment is related to the degree to which an activity is seen as causing a desirable goal state and the implication is that when individuals feel a high sense of control over their actions and goal attainment, they will experience greater enjoyment. This seems to relate to the finding of this study that success and enjoyment were related to increased positive affect and decreased negative affect and rumination, although the relationship with goal importance and positive affect was not as strong.

Influence of individual differences on responses to goal behaviours. Affective transfer in goal systems also relates to the evidence base on the effect of reinforcers in modulating reward-seeking behaviour, which seems to be disrupted in individuals with schizophrenia and depression (Morris et al., 2014; Pizzagalli et al., 2008), and it would be interesting to see whether affective transfer occurs in the same way in the goal systems of

these clinical groups. It is of interest to note that trait levels of schizotypy were negatively

associated with momentary positive affect in the current study, suggesting this trait may be

related to dampened pleasant feelings. This is in line with the negative symptoms of

schizophrenia, in particular anhedonia and blunted affect (Foussias & Remington, 2010).

However, the findings from the Hypothesis 3 analysis found no relationship between

schizotypy and ratings of enjoyment, which indicates the impact of this trait could be limited

to positive affect, and not consummatory pleasure. Again, this is congruent with previous

research on intact consummatory pleasure in schizophrenia when measurements are made in-

vivo, rather than through retrospective or prospective reports (Gard et al., 2007; Strauss,

2013). A reduced sense of enjoyment or reward associated with an activity may increase the

perceived cost of pursuing a goal, thereby leading to behavioural avoidance or goal

abandonment (Inzlicht, Schmeichel & Macrae, 2014; Kurzban et al., 2013). Indeed,

overestimations of the effort involved in goal behaviours, and perceptions of limited

resources to tackle difficult tasks, are key features in cognitive accounts of the negative

symptoms of schizophrenia (Rector et al., 2005) and recent evidence suggests this does

impact on goal setting and implementation, despite intact anticipatory and consummatory

pleasure (Gard et al., 2014). However, it would be important to further explore the

relationship between goal behaviours, effort and momentary reports of reward and pleasure in

other clinical populations.

The finding that trait rumination was positively associated with momentary negative

affect and ruminative thoughts, whereas depressive symptoms and trait schizoptypy were

differentially negatively associated with momentary positive affect was also of relevance.

Despite the overlap between symptoms of depression, rumination and schizotypy reported in

clinical groups, scores from the baseline measure of depressive symptoms (mini-MASQ-AD)

did not correlate with trait rumination and schizotypy. Initial exploration of the baseline

measures showed that trait rumination was positively correlated with the Interpersonal and

Disorganised subscales of the SPQ-B. Nonetheless, in the multilevel modelling analysis

momentary negative affect and rumination were differentially associated with trait

rumination, and not with baseline symptoms of depression or schizotypy. Momentary

positive affect was differentially associated with depressive symptoms and schizotypy, and

not with trait rumination. Moberly and Watkins (2010) also found that symptoms of

depression were not associated with momentary rumination, whereas trait rumination was

associated with momentary negative affect and rumination. Symptoms of depression were

also negatively correlated with mean ratings of activity enjoyment throughout the experience

sampling period. The current findings suggest that experiencing symptoms of depression had

a dampening effect on momentary positive affect, and that trait schizotypy had a similar

influence. This is in line with previous findings that individuals with depression experience

blunted positivity, rather than increased negativity (Dunn, 2012). Although the evidence for

the reduced positivity bias seems to be strongest for depression, this effect is seen across a

range of psychological difficulties, including psychosis (Mezulis, Abramson, Hyde, &

Hankin, 2004).

Another factor relevant to the finding of an association between momentary positive

affect and symptoms of depression and schizotypy is that this study employed a different

measure of depression from Moberly and Watkins (2010). While the Anhedonic Depression

subscale of the mini-MASQ is designed to measure symptoms specific to depression, and not

comorbid symptoms of anxiety (Watson, Clark, et al., 1995; Watson, Weber, et al., 1995), it

is of course a measure of anhedonia, which may explain why it had a particular association

with positive affect. The finding that trait rumination, and not depression, was associated

with negative affect and momentary rumination suggests that rumination may be the

dominant driver in the reciprocal relationship with negative affect for participants in this

study. In other words, individual differences in trait rumination were more relevant to the

cyclical relationship between momentary negative affect and rumination than individual

differences in depression symptoms.

It was also interesting to note in further analyses that appraisals of importance seemed

to be specifically related to task-orientated rumination (thinking about problems) rather than

emotion-oriented rumination (thinking about feelings). This is similar to the findings reported

by Moberly and Watkins (2010). When individual differences in trait rumination, depressive

symptoms and schizotypy were controlled, ratings of importance were differentially

associated with momentary rumination, and the relationship with momentary positive and

negative affect was marginal. This indicates that individuals ruminate more when engaged in

important tasks, and that the contents of rumination may be related more to the task than to

the experience of emotions. Appraisals of importance appeared to relate more to momentary

feelings of anxiety than sadness or irritation, suggesting that worry may be implicated in the

relationship between importance and momentary rumination (see analyses in Appendix H).

Exploratory analyses of individual differences on goal attainment. Given that the

findings related to the third hypothesis, namely the impact of individual differences in

motivation, rumination, depressive symptoms and schizotypy on goal attainment, enjoyment

and anticipation, did not hold once corrections for multiple testing had been applied, they will

not be interpreted.

Of some interest were the findings relating to self-reported levels of trait anticipatory

and consummatory pleasure and reported enjoyment and anticipation during the experience

sampling period. It was thought trait consummatory pleasure would correlate with reported

enjoyment, and that trait anticipatory pleasure would correlate with how much individuals

looked forward to the next day's activities; however, there were no significant correlations

between trait anticipatory and consummatory pleasure and reported enjoyment and

anticipation during the experience sampling period. This does fit with existing literature on

the exaggeration of reported retrospective and prospective reward in individuals free of

psychopathology relative to reports of real-time enjoyment (see Strauss, 2013), although it

does question the validity of scales such as the TEPS, which was used in this study to

measure trait anticipatory and consummatory pleasure. It is also surprising that trait levels of

anticipatory pleasure did not relate to the daily reports of anticipation during the sampling

period. This may be because the TEPS items related to looking forward in general to

hypothetical events, such as "When something exciting is coming up in my life, I really look

forward to it", whereas the daily reports specifically referred to anticipation of the next day's

event. These different measures may therefore have tapped into different types of ancitipatory

pleasure; a more abstract, general trait measured by the TEPS, and a much more specific,

task-related prediction measured by the ESM item. Gard et al. (2014) measured task-related

anticipatory and consummatory pleasure four times a day for a week, and found that

individuals with schizophrenia reported similar levels of consummatory pleasure and more

anticipatory pleasure than those in the non-clinical sample. This is an indication that our

understanding of anticipatory and consummatory pleasure could benefit from further

scientific scrutiny. In particular, these findings reflect the difficulties of measuring such

constructs using questionnaire measures that rely on retrospective, prospective or

hypothetical reports and emphasise the need to study these processes using naturalistic

methods such as ESM.

