The University Of Sheffield.

IMAGINING OTHERS: SOCIAL DAYDREAMING AND THE REGULATION OF SOCIO-EMOTIONAL WELL-BEING

By:

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ABSTRACT

A remarkable feature of the human mind is its ability to escape the constraints of the external environment to mentally simulate past, alternative present, and possible future, realities. Such mental activity often occurs in the form of daydreaming or mind wandering where mental content is internally-generated, and independent of the thinker's external environment and current task. Daydreaming occupies a central position in mental life and is estimated to consume up to a staggering 50% of waking thought. But *why* do we daydream? Is it simply an idle or detrimental activity that distracts us from the external world or might it serve some adaptive functions? In this thesis I develop and test the view that one of the core functions of social daydreaming (i.e. daydreams that involve the imagination of others) is to enable individuals to achieve and maintain a satisfactory level of socio-emotional well-being, both in the moment and over time, under conditions of social threat. This model of socio-emotional well-being regulation via social daydreaming is tested and substantiated in three empirical studies which show (1) that naturally-occurring and volitional daydreaming about significant others can regulate momentary socio-emotional well-being under conditions of social threat and (2) that the content and emotional outcomes of social daydreams are associated with socio-emotional adaptation to a new environment over time. Taken together, these studies provide evidence for the functional role of social daydreaming in the regulation socio-emotional well-being, offer new insights into how the content and context of daydreaming are associated with its beneficial outcomes, and provide a broader conception of the role of other people in shaping and regulating feelings of interpersonal connection. Overall, the present research represents an initial step in describing how people's imaginary, as well as actual, worlds contribute to their socio-emotional functioning.

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PUBLICATIONS AND CONFERENCE PRESENTATIONS ARISING FROM THIS THESIS

Peer-reviewed publications

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* Note that these publications are based on the three empirical studies in this thesis – Chapters 4, 5, and 6 respectively.

Conference presentations

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Contents

CHAPTER 1
INTRODUCTION AND THESIS OVERVIEW

"Your imagination, my dear fellow, is worth more than you imagine"

In this somewhat paradoxical quotation, the French poet and novelist, Louis Aragon, hints at the under recognized value of imagination. Indeed, perhaps he foresaw the swathes of research that would transform popular conceptions of imagination and daydreaming as vehicles of escape and discontent with reality into more functional accounts of daydreaming for various aspects of how our lives are lived. In this chapter, I chart the history of daydreaming research over the last century and the substantial progress that has been made in understanding the value of imagination. I describe how and why daydreaming has transformed from a niche topic studied by a handful of researchers into a credible topic for mainstream cognitive psychology and neuroscience. Despite the resurgence of daydreaming research in these domains, social psychology has not yet recognized its importance. Using bibliometrics, I illustrate the relative paucity of daydreaming research in social psychology and question why this is the case. In doing so, I position this thesis within the context of a core—but often overlooked—tenet of social psychology: the imagination of other people. I end the chapter by describing the scope and aims of this thesis and outline the forthcoming theoretical and empirical chapters, which serves as a guide for readers to navigate the thesis.

1.1 Daydreaming research: A brief history

In 1923, educational and developmental psychologist, Green described daydreaming as "*queer, perhaps abnormal, and certainly unworthy of the attention of anyone but the superstitious*" (p. 23). Over 90 years later, this remark could not be further from the truth. Scientific efforts to understand daydreaming have burgeoned, particularly over the last part of the 21st Century, leading to suggestions that this is now the era of the wandering mind (Callard, Smallwood, Golchert, & Marguiles, 2013). Daydreaming is now a legitimate topic for psychological science and is beginning to receive the attention that it deserves. Unfortunately, this has not always been the case.

Research into daydreaming during the first part of the 20th Century was scarce. Psychological accounts of daydreaming were based on first-person introspective evidence, personal experiences, and anecdotes from individuals seeking help in therapy (Freud, 1908; Varendonck, 1921). Daydreaming was rooted in psychoanalysis, linked to psychopathology, and ultimately viewed as an infantile activity associated with hysteria, neurosis, and psychosis (Freud, 1908; Varendonck, 1921). Aside from psychoanalytic accounts, daydreaming was considered a detriment to educational performance. In his 1954 textbook, *Educational Psychology,* Cronbach describes daydreaming as a symptom of maladjustment warning that it may escalate to create "severe mental disorders" (p. 552). Likewise, in an early article on daydreaming in educational settings, Brown (1927) argues that daydreaming is the most frequent cause of inferior scholarship and "*results in a sort of mental flabbiness which is a positive hindrance to scholarship*" (p. 279). Early 20th Century accounts position daydreaming as at best idle and, at worst, pathological, but certainly something to be avoided and discouraged.

The low repute of daydreaming was challenged by modern scientific daydreaming research in the 1960s, which was pioneered by Jerome Singer and John Antrobus (as well as others such as Huba, Pope, Golding, and McCraven). Singer and colleagues established daydreaming as a normal, ubiquitous, and predominately constructive human process (Singer, 1966, 1974, 1975a, 1975b). Singer and colleagues were the first to describe the normative frequency, content, and characteristics of daydreams by surveying large samples of the American population and using statistical analyses, rather than focusing on individual accounts. They established that daydreaming is frequent (i.e. engaged in on a daily basis), the conditions under which daydreams most commonly occur (e.g. alone, before sleep, and in resting states), that daydreaming content tends to involve immediate issues in one's life and is orientated towards future behavior (as opposed to fanciful wish fulfillment), and that these features tend to apply to all people regardless of age, gender, ethnicity, or social class (e.g. Singer & Antrobus, 1963; Singer & McRaven, 1961, 1962). Singer and colleagues also developed an individual difference approach to daydreaming, documenting that people display distinct patterns, or styles, of daydreaming, which were captured in a 344-item survey instrument called the Imaginal Processes Inventory (IPI; Singer & Antrobus, 1970).

As well as developing survey instruments to measure daydreaming, Singer and colleagues were the first to link daydreaming to physiology (e.g. showing that daydreaming is associated with reduced eye movements, Antrobus, Antrobus, & Singer, 1964; Singer, Greenberg, & Antrobus, 1971) and to study daydreaming in controlled laboratory settings. In particular, they established the conditions under which daydreaming decreased (e.g. greater external simulation, more complex tasks, greater motivation for task performance) and increased (e.g. after emotionally arousing news) (Antrobus, 1968; Antrobus, Singer, Goldstein, & Fortgang, 1970; Antrobus, Singer, & Greenberg, 1966). In doing so, they were the first to manipulate features of the external environment and observe changes in daydreaming activity; that is, to formulate and test scientific predictions concerning human thought flow. Singer was also amongst the first to suggest positive relationships between daydreaming and creativity, the delay of gratification, planning, problem-solving, and emotion regulation (Singer, 1961, 1966, 1974): a legacy that persists in modern daydreaming and mind wandering research (McMillan, Kauffman, & Singer, 2013).

Daydreaming research continued with the work of Eric Klinger who was the first to track daydreaming in daily life using thought-sampling techniques (Klinger & Cox, 1987-88). Rather than using individual introspective accounts or retrospective surveys of daydreaming tendency, Klinger used beepers to signal people to repeatedly report on their daydreams as they naturally occurred in daily life – one of the earliest examples of the experience-sampling method. Klinger measured and documented multiple characteristics of daydreams (e.g. their time orientation, visual and auditory qualities, controllability, and fanciful nature) and provided the first estimate of daydreaming frequency as between 30% and 50% of waking thought (Klinger & Cox, 1987-88). Klinger was also the first to examine the duration and frequency of thought segments, documenting that the median and mean duration of thought are 5 and 14 seconds respectively (Klinger, 1978). These figures suggest that during a 16-hour day, the average person experiences approximately 4,000 distinct thoughts, 1,600 of which are likely to be daydreams (Klinger, 2009).

Importantly, Klinger proposed the first theory of what daydreams are, why they occur, and what predicts their content. Klinger's current concerns theory (1975, 1996, 2009, 2013) links daydreaming to individuals' current goal pursuits such that daydreams represent mental attempts to pursue goals when it is impossible to do so in reality. Klinger devoted much effort to documenting how thought content is dictated

by goal commitments, which provided a theory for how and why human thought flow is so commonly not governed by the external environment. Notably, current concerns theory positions daydreaming as a process that is fundamental to human motivation and goal pursuit rather than a futile mental meandering.

Singer and Klinger both published books documenting their decades of early research and personal experiences of daydreaming (Singer (1966, 1975b): *Daydreaming: An Introduction to the Experimental Study of Inner Experience* and *The Inner World of Daydreaming*; Klinger (1971, 1990): *The Structure and Functions of Fantasy* and *Daydreaming: Using Waking Fantasy and Imagery for Self-Knowledge and Creativity*). These books not only document daydreaming as worthy of, and legitimate for, scientific study, but they also firmly advocate the benefits and adaptive functions of daydreaming. Although Singer and Klinger both acknowledged daydreaming's potential downsides (such as links with distraction and depression), they both view these negative aspects as either a reflection of an individual (rather than about the nature of daydreaming per se) or as negative outcomes of an otherwise, and predominately, adaptive process. Despite their extensive work into daydreaming, Singer and Klinger's efforts were not widely recognized by mainstream psychology, a fact reflected in their publications, which tended to be consigned to monographs or specific journals such as *Imagination, Cognition and Personality*, *Perceptual and Motor Skills* and the *Journal of Altered States of Consciousness*.

1.2 Why has daydreaming been neglected?

The neglect of daydreaming in mainstream psychology is perhaps so surprising because of its sheer ubiquity and centrality to mental life. Estimates from the 60s and 80s indicate that daydreaming occurs daily, occupying up to half of waking thought (Klinger & Cox, 1987-1988; Singer & McRaven, 1961). Why has daydreaming been one of psychology's orphans? There are at least three reasons: the legacy of behaviorism, the difficulties of studying daydreaming, and its bad reputation.

First, in the early part of the 20th Century, doubts were cast on the validity of introspection and the study of mental states in psychology was rejected. The rise of behaviorism eschewed the need for mental explanations of behavior and rejected the use of introspection deeming it unscientific (Lieberman, 1979). Instead, behavior was reduced to stimulus and response whereby mental states played no causal role in explaining behavior (Chiesa, 1992). Although the cognitive revolution in the 60s

reinstated the scientific study of the mind, the legacy of behaviorism was still influential; mental states still tended to be explored and inferred using external behavior rather than self-report (Jack & Roepstroff, 2002) and there was fear of not being able to express mental processes and experiences in sufficiently objective terms to be deemed scientific (Singer, 1966).

Second and relatedly, daydreaming is hard to study objectively. Daydreams are private mental experiences, the content of which is only accessible through introspection. Daydreaming research therefore inherently relies on self-report, which is subjective, incapable of independent verification, and ultimately unfalsifiable. Equally challenging is the often spontaneous and ephemeral nature of daydreaming. The spontaneous nature of daydreaming is perhaps one of its critical and defining features. But it is this quality that makes daydreaming hard to manipulate in order to examine cause and effect, which is a core principle of the scientific method. Daydreaming, of course, can be manipulated by experimental instruction, but doing so raises the question of whether one has altered the essential nature of daydreaming – its free flowing, unconstrained, and spontaneous nature. The study of daydreaming therefore requires both novel and covert methods to manipulate daydreaming and capture daydreaming in ways that do not disturb its spontaneity.

Third, the low repute of daydreaming, at least in Western cultures, has hampered the credibility of daydreaming and discouraged research on the topic (Klinger, 1990; Singer, 1966). The term "daydreaming" has negative connotations in everyday conceptions and usage. Daydreaming is described in pejorative terms such as *idle wool-gathering*, *off with the fairies*, *staring into space*, *zoning out* and *building castles in the air*. These terms label daydreaming as futile and daydreamers as lazy, inattentive, dissatisfied, and unrealistic. Interestingly, when people are provided with positive information about daydreaming, they report daydreaming more than people who are not given information about daydreaming (Gold & Cundiff, 1980). This implies that the negative connotations of daydreaming may inhibit how frequently people daydream, or at least, how willing they are to report the extent of their daydreaming. Such negative connotations in public perception and the scientific community have positioned daydreaming as a nuisance to the external world, rather than something potentially adaptive to be systematically explored. Instead, the psychological study of mental processes has been concerned with cognition that is externally directed such as problem-solving or deliberate mental efforts to make

progress on one's current task (Christoff, 2012). This reflects a more general bias towards the external present which is somehow considered more valuable and legitimate for scientific study compared to internally generated thoughts that extend beyond the here and now and are not helpful for present-moment goals.

1.3 The era of the wandering mind

The early efforts of Singer, Klinger and their colleagues laid the foundation for daydreaming research between the 60s and 90's. However, the first part of the 21st Century saw a resurgence of interest in the scientific study of daydreaming resulting in more widespread recognition and popularity of the topic. Using bibliometric analysis, Callard et al., (2013) charted the rise of daydreaming research into mainstream psychological science between 2003-2012. In particular, they document that the number of publications including the term "mind wandering" has increased 20-fold since the term appeared in 2006. The term "daydreaming" has also shown a 3-fold increase in the number of publications since 2003. The rise of daydreaming-related research into mainstream psychology has been reflected by a number of high impact and widely cited publications including *Science* (Killingsworth & Gilbert, 2010; Mason et al., 2007), *Annual Review of Psychology* (Smallwood & Schooler, 2015), and *Proceedings of the National Academy of Sciences* (Axelrod, Rees, Lavidor, & Bar, 2015; Christoff, Gordon, Smallwood, Smith, & Schooler, 2009; Kucyi, Salomons, & Davis, 2013; Szpunar, Khan, & Schacter, 2013), as well as special issues and research topics (e.g. "*Towards a psychological and neuroscientific account of the wandering mind*" in *Frontiers in Psychology, 2013*) and funding calls (e.g. The Imagination Institute, 2014, "*Advancing the Science of Imagination*").

Daydreaming is now not only a credible, but also a popular and thriving, research area. What accounts for this resurgence? Several advances have helped to overcome the barriers to the scientific study of daydreaming outlined in the previous section. First, the shift in terminology from daydreaming to mind wandering has (a) integrated various and previously unrelated terms and research areas and (b) helped to overcome the stigma associated with the term 'daydreaming' such as its connection with fantasy, wishful thinking, and psychopathology. In their seminal 2006 paper, *The Restless Mind*, Smallwood and Schooler introduced the term "mind wandering" and integrated previously disparate research domains and terms associated with mind wandering and daydreaming (e.g. task-unrelated thought, stimulus independent

thought, zone-outs, and mind pops). Smallwood and Schooler propelled mind wandering into cognitive psychology arguing that the phenomenon of mind wandering can, and should, be accommodated into models of executive attention. In doing so, they succeeded in highlighting the neglect of states of 'undirected' internal attention in cognitive psychology, and, by linking mind wandering with existing theories of attention, provided a legitimate framework for mind wandering to be integrated within cognitive science. *The Restless Mind* stimulated and sparked debates concerning whether mind wandering can be considered an executive function or failure (i.e. how the phenomenon of mind wandering is related to executive control) which has provided a fertile ground for enhancing the profile of mind wandering and scientific progress within cognitive psychology (e.g. Barron, Riby, Greer, & Smallwood, 2011; Kane & McVay, 2012, Kane et al., 2007, McVay & Kane, 2010, 2012; Smallwood, 2010).

Second, the tools of cognitive neuroscience, including technological advances such as functional magnetic resonance imagining, have enabled a more credible and 'objective' examination of daydreaming states. This has much to do with the serendipitous discovery of the default mode network (DMN; Raichle et al., 2001), which, in turn, has been associated with daydreaming activity (e.g. Mason et al., 2007). The DMN is a constellation of brain regions that are typically activated during physical rest or when attentional demands are low, and deactivated during cognitively demanding, externally focused, tasks (Raichle & Snyder, 2007).[1] The recognition that even when the body is resting the mind is still active is not new[2], but the link with an associated network of brain regions and daydreaming activity is.

The link between daydreaming and DMN activity has been established by several studies showing that (a) daydreaming during conditions of low cognitive demand (i.e. easy tasks) is positively associated with DMN activity (Mason et al., 2007; McKiernan, D'Angelo, Kaufman, & Binder, 2006), (b) that participants' with a

[1] Recent perspectives highlight that because DMN activity is also elevated during tasks that require directed self-generated thought, the DMN is indicative of self-generated thought regardless of whether it occurs spontaneously, deliberately, or for present-moment goals (Andrews-Hanna, Smallwood, & Spreng, 2014).

[2] Seneca 62 A.D. "*The fact that the body is lying down is no reason for supposing that the mind is at peace. Rest is sometimes far from restful*". The link between daydreaming and DMN activity also confirmed early proposals from Klinger (1971) that daydreaming represents a mental baseline, or default mode of thinking.

greater propensity to daydream (as measured by the IPI) show greater DMN recruitment during highly practiced (compared to novel) tasks (Mason et al., 2007), and (c) that DMN regions show significantly more activation immediately before mind wandering (compared to on-task) reports (Christoff et al., 2009). Although there are debates concerning whether DMN activity simply represents attentiveness towards external stimuli (Gilbert, Dumontheil, Simons, Frith, & Burgess, 2007 but see Stawarczyk, Majerus, Maquet, & D'Argembeau, 2011), whether DMN regions are activated in traditional 'goal-directed' thinking (see Spreng, Stevens, Chamberlain, Gilmore, & Schacter, 2010 and Andrews-Hanna, Reidler, Sepulcre, Poulin, & Buckner, 2010) and whether daydreaming activity also recruits executive regions that are anti-correlated to the DMN (the so called "Executive Attention Network", Fox et al., 2005), these debates have catalyzed further research and progress in both DMN and daydreaming research (Callard et al., 2013).

Establishing the neurocognitive basis of daydreaming has helped to corroborate self-report and introspective evidence, which is so often seen as fallible and biased. Linking daydreaming to the DMN has stimulated daydreaming-related research providing a fertile ground for research in cognitive neuroscience surrounding topics such as the functionality of internally generated thought, shifts in internal and external attention, and the ability for the brain to self-generate thought that is not based on perceptual information (Smallwood & Schooler, 2015). This has marked a paradigm shift in the focus of cognitive psychology and neuroscience from externally- to internally- directed cognition.

1.4 The neglect of daydreaming in social psychology

Despite clear advances in research and perceptions on the scientific study of daydreaming, these efforts have been largely constrained to cognitive psychology and neuroscience. Bibliometric analyses in Callard et al. (2013) showed that approximately 25% of mind wandering research papers between 2003-2012 could be categorized according to their key words as 'cognitive neuroscience'; the next largest categories were 'memory processes', 'attention, and perception' and 'performance' (which together accounted for another 25% of mind wandering papers). Daydreaming is no longer a niche topic in cognitive psychology or neuroscience but its popularity, importance, and relevance has, seemingly, not yet been recognized in social psychology.

To provide evidence for the relative neglect of daydreaming in social psychology I conducted analyses of how daydreaming and mind wandering had been represented in the field. For comparison with the Callard et al. (2013) bibliometrics, I conducted a literature search of the terms "daydreaming" and "mind wandering" appearing in article titles, keywords, and abstracts from 2003 to 2015 using the Scopus database. The search was conduced in June 2015 and retrieved 296 papers which I then categorized by publication name into the following: *Cognitive Neuroscience, Cognitive Psychology, General Psychology, Clinical and Abnormal Psychology, Developmental Psychology, Emotion and Affect,* and *Social and Personality Psychology*. Two additional categories were created: an *Other* category for articles that did not fit within a certain field (e.g. *Appetite, Psychology of Aesthetics, Creativity and the Arts, Cyberpsychology, Behavior and Social Networking*) and a *Frontiers in Psychology* category. This latter category was created because a substantial proportion of articles (13%, 39 articles) related to daydreaming and mind wandering were published in Frontiers; 27 of these articles were published in 2013 owing to a special issue on mind wandering. I chose not to categorize these articles to another section (e.g. General Psychology) so as not to unduly inflate estimates in other areas.

Figure 1.1 shows the relative proportion of articles published in each of the identified areas of psychology and Figure 1.2 plots these publications over time by year. Similar to findings from Callard et al. (2013), cognitive neuroscience and cognitive psychology account for nearly half of all publications (25% and 22% respectively) and both show rapid increases after 2010. Indicative of the broad appeal of daydreaming and mind wandering research, general psychology publications also show a steady increase over time (apart from a dip in 2011) particularly after 2006 when the term mind wandering was introduced. Of particular interest here is (a) the comparative lack of publications in social psychology journals: only 8 articles over 12 years accounting for a mere 3% of publications in the area and (b) the lack of change over time: there are, at most, 2 publications in any one year and in the last 3 years there have been no publications on daydreaming and mind wandering in social psychology journals. To check that the seeming lack of daydreaming-related articles in social psychology journals was not due to the size of the field in general relative to other fields, I examined the relative proportion of daydreaming-related articles in social psychology compared to those in cognitive psychology. To do this, I calculated

the number of journal articles published in the top 10 journals in each year from 2003-2014 for the fields of social psychology (N = 7,305) and cognitive psychology (N = 11,444) separately, and divided the number of daydreaming-related publications in each field by this number (excluding articles published in 2015). Daydreaming-related publications accounted for 1.10×10^{-3} of the total articles published in the top 10 journals in social psychology whereas in cognitive psychology, they accounted for a larger 4.53×10^{-3}.

What these brief analyses shows is that daydreaming and mind wandering are relatively rare topics in social psychology (compared to other fields) and that the rapidly growing and renewed interest in daydreaming has not yet extended towards the discipline.

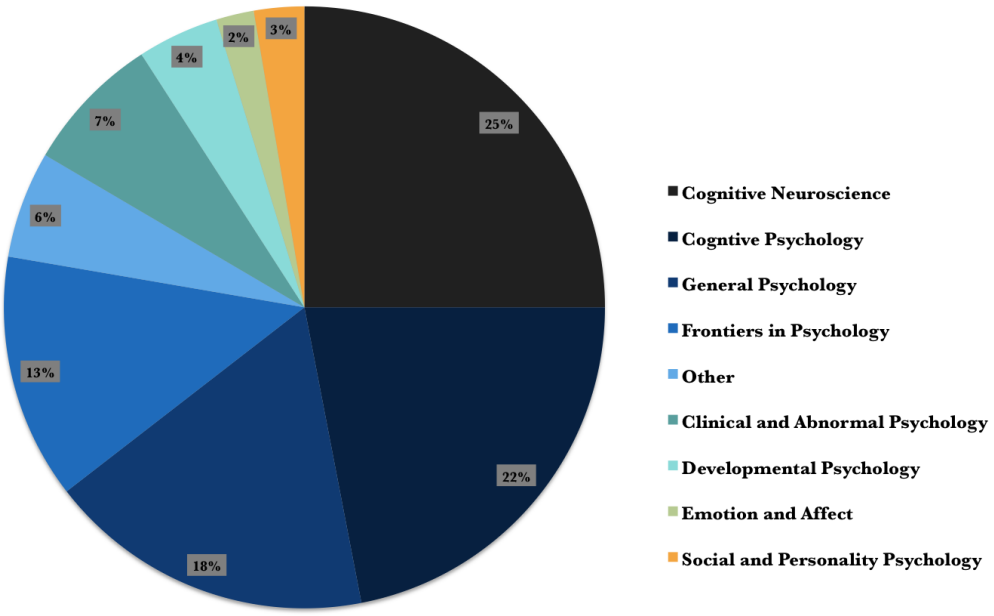

Figure 1.1 Pie chart illustrating the percentage of daydreaming and mind wandering articles within each subject area from 2003-2015.