Clinical relevance of findings

There are a number of clinical areas that the results of this study can contribute to, in

particular to the area of research relating to Control Theory, to cognitive models of

depression and the negative symptoms of schizophrenia, to behaviour change, and to

methodological considerations of self-report measures in psychological research.

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Relevance to Control Theory. The finding that appraisals of success are a better

predictor of affective and ruminative responses than task importance is of great relevance to

our understanding of Control Theory and the organisation of goals. This indicates that, at

least in non-clinical samples, the importance of an activity does not influence fluctuations in

affect and rumination as much as the success of carrying out the activity. Combined with the

influence of reported enjoyment, it seems that the influence of daily activities on mood has

less to do with engaging in personally important goals, but in activities that give a sense of

mastery and are high in hedonic return. This may vary according to individual differences in

conditional goal-setting and contingent self-worth. These constructs were not measured in

this study, so it is possible that these results reflect processes relating to mastery-orientated

activities carried out by individuals whose self-worth is not contingent on achieving specific

goals. Although the participants in this study predominantly engaged in personally important

tasks, they rarely reported poor success on important goals. This may be an indication that

these participants made relatively emotionally robust and non-catastrophic appraisals of

failure and success. Nonetheless, it lends support to the hypothesis that appraisals of task

success and achievement improve mood (Carver & Scheier, 1990). In particular, it appears

that while the separate experiences of success and pleasure reduce rumination and negative

affect, and increase positive affect, experiencing them simultaneously differentially

influences positive affect. This lends an interesting perspective to the separate constructs of

positive and negative affect, since task-related increases in positive affect were not always

consistent with lower levels of negative affect.

Another key finding was that task importance did influence momentary rumination,

in that greater importance was associated with higher levels of rumination when individual

differences in trait rumination, symptoms of depression and schizotypy were controlled. This

seems to have been a function of individuals ruminating about their problems rather than

their feelings, suggesting that task-related, and not feelings-related, rumination was affected

by task importance. There was some evidence that succeeding at enjoyable tasks reduced this

type of task-related rumination.

Clinically, these findings contribute to the evidence base on the regulation and

perception of goal-behaviours. The results are consistent with previous findings that

appraisals of goal success are related to increased positive affect, and reduced negative affect

and rumination. Crucially, because appraisals of success are subjective and can therefore be

swayed by beliefs of self-efficacy, self-esteem and optimism, these findings highlight the

importance of assessing these beliefs thoroughly, and targeting appraisals of success and

achievement in clinical interventions. The results also emphasize the importance of skilling

clients up in problem solving and task management, to help them break larger tasks into a

series of smaller steps that are associated with clear outcomes to facilitate appraisals of

success (Bell & D'Zurilla, 2009). In line with Gard et al. (2014), the results of this study also

imply that smaller task steps should be related to achievement-related rewards to enhance the

experience of both success and enjoyment. The findings also draw attention to the

importance of ensuring therapeutic goals are kept within clients' zone of proximal

development to ensure their appraisals of therapeutic gains and successes are high.

The finding that activity importance was related to momentary rumination when

individual differences in trait rumination, symptoms of depression and schizotypy were

controlled suggests that the motives individuals have for engaging in specific tasks are

important to our understanding of task-related rumination. This seems consistent with the

large evidence base on the influence of contingent self-worth, in that participants in this study

may have worried more when they were engaged in important tasks because of feared

consequences of failure. This also has clinical implications in terms of specific targets for

task-related rumination. There was some evidence that this was reduced during pleasurable

and successful tasks, which implies that helping clients connect with rewarding experiences,
and facilitating appraisals of success, could have an effect on this type of rumination as well.

    Relevance to cognitive models of depression and schizophrenia. The results of this
study lend some insight to the differential influence of symptom levels of depression,
rumination and schizotypy on momentary experiences of rumination and positive and
negative affect. Specifically, it seems that symptoms of depression and schizotypy function
similarly by reducing momentary experiences of positive affect, whereas trait rumination
functions by amplifying momentary levels of negative affect and rumination. This is in line
with evidence suggesting an absence or blunting of a positive bias in individuals suffering
from depression, which is normally present and much stronger in individuals free from
psychopathology (Dunn et al., 2009; Moore & Fresco, 2012; Msetfi, Murphy, Simpson, &
Kornbrot, 2005). This is also consistent with the blunting of positive affect and reduced
anticipation of pleasure associated with the negative symptoms of schizophrenia (Rector et al.,
2005). This is also in keeping with the large evidence base on the influence of rumination on
negative affect and symptoms of depression (Spasojevic & Alloy, 2001). Interestingly, there
is some evidence that the process of rumination dampens positive affect (Feldman, Joormann,
& Johnson, 2008), but the findings of this study do not indicate that trait levels of rumination
have an effect on momentary reports of positive affect. Because time-lagged analyses were
not carried out, it was not possible to discern the temporal relationship between positive
affect and rumination, but this is something that warrants further research. The clinical
implication of this is that depression- and rumination-related symptoms should therefore be
monitored and targeted in clinical interventions aiming to increase positive affect, pleasure
and appraisals of success.

    In particular, the association between momentary positive affect and the success by
enjoyment interaction is pertinent to therapeutic techniques such as behavioural activation

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because the implication is that to boost positive mood, clients should schedule activities they

can master and which are intrinsically rewarding, regardless of the personal importance of the

task. This is in line with previous work on boosting positivity in depression (Dunn, 2012).

However, the generalizability of these results remains tentative until the findings have been

replicated in a clinical sample, as it is yet unclear to what extent motivational and hedonic

experiences are altered in clinical populations (Gard et al., 2014; Treadway & Zald, 2011).