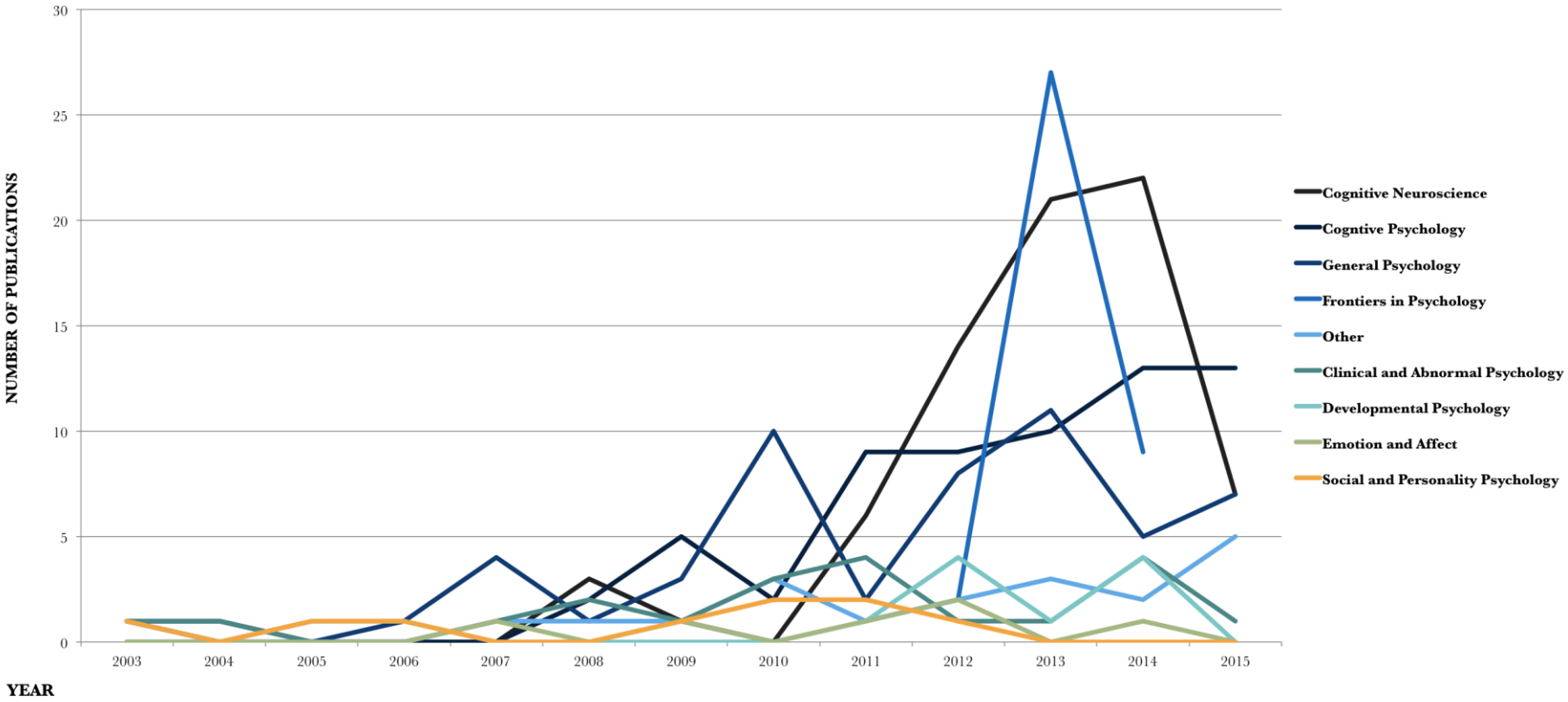

Figure 1.2 Daydreaming and mind wandering publications by year per subject area

The paucity of social psychology articles on daydreaming and mind wandering illustrated here should not be taken to mean that the discipline has overlooked or disregarded the topic completely. Rather, the lack of social psychology articles on daydreaming and mind wandering most likely reflects a difference in the terminology and study of daydreaming-related processes. Social psychologists tend to examine 'mental simulation', 'imagination' and 'mental time travel' which are processes related to daydreaming in that they involve the mental representation of events, commonly away from the here and now. However, the tendency in social psychology, is to view these processes as *directed* phenomena, which are manipulated in laboratory settings (e.g. by asking people to engage in imaginative tasks of an experimenter's choosing). Although such research examines the processes that are likely to be engaged in during daydreaming (e.g. mental simulation, imagination, memory, self-projection) they cannot *truly* be described as daydreaming research. This is because they do not capture either the free-flowing and often spontaneous nature of daydreams (e.g. the fact that they often occur when the mind is otherwise engaged) or the fact that daydreams are personally relevant, important, and based on an individuals' goal pursuits. In fact, studies on mental simulation in social psychology most probably examine daydreaming indirectly and unknowingly because participants will invariably start to daydream when they are asked to engage in imagination tasks of interest to the researcher.[3] And they will probably daydream about things that matter more to them that are based on their life goals rather than those of the researcher or experimental situation.

1.5 A social psychological account of daydreaming

To be clear, the lack of daydreaming and mind wandering research in social psychology is not just reflective of a terminological difference, but one where the essential nature of daydreaming as it naturally occurs has not yet been given the

[3] For example, in Study 3 (Chapter 4) of this thesis participants were asked to deliberately daydream (similar to mental simulation and imagination studies). Participants were asked to indicate the amount of time they spent thinking about things other than the imagination task (i.e. the amount of time they daydreamed or mind wandered about other things from 1(*none of the time*) to 5(*all of the time*). Average levels of daydreaming during imagination were 2.32 indicating that, despite experimental instruction, participants spent nearly half of the time daydreaming about other things.

attention it deserves. Why does it matter that daydreaming is not a core topic in social psychology? It matters because not having a social psychological account of daydreaming means (a) that the field is overlooking a psychological phenomenon that occupies a substantial proportion of our waking lives, and part of the process by which thinking naturally unfolds in daily life and (b) that the potential effects of daydreaming in areas of social psychology have not yet been explored and identified. In the same way that mind wandering has been incorporated into cognitive psychology, daydreaming needs to be incorporated into social psychological accounts of affect, cognition, and behavior. Social psychological accounts would focus on the social aspects of daydreaming, and, in doing so, would offer a broader—but complementary—conception of daydreaming (e.g. its potential social effects, consequences, and functions) than those currently offered in cognitive psychology and neuroscience.

In particular, social psychological accounts of daydreaming would center on imagining other *people*, social interactions, and interpersonal relationships, and how daydreaming helps (or hinders) people's ability to function in a social world. The imagination of other people is a core tenet of social psychology as articulated in Allport's (1954, p.5) definition of the discipline as:

> *[T]he attempt to understand and explain how the thoughts, feelings, and behaviors of individuals are influenced by the actual, imagined, or implied presence of other human beings.*

Social psychology examines how other people influence the individual such that other people (whether imagined, actual, or implied) are proposed to have a causal effect on cognition, affect, and behavior (Fiske, 2009). Social psychology is about how people influence people but the fact that people populate the *imagination* as well as the external world if often overlooked. The foundations of a social psychological account of daydreaming would therefore involve, at the most basic level, an examination of how imagining other people during daydreaming activity shapes and regulates feelings and social behavior.

1.6 Thesis scope and overview

This thesis is dedicated to initiating the development of a social psychological account of daydreaming by identifying how imagining other people during daydreaming activity is linked to the regulation of socio-emotional well-being.

Specifically, I draw on social psychological accounts of belonging regulation and propose that social daydreaming is a vital, but overlooked, part of this process. Before formally proposing and outlining this model of socio-emotional well-being regulation via social daydreaming in Chapter 3, I first define what daydreaming is, how it has been measured, its core characteristics and known consequences in Chapter 2. Chapters 4, 5, and 6 then present three empirical studies that were conduced to test and substantiate the theoretical model proposed in Chapter 3. Specifically, in Chapter 4, I present an experience-sampling study that examines the emotional outcomes of naturally occurring social and non-social daydreams, showing that social daydreams are associated with increased positive social feelings when they involve close significant others. In Chapter 5, I describe a laboratory study that replicates and extends the findings of Chapter 4; specifically, I show that that imagining close significant others can replenish connectedness under conditions of loneliness. In Chapter 6, I examine the role of social daydreaming in adjustment to social challenges in a month-long experience-sampling study during a life transition. I show that the emotional outcomes and characteristics of social daydreams predict loneliness and social adaptation over time, pointing to the adaptive value of social daydreaming for adjustment. In Chapter 7, I reflect on how the empirical studies support and extend the theoretical model of socio-emotional well-being regulation via social daydreaming advanced here. I also discuss the empirical and theoretical contributions of the thesis, as well as the limitations of the research, its potential practical implications, and outline what future research must do.

CHAPTER 2
DEFINITION, MEASUREMENT, CORE CHARACTERISTICS, AND CONSEQUENCES OF DAYDREAMING

In this chapter I discuss conceptual and methodological issues related to daydreaming. I outline how daydreaming can, and has, been defined and measured in the literature. I then review evidence examining the core properties and characteristics of daydreaming in terms of its form and content. I end the chapter by reviewing literature on the costs and benefits of daydreaming and emphasize the need to view daydreaming as a heterogeneous, rather than unitary, phenomenon. Overall, this chapter is intended to provide the reader with a broad understanding of the current knowledge of, and research on, daydreaming.

2.1 What is daydreaming?

Defining daydreaming is a bit like trying to pin jelly to a wall. As Singer (1975b) notes: "*because of its completely private nature it is impossible to formulate a generally agreed-upon definition of this act*" (p. 3). Indeed, a consistent definition of daydreaming amongst different (and sometimes even the same) researchers is hard to find. When introducing concepts such as daydreaming and mind wandering, most authors generally appeal to our introspective ability to recall instances of daydreaming and mind wandering because such experiences are an inherent part of mental life. For example, we are familiar with the experience of our mind drifting whilst reading and we have all, at some point, imagined our future selves in a situation different to our current reality. However, the fact that these experiences are common does not mean that the concept of 'daydreaming', or its meaning, is self-evident. The scientific study of daydreaming requires at least a working definition so that instances of daydreaming can be identified, distinguished from other forms of thought, measured, and systematically investigated.

Before defining what daydreaming is, I should at least say how psychological conceptions of daydreaming differ from popular conceptions of the term. The term daydreaming in the scientific literature departs from dictionary definitions and everyday usage, which connects daydreaming to fantasy and wishful thinking. The Oxford English dictionary defines daydreaming as "*the act of engaging in a series of*

pleasant thoughts that distract one's attention from the present", the Merriam-Webster dictionary defines a daydream as "*a pleasant visionary, usually wishful, creation of the imagination*" and the Collins English Dictionary defines it as "*a pleasant dreamlike fantasy indulged in while awake; idle reverie*". Contrary to these definitions, the content of daydreams need not be pleasant or fanciful[4], the act of daydreaming need not be an indulgence, and it may not distract one's attention from the external world. Of course, daydreams can include these characteristics but they are not what *defines* daydreams and are best thought of as some of the many dimensions upon which daydreaming can vary. Daydreaming is first and foremost a kind of mentation or thought, which in itself can be a difficult concept to define (Fernyhough, 2011). However, here, I take the term 'thought' to mean mental content that is perceptible to the thinker (this excludes 'unconscious' thought but not thought without meta-awareness). Thought can take a variety of forms including visual images, inner speech, auditory imagery, and imagery in other sensory modalities (e.g. smell) and various combinations of these; it may also be unsymbolized (e.g. thinking in concepts without equivalent perceptual imagery) (Hurlburt & Akhter, 2008).

What then are the defining properties of a daydream or the act of daydreaming? Daydreaming can be defined as any mental content experienced during a state of normal waking consciousness that is stimulus-independent and task-unrelated, because it is neither a direct reflection of the current sensory environment nor related to the thinker's current mental or physical task. The key defining features of daydreaming is that it is stimulus-independent and task-unrelated: jointly, these are both necessary and sufficient conditions for mental content to be defined as daydreaming. I describe and explain each of these conditions below and illustrate what they reveal about the nature of daydreaming.

2.1.1 Daydreaming is stimulus-independent

The first defining property of daydreaming is its stimulus-independency. Stimulus-independent thought refers to mentation that is not *directly* related to the processing of

[4] Despite popular conceptions of daydreaming as fanciful, fanciful thought during daydreaming is relatively rare. According to estimates by Klinger and Cox (1987-88) only 10% of thought segments involve improbable events, 9% involve dream-like distortions, and overall, only 20% of thoughts contain elements that would classify them as fanciful to some degree.

the immediate sensory environment (Antrobus, 1968; Teasdale et al., 1995).[5] This stands in contrast to stimulus-orientated thought which reflects the processing of the external environment (Gilbert, Dumontheil, Simons, Frith, & Burgess, 2007; Ritter & Weber, 1973). The difference between the two is the object, or target, of attention. Stimulus-independent thought is a state of *internal* attention (i.e. the selection and modulation of internally-generated information) whilst stimulus-orientated thought is a state of *external* (perceptual) attention (i.e. the selection and modulation of information derived from the senses, Chun, Golomb & Turk-Browne, 2011).

The fact that attention is directed internally during daydreaming is a key feature emphasized in conceptualizations of daydreaming. Daydreaming has been described as a state of normative dissociation (e.g. Butler, 2006), decoupled attention (e.g. Antrobus, et al., 1966; Smallwood, Obonsawin & Heim, 2003), and defined as a *shift in attention* away from current activity towards internally generated thought (Singer, 1961; Smallwood & Schooler, 2006). All of these descriptions capture the fact that daydreaming is stimulus independent and requires an internal (as opposed to external) attentional focus. Of course, not all forms of dissociation or decoupled attention are internally focused or stimulus-independent. For example, we might be dissociated from our immediate surroundings when engrossed in a novel or watching a film. Likewise, attention may be decoupled from an internal train of thought towards environmental stimuli, such as when the doorbell rings whilst you are absorbed in an enticing daydream. Nevertheless, when these terms are used in relation to daydreaming they are intended to reflect its stimulus-independency.

The idea that daydreaming is characterized by a *shift* in attention is sometimes used to mean that daydreaming *begins* when attention shifts *away* from monitoring the external environment *towards* internal thoughts and images (Smallwood & Schooler, 2006). The shift in attention characterizing daydreaming is, therefore, proposed to be external to internal. Whilst this may capture many instances of daydreaming, it should be noted that daydreaming does not always require an

[5] Daydreaming may often be triggered by the processing of information derived from the senses. For example, certain smells or tastes might conjure nostalgic images of childhood. It could, therefore, be argued that daydreaming is sometimes not purely 'stimulus-independent'. However, although daydreams may be triggered by stimuli in the external world, the object of attentional focus *during* daydreaming is internal (e.g. nostalgic memories) rather than external.

attentional shift in this direction. Daydreaming often occurs when we are *already* engaged in a mental task (e.g. daydreaming about what we will be doing on the weekend when we were supposed to be thinking about the best way to respond to an email). In such cases, attention (at the onset of daydreaming) is *already* internally focused and stimulus-independent. Thus, daydreaming may occur at any point where attention shifts away from our current activity (be that physical or mental) towards internally-generated information.

Regardless of the *direction* of the attention shift when daydreaming begins, the internal attentional focus involved in daydreaming implies a reduced awareness of external information. The extent to which we are unaware of the external environment during a daydream is likely to depend on the degree of psychological absorption during daydreaming. In turn, this might depend on the content of, and amount of time engaged in, daydreaming. For example, an unfolding sequence of thoughts about an exciting romantic liaison is likely to capture a daydreamer's attentional resources much more than a fleeting thought about what he or she will have for lunch. The former involves a feeling of engagement with the content of thought whilst the latter may simply represent the observation of spontaneously arising mentation on the part of the thinker. Nevertheless, all instances of daydreaming, regardless of the degree of psychological absorption, should result in reduced processing of the external environment.

There are several converging lines of evidence demonstrating that daydreaming results in reduced external processing. First, several studies have shown that daydreaming leads to superficial representations of the external environment (Schooler, Reichle & Halpern, 2005, Smallwood et al., 2003, Smallwood, O'Conner, Sudberry, Haskell, & Ballantyne, 2004). These studies indicate that periods of daydreaming during tasks requiring the processing of external stimuli (e.g. reading, encoding of words) are associated with poorer subsequent task performance (e.g. text comprehension, word stem completion). This suggests that the act of daydreaming hinders the ability to process the external information necessary for later task performance, because, at the time of daydreaming, attention is focused inwardly to the detriment of the external demands of the current task. Second, evidence indicates that pupil diameter activity differs when attention is externally, compared to internally focused (i.e. during periods of daydreaming), such that attention to internally generated information results in a reduced response to perceptual information

(Smallwood et al., 2011). Third, several EEG studies have demonstrated that periods of daydreaming activity are associated with a reduction in the processing of both visual and auditory information (Barron, et al., 2011; Braboszcz & Delorme, 2011; Kam et al., 2010; Smallwood, Beech, Schooler & Handy, 2008), consistent with the idea that daydreaming is a state of decoupled attention.

A key property of daydreaming is therefore the fact that it is a state of internal attention (or stimulus-independent thought) where attention is decoupled from the external environment.[6] This is a necessary property of daydreaming: all daydreaming is stimulus-independent and results in the decoupling of attention from the external world. However, this property is not sufficient to define thought as daydreaming and it is therefore not helpful for distinguishing daydreaming from mentation in general. This is because, many thought streams that we would not consider daydreaming (e.g. retrieving memories to make a decision about what to do in the present or mentally calculating the amount of money one needs to pay for a meal) are stimulus-independent, require internally directed attention, and may result in reduced external processing. Clearly, these features are not sufficient to make thought 'daydreaming'. What distinguishes daydreaming from other forms of stimulus-independent thought is their relation to one's present activity.

2.1.2 Daydreaming is task-unrelated

The second defining property of daydreaming is that it is task-unrelated. Daydreaming is often defined, or referred to, as task-unrelated thought (Smallwood & Schooler, 2006), task-unrelated imagery and thought (Giambra, 1995), task-unrelated and stimulus-independent thoughts and images (Stawarczyk, Majerus. Maj, Van der Linden & D'Argembeau, 2011) and task-irrelevant episodes (Singer, 1975a). What distinguishes daydreaming from other forms of stimulus-independent mentation is that thought is *unrelated* to whatever on-going activity (physical or mental) an individual may be engaged in at the present moment.

[6] Although daydreaming is a state of decoupled attention, research suggests that decoupling is not an 'all or nothing' phenomenon. Instead, decoupling should be viewed as continuous (i.e. one of degree) during which one can be more or less absorbed in thought (*see* Schad, Nuthmann & Engbert, 2012). As a result, daydreaming in a laboratory setting is sometimes measured on a continuous, as opposed to dichotomous, scale (e.g. Marchetti, Koster & De Raedt, 2012).

This property of daydreaming accurately captures many instances of daydreaming where the content of thought differs substantially from present activity (e.g. thinking about an argument with a friend when you are supposed to be concentrating in a lecture). In addition, this property is particularly useful for operationalizing daydreaming in laboratory tasks (as has been the case for experimental investigations of mind wandering) because the content of daydreaming will almost certainly be unrelated to a cognitive task designed by researchers. However, when this criterion for daydreaming is applied to daydreaming in daily life, it becomes more problematic and a broader conception of what it means for thought to be 'task-unrelated' is required.

There at least two problems with the conception of daydreaming as task-unrelated when applied to daydreaming as it occurs in daily life. First, some instances of daydreaming may be (more or less) related to one's current activity. For example, you could be sitting in a meeting and imagine a hypothetical alternative reality in which you argue with your boss about a comment he or she has just made. You could be planning the weekly food shop when you begin to ponder what it would be like to eat at a fine dining restaurant. Likewise, you could be reading a novel and imagine how events in the protagonist's life relate to your own. It is difficult to delineate the boundaries of what is task-related and what is not, or to say how far the content of thought must deviate from one's activity to be classified as daydreaming. Second, daydreaming may occur when there is no particular mental or physical 'task' or 'activity' at hand, such as when we are resting or relaxing, sitting on public transport, lying on a beach, or in the moments before falling asleep. In such cases, it would seem strange to call daydreaming 'task-unrelated' given that there does not appear to be anything that it is unrelated to. In addition, daydreaming could, in fact, be considered an activity or pastime in itself, such as when we use it to relieve boredom, pass idle time, for entertainment or comfort.

Clearly, defining daydreaming as task-unrelated is sometimes unsatisfactory because it is too narrow to capture examples of daydreams that are not immediately unrelated to our current activity. This probably reflects a superficial understanding of what task-relatedness means (e.g. that if thought content is in any way associated with what we are doing then it is task-related). However, for thought to be *truly* task-unrelated, it must be unrelated to the *progression or completion* of the present goals in the external environment (rather than completely unrelated in thematic content). For

example, thinking about how events in a novel you are reading relate to your life is task-related to the extent that the thematic content of your thought is related to your current activity. However, this mentation is task-unrelated in the sense that the thinking is unrelated to the progression or completion of the current task at hand, which is reading a novel. The distinction between task-related and task-unrelated thought is perhaps best captured by Klinger's (e.g. 1974, 1978) distinction between operant (i.e. actively goal-directed or 'working') and respondent (i.e. undirected or 'non-working') thought.

2.1.3 Operant and respondent thought

According to Klinger (1974, 1978, 2013), all mentation can be categorized as either operant or respondent (daydreaming is considered to fall into the latter category). Operant thought is the kind of mentation that is instrumental in bringing about progress to some external or internal task that we have set for ourselves. Calculating the amount that one has to pay for a meal, thinking about the best way to structure a sentence, choosing what clothes to wear for work, 'counting sheep' to help drift to sleep, and contemplating the merits of a philosophical argument are all examples of operant thought. Operant thought has two main features: it is deliberate and purposeful. Each of these features has implications for the nature of thought. In contrast, respondent thought is considered non-deliberate (i.e. spontaneous) and non-instrumental (at least for present-moment goals).

Operant thought is considered *deliberate* because it is intended by the thinker and is brought about by an act of will (i.e. it is volitional). It is *purposeful* because it helps the thinker move towards achieving a pre-conceived goal (one that is normally required for the mental or physical activity that the thinker is performing at the time). As a result, operant thought involves a conscious focusing of attention on thought content and is under the direct control of the thinker. It often requires effort (or feels effortful) and attempts are made to protect the train of thought from interference or distraction. Operant thought is often assessed in terms of how effective it is towards achieving its purpose, and the thinker is usually actively interested in the outcome of the thought.

To illustrate these features of operant thought, consider the thought processes involved in mentally retracting your steps to find lost car keys. This kind of thinking is deliberate; you intentionally conjure images of where you have been since you last

had your keys. Your thought is purposeful; it is instrumental towards achieving a pre-conceived goal (e.g. you want to find the car keys so you can drive to the shop). You are interested in the *outcome* of the thought process (e.g. what is the most likely place your keys will be found given what you have previously done?), you make attempts to evaluate the success of your thought for achieving your goal (e.g. 'I haven't been into the bedroom since I got home so the keys can't be there'), and you strive to protect your mental reconstruction from interference or distractions (e.g. ignoring your partner's unhelpful remarks about you 'always forgetting where you put things' or your own distracting thoughts about what you still need to do for the rest of the day).

Respondent thought stands in contrast to operant thought. It is considered *non-deliberate* and arises spontaneously without pre-meditation on the part of the thinker. Respondent thought is undirected in the sense that it is not necessary for the progress or completion of any mental or physical goal of the thinker in the present moment. As a consequence, respondent thought feels less effortful and the direction or progression of thought is less controlled by the thinker. These features seem to capture the nature and phenomenal experience of daydreaming especially its spontaneous, free-flowing, and ephemeral nature. The difference between operant and respondent thought also helps to explain the difference between stimulus-independent thought that is task-related and task-unrelated (i.e. by linking thought to the progression or completion of one's present-moment goals). Although, theoretically, the distinction between operant and respondent thought helps to differentiate daydreaming from other forms of thought, in practice, the difference may be more one of degree than dichotomy. Although we would probably not consider daydreams to exhibit all of the features of *operant thought*, daydreaming may not always be the direct opposite (i.e. respondent thought). It may share both the characteristics of operant and respondent thought, and, in many cases may lie somewhere in between these two modes of thinking. Daydreaming can often be deliberate or not completely spontaneous and it may be controllable or directed.

2.1.4 The deliberate/spontaneous nature of daydreaming

Daydreaming is often considered to be mental content that arises unintentionally and daydreaming is often referred to as spontaneous thought (Christoff, Ream & Gabrieli, 2004; Giambra, 1980; Klinger, 2009). Although many daydreams may initiate spontaneously, when thoughts or images emerge unbidden into awareness, the

distinction between deliberate and spontaneous thought is not always clear-cut. There are at least three ways in which daydreaming might be seen as more deliberate and/or less spontaneous. First, a thinker may deliberately choose to daydream about something other than what they are doing (e.g. deciding not to listen during a boring lecture). Here, the content of daydreaming is not intended (and may arise spontaneously) but the act of daydreaming is volitional. Second, a thinker may deliberately choose the content or topic of their daydream (e.g. daydreaming about a potential romantic partner), but let her or his mind wander in a spontaneous, undirected fashion. Third, although some daydreaming may initiate spontaneously, the elaboration of that thought segment (and the progression of daydreaming activity) could continue more volitionally (e.g. having a spontaneous pleasant thought and allowing yourself to elaborate on it).