   Facilitating behaviour change. The findings are also relevant to other areas of

clinical interest such as behaviour change in health settings. Findings from health literature

suggest that daily satisfaction is related to positive experiences such as believing one is close

to attaining personal goals (Baldwin et al., 2006). Focusing on these positive experiences, for

example by being mindful, may enhance this satisfaction and therefore sustain behaviour

change (Baldwin, Baldwin, Loehr, Kangas, & Frierson, 2013). Recently, it has been

suggested that mindfulness mediates the relationship of satisfaction with behaviours such as

physical exercise (Tsafou, et al., 2015). Mindfulness has been found to reduce rumination

(Deyo et al., 2009), possibly because being mindful of everyday life involves focusing more

on concrete aspects of events in the surrounding environment. It may be, therefore, that using

a more concrete processing style can help reduce the impact of daily goal failures on affective

and ruminative responses (Watkins, 2008; Watkins, Baeyens, & Read, 2009), and that this

concreteness of thought may also enhance the experience and positive effect of enjoyment.

Watkins' (2010) hypothesis that flexibly switching between higher and lower construal levels

is associated with adaptive goal pursuit and emotion regulation has not yet been tested using

ecologically valid methods such as ESM, but future work may want to explore whether the

experience of enjoyment during daily activities is related to mindfulness and changes in

abstract or concrete cognitive styles.

Measuring constructs in psychological research. The findings on the constructs of

anticipatory and consummatory pleasure are interesting from a theoretical and

methodological standpoint. Although previous research suggests that prospective and

retrospective reports of pleasure do not correlate well with in vivo measurements (see Strauss,

2013), it was nonetheless a surprise that there was no relationship between trait anticipatory

pleasure and the daily measures of anticipating the next day's activities. This underscores the

importance of using methods such as ESM to gather assessments of subjective experiences in

a way that minimises the biases of retrospective, prospective or hypothetical reporting.

Indeed, these results are in line with findings from other areas of psychological research on

the disconnect between actual behaviour and that which is self-reported or predicted under

hypothetical or decontextualized circumstances (FeldmanHall et al., 2012)

Study Strengths and Limitations

This study had a number of strengths, in that it was the first to assess fluctuations in

momentary positive affect as a function of appraisals of current activity success and

importance, using naturalistic and ecologically valid methods. It therefore made important

contributions to the evidence base on understanding how goals are regulated and how this

regulation influences the experience of positive and negative affect, as well as rumination.

The study also made unique contributions by assessing the effect of transdiagnostic factors

pertinent to motivation and reward processes, including the anticipation and experience of

pleasure, and trait schizotypy. The study was mainly constrained by finances and recruitment

limitations, which affected the characteristics of the sample and the power of the analyses. In

particular, the sample size affected the interpretation of the results of Hypothesis 3. To address

this, a far greater sample size could have been recruited. Statistical rules of thumb (Green,

1991; VanVoorhis & Morgan, 2007) suggest that between 100 and several hundred

participants would be required for this analysis to achieve power, assuming a medium effect

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size. This was not feasible in the time frame of this project. Alternatively, more specific predictions could have been made which would have reduced the need for multiple testing. For example, rather than include all of the baseline variables, those relating to psychiatric factors (depression, rumination and schizotypy) could have been selected and correlated with activity categories, or to the number of occasions participants reported struggling to achieve goals. Further limitations will now be discussed.

The use of mobile phones. Acquiring personal electronic devices such as digital watches or PDAs to lend participants was beyond the budget of the study, so prompting participants via text message seemed to be the best way to keep costs low while still employing a signal-contingent design. However, even with the low cost option of texting participants, compromises had to be made between the number of days in the sampling period, the number of alerts per day, and the number of participants in the study. To satisfy questions of power, the number of participants was prioritised over the number of alerts per day, and days in the sampling period. Five alerts for six days represented the optimal balance, but the result of this was that the analysis contained only a third the number of occasions as Moberly & Watkins (2010). The low number of text alerts means there were relatively few reports of evening activities as most alerts were received during the working day.

Text alerts may be phenomenologically different to respond to than digital watches. It is possible (and expected) to put mobile phones on silent, and there were times when participants may not have looked at their phones for several hours. Digital watches are less easy to ignore. Using text alerts as the prompt also relies on participants having network signal, which is not always the case (for example, train journeys, hiking trips and remote locations were cited by participants as interfering with text alerts).

Limitations specific to SurveySignal. There were some limitations posed by the service used to text the participants. Fifty text alerts were not received by participants for

unknown reasons. Participants could not sign up unless they had a smartphone as they needed

to be able to access the internet from their phone to register with the service. SurveySignal is

based in the USA, which operates on a different daily savings times schedule to Europe. For

example, when clocks changed, the text alerts were sent an hour early for a week.

Perhaps the biggest limitation was that it was not possible to individualise time

schedules between people or days, which meant the default sampling period was 9am-9pm

for all individuals across all days. Although the default, pseudorandomised schedule could be

overridden, and fixed alerts scheduled instead, these fixed alerts were effective for all

participants taking part at that time, and as there were often several participants at a time in

the active phase of the study, this was not always an ideal option. The consequence of this

was that some morning alerts were missed or answered late at the weekend.

Benefits of using mobile phones. However, the benefits of using text messages was

that participants could choose between responding in the paper booklets or using the online

questionnaires. It increased flexibility in that participants could also still respond to text alerts

if they forgot their booklets when they left the house for the day. It did not require any

training, because the online questionnaires looked the same as those in the booklets.

Although the disadvantages of being able to put phones on silent have been noted, this is

likely to have reduced the intrusiveness of the study on participants' lives, and therefore

increased the appeal of taking part. This may also have contributed to the low levels of

missing data in this study, relative to other, similar ESM studies.

Sample characteristics. To ensure the study was completed in a timely fashion, a

student population was chosen as the main target for recruitment, as it was thought this would

be an easily accessible group. This limited the sample to being a non-clinical, analogue group.

It may also have limited type of activities reported, as few participants were working, and

most lived near or on the UEA campus. In order to obtain permission to advertise to students,

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some University staff requested that alerts be timed for between lectures. To account for differences in schedules, participants were asked to keep their phone on silent in lectures and respond to any text alerts in the breaks as if they had just been received – effectively the same as creating a bespoke schedule for each person. However, this may have biased reports to when participants were between activities or just on a break.