Research suggests that daydreaming may often be deliberate. For example, during a vigilance task, participants were asked to report whether their off-task thoughts were spontaneous or deliberate in response to random thought probes (Giambra, 1995). Deliberate thoughts were defined to participants as occurring when they intentionally tried to think about something other than the task, whereas spontaneous thoughts were defined as those that emerged without intention. Results indicated that, on average, deliberate daydreaming was more common than spontaneous daydreaming (with an average of 71% off-task thoughts reported as deliberate). More recent research suggests that rates of deliberate daydreaming may be lower than spontaneous daydreaming (41%), with the finding that less motivated participants also engage in more deliberate off-task thinking (Seli, Cheyne, Xu, Purdon, & Smilek, 2015). Other recent research suggests that spontaneous daydreaming may be much more common than deliberate daydreaming (87% vs. 13%: Pimpton, Patel, & Kvavilashvili, 2015), but this may be due to task differences (e.g. the latter research involved cue words deliberately intended to trigger daydreaming whilst the former involved non-symbolic/meaningless stimuli). Nevertheless, the point here is that the act, and content of, daydreaming may not always be spontaneous and daydreaming may often be brought about by an act of will on the part of the thinker.

2.1.5 Daydreaming can often be directed and instrumental

A core feature of daydreaming when viewed as respondent thought is that it is non-instrumental for the progression or completion of any physical or mental task that the thinker is engaged in at the present moment. Although daydreaming is not 'goal-directed' in this traditional sense, this should not be taken to mean that daydreaming is not goal-directed in a broader sense (Baars, 2010). In fact, as we shall see, daydreaming is an inherently goal-directed activity – but the goals which daydreaming supports tend to be those that extend beyond the *present* moment. As a caveat, daydreaming can often be directed towards the *emotional* goals of the thinker in the present moment. That is, daydreaming can be used to regulate (i.e. improve, worsen, or maintain) the emotional state of the thinker in the present. Daydreaming may provide a means of entertainment, enjoyment, escape or distraction, and may, therefore, represent a deliberate or automatic strategy deployed in the service of the emotional needs of the thinker at the time (Klinger, 1990; Singer, 1966).[7] Daydreaming can also influence the emotional state of the daydreamer at the time as a consequence of imagination (e.g. thinking about plans for a holiday may result in feelings of excitement) but whether or not that is the primary goal or a byproduct of daydreaming is debatable.

2.1.6 A revised (and positive) definition of daydreaming

To summarize, daydreaming can, and has, be defined as mental content that is both stimulus-independent and commonly task-unrelated (in the sense that it is not directed to the goals of the present moment). Thus far, daydreaming has been defined in negative terms; that is, daydreaming is defined as what it is *not* rather than what it is. This most likely reflects a bias in which primacy is given to the present and external world meaning that daydreaming has been defined in relation to the external present. Although, for consistency, I use this definition of daydreaming (in particular for instructions to participants in further studies), I find such negative definitions of daydreaming inherently unsatisfactory. Instead, I prefer to think of daydreaming as

[7] Daydreams may also be used to regulate the emotional state of the thinker to facilitate the progress of an external goal in the present. For example, one participant in my research commented that they often daydream about things that make them angry when they are running because the emotional experience of anger helps them to run faster.

self-generated mentation that is directed to (a) instrumental goals that extend beyond the present moment (i.e. goals that are not currently active) and/or (b) the emotional goals of the thinker at the time. This definition is positive; it does not define daydreaming in relation to the external present, and captures what daydreaming is (and what it might be useful for), rather than what it is not (or what it might be detrimental to).

2.2 Methodology: How can daydreaming be measured?

Daydreaming is difficult to study, not only because it is difficult to define, but also because of its covert and introspective nature (Smallwood & Schooler, 2015). Daydreaming is a private mental phenomenon, which means that the content and occurrence of daydreaming can only be identified by the thinker at the time. Several behavioral and physiological markers of daydreaming have been identified. For example, daydreaming activity is associated with specific patterns of errors during cognitive tasks (Cheyne, Solman, Carriere, & Smilek, 2009; Manly, Robertson, Galloway, & Hawkins, 1999; Rabbitt, 1966; Smallwood et al., 2004; Smallwood, Riby, Heim & Davies, 2006), ocular activity (Grandchamp, Braboszcz, & Delorme, 2014; Meskin & Singer, 1974; Reichle, Reineberg & Schooler, 2010; Singer & Antrobus, 1965; Uzzaman & Joordens, 2011), and certain patterns of brain activation (Christoff et al., 2009; Cunningham, Scerbo & Freeman, 2000; Mason et al., 2007). Nevertheless, the identification of these markers of daydreaming have relied on corroboration from individuals' self-reported daydreaming activity, and, at present, there is no way in which to measure daydreaming without relying in some way on self-reports.

There are three main methods that have been used to examine daydreaming: questionnaires, thought-sampling in laboratory tasks, and experience-sampling in ecologically-valid settings. Researchers have occasionally instructed participants to daydream in experimental settings (e.g. Langens & Schmalt, 2002, Study 2) but this approach is rare and daydreaming tends to be measured rather than induced. Although instructing participants to daydream may influence the natural occurrence of daydreaming in ways that might change its fundamental nature (i.e. by having daydreaming as a 'task' it may no longer be considered daydreaming), it is an important method that can, and should, be used to (a) supplement other methods in a

process of convergence and (b) establish causal relationships between daydreaming and variables of interest.

2.2.1 Questionnaires

Early attempts to measure daydreaming relied on self-reported daydreaming frequency and tendency (to daydream in certain ways). For example, in one of the earliest investigations of daydreaming, Singer and McRaven (1961) created the Daydream Questionnaire, which comprised of more than 100 daydream descriptions based on clinical literature. Participants were asked to rate how frequently they engaged in specific kinds of daydreams (e.g. *"I plan how to increase my income in the next year", "I think about the specific steps to be taken in connection with my job during the next three or four weeks", "I think about the details of my next vacation", "I imagine myself clasped in the embrace of a warm loving person who will satisfy all my needs").*

Singer and Antrobus (1970) later developed the Imaginal Processes Inventory (IPI). The IPI is a 344-item measure used to index an individuals' overall daydreaming tendency, and items were derived from daydreaming interviews and personality measures. The items were divided into seven dimensions: Daydreaming Frequency, Mental Habits, Time Setting of Daydreams, Affective Reactions to Daydreams, Type of Imagery in Daydreams, Content of Daydreams, and Honesty in Reporting Daydreams. The IPI was later condensed to a short-form consisting of a more manageable 45-items (S-IPI; Huba, Singer, Aneshensel, & Antrobus, 1982). Factor-analytic studies of the IPI were used to reveal particular daydreaming styles or tendencies. In particular, three styles of daydreaming consistently emerged: (1) *positive constructive daydreaming*, which is characterized by acceptance of and positive reactions to daydreaming, high levels of visual and auditory imagery in daydreams, and daydreaming that tends to be associated with a future, problem-solving, orientation, (2) *guilt and fear of failure daydreaming,* which is characterized by hostile and guilty daydreams, that involve frightened reactions, self-doubt and achievement-orientated daydreams and (3) *poor attentional control* which is characterized by difficulty in maintaining task focus and susceptibility to boredom and distractibility.

With the exception of the Daydreaming Frequency subscale (e.g. Marchetti, Van der Putte, & Koster, 2014; Mason et al., 2007; Stawarczyk, Majerus, Van der

Linden, & D'Argembeau, 2012), the IPI is not a commonly used method to measure daydreaming in modern approaches (although there have been calls to explore daydreaming, particularly positive constructive daydreaming, as a dimension of personality; McMillan, Kaufman, & Singer, 2013). Modern daydreaming questionnaires measure similar, core, dimensions of daydreaming identified in the IPI subscales (e.g. visual/auditory imagery, emotion in daydreams, time orientation) but they have been used and developed to measure the content and form of daydreaming after a period of task engagement or 'rest' in fMRI scanning sessions, and are often used to determine the factor structure of daydreaming, rather than particular daydreaming styles. Examples of these kinds of questionnaires include[8]:

(1) The New-York Cognition Questionnaire (NYC-Q; Gorgolewski et al., 2014), which distinguishes eight factors representing the content and form of thought. Thought content is characterized by five distinct factors: future-related (e.g. "*I thought about something that could happen in the near future (days or weeks but not today)"*), past-related (e.g. "*I thought about something that happened a long time ago in the past*"), positive (e.g. *"I thought about something that made me feel cheerful"*), negative (e.g. *"I thought about something that made me feel guilty*), and social (e.g. *"I thought about people I have just recently met"*). Thought form is characterized by three distinct factors: words (e.g. *"Like an inner monologue or audiobook"*), images (e.g. *"In the form of images"*), and specificity (e.g. *"Had a clear sense of purpose"*).

[8] Note that questionnaires 1-3 measure the content and form of thought in general, rather than specifically focusing on daydreaming and/or mind wandering (i.e. they do not define which thoughts participants should report on, but instead ask participants to report on all thinking during a specific time period). This may reflect a more general trend in the literature to examine thought that is self-generated regardless of its relationship to the external environment (e.g. task-unrelated thought) and an concurrent shift in terminology from "mind wandering" to "self-generated thought" (e.g. Andrews-Hanna et al., 2013; Ruby, Smallwood, Engen, & Singer, 2013a; Smallwood, 2013). Nevertheless, these self-report measures tend to be used when there is no particular task at hand (e.g. during resting state brain scanning) and so are likely to capture many thoughts that would be considered daydreaming according the definition used here. Of course, they may also contain information about thought content that would not count as daydreaming such as thoughts about the experimental situation (e.g. "I wonder how much time I've got left", "The scanner is very loud and making me feel anxious").

(2) The Resting State Questionnaire (ReSQ; Delamillieure et al., 2010) which measures resting-state inner experience during fMRI. Sixty-two items index five types of mental activity: visual imagery (i.e. seeing something in thought), inner language (i.e. thinking in words or sounds), somatosensory awareness (i.e. paying attention to bodily sensations), inner musical experience (i.e. experiences of music in thought), and mental manipulation of numbers (i.e. thinking of numbers or time).

(3) The Amsterdam Resting State Questionnaire (ARSQ; Diaz et al., 2013) which is a 50-item questionnaire asking participants to report on thoughts and feelings experienced during rest. The ARSQ identifies seven phenotypes of resting state cognition: Discontinuity of Mind (which includes a busy, restless mind with rapidly switching thoughts), Theory of Mind (thoughts involving other people and empathetic understanding), Self (thoughts about one's self, behavior and feelings), Planning (thoughts about the past, future, problem-solving, and planning), Sleepiness (feeling tired or sleepy), Comfort (feeling relaxed and comfortable), and Somatic Awareness (thoughts about one's breathing, heartbeat, or health).

(4) The Thought Characteristics Questionnaire (TCQ; Stawarczyk et al., 2011), which measures phenomenological characteristics of daydreaming. Single items measure the following features of thoughts: visual imagery, inner speech, voluntary occurrence, structured succession of though, realistic nature, importance to life, repetitiveness, affective content, and time orientation. This measure is often used in combination with thought sampling techniques (described below) in which participants write down a brief description of their daydreaming when it occurs during a task and then later rate each daydreaming instance according to dimensions of the TCQ (e.g. Stawarczyk et al., 2011, Stawarczyk, Cassol, & D'Argembeau, 2013a, Stawarczyk, Majerus, & D'Argembeau, 2013b).

Questionnaire measures provide a useful way to examine the content and form of daydreaming during experimental tasks and resting-state fMRI. In particular, because they ask participants to provide retrospective and global evaluations of their daydreaming experiences they do not interrupt the experience of daydreaming to measure it. However, questionnaire measures are limited because they require

participants to estimate their daydreaming (either in general, or after a specific period of time). This may not only be hard for participants, especially if they lack meta-awareness of their daydreaming activity (e.g. Smallwood & Schooler, 2006), but it also suffers from the limits of retrospective recall which is well-known to be systematically biased due to reliance on memory (e.g. Bradburn & Rips, 1987). Using thought-sampling techniques, both in laboratory settings and in daily life can help to circumvent problems of retrospection because daydreaming is captured as it naturally occurs meaning that the time between the experience and recall of daydreaming is minimized.

2.2.2 Thought-sampling in the laboratory

In experimental settings, daydreaming is commonly measured via thought-sampling procedures where participants are asked to regularly report on the contents of their conscious experience (e.g. during a cognitive task). This technique is often referred to as thought-probing (Smallwood & Schooler, 2006), of which there are two variations: the 'probe-caught' and 'self-caught' methods.

The probe-caught method involves interrupting participants at (quasi) random intervals whilst they are engaged in a task, and asking them to report on their experience immediately before the interruption. Participant self-reports can be either experimenter-classified (where participants describe their thoughts which are then later classified by the researcher) or self-classified (where participants report on the nature of their experience with reference to some prior definitions outlined by the researcher). Self-classified thought probes can vary, but generally ask participants to report on whether they are daydreaming, experiencing some other form of thought (e.g. thoughts about task performance or external distraction; Stawarczyk et al., 2011), or are focused on the task at hand. They also commonly ask participants to further categorize the characteristics of their daydreaming, which are of interest to the researcher (e.g. its time orientation, emotional content). In contrast, self-caught methods require participants to identify or 'catch' their own daydreaming during a task and to indicate when this has occurred (e.g. via button press). Definitions of what constitutes the phenomenon of interest (e.g. daydreaming) are pre-defined by the experimenter. Self-caught and probe caught methods can also be used in combination which has the added advantage of estimating daydreaming with and without meta-awareness (e.g. Schooler et al., 2011).

Thought-probing techniques in the laboratory have the advantage of capturing daydreaming as it occurs, rather than relying on retrospective reports. These techniques also allow research to examine (a) the effect of various features of an experimental task on daydreaming (e.g. the impact of perceptual load on daydreaming frequency; Forster & Lavie, 2009, or the impact of a sad mood on the time orientation of daydreaming; Smallwood & O'Connor, 2011, Study 2) and (b) the effect of daydreaming on various concurrent tasks (e.g. the effect of daydreaming on reading comprehension, Schooler, Reichle, & Halpern, 2005; or errors in tasks of sustained attention, Smallwood et al., 2004). However, despite the experimental control afforded by such approaches, examining daydreaming in laboratory situations lacks ecological validity and cannot capture the full range or antecedents, concomitants, and consequences of daydreams as they occur in daily life. Of course, examining daydreaming in laboratory tasks may inform how daydreaming processes operate during certain life situations (e.g. in educational contexts) but is less relevant to examining how these cognitions unfold in different contexts, particularly social ones.

2.2.3 Experience-sampling in daily life

Although thought-sampling procedures are commonly referred to in the mind wandering literature as 'experience-sampling' (e.g. Smallwood & Schooler, 2015) this does not reflect the traditional and historical use of the term. Traditionally, the experience-sampling method (ESM; Csikszentmihalyi & Larson, 1987) refers to phenomena (e.g. thoughts, feelings, and behaviors) that are repeatedly sampled in ecologically valid settings over time and across situations. In ESM, participants are asked to report on the phenomenon of interest (e.g. daydreaming) numerous times in daily life. There are two main experience-sampling techniques, which largely map on to probe-caught and self-caught thought-sampling: time-based designs and event-based designs (Bolger, Davis, & Rafaeli, 2003). Time-based designs usually require a form of signaling (e.g. beepers, personal digital assistants, text messages, emails, or smartphone application alerts) that occur at quasi-random, random, or fixed time intervals. When participants are signaled, they report on variables of interest to the researcher either as they are naturally occurring, or since the last signal (e.g. "*are you currently daydreaming*" or "*tell us about your last daydream*"). Some time-based designs require participant to report on variables of interest at a fixed schedule (e.g. every evening before bed) and so do not necessarily involve a signal. Event-based

designs require participants to report on a variable of interest whenever it occurs (e.g. asking participants to tally every time they have a daydream). Event-based designs therefore only require a method of recording responses (e.g. paper booklets) and not of signaling.

ESM was one of the first methods used to examine daydreaming in daily life. Klinger and Cox (1987-88) used beepers to signal participants multiple times and asked them to report on several characteristics of thought flow in daily life using a paper diary. More modern approaches have used smartphone applications (Killingsworth & Gilbert, 2010; Ottaviani & Couyoumdjian, 2013; Ottaviani, Medea, Lonigro, Tarvainen, & Couyoumdjian, 2015; Poerio, Totterdell, & Miles, 2013) and personal digital assistants (Franklin et al., 2013; Kane et al., 2007; McVay, Kane, & Kwapil, 2009) to capture daydreaming in daily life. Participants are usually signaled at (quasi) random or fixed-interval schedules, asked whether they are currently daydreaming, and if, so, to answer several questions related to their daydreaming experience (e.g. its emotional content, time orientation, interest in thought content). In addition to daydreaming, participants are often asked to document other experiences such as their current activity, mood, and the presence of recent stressful events. Physiological recordings (e.g. heart rate) have also been used in conjunction with questionnaire measures in daily life (Ottaviani & Couyoumdjian, 2013; Ottaviani et al., 2015).

Event-based experience-sampling methods have also been used in daydreaming-related research but they are comparatively rare. For example D'Argembeau, Renaud, and Van der Linden (2011) asked participants to keep a tally of future thoughts as and when they occurred in daily life, and Birnbaum, Mikulincer, and Gillath (2011) asked romantic couples to write descriptions of their sexual daydreams as they occurred over 21 days. Other methods have used diary approaches where participants are provided with a paper diary and asked to write down daydream descriptions over a number of days (e.g. Gold & Reilly, 1985-86; Langens & Schmalt, 2002, Study 3).

Although ESM can be intrusive and burdensome to participants (meaning that measures are usually kept brief; Bolger et al., 2003), it has several key advantages that make it ideally suited to the study of daydreaming. First, the high ecological validity of the method means that daydreaming can be examined as it naturally occurs in daily life. This means that daydreams can be repeatedly captured in a variety of different

contexts (rather than just during a monotonous laboratory task or in an fMRI scanner) over time. Daydreams are thought to be triggered by cues in the environment (*see* Section 3.3.3.1) so ESM is likely to capture a wider range of daydreaming activity due to the richness of possible triggers in the natural environment compared to artificial laboratory examinations (Jackson & Balota, 2012).

Second, the temporal nature of experience-sampling allows a closer examination of the antecedents and consequences of daydreaming. By measuring daydreaming and other variables repeatedly over time, researchers can, for example, use time-lag analyses to determine whether certain variables (e.g. mood) can be considered causes or consequences of daydreaming (e.g. Franklin et al., 2013; Killingsworth & Gilbert, 2010). Such analyses can shed light on both when and why daydreaming occurs (e.g. when in a negative mood, perhaps to help solve problems) and what effects different types of daydreaming might have (e.g. whether repetitive negative daydreams have a negative impact on physiological health). ESM can therefore facilitate more nuanced conclusions about the possible functional or dysfunctional outcomes of daydreams as they occur in daily life (e.g. Ottaviani et al., 2015; Poerio et al., 2013).

Third, the repeated measurement of daydreaming within-individuals allows researchers to examine daydreaming as it occurs both within and between individuals (Connor, Tennen, Fleeson, & Barrett, 2009). This has the conceptual advantage of examining daydreaming at an ideographic level. Rather than assuming that daydreaming-related processes are the same for all people, ESM can examine patterns of associations between daydreaming and other variables both as they occur within individuals and across individuals (i.e. at an individual and a group level). Researchers can also explore what might account for why individuals differ in daydreaming related processes (e.g. more optimistic people might show stronger associations between future-orientated daydreaming and later happiness).

Despite the key advantages of ESM for daydreaming research, like all methods, it has several limitations, which should be considered. Because experience-sampling studies take place over an extended period of time and involve repeated measurement points, they are often intrusive and require high levels of commitment from participants, compared to laboratory and cross-sectional research. This may potentially result in (a) self-selection biases and (b) issues with compliance and drop-out, which can limit the generalizability of results as well as data quality. For

example, participants in ESM research are typically motivated, conscientious, have more spare time, and/or are particularly interested in nature of the investigation (Scollon, Kim-Prieto, & Diener, 2003). With respect to daydreaming research, advertised studies may attract conscientious and motivated individuals who are interested in the content of their thoughts and have a particular interest in daydreaming (perhaps because they daydream a lot). Thus, ESM samples may not be representative of the populations to which researchers' seek to generalize, and this should be taken into account when generalizing findings.

The burdensome nature of experience-sampling studies also means that missing data and study dropout are likely (Bolger et al., 2003). This is likely to affect the quality of data, especially in studies that last for relatively long periods of time (e.g. Stone, Kessler, & Haythornwaite, 1991, estimated that data quality declines after between two and four weeks of sampling). Dropout and missing data are particular problematic if the reason for drop-out/missing data is systematically related to the phenomenon under investigation because it may lead to certain types of participants or characteristics of the phenomenon being over- or under-represented (Shiffman, Stone, & Hufford, 2008). For example, participants with greater meta-awareness of daydreaming, or daydreams that are not personally distressing, may be over-represented in daydreaming research using ESM.

Perhaps of greatest relevance for the use of ESM in daydreaming research is the extent to which repeatedly measuring the occurrence and content of daydreams changes the nature of daydreaming itself. This concern is known as *reactivity* in which the phenomenon being studied changes over time as a result of being repeatedly measured and reported (Wheeler & Reis, 1991). Greater self-monitoring of contingencies between study variables (e.g. emotion and daydreaming) and/or heightened awareness of the phenomenon being studies (e.g. daydreaming frequency and content) may lead to potential changes in the experience. However, to bias results, reactivity effects would need to be consistent across participants and it is not clear that repeated sampling of thoughts, feelings, and behaviors produces systematic biases in reporting or participant behavior over time. Surprisingly few research investigations have explored the effect of reactivity in experience-sampling designs and those that have, suggest that although ESM might heighten awareness of the phenomenon under study, it does not necessarily result in changes to those phenomenon over time (which would be evidence for reactivity) (Cruise, Broderick,

Porter, Kaell, & Stone, 1996; Litt, Cooney, & Morse, 1998). Other research has suggested that ESM may result in initial changes in the phenomena under investigation at the start of ESM studies, but that these effect are relatively short-lived because participants habituate to repeated reporting (Gleason, Bolger, & Shrout, 2001 reported in Bolger et al., 2003).

Despite these limitations, ESM provides several distinct advantages for the study of daydreaming meaning that it can provide a more fine-grained picture of daydreaming as it naturally unfolds. Although ESM approaches are currently less common than thought-sampling in laboratory tasks, advances in the both the development and use of smartphone technology in psychological research (Miller, 2012) make it likely that ESM will become an increasingly popular method to examine daydreaming and complement experimental and neuroscientific methods.

2.3 Core features of daydreaming

Methods that have examined daydreaming through the use of questionnaires, thought sampling, and ESM, have revealed several core features of daydreaming in terms of its frequency, form and content. Although the content of daydreaming is potentially limitless, and only constrained by one's imaginative abilities, researchers have discerned several core dimensions that underlie the both the structure of daydreaming and dimensions upon which it can vary: imagery, temporal orientation, emotion and social content.

2.3.1 Daydreaming frequency

Daydreaming is both normal and ubiquitous. Early investigations of daydreaming frequency suggest that it occurs daily (Singer & McRaven, 1961) and can occupy between 30% and 50% of waking thought (Klinger & Cox, 1987-1988). These early estimates of daydreaming frequency have been confirmed by more modern approaches both in laboratory settings and in daily life. For instance, in a large-scale investigation using ESM with 2,250 participants, daydreaming was reported, on average, 47% of the time (Killingsworth & Gilbert, 2010). Not only was daydreaming reported with nearly the equivalent frequency as not-daydreaming, but rates of daydreaming were consistent across a range of 22 daily activities. In particular, a baseline daydreaming rate of at least 30% was observed during all activities, except, perhaps thankfully, making love where daydreaming rates were considerably lower.

Other ESM investigations in daily life report similar frequencies in the United Kingdom (36%: Poerio et al., 2013), the United States of America (26%: Franklin et al., 2013; 30%: Kane et al., 2007, McVay et al., 2009) and China (60%: Song & Wang, 2012). There do, however, appear to be individual differences in daydreaming frequency. One study found a range of 0% to 92% of reported daydreaming, suggesting that when signaled some people never report daydreaming whereas others report daydreaming nearly all of the time (Kane et al., 2007).

Laboratory studies using thought-sampling techniques have observed similar daydreaming rates. They typically vary between 14% and 29% in sustained attention and word encoding tasks, and between 30%-35% in less demanding tasks (e.g. Smallwood et al., 2004; Smallwood, Nind, & O'Connor, 2009; Smallwood, O'Connor, Sudberry, & Obonsawin, 2007; Smallwood et al., 2011). Slightly higher rates (43%-46%) are observed when tasks include verbal stimuli intended to trigger daydreaming (McVay & Kane, 2013, Studies 1-4). This suggests that although daydreaming is prevalent and ubiquitous, daydreaming frequency will depend on features of the situation (e.g. the demands of one's current activity) and person (e.g. the extent to which an individual tends to daydream), and most probably an interaction between the two.

Other research suggests that daydreaming rates may be higher in certain populations, specifically in individuals with attention-deficit/hyperactivity disorder (ADHD; Seli, Smallwood, Cheyne, & Smilek, 2015; Shaw & Giambra, 1993), depression (Giambra & Traynor, 1978; Smallwood et al., 2004; Watts, MacLeod, & Morris, 1988), dysphoria (e.g. Carriere, Cheyne, & Smilek, 2008; Smallwood et al., 2007), and mania (e.g. Meyer, Finucane, & Jordan, 2011). However, emerging research indicates that higher daydreaming rates in these populations may only reflect an increased incidence of certain kinds of daydreaming. For example, the relationship between daydreaming and both ADHD and depressive symptomology has been observed only with spontaneous and unintentional, but not deliberate, daydreaming (Deng, Li, & Tang, 2014; Seli et al., 2015). Likewise, the relationship between depression and daydreaming is thought to reflect an increased prevalence of negative, self-focused, and perseverative cognition rather than daydreaming per se (Marchetti, et al., 2014; Ottaviani et al., 2015). This highlights the importance of examining daydreaming as a heterogeneous, rather than unitary, phenomenon – a point that I shall return to later.

2.3.2 Imagery in daydreams

Daydreams are imaginary experiences because they involve the mental simulation (imagination) of what is not actually present as opposed to the direct sensory processing of the external world. Imagination involves forming mental images (e.g. visual, verbal, auditory), which generate the experience of inner seeing, speaking and hearing (Heavey & Hurlburt, 2008; Kosslyn, Ganis, & Thompson, 2001). Research suggests that daydreams tend to involve visual, verbal, and auditory imagery. Sampling daydreams in daily life, Klinger and Cox (1987-88) found that inner speech (i.e. inner monologue) occurred in three-quarters of daydreams. Visual imagery occurred in about two-thirds of daydreams, which also contained elements of color and movement in about a quarter of thoughts. Auditory imagery was present in about half of daydreams, two-thirds of which involved mentally hearing another person's voice[9]; the remaining third consisted of other sounds (e.g. music and other noise that would be experienced in daily life). More recent investigations reveal that moderate amounts of visual and auditory imagery are experienced when daydreaming during laboratory tasks (Stawarczyk et al., 2011a; 2013a). Likewise, Andrews-Hanna et al. (2013) found that participants' daydreams involved at least a moderate degree of visual imagery, Delamillieure et al. (2010) found that 40% of thoughts during rest were visual while 30% involved verbal and auditory imagery, and Gorgolewski et al. (2014) identified visual and verbal thought to be central, but negatively correlated (r = -.17), components of resting-state mentation.

Although visual, verbal and auditory imagery play a prominent role in the inner experience of daydreaming, other experiences are also likely to be present. To the extent that daydreams involve simulations of the external world, they may also involve other kinds of mental imagery that reflect the senses such as tactile imagery, taste, smells, and movement. (Kosslyn, et al., 2001). Daydreams may also involve unsymbolized thinking where particular thoughts are experienced without the awareness of mental imagery (Heavey & Akhter, 2008). Daydreams may involve

[9] Note that hearing another person's voice could be conceptualized as a form of inner speech rather than auditory imagery (see McCarthy-Jones & Fernyhough, 2011 and also Alderson-Day & Fernyhough, 2015 for a discussion on the overlap between auditory imagery and inner speech).

combinations of some, or all, of these imagery modalities or types of inner experience, which may contribute to realistic experiences during imagination.

There are also likely to be individual differences in the experience of imagery during daydreaming. For example, some people report never experiencing inner speech or visual imagery (Heavey & Hurlburt, 2008; Hurlburt, Heavey, & Kelsey, 2013), between 66% and 75% of people in studies of inner experience report a dominant mode of thought (e.g. tending to engage in visual imagery more than inner speech or vice versa; Delamillieure et al., 2010; Heavey & Hurlburt, 2008 and also Gorgolewski et al., 2014; Stawarczyk et al., 2013a) and people's imaginary capabilities can vary in general (Andrade, May, Deeprose, Baugh, & Ganis, 2014). Differences in the experience of daydreaming may also vary within individuals depending on the content of daydreaming (e.g. imagining a conversation is likely to involve more inner speech whereas thinking about what to wear to a wedding is likely to involve more visual imagery).

2.3.3 Temporal content

Daydreams allow one to disengage from the present to mentally simulate another time and place. They therefore often involve mental time travel, which consists of the ability to mentally travel forward and backward in time; that is to engage in pro- and retro-spection (Suddendorf, Addis, & Corbalis, 2009). Consequently, the time orientation of daydreaming is considered a core dimension of the experience and one that has been investigated and measured. Research has tended to converge on the view that daydreaming has a prospective bias such that daydreams tend to be orientated towards the future rather than the past or present or having no temporal location.

This prospective bias has been observed from daydreaming reports (a) during laboratory tasks (e.g. Baird, Smallwood, & Schooler, 2011; Jackson, Weinstein, & Balota, 2013, Study 2; McVay, Unsworth, McMillan, & Kane, 2013, Studies 1-3; Smallwood, et al., 2009; Smallwood et al., 2011b; Stawarczyk et al., 2011a; Stawarczyk et al., 2013a; Ruby et al., 2013a) (b) from retrospective reports of daydreams that had recently been on participants' minds (Andrews-Hanna et al., 2013) and (c) in daily life (Poerio et al., 2013; Song & Wang, 2012). Additionally, prospective daydreams tend to involve the near, compared to distant future. Several investigations show that daydreams (at least during laboratory settings) predominately

involve thoughts concerning later that day or the next, whereas retrospective daydreams tend to show a more even distribution of temporal locations in the past (Andrews-Hanna et al., 2013; Stawarczyk et al., 2011, 2013a). Although the prospective bias appears robust, both across different methods and cultures (Smallwood & Schooler, 2015) it should be noted that some researchers have failed to find consistent evidence that daydreams tend to be predominately future-orientated. A lack of, or only a slight, prospective bias has been observed from retrospective reports of daydreaming during fMRI scanning (Fransson, 2006) and during laboratory tasks (Jackson, et al., 2013, Study 1; McVay et al., 2013, Studies 4 & 5).

The prospective bias predominately observed in daydreaming research suggests that daydreams may be useful for planning and anticipating the future (Smallwood & Schooler, 2015). Daydreams tend to be more future focused after a period of self-reflection (Smallwood et al., 2011, Study 1) and future-orientated daydreams tend to involve more inner speech,[10] and are more personally relevant and concrete (Stawarczyk et al., 2013a). These investigations support the view that daydreams are involved in anticipating and planning of personally relevant future goals (Baird et al., 2011; Stawarczyk et al., 2011a), although whether such daydreaming facilitates goal achievement is an open question. Daydreams also tend to be more past orientated when they are preceded by a negative mood, in particular sadness. This retrospective bias has been demonstrated both with mood induction procedures (Smallwood & O'Connor, 2011) and with naturally occurring mood in the laboratory (Ruby et al., 2013a) and in daily life (Poerio et al., 2013), leading to suggestions that daydreaming in negative mood states may be linked with personal problem-solving (e.g. Poerio et al., 2013; Smallwood & Schooler, 2006).

2.3.4 Emotional content

Thought valence is proposed to be a major component, or dimension, of daydreaming. Several investigations that have examined the dimensional structure of daydreaming converge on the view that the emotional content of daydreaming (usually measured as

[10] Inner speech is proposed to be functional for planning (Morin, Uttl, & Hamper, 2011) and future thoughts involving planning and decision-making typically involve inner speech (D'Argembeau et al., 2011). The association between future-orientated daydreaming and inner speech has been replicated by Gorgolewski et al. (2014) using a retrospective questionnaire following fMRI scanning.

the extent to which daydreaming content is positive or negative) is a major component characterizing the daydreaming experience (Andrews-Hana et al., 2013; Gorgolewski et al., 2014; Ruby et al., 2013a).

Average levels of daydreaming valence tend to be neutral (i.e. around the mid-point of measurement scales) with a slight trend towards more positively valenced thoughts (Andrews-Hanna et al., 2013; Stawarczyk et al., 2011a, 2013a). Other investigations suggest that daydreams might be more positive than negative. For example, Ruby et al. (2013a) found that daydreams during a laboratory task were rated as significantly more positive than negative. Likewise, in more naturalistic settings, Killingsworth and Gilbert (2010) found that 69% of sampled thoughts were positive compared to 43% neutral and 27% negative thoughts. Song and Wang (2012) also found daydreams to be moderately positive and associated with greater than moderate levels of relaxation and calmness. However, Poerio et al. (2013) found daydreams to be, on average, slightly negative; specifically, that daydreams tended to be slightly more sad than happy and slightly more anxious than calm.

Although, on balance, estimates suggest that daydreams may be more positive than negative, the emotional content of individual daydreams is likely to be influenced by a number of factors. For example, the finding that daydreams during laboratory tasks are neutral, albeit slightly positive, may simply reflect the current emotional state of participants during laboratory tasks. The relationship between the emotional content of daydreaming and the previous, concurrent, and later emotional state of the daydreamer is likely to have complex interactions and relationships with other variables. It is well known that emotions affect cognitions, usually in a congruent fashion (Isen, Shalker, Clark, & Karp, 1978; Singer & Salovey, 1988) and research has shown that negative emotional states predict daydreaming with a negative emotional content both in the laboratory (Marchetti et al., 2012) and in daily life (Poerio et al., 2013). Likewise, concurrent mood is associated with the emotional content of daydreaming such that emotional states and the emotional content of daydreaming tend to concur. For example, Andrews-Hanna et al. (2013) found a strong positive correlation between thought valence and state affect and Killingsworth and Gilbert (2010) found that individuals tended to feel more positive when their minds wandered to positive topics, and more negative when their minds wandered to negative topics. Daydreams with content of interest to the daydreamer are also associated with a more positive concurrent mood (Franklin et al., 2013).

The emotional content of daydreaming is also likely to influence later mood. Although research has shown that daydreaming in general might be associated with later negative mood (Killingsworth & Gilbert, 2010), more recent research has revealed that this depends on the emotional content of daydreaming. Poerio et al. (2013) found later sadness and anxiety was only predicted by daydreaming with sad and anxious content respectively. Although this indicates that the emotional content of daydreaming is likely to influence later mood, other research indicates that other daydreaming features are also important for determining the effect of daydreaming on emotion and emotional well-being in general. For example, Ruby et al. (2013a) found that past-other and future-self related daydreams were associated with an increased negative and an increased positive later mood respectively, regardless of the emotional content of daydreaming.

Other research suggests that daydreaming may be especially linked to negative affective states when daydreams are unintentional (Deng, et al., 2014), when thoughts are self-focused and ruminative (i.e. indicative of perseverative cognition; Marchetti et al., 2014; Ottaviani et al., 2015) or accounted for by the extent to which people are inattentive to present-moment experiences (Stawarczyk et al., 2012). Further research also suggests that the extent to which people enjoy daydreaming and/or endorse negative beliefs about daydreaming may also affect its emotional outcomes. For example, individuals who believe that daydreaming is caused by being a distractible person predict that they would feel more negative after daydreaming, whereas individuals who believe that daydreaming results from a normal waxing and waning of attention predict that they would feel less negative after daydreaming (Mason, Brown, Mar, & Smallwood, 2013).

A separate line of research shows how people can use their imagination and daydreams to enhance their emotional well-being, albeit in a deliberate fashion. For example, asking participants to engage in 'positive mental time travel', where they imagine four positive events that will take place the following day for 15 days, has been found to increase levels of happiness, compared to imagining negative or neutral future events (Quoidbach, Wood, & Hansenne, 2009). Likewise, the use of guided affective imagery, where individuals are asked to mentally simulate positive hypothetical scenarios, has demonstrated long-term effects on positive emotional experiences (Roffe, Schmidt, & Ernst, 2005; Utay & Miller, 2006; Walker et al., 1999). Savoring emotional experiences before and after they occur during

daydreaming (e.g. by anticipating an enjoyable holiday, or bringing to mind positive memories) also has demonstrated positive effects on well-being (Bryant, Smart, & King, 2005; Havighurst & Glasser, 1972; Lyubomirsky, Sousa, & Dickerhoof, 2006; MacLeod & Conway, 2005). The association between daydreaming and emotional well-being is complex and depends on the content, nature, and context of daydreaming, which, again, emphasizes the need to examine daydreaming as a heterogeneous process, in order to fully understand its effects.

2.3.5 Social content

Daydreams are predominately social in nature; that is, they typically involve the mental representation of other people. In one of the earliest published articles on daydreaming, Singer (1975b) highlighted the interpersonal nature of daydreaming concluding that daydreaming "*is a human function that involves resort to visual imagery and is strongly orientated towards future interpersonal behavior*" (p. 55). More recent investigations have also converged upon the view that daydreaming often involves the imagination of other people. Mar, Mason, and Litvack (2012) demonstrated that 73% of a large sample (N = 17,556) reported that other people are 'frequently' or 'always' involved in their daydreams, whilst less than 1% reported that others are 'never' involved. A similar frequency of social daydreaming was reported by Song and Wang (2012) who collected real-time daydreaming reports from 165 participants using ESM. They found that daydreams were social 71% of the time, a proportion significantly greater than non-social daydreaming (29%).

Investigations examining the underlying factor structure of daydreaming during laboratory tasks and resting state conditions also highlight the preponderance of social daydreaming. Diaz et al. (2013) found "theory of mind" (which was characterized by thoughts about other people) to be a prominent dimension of resting state thinking. Likewise, social cognition (characterized by thoughts about close social relationships during daydreaming) has been identified as a major component of self-generated thought (Andrews-Hana et al., 2013; Gorgolewski et al., 2014; Ruby et al, 2013a, 2013b). Social daydreaming is sometimes also closely associated with focus on the past (Ruby et al., 2013a, 2013b) although this relationship has not been found in other, similar investigations (e.g. Andrews-Hanna et al., 2013; Gorgolewski et al., 2014) or corroborated outside the laboratory.

Neuroimaging data also lends converging support for the social nature of daydreams. A meta-analysis of 12 neuroimaging studies reported substantial overlap between brain regions involved in daydreaming and those involved in social cognition, suggesting a predisposition to generate social thoughts during daydreaming activity (Schilbach, Eickhoff, Rotarska-Jagiela, Fink, & Vogeley, 2008).[11] More recent work has shown that social daydreaming is associated with specific neurocognitive changes in resting state brain activity including regions such as those involved in the imagination of other people's mental and affective states (Gorgolewski et al., 2014).

2.4 Is daydreaming a help or a hindrance?

Daydreaming occupies a prominent position in mental life, consuming up to half of waking thought. But in what ways, and when, does it help or hinder? One of the conundrums facing research in the area is that the experience of daydreaming seems to have both costs and benefits with respect to psychological functioning. Mooneyham and Schooler (2013) recently reviewed research on the costs and benefits of daydreaming. They identified 29 studies that documented the negative consequences of daydreaming and only six studies that spoke to its potential beneficial effects. In particular, they highlighted the well-documented costs of daydreaming to task performance including reading comprehension (Franklin, Smallwood, & Schooler, 2011; McVay & Kane, 2012b; Reichle et al., 2010; Schad, Nuthmann, & Engbert, 2012; Schooler et al., 2005; Smallwood, McSpadden, & Schooler, 2008; Uzzaman & Joordens, 2011), sustained attention (Hu, He, & Xu, 2012; McVay & Kane, 2009; McVay & Kane, 2012a; Schad et al., 2012; Stawarczyk et al., 2011a), memory (Mrazek et al., 2012a; Mrazek, Smallwood, & Schooler, 2012b; Riby, Smallwood, & Gunn, 2008; Risko, Anderson, Sarwal, Engelhardt, & Kingstone, 2012; Smallwood et al., 2003; Smallwood et al., 2007), and to other tasks such as random number generation (Teasdale et al., 1995), response inhibition (Smallwood, McSpadden, & Schooler, 2007), driving (He, Becic, Lee, & McCarley, 2011), and performance in daily activities (McVay et al., 2009).

[11] This research concerned the Default Mode Network rather than daydreaming per se. Although the DMN is widely considered to be activated during daydreaming activity, it also has other functions, which may be independently associated with social cognition.

Daydreaming during particular tasks has a negative impact on performance. In some cases, this may have more meaningful effects than simply being unable to understand a passage of text or pay attention to a personally irrelevant laboratory task designed by researchers. For example, daydreaming may have a detrimental impact on learning and educational performance, which has important implications in real-world educational contexts (Robison & Unsworth, 2015; Smallwood, Fishman, & Schooler, 2007). Daydreaming whilst driving has also been proposed to represent an important risk for road traffic accidents, with research demonstrating that 52% of drivers involved in road traffic accidents reported daydreaming immediately before crashing (Galéra et al., 2012). Of these incidents, 13% involved extremely disruptive daydreaming which significantly predicted responsibility for road traffic accidents after controlling for a range of potential confounding variables such as age, gender, time of the crash and vehicle type.

In comparison to the negative effects of daydreaming, substantially less attention has been directed towards examining the positive effects of daydreaming. Nevertheless, several investigations have suggested that daydreaming may be beneficial, in particular for future planning and creative thought. As mentioned in the section on the temporal orientation of daydreaming, the often prospective nature of daydreams suggests that they may allow individuals to use idle time to mentally plan for and anticipate their future goals (Baird et al., 2011; Smallwood et al., 2011). Daydreams also tend to be highly personally relevant and related to an individuals goals and needs which is consistent with the idea that daydreaming is goal-directed and potentially helpful for goal progress, monitoring, and achievement (e.g. Andrews-Hanna et al., 2013; Klinger, 2013). However, whether or not daydreaming actually facilitates goal achievement is an open question. Surprisingly, research has not yet systematically investigated whether goal-related imagery in daydreams supports goal attainment. However, research on the mental simulation of goals suggests that whether or not daydreaming supports goal-directed action will depend on the nature of daydreaming. For example, daydreams may be more conducive to goal achievement when they involve imagining the process rather than the outcome of goal achievement (Freund & Hennecke, 2015), or contrasting one's desired goal attainment with potential obstacles (as in mental contrasting; Oettingen & Schwörer, 2013).

Anecdotally, daydreaming is thought to be related to creativity, and early research by Singer and McRaven (1961) suggested that individuals with a proclivity for daydreaming were also more creative (as measured by their original story-telling ability). More recent research indicates that daydreaming may be involved in the process of creative incubation. Baird et al. (2012) found that participants who engaged in an undemanding task (compared to a demanding or 'rest' task) showed increased creative solutions as measured by the unusual uses task. Although the undemanding task condition was associated with the most daydreaming, it was not linked with more daydreaming about the creativity task, suggesting that conditions favorable to daydreaming facilitate creative incubation. Baird et al. (2012) also found that a greater tendency to daydream in daily life (as measured by the daydreaming frequency scale) was associated with more creative problem-solving in general. Daydreaming has also been correlated with better problem-solving skills (Ruby et al., 2013b) and the ability to make patient inter-temporal choices (Smallwood, Ruby, & Singer, 2013). Although this suggests that daydreaming may be related to problem-solving and the delay of gratification it is not clear from the existing evidence whether daydreaming per se predicts these skills or whether these capacities share common features which explains their association (e.g. the reliance on autobiographical memory, Ruby et al., 2013b, or the ability to guard an internal goal from external interference, Smallwood et al., 2013).

More broadly, researchers have speculated on the potential adaptive functions of daydreaming. Mooneyham and Schooler (2013) for example have suggested that daydreaming may help with attention cycling (the ability to keep track of multiple goals), dishabituation (mental breaks from one's current task), and relief from boredom. These speculations mirror those of Klinger (e.g. 1990) and Singer (e.g. 1966). For example, Klinger suggested that daydreams act as a 'mental to-do list', which enables individuals to keep track of, and organize, their multiple goals pursuits and to make progress on goals when external demands are low. Additionally, both Singer and Klinger noted the potential emotion regulatory benefits of daydreaming, observing the potential benefit of daydreaming for self-stimulation during boring tasks (e.g. during monotonous tasks at work; Fisher, 1987). They also noted that positive daydreams may be used for entertainment, relaxation, or comfort in times of distress and that even negative daydreams may help with self-understanding and working-though problems and life events. Other researchers have speculated that

daydreaming may be important for socio-emotional development (Immordino-Yang, Christodoulou, & Singh, 2012), as well as for memory consolidation and complex decision-making (Christoff, Gordon, & Smith, 2011).

Although the potential benefits and adaptive functions of daydreaming have been proposed, at present, they are mainly inferred or speculative rather than directly supported by empirical evidence. Indeed, compared to the well-documented negative effects of daydreaming, the amount and strength of evidence to support the positive effects of daydreaming is not only lacking but also substantially weaker. However, the increasing trend to view daydreaming as helpful, rather than something to be avoided, promises that future years in the field will provide direct empirical evidence for the benefits of certain kinds of daydreaming (Smallwood & Schooler, 2015).

2.4.1 The importance of daydreaming context and content

The fact that daydreaming can have both costs and benefits with respect to psychological functioning suggests that a more balanced and nuanced perspective on the effects of daydreaming is required. Rather than viewing daydreaming as inherently positive and or negative, researchers should more clearly specify when and why daydreaming helps or hinders, and with respect to what. Smallwood and Andrews-Hanna (2013) have urged researchers to examine daydreaming as a heterogeneous phenomenon whereby its effects depend on both the content of daydreaming and the context in which it occurs. These proposals have been formally described as the Context and Content Regulation Hypotheses (Smallwood & Andrews-Hanna, 2013; Smallwood & Schooler, 2015).

The Context Regulation Hypothesis proposes that the extent to which daydreaming has positive or negative effects depends on the context in which it occurs. Specifically, daydreaming in contexts that require continuous attention (e.g. driving) may be detrimental and associated with errors, whereas daydreaming in contexts where the external demands are low or unimportant (e.g. during a long train journey), which, incidentally, are the most fertile contexts for daydreaming (Klinger, 1990), are likely to be associated with benefits such as creativity, problem-solving, and goal pursuit. Here ‘context’ is viewed as the external present (i.e. the demands of one’s current activity) but ‘context’ can also be considered in the broader sense of daydreamers’ motivations and life circumstances. Consider for example, an individual who, during an important work meeting, daydreams about what they might say to a

partner to salvage their relationship after a distressing argument that morning. In this case, daydreaming may simultaneously have negative effects on task performance (e.g. missing important details of the meeting) but positive effects elsewhere (e.g. helping the individual to regulate personal distress at the potential dissolution of the relationship and planning and rehearsing how to mitigate such a negative situation). In this situation, the 'context' of daydreaming may be described not only in terms of the immediate context (i.e. the external demands) but also the emotional context (e.g. negative feelings) and life context (e.g. important life situations or goals) of the daydreamer at the time. Whether daydreaming can be thought to have an overall positive or negative effect will therefore depend on the relative importance and value of attending to the external world versus pursuing an independent thought stream. Crucially, this will depend on what activity the individual considers to be most beneficial at the time (i.e. what takes most priority) and it is not for researchers to decide what is of most benefit or cost to an individual at any one time (e.g. during a laboratory task). This is because, sometimes, even if an external task is deemed important, it may not be as important as other emotional or personal goals and needs that an individual has at the time.

The Content Regulation Hypothesis proposes that the adaptive or maladaptive impact of daydreaming on emotional well-being depends on the specific content underlying the experience. This idea may help to explain why certain kinds of daydreaming (e.g. those indicative of negative, repetitive thoughts such as rumination or worry; Marchetti et al., 2014; Ottaviani et al., 2015) are linked with negative emotional outcomes whereas other kinds of daydreaming (e.g. with positive or interesting content, Franklin et al., 2013; Poerio et al., 2013) are linked with positive emotional outcomes.

The idea that the content of thought is important for determining the impact of thinking on later well-being is mirrored in accounts of repetitive thinking (Segerstrom, Stanton, Alden, & Shortridge, 2003; Watkins, 2008). Research on various forms of repetitive thought, which is often manifested in daydreaming activity, show that it can have both adaptive and maladaptive outcomes with respect to adjustment and well-being. Several forms of repetitive thought are proposed to be conducive to well-being because they involve successful cognitive and emotional processing (e.g. Austenfeld & Stanton, 2004; Greenberg, 1995). Indeed, post-event cognitive processing (e.g. Bower, Kemeny, Taylor, & Fahey, 1998; Calhoun, Cann,

Tedeschi, & McMillan, 2000), emotional processing (e.g. Hoyt, Stanton, Irwin, & Thomas, 2013; Manne, Ostroff, & Winkel, 2007) and reflective thinking (e.g. Burwell & Shirk, 2007; Eisma et al., 2015) predict successful emotional adjustment following stressful events. However, other forms of repetitive thinking, notably rumination and worry, have been associated with negative emotional outcomes (e.g. Ehlers, Mayou, & Bryant, 1998; Holeva, Tarrier, & Wells, 2002; Robinson & Alloy, 2003).