Future Work

It would be important to replicate the findings of this study in larger, more diverse sample. This study recruited a predominantly student sample, but to improve generalizability the hypotheses should be tested in a sample including community members. Additionally, much like the recruitment strategy of Moberly and Watkins (2008a, 2008b, 2010), this could include a wider representation of clinical symptoms such as depression levels, trait rumination and schizotypy, without necessarily recruiting a clinical sample. Ideally, comparisons between ages could be made to assess whether the developmental trajectory of self-control processes in adolescence and early adulthood influence the regulation of goal behaviours and the relationship between goal-related appraisals and affect.

It would be equally important to apply these study questions to clinical samples, to investigate the differences in the affective experience of daily goals and activities in individuals with psychiatric disorders. Individuals with specific presentations, such as depression and schizophrenia, could be recruited to assess diagnosis-specific processes. However, taking a transdiagnostic approach to rumination, motivation and hedonic experiences would have greater clinical relevance as well as theoretical value in elucidating the role of these processes across diagnoses. When conducting research with individuals with a history of psychopathology, it is important to gain as much information as possible about each participant's clinical history, for example by conducting the Structured Clinical Interview for DSM-IV Axis I disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 1997).

This information can help account for the influence of cognitive 'scars' as a result of previous experience of psychopathology, and using this method would be recommended in future research. If a large enough sample also included individuals with no history of psychopathology, dimensional analyses could assess the influence of transdiagnostic factors across the spectrum of symptom severity.

In addition to further exploring the relationship between processes of goal regulation and clinical symptoms such as depression, rumination, anhedonia and low motivation, it would also be interesting to investigate how broader, sub-clinical constructs such as self-esteem, self-efficacy, contingent self-worth and conditional goal setting influence appraisals of and responses to goal perceptions, using ESM methods. In particular, questions relating to whether these constructs affect the types of goals individuals plan and engage in, the effort and strategies they use in goal implementation, and how they respond to perceptions of low success in real life settings could be addressed.

It would also be interesting to conduct further work on the impact of cognitive processing style and mindfulness on affective responses to goal progression and failure. In particular, an important next step in evaluating Watkins' (2010) hypotheses would be to directly measure fluctuations in construal level as a function of goal behaviours using ESM. This may be challenging to assess using self-report measures, even with the high face validity of those employed in ESM, given that construal level is not normally available to conscious awareness (Liberman & Trope, 2009). Piloting work may need to be done first to find an indirect way of measuring construal level, for example by asking individuals to what extent they are thinking about how to carry out an activity (low-level construal) versus thinking about why they are carrying it out (high-level construal).

Additionally it would be interesting to specifically recruit a sample looking to change behaviours or to sustain a behaviour change. This would be particularly relevant to health

psychology, but also to the area of clinical psychology as the products of therapy are also
often behaviour changes. Individuals attempting to sustain a behaviour change may respond
more catastrophically to perceived failure, such as when restrained eaters who believe they
have broken their diet proceed to eat more, compared to unrestrained eaters (Polivy, Herman,
& Deo, 2010). It would be interesting to see whether individual differences in self-efficacy
affect these reactions, and whether attempting to sustain a behaviour change is akin to
conditional goal setting, in that failures of individual goals are considered to be representative
of low progression towards higher order ideals.

Finally, future work could consider assessing fluctuations in goal efforts using ESM,
expanding on the findings by Gard et al. (2014) relating to anticipating goal efforts and
overall functioning. In particular, the relationship between current goal effort, affect and
rumination should be investigated using ESM, to assess whether people do 'coast' and
minimise efforts as a function of success and the experience of positive emotions.

Summary and Conclusions

This study used experience sampling methods to investigate a psychological model of
goal-directed behaviour, Control Theory, in a non-clinical sample of young adults. The aim
was to elucidate the relationship between goal-related appraisals and the experience of affect
and ruminative thought. Specifically, the study addressed key gaps in the evidence base by
assessing how appraisals of goal success and importance influence momentary positive affect,
as well as negative affect and rumination. Whereas previous studies have related these goal-
and affective processes to symptoms of depression and trait rumination, this study sought to
expand on the existing literature by considering levels of trait schizotypy. Additionally, the
relationship between individual differences in motivational and psychopathological factors
and levels of momentary affect and ruminative thought during the experience sampling

period was assessed. Constructs relating to transdiagnostic anhedonic and motivational

factors, such as approach and avoidance motivation, and anticipatory and consummatory

pleasure, were also considered. It was predicted that appraisals of goal success and

importance would be associated with fluctuations in momentary affect and rumination, such

that negative affect and rumination would be relatively higher under circumstances of low

success on personally important goals, and momentary positive affect would be relatively

lower under these circumstances. It was also expected that momentary levels of affect and

rumination would be influenced by individual differences in depression symptoms, trait

rumination and schizotypy, such that high levels of these symptoms would result in lower

levels of momentary positive affect, and higher levels of momentary rumination and negative

affect. It was also expected that lower levels of approach motivation and anticipatory

motivation would be related to greater difficulties achieving tasks.

It was found that appraisals of success were associated with increased momentary

positive affect and decreased momentary negative affect and rumination. Appraisals of

importance were associated with increased momentary rumination. However, the expected

interaction between importance and success was not found. Overall, activity success was

more important in determining affective and ruminative responses than activity importance.

In exploratory analyses, it was found that consummatory pleasure, measured by ratings of

enjoyment, was strongly related to increased positive affect, and decreased negative affect

and rumination. Additionally, increases in positive affect were predicted by an interaction

between success and enjoyment.

Individual differences in depressive symptoms and schizotypy were differentially

associated with reduced levels of momentary positive affect, indicating these symptoms

dampened the experience of positive affect. This is in line with evidence of reduced positivity

associated with these symptoms. Higher levels of trait rumination were associated with

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increased momentary negative affect and rumination, suggesting that the tendency to ruminate fuelled the reciprocal relationship between fluctuations in negative affect and ruminative thoughts.

The findings also highlight the importance of using naturalistic methods to gather reports of subjective experiences such as pleasure, since there was no relationship between trait anticipatory and consummatory pleasure and levels of actual enjoyment reported by participants.

These results further our understanding of the relationship between goal appraisals and affective and ruminative responses, and how these are influenced by symptoms of psychopathology. The clinical applications of the results are relevant to how we view the separate constructs of positivity and negativity and how subjective appraisals of success and the experience of pleasure and reward are important targets for clinical interventions. This can inform the way we support clients in managing goals, regulating their behaviours and altering beliefs relating to efficacy and achievement. The findings are also important to our understanding of how symptoms of depression and schizotypy differentially reduce positive affect, where as ruminative tendencies have a particular influence on negative affect and ruminative responses to goal appraisals. Future work should expand on these findings by applying these methods to clinical populations, assessing clinically relevant traits such as self-esteem and self-efficacy, and how appraisals of success and the experience of positive affect influence subsequent goal efforts.

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Appendix A: Study Poster

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Appendix B: Questionnaire Materials

Baseline Measures

Mini-MASQ (Clark & Watson, 1995)

Below is a list of feelings, sensations, problems, and experiences that people sometimes have.
Read each item and then fill in the blank with the number that best describes how much you
have felt or experienced things this way during the past week, including today. Use this scale
when answering::

1	2	3	4	5
not at all	a little bit	moderately	quite a bit	extremely

_____ 1. Felt really happy
_____ 2. Felt tense or "high strung"
_____ 3. Felt depressed
_____ 4. Was short of breath
_____ 5. Felt withdrawn from other people
_____ 6. Felt dizzy or lightheaded
_____ 7. Felt hopeless
_____ 8. Hands were cold or sweaty
_____ 9. Felt like I had a lot to look forward to
_____ 10. Hands were shaky
_____ 11. Felt like nothing was very enjoyable
_____ 12. Felt keyed up, "on edge"
_____ 13. Felt worthless
_____ 14. Had trouble swallowing
_____ 15. Felt like I had a lot of interesting things to do
_____ 16. Had hot or cold spells
_____ 17. Felt like a failure
_____ 18. Felt like I was choking
_____ 19. Felt really lively, "up"
_____ 20. Felt uneasy
_____ 21. Felt discouraged
_____ 22. Muscles twitched or trembled
_____ 23. Felt like I had a lot of energy
_____ 24. Was trembling or shaking
_____ 25. Felt like I was having a lot of fun
_____ 26. Had a very dry mouth

Brief Schizotypal Personality Questionnaire (SPQ-B; Raine & Benishay, 1995)

1. People sometimes find me aloof and distant. Y/N

2. Have you ever had the sense that some person or force is around you, even though you cannot see anyone? Y/N

3. People sometimes comment on my unusual mannerisms and habits. Y/N

4. Are you sometimes sure that other people can tell what you are thinking? Y/N

5. Have you ever noticed a common event or object that seemed to be a special sign for you? Y/N

6. Some people think that I am a very bizarre person. Y/N

7. I feel I have to be on my guard even with friends. Y/N

8. Some people find me a bit vague and elusive during a conversation. Y/N

9. Do you often pick up hidden threats or put-downs from what people say or do? Y/N

10. When shopping do you get the feeling that other people are taking notice of you? Y/N

11. I feel very uncomfortable in social situations involving unfamiliar people. Y/N

12. Have you had experiences with astrology, seeing the future, UFOs, ESP or a sixth sense? Y/N

13. I sometimes use words in unusual ways. Y/N

14. Have you found that it is best not to let other people know too much about you? Y/N

15. I tend to keep in the background on social occasions. Y/N

16. Do you ever suddenly feel distracted by distant sounds that you are not normally aware of? Y/N

17. Do you often have to keep an eye out to stop people from taking advantage of you? Y/N

18. Do you feel that you are unable to get "close" to people? Y/N

19. I am an odd, unusual person. Y/N

20. I find it hard to communicate clearly what I want to say to people. Y/N

21. I feel very uneasy talking to people I do not know well. Y/N

22. I tend to keep my feelings to myself. Y/N

The Temporal Experience of Pleasure Scale (Gard et al., 2007)

Below you will find a list of statements that may or may not be true for you. Please read each statement carefully and decide how true that statement is for you in general. Please respond to all items

1=very false for me to 6=very true for me

1. When something exciting is coming up in my life, I really look forward to it

2. The sound of crackling wood in the fireplace is very relaxing

3. When I think about eating my favorite food, I can almost taste how good it is

4. I love the sound of rain on the windows when I'm lying in my warm bed

5. The smell of freshly cut grass is enjoyable to me

6. I enjoy taking a deep breath of fresh air when I walk outside

7. I don't look forward to things like eating out at restaurants

8. A hot cup of coffee or tea on a cold morning is very satisfying to me

9. I love it when people play with my hair

10. I really enjoy the feeling of a good yawn

11. When I'm on my way to an amusement park, I can hardly wait to ride the roller coasters

12. I get so excited the night before a major holiday I can hardly sleep

13. I appreciate the beauty of a fresh snowfall

14. When I think of something tasty, like a chocolate chip cookie, I have to have one

15. Looking forward to a pleasurable experience is in itself pleasurable

16. I look forward to a lot of things in my life

17. When ordering something off the menu, I imagine how good it will taste

18. When I hear about a new movie starring my favorite actor, I can't wait to see it

Short Ruminative Response Scale (Nolen-Hoeksema & Morrow, 1991)

People think and do many different things when they feel depressed. Please read each of the items below and indicate whether you almost never, sometimes, often, or almost always think or do each one when you feel down, sad, or depressed. Please indicate what you generally do, not what you think you should do.

1 almost never   2 sometimes   3 often   4 almost always

1. think about how alone you feel

2. think "I won't be able to do my job if I don't snap out of this"

3. think about your feelings of fatigue and achiness

4. think about how hard it is to concentrate

5. think "What am I doing to deserve this?"

6. think about how passive and unmotivated you feel.

7. analyze recent events to try to understand why you are depressed

8. think about how you don't seem to feel anything anymore

9. think "Why can't I get going?"

10. think "Why do I always react this way?"

11. go away by yourself and think about why you feel this way

12. write down what you are thinking about and analyze it

13. think about a recent situation, wishing it had gone better

14. think "I won't be able to concentrate if I keep feeling this way."

15. think "Why do I have problems other people don't have?"

16. think "Why can't I handle things better?"

17. think about how sad you feel.