What distinguishes adaptive from maladaptive forms of thinking is their content, and several important features of thinking have been identified and explored: valence, purpose, and level of construal. Negatively valenced and positively valenced thoughts tend to be associated with negative and positive outcomes respectively (Segerstrom, Eisenlohr-Moul, Evans, & Ram, 2015; Segerstrom, Roach, Evans, Schipper, & Darville, 2010; Watkins, 2008). Thinking with a searching purpose (i.e. exploring possibilities and understanding) has been associated with adaptive outcomes when thinking is positive, and negative outcomes when thinking is negative (Segerstrom et al., 2003). Abstract and concrete construals have been associated with maladaptive and adaptive outcomes respectively, at least for negatively valenced thoughts (Watkins, 2008). This strongly suggests that in order to fully understand the impact of daydreaming on later emotional well-being researchers must explore the content of those cognitions, including, but not limited to, aspects such as valence, purpose, and level of construal.

Although not explicitly stated as part of the content regulation hypothesis, the nature, as well as the content, of daydreaming experiences are also likely to have an impact on emotional well-being; in particular, individuals' subjective responses, and reactions, to their daydreams. For example, spontaneous thoughts that are appraised as unwanted and uncontrollable, and associated with attempts at thought suppression, may be especially linked to negative outcomes and the persistence of negative affective disorders such as depression, anxiety and obsessive compulsive disorder (Borkovec, Robinson, Pruzinsky, & DePree, 1983; Fox, Dutton, Yates, Georgiou, & Mouchlianitis, 2015; Purdon & Clark, 2001; Purdon 2004). Likewise daydreams that are volitional, wanted, and perceived as helpful or enjoyable may be associated with greater emotional well-being (e.g. through the use of deliberately savoring past and possible future events; Quoidbach, Berry, Hansenne, & Mikolajczak, 2010).

In line with the nuanced and considered approach to examining the impact of daydreaming on psychological functioning proposed by Smallwood and Andrews-

Hanna (2013), the remainder of this thesis is concerned with examining the potential benefit of daydreams with *social content* for socio-emotional well-being in the specific *context* of social threat or challenge. In the next chapter, I advance the view that social daydreams are beneficial for promoting and regulating positive social feelings under conditions that threaten or challenge socio-emotional well-being. This, I propose, may be one of the adaptive functions of (social) daydreaming.

CHAPTER 3

SOCIAL DAYDREAMS AND THE REGULATION OF SOCIO-EMOTIONAL WELL-BEING

In this Chapter I propose and develop the view that a core function of social daydreaming is to enable individuals to achieve a satisfactory level of socio-emotional well-being. This chapter provides the theoretical background for the three empirical studies presented in the thesis, which test the proposal that social daydreams regulate socio-emotional well-being. First, I explain what socio-emotional well-being is and why it is important. Next, I review existing literature on the regulation of socio-emotional well-being and, drawing on both Perceptual Control Theory (PCT; Powers, 1973) Klinger's current concerns theory of daydreaming (1975, 1996, 2009, 2013), describe and explain how social daydreaming is proposed to be vital to this process, both immediately and over time. In doing so, I outline a basic model of socio-emotional well-being regulation via social daydreaming, which is tested in the forthcoming empirical chapters.

3.1 What is socio-emotional well-being?

I use the term socio-emotional well-being to refer to subjective feelings of interpersonal connection or belonging (i.e. positive social feelings) that result from the perception that one has satisfying and fulfilling social relationships appropriate to one's social needs. This distinguishes socio-emotional well-being from other conceptions of well-being such as: *subjective well-being,* which comprises of positive affect, negative affect and cognitive evaluations of satisfaction with life (Diener & Lucas, 1999), *eudaimonic well-being,* which describes the extent to which individuals can achieve a sense of meaning in life and fulfill their potential (Ryan & Deci, 2001; Waterman et al., 2010), and *psychological well-being,* which consists of various well-being dimensions such as environmental mastery, positive relations with others, autonomy, personal growth, and self-acceptance (Ryff & Keyes, 1995).

Although socio-emotional well-being is separate from other conceptions of well-being it is related to hedonic, eudaimonic, and psychological well-being. For example, socio-emotional well-being reflects one component of psychological well-being namely, the dimension of 'positive relations with others', which refers to the

possession of meaningful and positive interpersonal relationships. Socio-emotional well-being is also related to subjective and eudaimonic well-being because people who experience socio-emotional well-being (indexed by having close positive relationships and social support) also report greater happiness and life satisfaction (Meyers, 2000), and the experience of positive social relationships and social activities is associated with greater meaning in life (Baumeister, Vohs, Aaker, & Garbinsky, 2013; Lambert et al., 2013).

Socio-emotional well (or ill) being can be experienced and measured at different temporal levels. For example, social feelings such as connection with others, loneliness, and rejection, may be relatively short-lived and fleeting (e.g. the negative social feelings experienced when one is ignored during a conversation) but may also be more persistent and experienced for longer periods of time (e.g. somebody who is chronically lonely). It is likely that repeated socio-emotional experiences at a micro-level will lead to more chronic overall patterns of perceived socio-emotional well-being (e.g. persistent micro-moments of interpersonal connection, can lead to feelings of being loved and supported; Fredrickson, 2013).

3.1.1 The importance of socio-emotional well-being

The need to feel interpersonally connected, to love and be loved, is central to theories of human motivation. Maslow (1948) considered love and belongingness to be the most primitive affective needs, emerging after an individual's basic physiological and safety needs have been met. Fromm (1956) argued that humans *must* establish themselves in strong affective interpersonal relationships, a process that can be achieved constructively or destructively (e.g. in loving versus controlling relationships). More recently, self-determination theory (Ryan & Deci, 2000) considers relatedness (feeling close and connected with others), along with autonomy and competence, to be a basic need for human functioning. Baumeister and Leary (1995) have referred to these conceptualizations as the "need to belong" and review extensive evidence consistent with the hypothesis that humans are fundamentally driven to form and maintain close, positive, relational bonds. In particular, the need to belong is described as an evolved drive for "*a minimum quantity of lasting, positive, and significant interpersonal relationships*" (Baumeister & Leary, 1995, p. 497). The need to belong can be thought of as a higher-order desired end state (i.e. goal) that organizes lower level relational goals (Elliot & Fryer, 2008). For example, goals such

as “make new friends”, “avoid losing a romantic partner’s interest”, and “remembering your mother’s birthday” can all be considered lower level manifestations of the need to form and maintain positive relationships with others.

Achieving a sense of interpersonal connection is vital for a healthy, happy, and meaningful life. A large body of evidence demonstrates that when people are socially connected they thrive and when people are socially disconnected they suffer. The beneficial effects of interpersonal connection, and in particular, positive social relationships, are well established. For example, people report feeling happiest when socializing (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004) and during interactions with friends (Csikszentmihalyi & Hunter, 2003). Feelings of social connectedness are predicted by social activities and supportive interactions (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000), and interactions with loved ones are linked with lower blood pressure (Holt-Lunstad, Uchino, Smith, Olson-Cerny, & Nealey-Moore, 2003). Being socially connected has a positive effect on physical health, including on cardiovascular, endocrine, and immune functioning (Uchino, Cacioppo, & Kiecolt-Glaser, 1996) as well as longevity in general (Holt-Lunstad, Smith, & Layton, 2010). Positive social relationships are proposed to influence health both directly, through biological mechanisms (e.g. reduced stress reactivity; Eisenberger, Taylor, Gable, Hilmert, & Lieberman, 2007; Reblin & Uchino, 2008) and indirectly, though the promotion of health behaviors (*see* Uchino, 2006).

A complementary body of evidence documents the deleterious consequences of inadequate social connection for mental and psychical health. In particular, research has focused on the detrimental effects of loneliness, which is an aversive feeling accompanying the perception that the quantity or quality of one’s social relationships are not meeting one’s social needs (Russell, Peplau & Cutrona, 1980). Loneliness can produce negative effects on cognition and behavior (Cacioppo & Hawkley, 2009) and even moderate levels are associated with mental health problems (e.g. depression, anxiety and suicidal ideation; Heinrich & Gullone, 2006) and poorer physical health (Caspi, Harrington, Moffitt, Milne, & Poulton, 2006; Pressman et al., 2005). Perhaps most strikingly, a recent meta-analysis of 70 prospective studies with nearly 3.5 million participants estimated that loneliness increases one’s likelihood of death by 26%, thereby posing an equivalent risk to mortality as well-know health risks such as smoking, obesity, and a sedentary lifestyle (Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015).

Although forming and maintaining positive social relationships to achieve a sense of connectedness is inherent to human striving and thriving, achieving and maintaining socio-emotional well-being is not always easy. Navigating social relationships can be fraught with difficulties. People suffer from rejection, loneliness and social isolation, and they must maintain relationships and form new ones in light of changing life circumstances (e.g. relationship dissolution, geographical relocation, bereavement). People are regularly faced with challenges that threaten their need to belong and sense of interpersonal connection (Leary, 2001).[12] Like other basic needs, threats to belonging influence cognition, affect, and behavior (Baumeister & Leary, 1995). In the same way that the states of hunger and thirst hijack thoughts, feelings, and behaviors to satisfy the need for sustenance, when the need to belong is threatened, psychological processes are driven towards gaining and maintaining *social* sustenance (Leary, Tambor, Terdal, & Downs, 1995; Pickett & Gardner, 2005). When socio-emotional well-being is threatened, the psychological system must engage in behavioral and/or mental activities aimed at restoring and replenishing connectedness (Gere & MacDonald, 2010). I present a theoretical model, which describes and explains how social daydreaming is involved in this process and functions to regulate socio-emotional well-being to help individuals' achieve a satisfactory and necessary sense of interpersonal connection.

3.2 A proposed model of socio-emotional well-being regulation via social daydreaming

The model shown in Figure 3.1 is a schematic diagram that represents how social daydreaming is proposed to relate to, and regulate, socio-emotional well-being. Note that this model is neither the only way that socio-emotional well-being can be regulated, nor the only way that social daydreaming can be functional/adaptive. The model is based on principles of Perceptual Control Theory (PCT; Powers, Clark, &

[12] Likewise, people are also responsible for threatening other peoples' need to belong. Nobody enjoys feeling rejected or interpersonally disconnected and yet we are not simply passive receivers of thwarted belonging: we also reject, ostracize, and avoid other people (sometimes knowingly and deliberately, other times unknowingly and without premeditation). Rather than this revealing a malign part of human nature, it most probably reflects the fact that the amount of time and effort we can dedicate to achieving and maintaining positive social connections is limited (Tooby & Cosmides, 1996).

McFarland, 1960; Powers, 1973 and also Carver & Scheier, 2002), which is a cybernetic theory of self-regulatory behavior originally derived from control system engineering. PCT describes how a system is regulated via negative feedback loops, which act to reduce a discrepancy between an observed and desired state. There are four key components to this process:

(1) An input function, which senses information relevant to the system (e.g. the perception of one's current behavior and/or state)
(2) A standard, which represents the goal (desired end state) that is to be obtained
(3) A comparator, which is a mechanism that compares the input to the standard to detect a discrepancy between an observed and desired state (i.e. whether regulation is required)
(4) An output function, which is activated when a discrepancy is present so as to minimize it.

To illustrate these principles, consider an example of feedback control involved in maintaining a car speed whilst driving (adapted from Vancouver, 1996). An individual senses the speed of the car (e.g. by looking at the speed gauge) and compares this against the desired speed (e.g. the speed limit of the area): the input and standard are compared in the comparator. If the difference detected between these two values is too high (e.g. going 40mph in a 30mph zone) then appropriate behavior (e.g. reducing the pressure on the accelerator) is engaged (i.e. the output function). This reduces the discrepancy so that the input now matches the standard. Note that standards can also change (e.g. different speed limits) which also creates a discrepancy and subsequent discrepancy reduction via behavioral output. Note also that disturbances from the environment are implicated in the feedback loop because they can impact the input function, which can create a mismatch between the input and standard (e.g. a hill could be thought of as an environmental disturbance which results in an observed slowing a car detected by the input function).

When applied to the regulation of socio-emotional well-being the following components and process can be described according to three principles (which are more fully explained and justified in the remainder of this chapter):

Principle 1: Socio-emotional well-being has a set point to which people return but fluctuates across time and situations (this is the standard, or reference value in the model). Environmental threats or challenges to belonging reduce an individual's level of socio-emotional well-being (this is an environmental disturbance which affects the input function).

Principle 2: An individual's current level of socio-emotional well-being acts as a signal for whether regulation is required (i.e. the input function). When an individual's current level of socio-emotional well-being is substantially different from the desired standard (assessed via the comparator), then psychological processes are mobilized with the aim of replenishing connectedness (i.e. discrepancy reduction). Regulation attempts (i.e. the output function) can be varied but often consist of external behavior directed at the present external environment (e.g. seeking interpersonal contact).

Principle 3: When an individual is unable to take immediate or satisfactory action to achieve the social goals that would replenish connectedness, then attempts to regulate socio-emotional well-being will be mental, via social daydreaming. Social daydreaming can have an immediate effect on socio-emotional well-being by replenishing connectedness through the regulation of emotion. The regulatory effect of social daydreaming on socio-emotional well-being can also emerge over time through a process of adaptation/adjustment to social challenges.

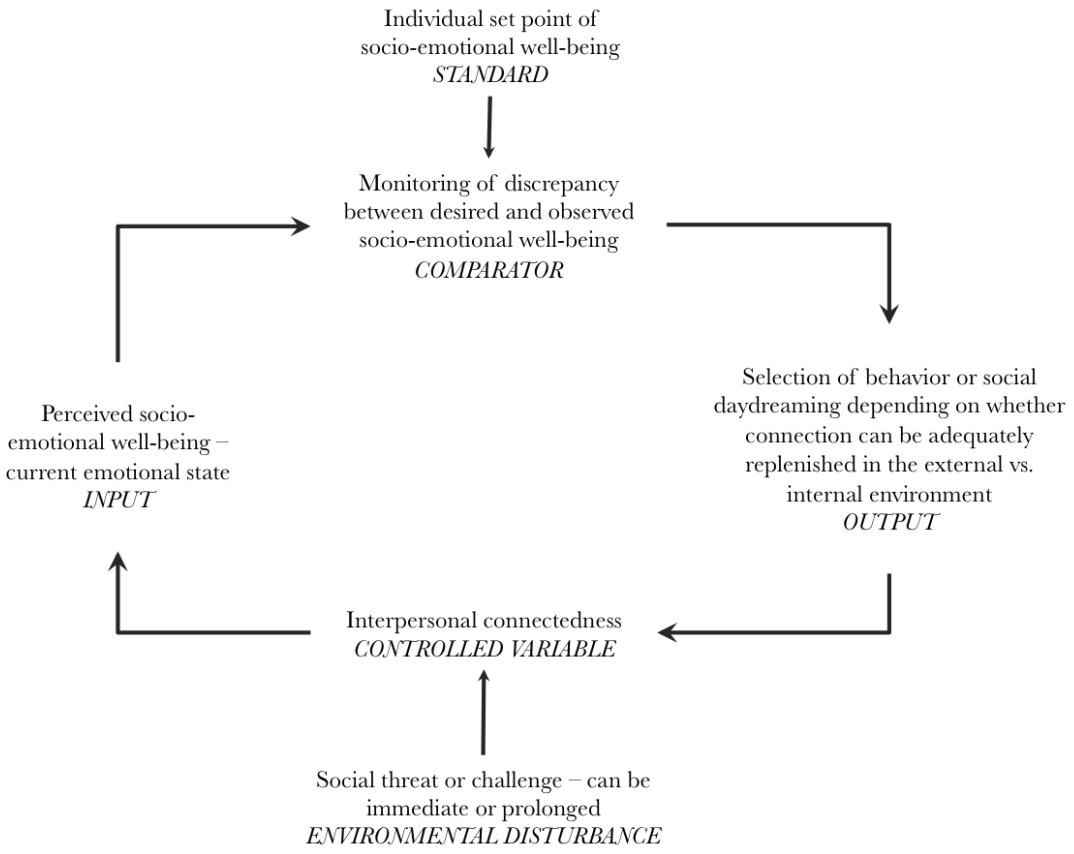

Figure 3.1. A proposed model of socio-emotional well-being regulation via social daydreaming.

Social threats or challenges (which can be immediate or prolonged) are an environmental disturbance, which affect an individuals' level of socio-emotional well-being. The resulting negative social emotions or current emotional state (the input) results in a discrepancy between observed and desired levels of socio-emotional well-being via the comparator. This signals that attempts to regulate socio-emotional well-being and replenish interpersonal connectedness are required (i.e. the output). If connectedness can be adequately replenished in the current external environment then individuals will engage in external behaviors to regulate socio-emotional well-being. However, under conditions where an individual is unable to adequately replenish connectedness in the immediate external environment then attempts (i.e. outputs) will be mental via social daydreaming. Note that the success of social daydreaming (or indeed behavior) for replenishing connectedness is not guaranteed and will depend on a variety of factors (e.g. the content and nature of daydreaming, or, in the case of behavior, a positive response from other people). Also note that the regulation of socio-emotional well-being can take place immediately (when negative social emotions are counteracted in the moment) and over time (when an individual adjusts or adapts to prolonged social challenges).

3.2.1 Principle 1: Fluctuations in, and threats to, socio-emotional well-being

An individual's current level of socio-emotional well-being is proposed to fluctuate across time and situations depending on social challenges or threats in the external environment. Drawing parallels with hedonic well-being (i.e. positive and negative affect rather than social feelings) and hedonic adaptation theory (Kahneman, Diener, & Schwarz, 1999), socio-emotional well-being is likely to have a set point, or baseline level, that individuals seek to maintain. This set point is likely to be above average levels (e.g. sampling 1.1 million individuals across 45 nations Diener & Diener, 1996 found average subjective well-being to be 6.75 on a 10 point scale) because a positive emotional set point is likely to have survival value (e.g. promoting interpersonal bonding, Diener, Lucas, & Scollon, 2006). The set point of socio-emotional well-being is also likely to be subject to individual differences (i.e. people may have different optimal baseline levels of socio-emotional well-being; Diener, et al., 2006). Although there is little support for the idea that socio-emotional well-being acts like hedonic well-being in terms of a set point and adaptation across time, several empirical studies demonstrate that feelings of social connectedness fluctuate depending on the environmental context. Denissen, Penke, Schmitt, and Van Aken (2008) found that fluctuations in people's level of social inclusion depended on the quality of their social interactions, and levels of loneliness have also been found to fluctuate within and across days as a function of the social context (e.g. the amount and quality of social contact; Arpin, Mohr, & Brannan, 2015; Gross, Juvonen, & Gable, 2002; Larson, 1999), and feelings of relatedness (i.e. connection with others) also fluctuates across time which predicts later well-being (Reis et al., 2005).

Environmental threats, or challenges, to belonging reduce an individual's level of socio-emotional well-being (Gardner, Pickett, Jefferis, & Knowles, 2005; Pickett & Gardner, 2005). But what constitutes social threat or challenge? At the most basic level a social threat or challenge is an event (which may be discrete or prolonged) that is perceived by an individual to diminish feelings of positive interpersonal connection and typically involves the inference that others do not sufficiently value a relationship (Leary, et al., 1995; Leary, Koch, & Hechenbleikner, 2001). Typically, social threat has been examined in terms of social exclusion, most notably, rejection and ostracism. Social threat in these circumstances is conceived of as either (a) negative behavior from others (e.g. in the case of rejection) or (b) lack of positive behavior from others

(e.g. in the case of non-inclusion/ostracism). Laboratory paradigms for inducing social threat include: (a) ignoring or excluding participants to ostracize them (as in cyberball; Williams & Jarvis, 2006, or the train ride paradigm, Zardo, Williams, & Richardson, 2005), (b) telling participants that they are being explicitly rejected (e.g. that nobody wants to work with them, Nezlek, Kowalski, Leary, Blevins, & Holgate, 1997), (c) telling participants that they will encounter future rejection (e.g. providing participants with bogus feedback on a 'personality' test which indicates that they will be alone in later life; Twenge, Baumeister, Tice, & Stucke, 2001), and (d) asking participants to re-live past experiences of rejection (e.g. writing about a rejection experience; Gardner, Pickett, & Brewer, 2000).

Although social threat is often conceived of as an immediate or momentary state—most likely because this is how it is induced and examined in laboratory settings—social threats or challenges can extend beyond events that have just occurred. Often, social threat can be more prolonged and enduring, which is likely to be the case in more naturalistic settings. For example, social threat has also been conceptualized as more enduring in specific relational contexts (e.g. romantic relationships) which can include relationship conflict, criticism from one's partner, and feelings of being ignored or unappreciated (Murray, Griffin, Rose, & Bellavia, 2003; Murray & Holmes, 2015). Prolonged social challenges or threats may also include losses or reductions in (perceived) social connection or the (perceived) availability of social support over extended periods of time. Examples might include important life events such as: bereavement, divorce, and relationship dissolution as well as life transitions that involve changes in social networks or social roles and separation from loved ones (e.g. transition to university, starting a new job, becoming unemployed, emigrating, parenthood). Social threats may also take the form of (perceived) relational threats such as when one's partner builds a relationship with an attractive work colleague, when close others have increased work demands that mean less time for interaction or less caring/supportive behavior, or when close others form other positive social bonds. Threats to belonging are likely to be most stark when they represent threats to established social bonds, rather than rejection, exclusion, or threat from an unknown other (Leary, et al., 2001; Miller, 1997).

3.2.2 Principle 2: The regulation of socio-emotional well-being in the external environment

What happens when individuals' face challenges or threats to their socio-emotional well-being? When threats are attended to, they activate and motivate compensatory responses. In the same way that states of hunger and thirst hijack thoughts, feelings and behaviors to satisfy the need for sustenance, when the need to belong is threatened, psychological processes are driven towards gaining and maintaining social sustenance. In order for socio-emotional well-being to be regulated the psychological system must (a) detect social threats or challenges and (b) engage in mental or behavioral activities aimed at restoring/replenishing connectedness (Leary et al., 1995; Pickett & Gardner, 2005).

3.2.2.1 Detecting threats to socio-emotional well-being: emotions as a signal

Threats or challenges to socio-emotional well-being result in aversive and negative feeling states which signal that regulation is required and motivates attempts to replenish connectedness (Molden & Maner, 2013; Pickett & Gardner, 2005). In support of this, a meta-analysis of 88 laboratory rejection studies showed that immediate threats to socio-emotional well-being result in decreased positive, and increased negative mood (overall effect on mood was moderate: d = -.50; Gerber & Wheeler, 2009 although see Baumeister, DeWall, & Vohs, 2009). This indicates that negative mood occurs as a result of rejection, at least in laboratory settings. Although it might be expected that threats to socio-emotional well-being reduce positive and/or increase negative *social* feelings (e.g. rejection, disconnection, loneliness), laboratory studies of rejection have not typically measured social feelings, and when they have (e.g. Williams, Cheung, & Choi, 2000; Zadro, et al., 2005) these measures have been used as manipulation checks of the rejection induction procedure, rather than explored as the effect of rejection on social feelings. Unfortunately, this means that the effect of social threats on inherently social feelings cannot be determined from the large number of experimental studies on social rejection and exclusion. This is surprising because threats to socio-emotional well-being should most affect the feelings associated with the experience of social disconnection.[13]

[13] This may explain why several research investigations have failed to find both effects of rejection on negative affect (e.g. Gardner et al., 2000; Twenge, Catanese,

Nevertheless, other investigations have shown that threats to socio-emotional well-being *are* associated with changes in inherently social feelings (such as hurt feelings and loneliness), as opposed to negative affect more generally. For example, hurt feelings are proposed to be a specific kind of social pain, which are activated in response to threats to social connection (MacDonald, 2009; MacDonald & Leary, 2005). Indeed, experimental manipulations that make participants believe that others do not wish to interact with them elicit hurt feelings (Buckley, Winkel, & Leary, 2004; Snapp & Leary, 2001), and when people are asked to describe instances of hurt feelings they tend to describe interpersonal criticism, rejection or betrayal – often by close others (Leary, Springer, Negel, Ansell, & Evans, 1998). Other social feelings such as loneliness are predicted by events that threaten socio-emotional well-being such as peer rejection (Boivin, Hymel, & Bukowski, 1995), geographical relocation (Brown & Orthner, 1990; Rokach, 1998) and lack of social contact (Gross et al., 2002, Larson, 1999).