18. think about all your shortcomings, failings, faults, mistakes

19. think about how you don't feel up to doing anything

20. analyze your personality to try to understand why you are depressed

21. go someplace alone to think about your feelings

22. think about how angry you are with yourself

BIS/BAS

Each item of this questionnaire is a statement that a person may either agree with or disagree with. For each item, indicate how much you agree or disagree with what the item says. Please respond to all the items; do not leave any blank. Choose only one response to each statement. Please be as accurate and honest as you can be. Respond to each item as if it were the only item. That is, don't worry about being "consistent" in your responses. Choose from the following four response options:

1 = very true for me
2 = somewhat true for me
3 = somewhat false for me
4 = very false for me

1. A person's family is the most important thing in life.

2. Even if something bad is about to happen to me, I rarely experience fear or nervousness.

3. I go out of my way to get things I want.

4. When I'm doing well at something I love to keep at it.

5. I'm always willing to try something new if I think it will be fun.

6. How I dress is important to me.

7. When I get something I want, I feel excited and energized.

8. Criticism or scolding hurts me quite a bit.

9. When I want something I usually go all-out to get it.

10. I will often do things for no other reason than that they might be fun.

11. It's hard for me to find the time to do things such as get a haircut.

12. If I see a chance to get something I want I move on it right away.

13. I feel pretty worried or upset when I think or know somebody is angry at me.

14. When I see an opportunity for something I like I get excited right away.

15. I often act on the spur of the moment.

16. If I think something unpleasant is going to happen I usually get pretty "worked up."

17. I often wonder why people act the way they do.

18. When good things happen to me, it affects me strongly.

19. I feel worried when I think I have done poorly at something important.

20. I crave excitement and new sensations.

21. When I go after something I use a "no holds barred" approach.

22. I have very few fears compared to my friends.

23. It would excite me to win a contest.

24. I worry about making mistakes.

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Appendix C: Experience Sampling Questionnaires

Morning questionnaire

Good Morning.

Please fill in these questions when you wake up.

Today's date: ...../...../.....

What time is it now?   ..... : .....

How long did it take before you slept last night?   .....hrs......mins

How often did you wake in the night?   ......times

	Not			Moderate			Very
I slept well	1	2	3	4	5	6	7

Reminder: Is your phone set to make a noise when you receive a text message?

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Evening questionnaire

Please answer these questions just before you go to sleep:

Evening questionnaire.
Please answer these questions just before you go to sleep:

Overall, today I felt	*Not*			*Moderate*			*Very*
• sad	1	2	3	4	5	6	7
• anxious	1	2	3	4	5	6	7
• irritated	1	2	3	4	5	6	7

	Not			*Moderate*			*Very*
• happy	1	2	3	4	5	6	7
• enthusiastic	1	2	3	4	5	6	7
• interested	1	2	3	4	5	6	7

To what extent were you thinking about:	*Not*			*Moderate*			*Very*
• your feelings	1	2	3	4	5	6	7
• your problems	1	2	3	4	5	6	7

I feel like I achieved what I wanted to today:

	-3	-2	-1	0	+1	+2	+3
	Not at all						*Definitely*

How much are you looking forward to
what you are doing tomorrow?

	-3	-2	-1	0	+1	+2	+3
	Not at all						*Definitely*

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	Not			*Moderate*			*Very*
It was a normal day today	1	2	3	4	5	6	7
Filling in the booklets influenced my mood today	1	2	3	4	5	6	7
Without the booklets I would have done other things today	1	2	3	4	5	6	7

I did not fill in the 'text questionnaires':

From: ….. : …..   to: ….. : …..   Reason:……………………

From: ….. : …..   to: ….. : …..   Reason:……………………

From: ….. : …..   to: ….. : …..   Reason:……………………

I'm going to sleep now.

The time is exactly: ….. : ..…

Good night.

Reminder: Is your phone charged for tomorrow?

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Text message questionnaires

Text questionnaire

I feel:	*Not*			*Moderate*			*Very*
• sad	1	2	3	4	5	6	7
• anxious	1	2	3	4	5	6	7
• irritated	1	2	3	4	5	6	7
	Not			*Moderate*			*Very*
• happy	1	2	3	4	5	6	7
• enthusiastic	1	2	3	4	5	6	7
• interested	1	2	3	4	5	6	7

To what extent were you thinking about:	*Not*			*Moderate*			*Very*
• your feelings	1	2	3	4	5	6	7
• your problems	1	2	3	4	5	6	7

What were you doing (just before the text)?

How important was this activity to you?

-3	-2	-1	0	+1	+2	+3
Not at all						*Definitely*

How successful were you in achieving it?

-3	-2	-1	0	+1	+2	+3
Not at all						*Definitely*

How much were you enjoying the activity?

-3	-2	-1	0	+1	+2	+3
Not at all						*Definitely*

Since the last text alert, have you struggled to accomplish any activities or goals?

Yes ☐   No ☐

	Not			*Moderate*			*Very*
The text disturbed me:	1	2	3	4	5	6	7

Exact time now (from mobile phone clock):   ….. : …..

Time on text message: ….. : …..

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Appendix D: Debriefing Document

Debriefing document

Thank you for taking part in this study. Your time and contribution is really valued. This document will explain in more detail what the aims of the investigation are, and should answer some of the questions you may have.

Please do spread the word about this study if you have friends who may be interested in talking part. However, we'd like to ask that you <u>do not</u> show them this document, or tell them what the aims of the study are, as this may change the way they respond to the questionnaires, should they choose to take part. You would be welcome to show them the information sheet you received at the start of the study, though.

Purpose of the study

The purpose of the study is to look at how the things we do during the day affect the way we feel. Previous research has already found that when we struggle to complete tasks that we feel are important, we experience more negative emotions, such as sadness and frustration. We also tend to think about these problems repetitively. This is also known as rumination, and it can make your mood worse to mull over problems like that. We are interested in knowing whether successfully completing important tasks has the opposite effect – that is, whether achieving important goals makes you feel happy. We are also interested in seeing whether this effect is different for different people; in particular, we are interested in whether it makes a difference if you are the type of person who really looks forward to doing things. One of our research questions is whether looking forward to things affects the types of things you do, how successful you are in doing them, and how you feel afterwards. This may make a difference in how we understand common mental health problems, such as psychosis and depression, because people who suffer from these disorders often lose interest in doing things they used to enjoy.

We were especially interested in studying these things in people's everyday lives, because we feel that is a more accurate reflection of the relationship between activities and mood than conducting experiments in a laboratory.

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What will happen to the results?

Once the necessary number of participants has been recruited and completed the study, the results will be analysed. They will be written up for a Doctorate of Clinical Psychology thesis, and they may also be written up for publication in an academic journal. If they are published, you may receive a copy of the article if you wish. Please email the Primary Investigator, Theresa Dahm, at t.dahm@uea.ac.uk to let us know if you wish to receive a copy of the article, should it be published. You may also receive a non-technical summary of the findings if you would prefer.

What about the prize draw?

The prize draw for the £25 Amazon vouchers will take place once all the participants have completed the study. This should be in October 2014. If you have won, we will contact you by email. We may chase you up by telephone if you don't respond to the email within a week, so please let us know if you think you will be changing your email address in the near future.

Who to contact if I feel upset

If you feel upset following the study, and you think it is related to taking part in the study, please contact Theresa in the first instance (t.dahm@uea.ac.uk). If you wish to make a complaint about any part of the study, please contact the Course Director for the Doctorate in Clinical Psychology, Prof Ken Laidlaw (ken.laidlaw@uea.ac.uk)

If you are feeling upset following the study for any other reason, you may find the numbers below helpful:

Nightline: 01603 503504

The Samaritans: 0845 790 9090

The University Counselling Service: 01603 592651; csr@uea.ac.uk

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Appendix E: Ethical Approval

Faculty of Medicine and Health Sciences Research Ethics Committee

UEA
University of East Anglia

Theresa Dahm (c/o Doctoral Programme in Clinical Psychology)
Elizabeth Fry Building
University of East Anglia
Norwich Research Park
Norwich
NR4 7TJ

Research & Enterprise Services
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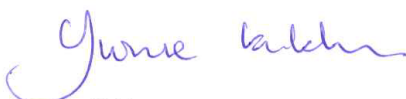
6th March 2014

Dear Theresa,

Project Title: Goal Pursuit, Motivation And The Experience Of Positive And Negative Affect In Young People: An Experience Sampling Study. Reference: 2013/2014 – 31

The amendments to your above proposal have been considered by the Chair of the Faculty Research Ethics Committee and we can confirm that your proposal has been approved.

Please could you ensure that any further amendments to either the protocol or documents submitted are notified to us in advance and also that any adverse events which occur during your project are reported to the Committee. Please could you also arrange to send us a report once your project is completed.

The Committee would like to wish you good luck with your project.

Yours sincerely,

Yvonne Kirkham
Project Officer

CC Joanne Hodgekins

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Appendix F: Participant Information Sheet

Everyday goal-directed behaviour, motivation and the experience of emotion in young people: an experience sampling study

We would like to invite you to take part in a study investigating how people feel about the sorts of activities they engage in every day. Before you decide whether you would like to take part, we would like you to understand why the study is being conducted, and what it would mean for you to be involved. You will be able to speak to the main researcher over the phone who will go through this sheet with you and answer any questions you have. This should take about 10-15 minutes.

What is the purpose of the study?
The purpose of the study is to investigate how people feel when they do everyday activities, such as studying, cooking, watching television, meeting friends, etc. People engage in these types of activities for all sorts of reasons – sometimes because they are bored, or because they have to even if they don't want to, or because they just really enjoy them. Often people who suffer from mental health problems, such as depression or psychosis, find it difficult to plan and carry out these types of activities. Part of the reason for this is that they may not expect to enjoy the activities very much. We are therefore interested in understanding the emotions people in the general population experience while they are carrying out everyday activities. This may then help us better understand these emotions in clinical populations in future research.

What does 'experience sampling' mean?
Experience sampling is a type of research method that captures information from people's real, every day lives. This means that several times a day, for several consecutive days, you will answer brief questions on what you are doing and how you are feeling. You will be reminded by text message to fill out the questions at five random points during the day, and you'll also fill out a brief questionnaire in the morning and at night. In this way, we can better understand the relationship between activities and emotions in real life, rather than in the laboratory, which is how psychological studies often take place. Although this means our research should be a better representation of natural, spontaneous emotional reactions, it is more intense and demanding for you to take part.

Why have I been invited?
You have been invited because you responded to an advert for the study. We are recruiting undergraduates on the University of East Anglia campus who speak English fluently, own a mobile phone, and who are available to take part in the study for eight consecutive days.

Do I have to take part?
No, you do not have to take part – it is entirely up to you! We will describe the research study and go through this information sheet with you. If you do decide to take part, we will ask you to sign a consent form. However, you can withdraw from the study at any point if you change your mind. In responding to the advert, you will also have provided your mobile phone number to the team, so we will phone you at a convenient time for you to discuss the study further.

What will happen to me if I take part?
If you decide you would like to take part, we will first arrange a session for you to meet a member of the research team. This briefing session will mark the start of the eight day study period, so we will make sure it takes place at a convenient time for you. The session will take place on the UEA campus. There may also be other interested participants at this session. At this briefing session you will again have a chance to ask questions about the study. We will show you the short questionnaires you would fill out at each text message alert, so you know what they look like before the study starts. You will have the choice of filling them out electronically on your phone or in paper booklets. If you are still happy to be part of the study, we will ask you to sign a consent form. Then we will ask you to complete a number of baseline questionnaires. These assess symptoms of depression, personality-type traits, motivation, and how much you tend to worry about your problems. This briefing session should take an hour.

For the next six days you will be alerted at five time-points during the day, between 9am and 9pm. These time-points will be random, so you don't know when they will happen, but they will be fixed so that you don't have to answer twice within 15 minutes. Because the alerts will come by text message, it is important that you have your phone with you and that it is not on silent at all times during the day. If there are certain times of the day where this is not possible, e.g. during a religious service or similar, please let us know at the briefing session and we can discuss the options. You will also fill out a brief questionnaire when you wake up in the morning and before you go to bed at night. The morning/evening questionnaires and the ones during the day will each take two minutes or less to complete.

We will also arrange a phone call half way through the week so we can check up on how you are getting on with the study. After these six days, we will meet again on the UEA campus to de-brief. You will give back the questionnaire booklets and have the chance to ask questions. This session should take half an hour.

For example, if we arrange a briefing session for a Monday, we will meet then for an hour to discuss the study. Following this, you would fill out the experience sampling questionnaires for the next six days (Tuesday-Sunday) and we'd meet again the following Monday to de-brief for half an hour.

How will my information be kept safe?
We will keep your information confidential by assigning you an individual participant code. This code will be used to mark all the questionnaires you complete – the baseline questionnaires and the booklet/electronic questionnaires you complete during the experience sampling days. This means your name will not appear when we analyse the data. Your information will not be identifiable in any reports or publications resulting from the study. The questionnaires you complete will be kept in a locked filing cabinet in a locked office on the UEA campus. Information from any electronic questionnaires will likewise be stored in a password-protected database.

Will I be paid to take part?
We cannot offer individual payments to participants, but we will be holding a raffle at the end of the study for two £25 Amazon vouchers as a gesture of thanks for completing the study.