Broadly speaking, emotions are proposed to act as signals that monitor well-being and guide behavior (Smith & Kirby, 2000). More specifically, negative social emotions and/or reductions in positive social emotions signify that the need for interpersonal connection is at risk or lacking. This signal then motivates attempts to replenish connectedness (Gardner, Pickett, Jefferis, & Knowles, 2005). The adaptive value of negative social emotions for replenishing connectedness is noted in accounts of belonging regulation (e.g. Leary et al., 1995; Pickett & Gardner, 2005) and loneliness. For example, Cacioppo, Cacioppo and Boomsma (2014) propose that loneliness "*evolved as a signal to serve as a signal that one's connections to others are frayed or broken and to motivate the repair and maintenance of the connections to others that are needed for our health and well being as well as for the survival of our genes*" (p. 5). In this way, social feelings act as a signal or trigger that motivates

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Baumeister, 2003; Zadro, et al., 2004) and evidence to show that negative affect mediates the behavioral effects of rejection (e.g. Buckley, Winkel, & Leary, 2004; Williams et al., 2000). Researchers typically measure mood with the positive and negative affect schedule (PANAS; Watson, Clark, & Tellegen, 1988) which consists of items such as 'interested', 'excited', 'ashamed', 'irritable', and 'afraid'. The items of the PANAS do not seem to capture the feelings most pertinent to the context of interpersonal threat (i.e. social feelings) and so perhaps researchers should not be surprised when they observe null effects when using these scales.

an individual to replenish connectedness. But *how* do individuals restore their sense of interpersonal connection when their socio-emotional well-being has been threatened?

3.2.2.2 Attempts to replenish connectedness

A large body of research shows that, under conditions of socio-emotional threat, individuals engage in a variety of behaviors with the aim of replenishing connectedness. In particular, research has explored three main ways that individuals attempt to restore interpersonal connection following rejection and exclusion.[14] First, individuals show increased sensitivity to, and monitoring of, social information for reconnection opportunities. For instance, threats to socio-emotional well-being are associated with greater memory for, and attention to, social events (Gardner, Pickett, & Brewer, 2000; Gardner et al., 2005; Hess & Pickett, 2010), increased attention to smiling faces (DeWall, Maner, & Rouby, 2009) and superior ability to detect 'fake' from genuine smiles (Bernstein, Young, Brown, Sacco, & Claypool, 2008). Therefore, the processing of social information under socio-emotional threat appears to be systematically driven towards seeking out opportunities for reconnection. Second, individuals engage in ingratiating social behavior including conformity (Williams et al., 2000), co-operation (Kerr et al., 2009; Ouwerkerk, Kerr, Gallucci, Van Lange, 2005), working harder in group tasks (Williams & Sommer, 1997) and behavioral mimicry to promote affiliation and rapport (Lakin, Chartrand, & Arkin, 2008). Third, individuals seek more direct forms of interpersonal contact and new relational bonds. In a series of studies Maner, DeWall, Baumeister, and Schaller (2007) found that excluded (compared to control) participants (a) showed more interest in a hypothetical student service aiming to help people socially connect (Study 1), (b) expressed a greater desire to interact with other people during a subsequent task (Study 2), (c) rated others as nicer, friendlier, and more desirable

[14] Note that another line of research documents that individuals can sometimes respond to social exclusion through aggressive or antisocial behaviors, which may be indicative of a maladaptive response to rejection (see Leary, Twenge & Quinlivan, 2006, for a review). However, antisocial behavior is commonly directed at the source of the rejection, and most likely reflects attempts by the rejected individual not to be hurt again and/or to gain control over the situation (Gerber & Wheeler, 2009). Aggressive effects may also be an artefact of the experimental situation because meaningful connection with others cannot be sought. Indeed, aggressive effects are eliminated when participants are given opportunity for positive social connection (Twenge, Zhang, Catanese, Dolan-Pascoe, Lyche, & Baumeister, 2007).

(Studies 3 & 4), (d) rated an interaction partner's work as more creative and, on that basis, rewarded them with money (Study 5), and (e) assigned more money to other people, but only when they believed that they would have the opportunity to interact with them (Study 6).

Clearly, under conditions of socio-emotional threat, individuals' cognitions and behaviors are directed towards replenishing connectedness in the present external environment – either through actual interpersonal behavior or through seeking reconnection and affiliation opportunities. Indeed, a meta-analysis of experimental studies on rejection and exclusion found that threats to socio-emotional well-being motivated reconnection attempts in the present external environment (d = .96, Gerber & Wheeler, 2009). However, an issue with the laboratory investigations described above is that they may not accurately reflect how socio-emotional well-being is regulated in daily life. Importantly, the opportunities and means for replenishing connectedness in laboratory studies are dictated by the experimental design and they do not provide participants with the opportunity for *meaningful* social connection (e.g. with a loved one). For example, after rejection, participants in Maner and colleagues' (2007) studies might have, if given the opportunity, opted to connect with somebody from their social network, rather than interact with a stranger. In daily life, connection is likely to be best replenished through meaningful contact with close others because doing so would affirm that one has meaningful interpersonal connections (Mikulincer & Shaver, 2007; Sommer, 2001).

Although socio-emotional well-being might be best regulated through direct contact with close others in the external environment, there may be situations where meaningful social contact is not readily available, or may not be the optimal strategy. For instance, feelings of loneliness are often experienced in situations where meaningful social connection is not readily available (e.g. when people are alone; Gross et al., 2002; Larson, 1999) and experiences of rejection, exclusion, and ostracism may typically occur in social situations where meaningful social connection is unlikely to be immediately reestablished (e.g. with individuals who are the source of the rejection; Leary et al., 2006). There is also reason to think that attempts at reestablishing social contact may hinder rather than help, at least in the case of loneliness. This is because loneliness is associated with a cycle of negativity in which lonely individuals hold negative social expectations about themselves and others, engage in more negative social encounters and behaviors that increase the likelihood

of rejection and, as a result, may distance themselves from situations which could counteract their loneliness (Anderson, Horowitz, & French, 1983; Hawkley, Preacher, & Cacioppo, 2007; Jones, Freemon, & Goswick, 1981). Similarly, research has also shown that, ironically, individuals who are most sensitive to rejection often over-react under conditions of social threat and engage in maladaptive behaviors that ultimately lead others to reject them (Levy, Ayduk, & Downey, 2001).

Gardner and colleagues (2005) have proposed that in situations where meaningful social contact is not available or optimal, individuals can use indirect strategies to regulate socio-emotional well-being: *social shielding* and *social snacking*. The concept of social shielding suggests that individuals can protect or 'shield' their sense of interpersonal connection through the use of social surrogates. Social surrogates can take many forms (e.g. one-sided relationships to TV characters, imaginary companions, or anthropomorphizing nonhuman objects such as a stuffed toy) but are considered substitutes for actual interpersonal connection and relationships. Social surrogates are proposed to provide the experience or illusion of interpersonal connection even when no 'real' connectedness is experienced (Gardner & Knowles, 2008). Indeed, research on para-social attachments (i.e. one-sided attachments to television personalities, celebrities, or characters in novels) suggests that people turn to favored TV programs when they feel lonely and that thinking about favored TV programs can replenish feelings of interpersonal connection (Derrick, Gabriel, & Hugenberg, 2009). Other research shows that under conditions of socio-emotional threat, individuals attribute human characteristics to non-human agents (e.g. gadgets such as battery chargers and air purifiers) and increase their belief in religious agents such as God, which fosters and replenishes interpersonal connection (Epley, Akalis, Waytz, & Cacioppo, 2008). Engagement with fiction may, amongst other benefits, allow people to engage with and derive interpersonal connection though socially constructed worlds (Mar & Oatley, 2008) and even comfort food can counteract loneliness and social threats by virtue of its association with important relational bonds (Troisi & Gabriel, 2011, although *see* Ong, Ijzerman, & Leung, 2015, for a recent failed replication of this effect).

In contrast to social shielding, social snacking describes attempts to temporarily replenish connectedness through the use of social symbols that remind individuals of their existing, valued, social connections. The use of social snacks to replenish connectedness has received less attention in the literature compared to social

surrogates. However, in an initial investigation of what might constitute common 'social snacks', Gardner, Knowles and Jefferies (2004; cited in Gardner et al., 2005) found that, under conditions of loneliness when social contact is unavailable, participants reported using a variety of social symbols. The most commonly reported social snack was looking at photographs of loved ones, which may serve as reminders of important social bonds (and might explain why people commonly populate their desks at work with photographs or mementos of loved ones, which, in turn, may increase productivity and well-being; Wells, 2000). Other commonly reported social snacks were re-reading emails, turning to other reminders and mementoes of social bonds (e.g. items of clothing), and *daydreaming* of loved ones. Interestingly, this is one of the few investigations that implicate mental representations of other people as a means of regulating socio-emotional well-being, and the only example (at least that I have found) in the literature where daydreaming is *directly* implicated in belonging regulation.

Instead, what is clear from the research reviewed so far, is that the vast psychological research on socio-emotional well-being regulation has tended to focus on either (a) people's behavioral attempts to replenish connectedness (e.g. through direct social contact, affiliative behaviors, engagement with external objects or material than might provide an adequate surrogate or 'snack' for meaningful social interaction) and/or (b) people's cognitive processes that are directed towards the external environment (e.g. cognitive processing that is directed towards opportunities for social reconnection in the external environment). Generally speaking, the psychological literature would suggest that individuals appeal to their external environments rather than their internal worlds to regulate belonging. In fact, if one believed the social psychological literature, internally-generated thought would appear to play only a minor, and possibly insignificant role, in how socio-emotional well-being is regulated. And, on the rare occasions when internally-generated thought *is* considered a means of regulating socio-emotional well-being (e.g. as a social snack), it is conceived of as one of many indirect (and probably deliberate) strategies that people might use to replenish connectedness. But daydreaming about other people is not just a subsidiary activity, or one that individuals have to use in a deliberate fashion as a 'last resort' or seemingly sub-optimal strategy to foster connectedness. Rather, social daydreaming is a naturally occurring mental process

that plays a central and adaptive role in the regulation on socio-emotional well-being both in the moment and over time. I explain why in the next section.

3.2.3 Principle 3: Social daydreaming and the regulation of socio-emotional well-being.

I propose that when individuals are unable to appropriately regulate their need for interpersonal connection in the external environment, then they will attempt to do so mentally (often spontaneously, but also deliberately) via social daydreaming. This proposition is founded on the current concerns theory of daydreaming which proposes that daydreams are triggered when overt action towards a goal in not possible (e.g. when an individual feels lonely but is unable to seek social connection through direct social contact) and means that daydreams allow an individual to make mental progress towards that goal when doing so in the external world is not feasible (e.g. by fostering feelings of interpersonal connection through the imagination).

3.2.3.1 Current concerns theory: Linking daydreaming to goal pursuit

According to Klinger's current concerns theory (1975, 1996, 2009, 2013), daydreams allow individuals to make progress on personal and emotional goals when doing so in the current external environment is not possible. For example, an individual might use a long train journey to mentally consider and organize work commitments, or whilst taking a shower he or she might imagine the best way to apologize to a friend after an argument. Equally, an individual might use daydreams to regulate his or her current emotional state. For example, bringing to mind a pleasant scenario might mitigate feelings of anxiety about an upcoming event. In these cases, daydreams can be used to make goal progress both in the present (via emotional goals) and for the future (e.g. through mental, rehearsal, planning or problem-solving). When goal-directed action is not possible in the external environment daydreams allow individuals to make progress towards their personal or emotional goals.

Although the term *current concern* might imply that current concerns are negative, the term is simply used to refer to any goal that an individual is committed to pursuing or avoiding. More specifically, a current concern describes the hypothetical motivational state between committing to a goal and either achieving or abandoning that goal. Goals in this sense are viewed as desired end states which may be relatively concrete (e.g. doing the laundry) or abstract (e.g. achieving a deeper

meaning in life). People possess a different current concern for each goal they are committed to which can last for anywhere between a few seconds to a lifetime. Examples of current concerns include, doing the laundry, going on holiday, eating healthily, maintaining a friendship, or achieving a deeper meaning in life. Recall that the need for interpersonal connection can be considered a higher order goal (end state) that organizes lower level relational or interpersonal goals (Elliot & Fryer, 2008). This implies that a large proportion of individuals' current concerns will be related to achieving and maintaining positive interpersonal relationships and a sense of interpersonal connection, which may explain why daydreams are predominately social in content (*see* Section 2.3.5).

Current concerns are proposed to guide behavior and thought content because they make an individual sensitive to goal-relevant cues in the environment and make emotional arousal in response to those cues more likely. This *protoemotional* response then prepares and motivates action for goal progress or attainment. Notice here the parallel between this principle of current concerns theory and theories of belonging regulation: an individual who encounters a situation in which they perceive their sense of interpersonal connection to be threatened, experiences negative (social) emotions (e.g. loneliness) which are proposed to initiate attempts to replenish connectedness in the external environment. However, current concerns theory posits that in situations where individuals' encounter goal-relevant cues that do not lend themselves to attaining those goals (i.e. goal progress in the external environment is blocked), mental attempts at goal pursuit will ensue via daydreaming. For example, hearing a friend's name in a song on the radio may act as a reminder that the friend has an upcoming birthday, which then triggers thoughts and images about what gift to give, what the birthday party might be like, who will be there, and what conversations might unfold. In this way, daydreams are goal-relevant and involve mentally pursuing or seemingly attaining goals when doing so in reality is not possible. Daydreams therefore allow individuals to make mental progress towards relevant goals either in the present (when those goals are emotional) or in the future (when those goals are instrumental), and probably commonly support both forms of goal attainment (although this has yet to be empirically discerned).

Several investigations support current concerns theory by demonstrating (a) that daydreams are predominately goal-related (i.e. their content is related to an individual's goal pursuits), (b) that daydreams are triggered by external and internal

cues related to current concerns, and (c) that influencing and individuals' current concerns affects daydreaming activity in attempts to foster and mobilize goal progress and/or fulfillment.

The idea that daydreams are goal-related is supported by a number of studies showing that ongoing thought content is related to individuals' current concerns. Gold and Reilly (1985-86) found that 65% of daydreams over a two-week period were related to the five most important concerns in participants' lives. Likewise, participants in a study by Klinger, Bartha, and Maxeiner (1980) spent, on average, 30% and 50% of the time daydreaming about their most important, and top two most important, concerns respectively. More recently, ESM studies have confirmed that daydreams are related to individuals current concerns. For example, Poerio et al. (2013) found that daydreams tended to be concern related (average levels of concern-related daydreaming were 3.20 on a 5-point scale where higher scores represented greater relevance of daydreaming to current life concerns), and both Kane et al. (2007) and McVay et al. (2009) found that participants tended to daydream more about concern-related content than fantasy or worry.[15] The content of mind wandering episodes during laboratory tasks also indicates that off-task thinking predominately reflects the processing of self-relevant goals (Baird et al., 2011; Stawarczyk et al., 2011a) and periods of mind wandering are associated with elevated physiological activity (e.g. heart rate and skin conductance) which is purported to reflect the fact that, during mind wandering, attention is drawn to current concerns which are more emotionally arousing than the experimental situation in which tasks take place (Smallwood et al., 2004, Studies 1 & 2; Smallwood et al., 2007). The fact that daydreams are also predominately future focused (as reviewed in Section 2.3.3) also supports the idea that daydreams involve future focused goal pursuit. However, past-related daydreams may also help with goal progress or fulfillment. For example, the recapitulation of past events can lead to greater understanding of oneself and others in a process of sense making (Immordino-Yang et al., 2013; Park, 2010), consolidation (Christoff et al., 2011), learning (e.g. through processes of counterfactual thinking; Epstude & Roese, 2008), and the regulation of emotion (e.g. Josephson, 1996).

[15] Note that these categories are not mutually exclusive and daydreams may include elements of worry and fantasy.

Daydreams are not only goal-related, they are also triggered by goal-relevant cues. Goal-relevant cues can include any feature of the external environment that reminds an individual of his or her current concerns. For example, seeing a postbox on the walk to work may remind an individual of the birthday card he or she should have already posted. How an individual interprets the external world, what he or she notices and attends to, and what ultimately triggers his or her daydreams, is idiosyncratic and depends on individuals' existing and pertinent goal pursuits. Almost anything in the external world can act as daydreaming trigger. This is wonderfully illustrated with an anecdote in Klinger (1990, p. 40) in which he describes futile attempts to create stimuli for experimental studies that did not trigger associations with thoughts:

> *Early in our experimental work we tried to write passages for our tapes that would not remind our listeners of anything significant. Seeing our efforts fail, we made one last desperate try: we referred on one tape to a gray blob. When we stopped the tape a few seconds later, our listener didn't hesitate a bit in reporting her thoughts. She was thinking of her friend who liked elephants!*

In experimental studies, the link between concern-related cues in the external environment and daydreaming has been demonstrated by embedding concern-related cues into experimental procedures and observing daydreaming related activity. Klinger (1990) describes increases in reports of concern vs. non-concern related thoughts during a dichotic listening task when participants were played current-concerns cues (specific to their individual goals). More recently, McVay and Kane (2013, Studies 1-4) showed that surreptitiously priming an individual's current concerns by embedding word triplets related to personal concerns in a sustained attention task (e.g. increase—facial—hair), increased levels of daydreaming compared to when non-concern related words were used.

Although daydreaming can often be triggered by external environmental cues, internal cues (e.g. other thoughts[16] and emotional states) are also likely to play a role

[16] Substantially less daydreaming research has explored how thoughts trigger daydreams. However, experiences of daydreaming from daily life would suggest that thoughts often trigger daydreams, and that the content of daydreams themselves can naturally trigger other daydreams as the mind flits from one topic to another (i.e.

in the initiation of daydreaming. For example, Song and Wang (2012) asked participants to indicate what triggered their daydreaming finding that, out of the 88% of occasions where participants identified a daydreaming trigger, 49% were reported as being triggered by an internal, rather than, external cue.[17] Emotion, in particular, is an internal cue that is thought to trigger and bias daydreaming related activity. This is well illustrated by a classic study conducted by Antrobus, Singer, and Greenberg (1966) who exposed participants to a bogus radio broadcast announcing the entry of Chinese Communists into the Vietnam War. Compared to a control group, participants exposed to the broadcast subsequently experienced more daydreaming, which reflected attempts to deal with the personal implications of the event. Likewise, participants in a study by Stawarczyk, Majerus, and D'Argembeau (2013), who were told that they would have to perform a speech that would be evaluated by psychologists, showed both increased negative emotion and daydreamed more about the upcoming task, compared to participants who believed that they would have to complete a cognitive task. More generally, negative emotional states appear to influence daydreaming. For example, laboratory inductions of negative affect (Smallwood, Fitzgerald, Miles, & Phillips, 2009) have been shown to increase overall rates of daydreaming (as well as increasing daydreaming towards the past; Smallwood & O'Connor, 2011). In daily life, a sad mood has been shown to predict later daydreaming and, in particular, feelings of sadness and anxiety bias later daydreaming to highly relevant life concerns (Poerio et al., 2013). These investigations suggest that negative emotional states trigger daydreaming towards pertinent concerns (either concerns induced by laboratory manipulations or those that an individual already has), which may foster attempts to deal with personal concerns (e.g. through mental problem-solving attempts) and/or the regulation of negative emotional states (Klinger, 1990; Smallwood & Schooler, 2006).

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daydreams within daydreams) – a process that probably operates through associations in memory (Berntsen, 1998).

[17] This study also suggests that there were occasions (22%) when daydreams had no (obvious or reportable) trigger. Perhaps one of the most fascinating questions regarding how daydreams occur is how the brain can seemingly self-generate thought in the complete absence of internal or external cues. Pertinent examples of this might be the cognitions that one experiences in the moments before sleep and, of course, dreaming, where the stream of consciousness seems to operate independently of external or internal input.

3.2.3.2 Implications of current concerns theory for the regulation of socio-emotional well-being

Current concerns theory has implications for how social daydreams are related to and regulate socio-emotional well-being, both in the moment and over time. In terms of the momentary regulation of socio-emotional well-being, current concerns theory suggests that (a) feelings of social disconnection and/or reductions in positive social feelings act as a signal that mobilizes goal pursuit in reparative efforts to achieve connectedness (e.g. seeking meaningful contact with others), (b) when immediate action towards replenishing connectedness is not available, then this will trigger daydreaming, (c) resulting daydreaming will allow an individual to make progress towards their goal of interpersonal connection. An obvious question here is what the content of daydreams will be like under conditions of social threat. What people daydream about is likely to be idiosyncratic and dependent on the context in which social threat is experienced. For example, after being left out of a conversation with work colleagues, an individual might think about an upcoming event with friends (fostering feelings of social acceptance), he or she might think about ways in which they could enhance or reinforce their other social relationships (e.g. doing something nice for a partner), or he or she might simply bring to mind people with whom he or she has a positive relationship with (as a reminder of relational acceptance). However, the kinds of daydreams experienced under social threat in other relational contexts might be different. For example, after an argument with one's partner, an individual might daydream about ways to salvage the relationship, he or she might think about other sources of potential romantic interest, or past romantic partners. The possibilities for what people daydream about when they feel socially disconnected is potentially limitless – but as a general statement, daydreams under conditions of social threat should reflect attempts at socio-emotional well-being regulation.[18,19]

[18] Of course, in addition to immediate emotional effects, social daydreams might have later effects on interpersonal behavior, which can then have a cascading effect on longer-term socio-emotional well-being (e.g. through relationship formation, maintenance, or improvement). Thus, although I am proposing that social daydreams under conditions of social threat regulate momentary socio-emotional well-being, positive, longer-term effects are also likely to be observed.

[19] Also note that I make the assumption that daydreams under conditions of social threat will be social, rather than non-social. One way to regulate negative emotions as

Whether or not these attempts are successful is another issue, to which I return shortly.

3.3 Can social daydreams regulate momentary socio-emotional well-being?

Although daydreaming research has not examined how social threats affect daydreaming activity, a pertinent study in the mental simulation literature supports the proposal that social daydreams might function to regulate socio-emotional well-being in the manner I propose. Across four experiments, Kappes Schwörer and Oettingen (2012) found that arousing specific needs in participants (relatedness, meaning in life, thirst and power) resulted in more positive mental simulations directed at mentally addressing those needs. Most relevant here is Study 3 in which Kappes et al. (2013) induced the need to feel interpersonally connected by asking participants in the experimental and control condition to list 12 and four examples of "close contact with others who care about you". Because listing 12 examples of close contact is harder than listing four examples, participants in the experimental condition were made to feel as if they lacked close contact with caring others, thereby increasing their need for meaningful interpersonal connection. Participants were then asked to imagine the end of two scenarios. One scenario was relevant to the need for interpersonal connection ("You're on your way to the store when you suddenly recognize one of your close friends. You go over to you friend and…"); the other scenario was not ("You arrive for an appointment in a big office that's full of people. You look around but don't see anyone you know, you sit down to wait and…"). Results showed that participants with an aroused need for interpersonal connection reported more positive fantasies when the imagination scenario was relevant to addressing that need compared to when it was irrelevant. This, presumably, reduced the aroused need for interpersonal connection and replenished feelings of interpersonal connection through mental simulation (although data was not obtained on the emotional reactions of participants during the study).

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a result of social threat might be to daydream about positive, non-social aspects of one's life as a means of self-enhancement (e.g. one's academic achievements). Although this is possible, and may increase/decrease positive/negative emotional states, I propose that non-social daydreams will not regulate *social* emotions and socio-emotional well-being (although this would need to be empirically established).

More direct evidence that mental representations of other people, and specifically, close others, might regulate socio-emotional well-being comes from two studies by Twenge and colleagues (2007, Studies 3 & 4). After being socially excluded, participants who spent two minutes writing a description of a close family member (vs. a meal, Study 3) and their best friend (vs. their travel to campus, Study 4) behaved in ways consistent with the idea that their sense of interpersonal connection had been replenished. Specifically, writing about a close other mitigated the effect of rejection on aggressive behavior as measured by a noise-blast game where participants chose the intensity and duration of a noise that their interaction partner would experience upon responding incorrectly. Although these findings are consistent with the idea that mental representations of close others can replenish connectedness, Twenge et al. (2007b) neither examined the effect of imagination per se in this process (participants wrote rather than imagined), nor the effect of bringing close others to mind on socio-emotional well-being.

Nevertheless, these studies provide initial evidence for the idea that social threat might bias the content and nature of social daydreams in order to mentally derive a sense of interpersonal connection. Whether similar effects can (a) be observed with naturally occurring daydreams and (b) have demonstrable effects on feelings of socio-emotional well-being are open questions. However, there is good reason to think that social daydreams will regulate and promote positive social feelings because of the well-established effects of imagination on emotion. Daydreams are inherently imaginary experiences (*see* Section 2.3.2), and, because imagination makes events seem real, daydreams can evoke the feelings that would arise if the simulated event were occurring (Kosslyn, et al., 2001). The capacity of imagination to evoke and change feelings associated with the imagined subject matter is well established. Asking participants to imagine emotional events is a widely used technique to induce desired mood states (Westermann, Spies, Stahl, & Hesse, 1996) and guided imagery is often employed in therapeutic interventions to promote positive feelings and reduce negative feelings (e.g. Hutcherson, Seppala, & Gross, 2008; Lewis, O'Reilly, Khuu, & Pearson, 2013; Panagioti, Gooding, & Tarrier, 2012). There is also good reason to think that *social* imagination can change and promote inherently social feelings. Indeed, experimental manipulations of social disconnection often involve imagining past rejection experiences (e.g. Gardner et al., 2000) or imagining the future alone (e.g. Twenge et al., 2001), which capitalize on the

emotional power of imagination to induce negative social feelings. Positive, as well as negative, social feelings can also emerge from imagination. For example, across two studies, Kumashiro and Sedikides (2005) found that participants instructed to visualize a close positive relationship expressed warmer and more positive other-directed feelings compared to participants who had visualized a close negative, or neutral, relationship.

3.4 Can social daydreams regulate socio-emotional well-being over time?

Thus far, I have explained why and how social daydreams might regulate socio-emotional well-being in response to momentary social threats. This connects social daydreaming to previous research on belonging regulation and responses to social disconnection, which typically examine such effects as they occur momentarily, rather than over time. However, recall from Section 3.3.1 that threats or challenges to socio-emotional well-being are often more enduring and prolonged. How then is social daydreaming involved in the regulation of socio-emotional well-being over time?

When faced with prolonged socio-emotional challenges (e.g. relationship conflict, separation from loved ones, life transitions) these challenges will become a pertinent current concern for an individual (or, more likely, a series of related current concerns related to the challenge at hand). The impact of prolonged socio-emotional challenge on current concerns will then mean that social daydreaming is biased towards addressing these concerns when doing so in the external environment is not possible. For example, consider a situation in which an individual experiences the social challenge of his or her partner's infidelity and associated negative social emotions (such as betrayal, jealousy, and sadness). This is an enduing concern that threatens an individual's need for close, positive, relationships, and is not one that can be immediately remedied. During this period, an individual's behavior is likely to be driven towards regulating her or his thwarted need to belong and negative social emotions in a variety of ways. For instance, he or she may seek support from close others, engage in conversations with his or her partner in attempts to salvage the relationship, attempt to work through problems in the relationship, or distract him- or herself by engaging in social activities with friends and family. However, in situations where overt action to regulate socio-emotional well-being is not possible (e.g. during the many idle moments of the day, when alone for extended periods of time, or when

performing routine and automatized activities) this individual is likely to daydream about the current situation. For example, he or she might consider past interactions with the partner, think about upcoming conversations, and consider all manner of potential future situations that might unfold (e.g. life without that partner, or the possible effects of relationship dissolution on others involved). These mental processes during daydreaming are likely to represent efforts at problem-solving, understanding, decision-making, and regulating the distressing emotions surrounding the event, which, if done constructively, *over time* should facilitate adjustment to the relational challenge and regulate socio-emotional well-being.

In the situation described above, the process of social daydreaming is proposed to be one that facilitates the process of adaptation or adjustment to a socio-emotional challenge. Generally speaking, adaptation refers to the process by which individuals regulate their behavior, thoughts, and emotions when faced with a prolonged environmental challenge. Adaptation theories (e.g. Cummins, 2010, Cummins & Nistico, 2002; Diener, et al., 2006; Frederick & Loewenstein, 1999; Headey & Wearing, 1989; Helson, 1964) predict that, over time, individuals will return to baseline levels of functioning (i.e. their set point). Typically, psychological research on adaptation or adjustment, examines how individuals react and adapt to stressful life events, and explores the psychological, social, and emotional processes that are implicated in (mal)adjustment. Stressful life events can be described as events that substantially disturb an individuals' daily routine (Turner & Wheaton, 1997) and includes positive (e.g. marriage, parenthood, employment) as well as negative (e.g. bereavement, chronic illness diagnosis, divorce) events, but excludes minor stressful events such as daily hassles and uplifts (Kanner, Coyne, Schaefer, & Lazarus, 1981). Although many stressful life events have the potential to pose an enduring challenge to socio-emotional well-being, research has predominantly examined the effect of life events on cognitive and emotional well-being (see Luhmann, Hofmann, Eid, & Lucas, 2012 for a meta-analysis). However, the point here is that many stressful life events are likely to affect an individual's level of socio-emotional well-being, which requires regulation over time.

Of most relevance for understanding how social daydreaming relates to the regulation of socio-emotional well-being over time, is research on repetitive thought and coping with negative stressful life events. Cognitive theories of adjustment propose that repetitive thinking about one's self and world predicts adjustment to

environmental challenges (Segerstrom, et al., 2003). Various forms of repetitive thought have been identified including worry, rumination, mental simulation, cognitive and emotional processing and reflection, which, although conceptualized differently and examined in different research domains, share many similarities and theoretical overlap (Watkins, 2008). Given the broad definition of daydreaming, many, if not all, of these kinds of thought processes are likely to be manifested in daydreaming activity. Although daydreaming is not repetitive per se, because daydreams are dictated by current concerns their content is likely to center on consistent themes particularly during times of adjustment.

Research on various forms of repetitive thought show that it can have both adaptive and maladaptive outcomes with respect to adjustment and well-being. Several forms of repetitive thought are proposed to be conducive to recovery from stressful events because they involve successful cognitive and emotional processing (Greenberg, 1995; Horowitz, 1986). For instance, post-event cognitive processing has been associated with posttraumatic growth and improved functioning after traumatic events (Calhoun, et al., 2000). In a sample of HIV seropositive men, cognitive processing following the loss of partner or friend to AIDs was associated with finding meaning, which then predicted lower AIDs-related mortality (Bower, et al., 1998). Likewise, emotional processing predicted greater immune functioning in prostate cancer patients (Hoyt et al., 2013) and reduced psychological distress and improved psychological well-being in women with early stage breast cancer (Manne, et al., 2007). Reflection has also been associated with adaptive coping strategies (Burwell & Shirk, 2007) and reductions in grief symptoms and depression following bereavement (Eisma et al., 2015).

However, other forms of repetitive thinking, notably rumination and worry, have been associated with negative outcomes in the context of adjustment. For example, both negative rumination and worry predicted post-traumatic stress symptoms following road traffic accidents (Ehlers, et al., 1998; Holeva, et al., 2001) and the onset of clinical and sub-clinical depression following the sudden loss of child (Ito et al., 2003). The general tendency to ruminate following stressful events has also been associated with the onset and maintenance of major and hopeless depression (Robinson & Alloy, 2003).

Attempts to integrate the seemingly contradictory effects of repetitive thought have resulted in a dimensional approach, which proposes that the positive or negative

effects of cognition on adjustment depend on its content (Segerstrom et al., 2003; Watkins, 2008). Several important dimensions have been identified: valence, purpose, and level of construal. Positively valenced repetitive thoughts tend to be associated with positive outcomes, especially when thoughts involve a searching purpose (i.e. exploring possibilities and understanding); negatively valenced repetitive thoughts tend to be associated with negative outcomes, especially when they are abstract and involve a searching purpose (Segerstrom, et al., 2015; Segerstrom et al., 2003; Segerstrom, et al., 2010; Watkins, 2008). Notice here the similarity with the Content Regulation Hypothesis (Smallwood & Andrews-Hanna, 2013; see Section 2.4.1), which proposes that the effect of daydreaming on well-being depends on its content. However, in contrast to the Content Regulation Hypothesis, the literature on repetitive thought explicitly considers, and provides empirical evidence for, the consequences of thought processes on adaptation over time.

Although dimensional approaches to cognition have helped to make sense of how thinking can have adaptive and maladaptive outcomes, they do not typically consider the *social* content of thought. As an exception, Segerstrom et al. (2003, Study 2) identified that repetitive thinking can vary to the extent that it is interpersonally or intrapersonally focused and found that the effects of negative repetitive thinking on depression were most pronounced when cognition was self- rather than other-focused (Segerstrom et al., 2003, Study 3). This finding dovetails with the consistent relationship observed between self-focused attention and negative affect (Mor & Winquist, 2002) and indicates that self-focused negative thinking is particularly detrimental. Although self-focused thinking may have negative outcomes, research has yet to fully document the effects of other-focused thinking on adjustment. In addition, cognitive theories of adjustment do not tend to examine (a) specific socio-emotional challenges and/or (b) the effects of cognition on socio-emotional well-being. Rather, cognitive adjustment research tends to examine stressful life events in terms of their personal consequences and impact on physiological and emotional well-being (e.g. in depressive symptoms, feelings associated with grief, post-traumatic stress symptoms, and immune functioning).

Although social daydreaming research has not yet examined how imagining others is related to adjustment, social daydreaming has been linked with positive effects on socio-emotional well-being, in particular, loneliness. Mar et al. (2012) found that although loneliness was associated with more social daydreaming, only the

tendency to daydream about close others (versus non-close others) was associated with greater socio-emotional well-being. This suggests that lonely individuals engage in more social daydreaming to counteract loneliness; however, only daydreaming about close others confers a socio-emotional benefit whereas daydreaming about non-close others may exacerbate loneliness. Likewise, research on imagined interactions—internal dialogues with real-life significant others (Honeycutt, Zagacki, & Edwards, 1990)—suggests that the social daydreams of chronically lonely individuals may be indicative of a maladaptive response. Chronically lonely individuals report experiencing fewer, less satisfying, and more negative imagined interactions (Honeycutt, Edwards, & Zagacki, 1989) suggesting that loneliness may be exacerbated by a lack of positive social daydreaming and, by extension, that frequent and positive social daydreams may protect or buffer against loneliness. However, this research is limited because it does not examine social daydreaming *during the process of adjustment*. These cross-sectional studies examine the social daydreams of individuals who are currently adapted or maladapted (e.g. lonely or not) and measure supposedly stable and global daydreaming features (e.g. how much individuals tend to daydream about close vs. non-close others). This assumes that individuals display consistent patterns of daydreaming over time, does not account for the dynamic nature of daydreaming, and cannot capture the *process* of adaptation over time.

More generally, correlational approaches reflect the conception of adaptation as a *state* rather than a process. An individual is considered well or mal-adjusted depending on his or her score on a variable of interest (e.g. depression) or compared to a control group (e.g. a group not undergoing a stressful life event) at a single point in time. The impact of certain variables (e.g. repetitive thoughts) is then used to predict an individual's current level of adjustment and researchers then make inferences about the specific cognitive processes that predict (mal)adjustment. The problem with this approach is that associations may be bi-directional (e.g. (mal)adjustment is reflected in the content and nature of individuals' repetitive thoughts) or amenable to third variable explanations. This highlights the need for repeated measurements and prospective studies that examine repetitive thoughts and daydreaming repeatedly, over time, during a period of socio-emotional challenge, rather than making inferences based on cross-sectional data. Adaptation is a temporal process, which means that to properly understand how social daydreams are related to

adjustment, it is necessary to capture repeated observations of daydreaming over time in a situation where adjustment is required. Taken together, consideration of (a) the effect of current concerns on social daydreaming when social challenges are enduring and (b) the literature on how repetitive thought is linked to adjustment, strongly suggests that social daydreaming should be related to the regulation of socio-emotional well-being over time, as well as in the moment (when social threats are more transient).

3.5 Summary

The model I have proposed in this chapter links social daydreaming to the regulation of socio-emotional well-being, both as it occurs in the moment and over time via the process of adaptation or adjustment. The beneficial effects of social daydreaming, both on immediate and longer-term socio-emotional well-being are not guaranteed and depend on the content and nature of social daydreaming, which is something that will be considered in the forthcoming empirical chapters. However, previous research has highlighted that daydreaming about close significant others may be particularly conducive to the regulation of socio-emotional well-being because doing so can provide a means of simulating meaningful social contact when that contact is not available in reality (e.g. Twenge et al., 2007b). Other research suggests that pertinent dimensions of thought (e.g. valence) are important, and should be measured, in order to understand the effect of cognition on adaptation over time (e.g. Segerstrom et al., 2003).

In the next three chapters I present three studies that provide preliminary evidence to substantiate the model of socio-emotional well-being regulation via social daydreaming. Study 1 (Chapter 4) examines whether naturally occurring social, compared to non-social, daydreams are associated with increased positive social feelings, both in general, and when individuals are deficient in these feelings before their social daydreams. In Study 2 (Chapter 5) I build on the findings from Study 1, and present a laboratory study that experimentally induces social threat (via induced loneliness) and examines whether social versus non-social daydreaming can replenish connectedness. Studies 1 and 2 therefore examine the immediate effects of social daydreaming, and in particular, daydreaming of close significant others, on momentary socio-emotional well-being. In Study 3 (Chapter 6) I examine whether social daydreaming is associated with socio-emotional well-being over time, in the

naturally occurring context of adaptation to university in first year students. Specifically, I examine how the emotional outcomes and characteristics of social daydreams over the first month of the transition are associated with loneliness and social adaptation to university. Taken together, the studies conducted provide an empirical test of whether social daydreaming can regulate socio-emotional well-being both in the moment and over time.

CHAPTER 4
STUDY 1: SOCIAL DAYDREAMS AND SOCIAL FEELINGS IN DAILY LIFE

This chapter presents the first empirical study aimed at testing the proposed model of socio-emotional well-being regulation via social daydreaming. The study had three main aims. First, to provide initial evidence for the idea that social daydreams are associated with changes in momentary socio-emotional well-being (i.e. that social daydreams can influence social feelings). Second, to provide evidence consistent with the idea that social daydreams can regulate momentary socio-emotional well-being by examining the effect of social daydreams on social feelings when positive social feelings are deficient (as might be expected in momentary situations of social threat or challenge). Third, to examine whether the impact of social daydreaming on momentary socio-emotional well-being depends on who is being daydreamed about (i.e. the relationship quality between the daydreamer and the most central other person involved in the daydream). To this end, I used experience-sampling methodology (ESM) to sample participants' naturally occurring social daydreams, who was being daydreamed about, and social feelings (love and connection) before and after daydreaming in daily life. To serve as points of comparison, I also sampled participants' non-social daydreams and measured non-social feelings (happiness, calmness, and excitement) before and after daydreaming.

4.1 Social daydreaming and positive social feelings

In the previous chapter I proposed that social daydreams regulate momentary socio-emotional well-being under conditions of social threat. This relies on the ability of social daydreams to change momentary social feelings, but there is no direct evidence for this proposal in existing literature. Although research suggests that deliberately imagining social experiences can elicit both positive (e.g. Hutcherson et al., 2008; Kumashiro & Sedikides, 2005) and negative social feelings (e.g. Gardner et al., 200; Twenge et al., 2001), and that daydreams can influence non-social feelings (e.g. Franklin et al., 2013; Ruby et al., 2013a; Poerio et al., 2013), research has yet to examine whether naturally occurring *social* daydreams can influence *social* feelings. Measuring social and non-social daydreams and social and non-social feelings before

and after daydreaming provides a test of whether social (but not non-social) daydreams are associated with increased positive social (but not non-social) feelings for daydreams that naturally occur in daily life. I predicted that social, but not non-social, daydreams would be associated with increases in the positive social feelings of love and connection (Hypothesis 1). I did not make specific predictions about whether social and non-social daydreams would differ in their association with changes in non-social feelings (happiness, calmness, and excitement). Daydreams with and without social content could both relate to changes in non-social feelings and there was no theoretical reason to predict any consistent patterns of non-social feeling change for either type of daydream.

Note that I am predicting a general pattern of increased positive social feelings as a result of social daydreaming. But not all social daydreams will result in positive social feelings and therefore increased momentary socio-emotional well-being. Depending on their content, social daydreams might also be associated with reductions in positive and/or increases in negative, social feelings (e.g. re-living an experience of interpersonal rejection). However, as a general pattern of how social daydreaming affects social feelings and momentary socio-emotional well-being, there is reason to think that social daydreams will be associated with increased positive social feelings.

The social goals underlying and influencing daydreams may be approach-oriented, i.e., concerned with the attainment of positive end-states (e.g. affiliation) or avoidance-oriented, i.e. concerned with the prevention of negative end-states (e.g. social rejection). Daydreams involving the mental pursuit of social approach goals would be more likely than those involving social avoidance goals to be associated with positive social feelings because the former engages positive cognitions and the latter engages negative cognitions (Elliot, Sheldon, & Church, 1997; Tamir & Diener, 2008). Although individual social daydreams may be associated with increased or decreased positive social feelings, there is reason to suspect that social daydreams, in general, involve social approach rather than social avoidance goals, and, as a result will be associated with increased positive social feelings. I make this prediction from a study by Johannessen and Berntsen (2010) that assessed participants' current goal commitments which often referred to social life categories including "love, intimacy and sexual matters" and "friends and acquaintances". Importantly, participants reported their specific goals to be related to achievement rather than avoidance. This

suggests that daydreams will be predominately associated with mentally pursuing desired social goals, which in turn, should increase the positive social feelings associated with their imagined pursuit or attainment. This effect should also be more apparent in social feelings but not necessarily non-social feelings because social daydreams and social feelings have the social aspect in common.

4.2 The regulation of momentary socio-emotional well-being via social daydreaming

Sampling naturally occurring daydreams in daily life means that social threat (and its effect on social daydreaming) cannot be induced to properly examine causal processes. However, to provide initial evidence consistent with the idea that social daydreams are involved in the regulation of momentary socio-emotional well-being, I examined the effect of social daydreaming on social feelings when positive social feelings were deficient, or lacking. Because previous research indicates that conditions of social threat are associated with negative social feelings, and/or a lack of positive social feelings (e.g. Leary, et al., 1995; Leary, et al., 2001; Leary, et al., 1998), I examined the effect of social daydreaming on positive social feelings when participants were *low* in positive social feelings *before* their daydream (as might be the case under conditions of social threat). I predicted that increases in positive social feelings would be observed only when participants were low, but not high, in feelings of love and connection before their social daydreams (Hypothesis 2). If, as I propose, social daydreams are implicated in the regulation of momentary socio-emotional well-being, then the effect of social daydreaming on increases in positive social feelings should be more pronounced when individuals are low in these feelings before daydreaming.

4.3 The effect of imagining close others in daydreams

Recall from Chapter 3 that the effect of social daydreams on momentary socio-emotional well-being is not guaranteed, but depends on the specific content of individual social daydreams. Perhaps the most relevant characteristic of social daydreams that determines whether social daydreams are associated with increased socio-emotional well-being is *who* is involved in the daydream. Several previous lines of research suggest that daydreams involving close significant others should be

especially linked to increases in momentary socio-emotional well-being and positive social feelings.

First, actual interactions within close relationships are most likely to elicit positive social feelings in daily life (e.g. Laurenceau, Barrett, & Rovine, 2005) suggesting that similar effects might emerge from imaginative, rather than actual activity, with close others. Second, deliberately imagining a close positive relationship, compared to imagining a close negative, or neutral relationship, has been shown to elicit positive social feelings (Kumashiro & Sedikides, 2005), which is an effect that might be expected to emerge when social imagination occurs naturally rather than when it is experimentally induced. Third, cross-sectional research suggests that the general tendency to daydream about close others is positively correlated with socio-emotional well-being (Mar et al., 2012), which might also occur when examining daydreams and feelings in the moment as well as when using retrospective measures. Fourth, at least anecdotally, feelings of love have been associated with daydreaming about close others. Fitness and Fletcher (1993) asked 160 married participants to describe the most recent time that they had felt love for their partner. Among the events reported that elicited love (e.g. supportive interactions or fun activities) daydreaming about one's partner was reported by 40% of the sample. Given this evidence, I was interested in examining how the relationship quality between the daydreamer and the most central other person in their daydream was associated with changes in positive social feelings. I predicted that increases in positive social feelings would be greater, or more apparent, when those daydreams involved higher quality relationships (Hypothesis 3).

To test these hypotheses, I used ESM to sample individuals' social and non-social daydreams, feelings and the social and emotional content of social daydreams. Participants were signaled via their smartphones four times on one day to answer questions about their last social or non-social daydream and their feelings before and after daydreaming. For social daydreams, participants also reported on the relationship quality between themselves and the most central other person in the daydream.

4.4 Method

4.4.1 Participants

One hundred and one volunteers (81 women, 20 men; M_{age} = 22.32 years, SD = 5.17) were recruited to the study. It was described as an investigation into the content and nature of daydreams and advertised via email, flyers at a public engagement event, personal contacts, and referrals. Of the participants, 49 were undergraduate psychology students, 22 were postgraduate students, 20 were in full-time employment, and 10 were non-psychology undergraduate students. In exchange for their participation, undergraduate psychology students were given study credits; all other volunteers were entered into a prize draw to win shopping vouchers worth £20, £30, and £50. The study received ethical approval from the University Psychology Ethics Committee.[20]

4.4.2 Experience-sampling protocol

A signal-contingent experience-sampling protocol (Wheeler & Reis, 1991) was used to sample daydreaming and associated feelings. Participants were signaled four times via text messages to their smartphones to answer online questionnaires about their two most recent social and two most recent non-social daydreams. The questionnaires were answered by following a survey link sent within the messages. Participants received the four messages on one day between 10am and 10pm at individually randomized times within four three-hour blocks (between 10:00-13:00, 13:00-16:00, 16:00-19:00, 19:00-22:00), with the constraint that consecutive signals were at least one hour apart, to allow for potential delayed responses before the next signal (e.g. if the participant was driving or in a meeting). The order of the questionnaires (2 x social, 2 x non-social) was also individually randomized for each participant within the quartet (e.g. social, social, non-social, non-social). I randomized the time and order of questionnaires to prevent anticipation of signals, to sample daydreams and

[20] To avoid unnecessary repetition, ethical approval was obtained for all studies presented in the thesis. Informed consent was obtained prior to each study, participants were fully debriefed upon completion, and were assured of their right to withdraw and that their data would remain confidential. All research was conducted in line with British Psychological Society code of human research ethics. Any specific ethical issues arising as a result of the studies in this thesis will be mentioned when appropriate.

feelings across a range of times and daily activities, and to counteract potential order effects and demand characteristics. Measures were kept brief so as not to unduly interfere with participants' daily routine. Brevity of measures in ESM studies is typical and items are often taken from larger, validated, measures, although the practical comprise may reduce measurement reliability (Hektner, Schmidt, & Csikszentmihalyi, 2007).

4.4.3 Measures

Social feelings. Two items, taken from Crocker, Niiya and Mischkowski (2008), measured the positive social feelings of love and connection. Participants indicated how loving (*"How loving did you feel before/after your daydream?"*) and connected with others (*"How did you feel before/after your daydream?"*) they felt before and after their daydream on 7-point scales from *not at all* to *extremely*.

Non-social feelings. Participants indicated how they felt before and after their daydream (*"How did you feel before/after your daydream?"*) on the following dimensions: sad-happy, anxious-calm, and excited-bored. Responses were made on a 7-point scale (e.g. 1 = *sad*, 7 = *happy*). These items were chosen to measure the pleasure (valence) and arousal (activation) dimensions of core affect (Remington, Fabrigar, & Visser, 2000); specifically, pleasure (*sad-happy*), pleasant deactivation (*anxious-calm*) and pleasant activation (*bored-excited*).

Relationship quality. Three items were used to provide a quality index of the relationship between participants and the most central person involved in their daydream. Participants rated their general feelings of closeness (*"In general, how close do you feel to them?"*), liking (*"In general, how much do you like them?"*), and trust (*In general, how much do you trust them?"*) towards the most central person in their daydream on 7-point scales from *not at all* to *extremely*. These items were chosen to reflect indicators of high-quality interpersonal connections (Niven, Holman, & Totterdell, 2012). These three items were combined to create an overall score for relationship quality; internal reliability was high, $\alpha = .92$.