What are the advantages and disadvantages of taking part?
Although you yourself are unlikely to gain any advantages from taking part, you will be helping us conduct research that improves our understanding of emotions during everyday activities. This may inform future studies, including studies on mental health problems such as depression and psychosis.

The disadvantages of taking part are that you will need to give up some of your time every day to answer the questionnaires following the text message alerts. You may find this a bit tedious – and you may also find it a bit disturbing to have your phone with you and not on silent every day for six days. There is a small chance that you may become upset at some of the questions, particularly those asking you about your feelings. Should this be the case, please tell us immediately and together we can decide what to do – for example, you may then wish to withdraw from the study. However, based on our experience and that of other researchers, we think the likelihood of this happening is small, but we want to be careful nonetheless, as your safety and wellbeing is paramount to us.

What will happen if I don't want to carry on with the study?
We will phone you halfway through the study to see how you are getting on with filling out the questionnaires. This is a good opportunity for you to tell us if you don't feel like carrying on. However, you will also have been given our contact details so you can get in touch at any point during the study to inform us if you have changed your mind about continuing. If you do decide to withdraw, we may still wish to use some of the data you already provided but we can discuss this if you would prefer us not to. If you withdraw part way through the trial, we will unfortunately be unable to include you in the Amazon voucher raffle.

What if there is a problem?
If there is a problem and you wish to make a complaint, please contact Professor Ken Laidlaw, Director of the Doctorate of Clinical Psychology programme at UEA. His contact details are:

Professor Ken Laidlaw
K.Laidlaw@uea.ac.uk
Tel: 01603 59 3600
Elizabeth Fry Building 2.11

What will happen to the results of the study?
The results of the study will be written up as part of a Doctoral thesis. They may also be submitted to an academic journal to be considered for publication. Should the study be published, a copy of the article can be sent to you if you are interested.

Who is organising and funding the research?
The research study is being organised by Theresa Dahm, Dr Joanne Hodgekins, and Dr Sian Coker, who are part of the Doctorate of Clinical Psychology Programme at the UEA School of Medicine. It is being funded by the UEA Medical School.
Contact details
Theresa Dahm: t.dahm@uea.ac.uk
Tel: 07XXXXXXXXXX (study mobile number)

T. Dahm

Appendix G: Participant Consent Form

Participant ID: _____ (to be completed by researcher)

Study Title: Everyday goal-directed behaviour, motivation and the experience of emotion in young people – an experience sampling study

Chief Investigator: Theresa Dahm

Please initial box

I confirm that I have been given a copy of the participant information sheet (version X) for the above study, which I have read.

☐

I was given the opportunity to ask questions and discuss any concerns with the chief investigator.

☐

I understand that my participation is voluntary and I can withdraw at any time without giving a reason

☐

I understand that all information collected as part of the study will be treated as completely confidential and that relevant sections of data collected during the study may be looked at by individuals from the University of East Anglia. I give permission to these individuals to have access to my data which will be anonymised

☐

I understand that any records will be kept in a password-protected computer and in a locked cabinet and will only be accessible to relevant research staff.

☐

I understand that the study will involve two sessions on the UEA campus, as well as experience data collection for six consecutive days

☐

I agree to take part in the above study

☐

Name of participant   Date   Signature

_____   _____   _____

Name of researcher   Date   Signature

_____   _____   _____

Appendix H: Further analyses with deconstructed composite scores

When ratings of thinking about feelings and problems were included instead of the
rumination composite score, the results were similar, except that importance was not
significantly associated with thinking about feelings ($B = .04$, $SE = .03$, $p>.10$). Interestingly,
thinking about problems was associated with the success by enjoyment interaction ($B = -0.04$,
$SE = 0.03$, $p<0.05$ [one-tailed]). Thinking about problems was more strongly associated with
both positive and negative affect than thinking about feelings (Table H.1).

Table H.1.

*Unstandardized coefficients (*SE*) for multivariate multilevel model with decomposed rumination
scores*

	Negative affect	Positive affect
Thinking about feelings	0.43 (0.08)***	-0.12 (0.04)**
Thinking about problems	0.69 (0.12)***	-0.29 (0.06)***

Note: ***$p<0.001$, two-tailed. **$p<0.01$, two-tailed.

When sad, anxious and irritated affect ratings were included instead of negative affect,
the results were similar, with two exceptions: importance was not significantly associated
with sadness ($B = .02$, $SE = .03$, $p>.60$) or irritation ($B = .03$, $SE = .04$, $p>.40$), and success
was not significantly associated with sadness ($B = -.09$, $SE = .06$, $p>.10$). Momentary ratings
of anxiety were associated with the success by enjoyment interaction ($B = -0.05$, $SE = 0.03$,
$p<0.05$ [one-tailed]). All of the negative affect items were associated with rumination,
although this relationship was somewhat stronger for sad than anxious and irritated ratings
(Table H.2). All of the negative items were also negatively associated with positive affect,
and this relationship was stronger for sad and irritated ratings than anxious ratings.

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Table H.2.

*Unstandardized coefficients (*SE*) for multivariate multilevel model with decomposed negative affect scale*

	Rumination	Positive affect
Sad	0.45 (0.09)***	-0.46 (0.10)***
Anxious	0.35 (0.07)***	-0.26 (0.06)***
Irritated	0.32 (0.06)***	-0.37 (0.07)***

Note: ***p<0.001, two-tailed.

When happy, enthusiastic and interested ratings were included instead of the composite score of positive affect, the results were very similar, except that the association between importance and happy was not significant ($B = .01$, $SE = .03$, $p>.60$). The association with the success by enjoyment interaction was somewhat stronger for ratings of enthusiasm ($B = 0.07$, $SE = 0.02$, $p<0.005$) and interested ($B = 0.08$, $SE = 0.03$, $p<0.005$), than happiness ($B = 0.05$, $SE = 0.03$, $p<0.05$). All of the positive affect items were negatively associated with rumination and negative affect, although the relationships were stronger with negative affect (Table H.3). The relationship with negative affect was stronger for happy and enthusiastic than for interested ratings.

Table H.3.

*Unstandardized coefficients (*SE*) for multivariate multilevel model with decomposed positive affect scale*

	Rumination	Negative affect
Happy	-0.15 (0.04)***	-0.43 (0.07)***
Enthusiastic	-0.16 (0.03)***	-0.35 (0.06)***
Interested	-0.11 (0.04)**	-0.29 (0.06)***

Note: ***p<0.001, two-tailed. **p<0.01, two-tailed