4.4.4 Procedure

Participants attended an individual training session during which they were given a written and verbal description of daydreaming (see Appendix A). A daydream was defined as a series of connected thoughts and/or images where that mental content is not about whatever mental or physical activity one is engaged in at the present moment. Participants were told that daydreams could be brief but should consist of more than a single thought or image. Social daydreams were defined as daydreams where another (real or imaginary) person or people are involved; non-social daydreams were defined as daydreams that did not involve another person or people. Examples of daydreams, including social and non-social ones, were provided. When participants indicated that they understood what counted as daydreaming, they were provided with written instructions for the study followed by a demonstration of the text message with online questionnaire link and verbal explanation of the meaning and response of each questionnaire item. Finally, participants nominated a date to complete the study and were free to choose whatever day they liked as long as it represented a typical day in their life.

On the nominated day, participants followed the online questionnaire link sent via text and, after entering their unique participation number, indicated their social and non-social feelings before and after their last (social or non-social) daydream. All five items referring to feelings were asked twice (with reference to before and after the daydream) but the order of all 10 question items was individually randomized to minimize response bias. For social daydreams participants then completed items indexing relationship quality. Participants were asked to report on their last social or non-social daydream before each text message but were not asked about the time lapse between the daydream and reporting its content. Participants were also asked to provide a short description of the daydream (see Appendix B for some example descriptions of social and non-social daydreams reported).

4.5 Results

4.5.1 Response rate

Overall, 383 of a possible 404 daydreaming questionnaires were completed (192 social and 191 non-social daydreams) corresponding to a 95% response rate. I examined participants' daydream descriptions to ensure that participants had

accurately categorized their daydreams as social or non-social. Twelve non-social daydreams were excluded from the dataset because they contained references to other people, which suggested that they might have been instances of social, rather than non-social, daydreams. I chose not to reclassify these as social daydreams because doing so would have led to an unbalanced design. Therefore, the following analyses were based on 179 non-social and 192 social daydreams.

4.5.2 Data checks and descriptives

Prior to analyses all variables were screened for outliers and normality was assessed. Concerning normality, the relationship quality variable was negatively skewed (-.86), both in terms of visual examination with histograms and normal Q-Q plots and through significance testing (KS = .11, p = .009; SW = .93, p < .001). Descriptive statistics and inter-correlations between key study variables for social and non-social daydreams are presented in Table 4.1 and Table 4.2. respectively.

Table 4.1. Means, standard deviations and inter-correlations between measures of social daydreams.

	Social Daydreams												
	M	*SD*	1	2	3	4	5	6	7	8	9	10	11
Feelings before daydreaming													
1. Loving	4.27	1.22											
2. Connected	4.24	1.33	.82***										
3. Happiness	4.56	1.03	.71***	.71***									
4. Calmness	4.92	1.25	.39***	.46***	.57***								
5. Boredom	4.08	1.07	-.46***	-.45***	-.50***	-.13							
Feelings after daydreaming													
6. Loving	4.73	1.28	.57***	.53***	.38***	.22*	-.24*						
7. Connected	4.76	1.22	.54***	.54***	.35***	.16	-.19	.85***					
8. Happiness	4.86	1.21	.48***	.45***	.41***	.32**	-.12	.66***	.62**				
9. Calmness	4.70	1.29	.25*	.24*	.24*	.59***	.11	.41***	.37**	.63***			
10. Boredom	3.13	1.06	-.37***	-.31**	-.16	-.02	.28**	-.53***	-.55**	-.61***	-.28**		
Daydreaming content													
11. Relationship quality	5.56	1.17	.38***	.30**	.27**	.19	-.01	.49***	.51***	.42***	.31**	-.36**	.53***

Note. Due to the non-normal distribution of the relationship quality variable, Spearman's rank order correlations were computed for correlations between this variable and the other social daydreaming variables. All other correlations use Pearson's product moment correlation. Means represent values average over two time points. All variables were measured on 1-7 scales. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 4.2. Means, standard deviations and inter-correlations between measures of non-social daydreams.

Non-Social Daydreams												
	M	*SD*	1	2	3	4	5	6	7	8	9	10
Feelings before daydreaming												
1. Loving	3.94	1.10										
2. Connected	3.88	1.27	.65***									
3. Happiness	4.57	.97	.47***	.41***								
4. Calmness	4.69	1.29	.27**	.13	.59***							
5. Excitement	4.39	1.04	-.18	-.20*	-.17	.07						
Feelings after daydreaming												
6. Loving	3.86	1.32	.68**	.52***	.38***	.18	-.13					
7. Connected	3.73	1.34	.56***	.68***	.46***	.18	.39***	.71**				
8. Happiness	4.56	1.26	.45***	.50***	.57***	.47***	-.05	.70***	.66***			
9. Calmness	4.28	1.58	.30**	.35***	.36***	.57***	-.02	.51***	.38***	.67***		
10. Boredom	3.47	1.16	-.33**	-.24*	-.27**	-.16	.37***	.48***	.52***	.52***	.20	
Daydreaming content												
11. Valence	4.44	1.35	.36**	.33***	.35***	.33**	-.01	.61***	.55***	.74***	.57***	.49***

Note. All correlations use Pearson's product moment correlation. Means represent values average over two time points. All variables were measured on 1-7 scales. *$p < .05$, **$p < .01$, ***$p < .001$.

4.5.3 Were social daydreams associated with increases in positive social feelings? (Hypothesis 1)

To examine whether social, compared to non-social, daydreams were associated with increases in positive social feelings, I conducted a series of 2 x 2 x 2 (Daydream Type [social, non-social] x Time [pre, post] x Questionnaire [questionnaire 1, questionnaire 2])[21] triply repeated-measures ANOVAs with each feeling state (i.e. happiness, calmness, excitement, loving and connected) as the dependent variable. The results of these analyses are presented in Table 4.3. If social, but not non-social, daydreams were associated with increased positive feelings after (compared to before) daydreaming, then I expected to find a significant Daydreaming Type x Time interaction. This would indicate that changes in feelings from before to after daydreaming differed according to the social content of daydreams, which is what I predicted for social feelings of love and connection.

Social feelings. Consistent with the prediction that social, but not, non-social daydreams would be associated with increased positive social feelings the interaction between daydreaming type and time was significant for feelings of love and connection. There was a significant interaction between daydreaming type and time on feeling loving ($F(1, 73) = 14.70$, $p < .001$, $\eta_p^2 = .17$). Post-hoc repeated measures t-tests indicated that participants reported feeling significantly more loving after (M = 4.86, SD = 1.23) compared to before (M = 4.20, SD = 1.17) social daydreams ($t(73)$ = -3.64, p = .001, d = -.39, 95%CI [-.75, -.21]) and significantly *less* loving after (M = 3.70, SD = 1.34) compared to before (M = 3.92, SD = 1.06) non-social daydreams ($t(73)$ = 2.06, p = .043, d = .18, 95%CI [.01, .45]).

Similarly, there was a significant interaction between daydreaming type and time on feeling connected with others ($F(1, 73) = 14.28$, $p < .001$, $\eta_p^2 = .16$). Repeated measures t-tests indicated that participants reported feeling significantly more connected with others after (M = 4.67, SD = 1.23) compared to before (M = 4.22, SD = 1.26) social daydreams ($t(73)$ = -3.40, p = .001, d = -.39, 95%CI [-.70, -.19]). Participants also reported feeling marginally less connected with others after (M

[21] Questionnaire 1 and questionnaire 2 refer to whether the measurement point was the first or the second questionnaire that participants answered about their social and non-social daydreams (there were four questionnaires in total; two concerning social and two concerning non-social daydreams).

= 3.61, *SD* = 1.28) compared to before (*M* = 3.80, *SD* = 1.18) non-social daydreams (*t*(73) = 1.89, *p* = .063, *d* = .15, 95%CI [-.01, .38]), although this result was statistically non-significant. Overall, consistent with Hypothesis 1, social daydreams were associated with increased, whereas non-social daydreams were associated with decreased, feelings of love and connection (see Figure 4.1).

Non-social feelings. Unexpectedly a similar interaction pattern emerged when examining the effect of daydreaming on happiness. There was a significant interaction between daydreaming type and time on happiness ($F(1, 73) = 5.72$, $p = .019$, $\eta_p^2 = .07$). Post-hoc repeated measures t-tests indicated that participants reported feeling significantly happier after (*M* = 4.91, *SD* = 1.23) compared to before (*M* = 4.53, *SD* = 1.06) social daydreams (*t*(73) = -2.67, *p* = .009, *d* = -.33, 95%CI [-.64, -.10]), but not non-social daydreams (*t*(73) = .88, *p* = .383, *d* = .09, 95%CI [-.14, .35]). Social daydreams were associated with increased happiness but there was no change in happiness for non-social daydreams (see Figure 4.3).

The same interaction effect was not observed for feelings of calmness or excitement. However, there was a significant main effect of time for these feelings. Participants were significantly less calm after (*M* = 4.50, *SE* = .14) compared to before (*M* = 4.82, *SE* = .13) daydreaming ($F(1, 73) = 7.74$, $p = .007$, $\eta_p^2 = .10$) and significantly more excited after (*M* = 3.31, *SE* = .10) compared to before (*M* = 4.20, *SE* = .11) daydreaming ($F(1, 73) = 68.06$, $p < .001$, $\eta_p^2 = .48$). This suggests that daydreaming was associated with decreased calmness and increased excitement, which may be indicative of an overall increase in the arousal dimension of core affect. Although not the main focus of this study, this finding is consistent with previous research connecting daydreaming in laboratory settings with increased physiological arousal (Smallwood et al., 2004, Studies 1 & 2; Smallwood et al., 2007). It most probably reflects the fact that daydreams are associated with an individual's current concerns, which are emotionally arousing (see section 3.3.3.1).

Table 4.3. Summary of 3-way repeated measures ANOVAs for each feeling

	Main Effects			2- Way Interactions			3-Way Interaction
	Daydream Type	Time	Questionnaire	Type x Time	Type x Quest	Time x Quest	Type x Time x Quest
Feeling							
Loving	32.82***	2.70	0.20	14.70***	0.97	0.18	0.61
Connected	43.10***	2.52	6.93**	14.28***	0.01	1.67	0.34
Happiness	10.02*	2.87	0.06	5.72*	0.83	0.02	0.16
Calmness	5.43*	7.74**	0.05	3.11	6.67*	0.03	0.56
Excitement	13.87***	68.06***	2.93	0.40	0.25	1.39	0.45

Note. Values are F-values. * $p < .05$, ** $p < .01$, *** $p < .001$. All df were 1, 73.

Main effects of Daydreaming Type on calmness and excitement were a result of greater mean ratings of calmness and excitement for social compared to non-social daydreams. The Daydreaming Type x Questionnaire interaction for calmness appeared to be driven by greater overall ratings of calmness for social compared to non-social daydreams on the second set of questionnaires. The main effect of questionnaire for feelings of connection suggests that participants tended to report feeling more connected when answering questionnaires later in the day. Effects specific to the main hypotheses are described in the text.

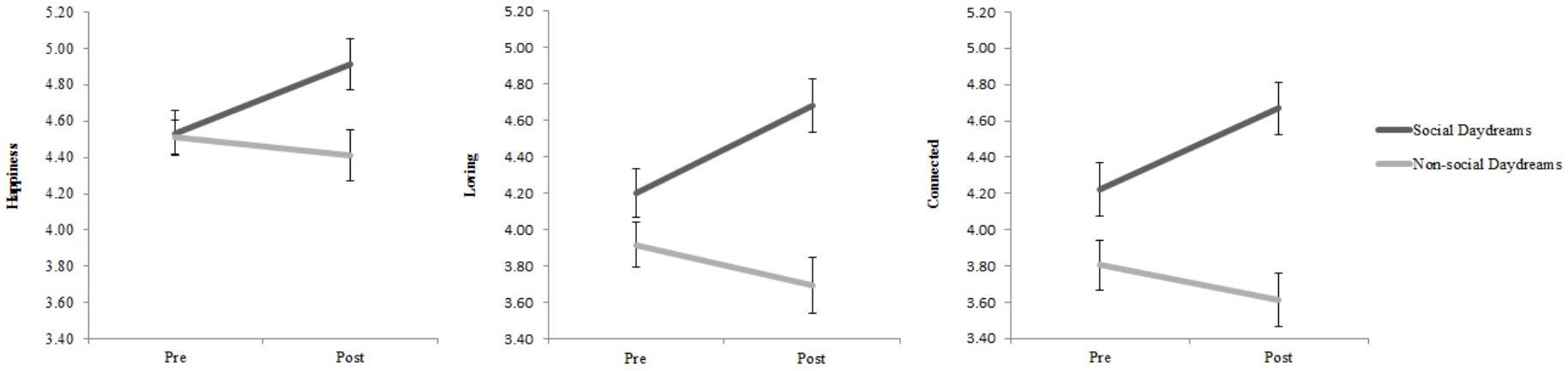

Figure 4.1. Interactions between daydreaming type and time (pre- and post-daydream) for feelings of happiness, loving and connected. Error bars represent 95% confidence intervals.

4.5.4 Were social daydreams regulating people's feelings? (Hypothesis 2)

To provide initial evidence consistent with the idea that social daydreams are involved in the regulation of momentary socio-emotional well-being, I examined the effect of social daydreaming on social feelings when positive social feelings were deficient or lacking. Because results also showed that social daydreams were associated with increased feelings of happiness, I also examined Hypothesis 2 in relation to happiness in addition to feelings of love and connection. I was interested in whether the effect of social daydreaming on increased feelings of happiness, love, and connection, might be regulatory; that is, whether social daydreams might be compensating for low levels of happiness, love and connection (as might be expected in context of social threat). If that were the case, then I would expect increases in happiness, love and connection to be observed for participants who scored low, but not for those who scored high, on these feelings before daydreaming. To explore this, I created each participant's average scores for feelings of happiness, love and connection before and after social daydreams over the two time samples. I then ran a series of repeated measures t-tests to examine differences between feelings of happiness, love and connection before and after social daydreams separately for those 'high' and 'low' in the associated feeling before daydreaming. I classified each participant as 'low' or 'high' using a median split of their average feeling state before social daydreams.

The results were consistent across feeling dimensions: increases in happiness, love and connection were only observed for those participants scoring 'low' and not for those already 'high', on the associated feeling before social daydreaming. Participants low in happiness felt significantly happier after (M = 4.54, SD = 1.14) compared to before (M = 3.86, SD = .71), social daydreaming ($t(56) = -4.41$, $p < .001$, d = -.71, 95%CI [-.99, -.39]); participants low in feelings of loving felt significantly more loving after (M = 4.03, SD = 1.26) compared to before (M = 3.24, SD = .92) social daydreaming ($t(45) = -3.90$, $p < .001$, d = -.71, 95%CI [-1.20, -.43]); and participants low in feelings of connection felt significantly more connected with others after (M = 4.20, SD = 1.30) compared to before (M = 3.04, SD = .99) social daydreaming ($t(44) = -5.68$, $p < .001$, d = -.99, 95%CI [-1.56, -.77]). In contrast, there were no significant differences observed between feelings of happiness, love and connection, before and after social daydreams for participants who were 'high' on the

associated affective state before daydreaming (all *p*'s > .1) Inspection of mean scores and 95% confidence intervals also suggests that results for 'high' scorers were not due to a ceiling effect in this group: mean ratings (on a 7 point-scale) and confidence intervals before daydreaming were 5.47 (95%CI [5.32-5.60]) for happiness, 5.11 (95%CI [4.98-5.31]) for love, and 5.19 (95%CI [5.05-5.34]) for connection.

For comparison, I performed the same set of analyses with non-social daydreams. Levels of happiness from before and after non-social daydreams were not different for participants low ($t(57) = -.96$, $p = .340$) or high ($t(40) = 1.41$, $p = .168$) in happiness before non-social daydreaming. Participants low in feelings of love and connection before non-social daydreams did not report significant increases in these feelings after non-social daydreams (loving: $t(59) = -.12$, $p = .906$; connected: $t(42) = -1.22$, $p = .230$). However, participants high in feelings of loving before non-social daydreams felt marginally less loving after ($M = 4.74$, $SD = 1.04$) compared to before ($M = 4.99$, $SD = .57$) non-social daydreams ($t(38) = 1.88$, $p < .068$, $d = .24$, 95%CI [.01, .49]). Similarly, participants high in feelings of connection felt significantly less connected after ($M = 4.36$, $SD = 1.15$) compared to before ($M = 4.77$, $SD = .78$) non-social daydreams ($t(55) = 3.16$, $p = .003$, $d = .40$, 95%CI [.16, .67]).

These results support Hypothesis 2 and provide initial support for the proposal that social daydreams regulate momentary socio-emotional well-being: the positive emotional outcome of social daydreaming was only found for participants who would benefit from it the most (i.e. 'low' scorers), but not for participants already experiencing positive feelings (i.e. 'high' scorers). The fact that the opposite pattern of results was observed for non-social daydreams also suggests that these effects could not be explained by regression to the mean.

4.5.5 Did the effect of social daydreams on positive feelings depend on relationship quality? (Hypothesis 3)

The measure of relationship quality was significantly ($p < .001$) negatively skewed indicating that participants' daydreams overwhelmingly involved significant others. Attempts to transform the variable to normalize the distribution were unsuccessful so a median split procedure was applied (MacCallum, Zhang, Preacher, & Rucker, 2002) to examine the effect of relationship quality on feelings. I dichotomized the variable to represent 'high' and 'low' quality relationships for the sample: *low (n = 186)* = 1–5.67; *high* ($n = 198$) = 6.00–7.00.

I then ran multi-level models examining whether feelings of happiness, love and connection, were significantly greater after, compared to before, social daydreams separately for daydreams that involved low, and high quality relationships. Multi-level regression modeling (Hox, 2010) allows the examination of data that is hierarchical or nested, taking into account the structure of the data. For example, in the present study, observations (i.e. feelings and daydreaming characteristics) are nested within individuals (i.e. participants). This represents a two-level hierarchical structure in which observations (called level-1 or event-level units) are nested within persons (called level-2 or person-level units). Each participant in therefore associated with a regression line that includes an intercept and a slope. Multi-level analyses have advantages over techniques such as repeated measures ANOVA because it can allow for the examination of within as well as between persons processes (reducing type-1 error), cope better with missing data, and account for data clustering/non-independence of observations (e.g. by modeling serial dependency in repeated measures data) (Hox, 2010). For the present analyses, I therefore restructured the data so that time points (i.e. questionnaire responses were nested within individuals) and then ran a series of multi-level models to examine the effect of relationship quality on the emotional outcomes of social daydreaming.

For low quality relationships, the fixed effect of time was non-significant for models predicting happiness (B = .12 (.15), $t(113)$ = .80, p = .423, ICC = .05, 95%CI [-.17, .41]), loving (B = -.09 (.15), $t(114)$ = -.53 p = .600, ICC = -.04, 95%CI [-.41, .24]) and connection (B = -.19 (.15), $t(114)$ = -1.23, p = .223, ICC = -.08, 95%CI [-.51, .12]), indicating no significant change in feelings from before to after daydreaming. In contrast, for high quality relationships, the fixed effect of time was significant in models predicting happiness (B = -.68 (.17), $t(118)$ = -3.94, $p < .001$, ICC = -.51, 95%CI [-1.02, -.34]), loving (B = -.82 (.14), $t(119)$ = -5.82, $p < .001$, ICC = -.49, 95%CI [-1.08, -.53]) and connection (B = -.75 (.16), $t(118)$ = -4.82, $p < .001$, ICC = -.38, 95%CI [-1.06, -.44]), indicating more positive feelings after compared to before daydreaming. Specifically, after daydreams involving high quality relationships, feelings of happiness (M = 5.41, SD = 1.42), love (M = 5.43, SD = 1.26) and connection (M = 5.31, SD = 1.28) were greater than feelings of happiness (M = 4.74, SD = 1.10), love (M = 4.63, SD = 1.27) and connection (M = 4.57, SD = 1.47) prior to daydreaming. These results support Hypothesis 3 and indicate that social daydreams were associated with increases in feelings of happiness, love and

connection, only when participants' daydreams involved people with whom they had a high, but not low, quality relationship.[22]

4.6 Discussion

Study 1 has three important findings, which provide initial support for the model of socio-emotional well-being regulation via social daydreaming proposed in Chapter 3. First, as a general pattern, social daydreams promoted positive social feelings (i.e. social daydreams were associated with increased momentary socio-emotional well-being). Second, the positive effect of social daydreaming on momentary socio-emotional well-being emerged only when participants were deficient in positive feelings before daydreaming, consistent with a regulatory effect of social daydreaming on momentary socio-emotional well-being. Third, the positive effect of social daydreaming on momentary socio-emotional well-being was most apparent when daydreams involved close significant others, suggesting a boundary condition for the effect. I discuss each of these findings below as well as the limitations of the study, which provide the impetus for Study 2.

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[22] Although splitting the relationship quality variable was justified due to the distribution of the data, a median split may seem somewhat arbitrary. I also performed the same analyses by trictotomizing the relationship variable to represent low, median, and high quality relationships for the sample: low = 1–5; medium = 5.33–6.33; high = 6.67–7.00. Similar results were obtained: social daydreams were only associated with increases in feelings of happiness, love, and connection when participants daydreams involved people with whom they had a high (but not medium or low) quality relationship with. For low quality relationships, the fixed effect of time was non-significant for models predicting happiness, B = .24 (.18), t(70) = 1.36, p = .179, 95%CI [-.11, .59], loving, B = -.05 (.22), t(73) = -.22, p = .830, 95%CI [-.49, .39], and connection, B = -.18 (.19), t(73) = -.92, p = .361, 95%CI [-.56, .21], indicating no significant change in feelings from before to after daydreaming. Equivalent results were obtained for medium quality relationships: happiness, B = -.32 (.19), t(67) = -1.66, p = .102, 95%CI [-.70, .06]; loving, B = -.25 (.17), t(68) = -1.49, p = .140, 95%CI [-.58, .08]; connection, B = -.25 (.19), t(67) = -1.34, p = .185, 95%CI [-.62, .12]. In contrast, for high quality relationships, the fixed effect of time was significant in models predicting happiness, B = -.74 (.21), t(80) = -3.53, p = .001, 95%CI [-1.16, -.32], loving, B = -1.00 (.16), t(80) = -6.14, p < .001, 95%CI [-1.32, -.68], and connection, B = -94 (.18), t(81) = -5.34, p < .001, 95%CI [-1.29, -.59], indicating more positive feelings after compared to before daydreaming.

4.6.1 Social daydreams promote positive social feelings

The results of this study demonstrate that social, but not non-social, daydreams are associated with increases in self-reported positive social feelings of love and connection. This provides initial evidence that social daydreams are associated with improved momentary socio-emotional well-being. Although previous research suggests that imagining others is associated with positive social emotions (e.g. Kumashiro & Sedikides, 2005) and that social daydreaming in general is associated with socio-emotional well-being (Mar et al., 2012), this is the first study to demonstrate that social daydreams result in increased momentary positive social feelings with naturally occurring social daydreams. As well as being associated with increased social feelings, social daydreams were also associated with increases in happiness. Although unexpected, this may reflect the tendency for happiness to be a positive emotion linked with social interaction (e.g. Csikszentmihalyi & Hunter, 2003; Kahneman et al., 2004) and more closely linked to socio-emotional well-being in general (e.g. Meyers, 2000), at least compared to feelings of calmness and excitement. Indeed, the high positive correlations between feelings of happiness, connection, and love (see Table 4.1) suggest that these feelings may be better conceptualized as indexing a common construct of 'positive social feelings' rather than being examined as separate feeling states.

The finding that social, but not non-social, daydreams are associated with increased momentary socio-emotional well-being is important because it demonstrates that social imagination in naturally occurring daydreaming activity can change social feelings. This might seem like a relatively innocuous or obvious finding, but it is both novel and important. First, it provides evidence that social daydreams can change social feelings, which is central to the proposal that social daydreams can replenish connectedness. Second, it suggests that, compared to non-social daydreams, social daydreams may be better equipped to regulate socio-emotional well-being than non-social daydreams. In fact, non-social daydreams were associated with *decreases* in positive social feelings. In Chapter 3 (footnote 19) I made the point that, under conditions of social threat, individuals might daydream about positive, but non-social, aspects of their lives as a means of self-enhancement or emotion regulation. I also asserted that although non-social daydreams might be associated with reduced negative and/or increased positive feelings, they would not

regulate *social* emotions and socio-emotional well-being. The fact that naturally occurring non-social daydreams in this study were associated decreased positive social feelings provides initial evidence to substantiate this proposal. This finding also suggests that non-social daydreams may actually have negative consequences for socio-emotional well-being regulation. Non-social daydreaming when connectedness is threatened could represent a maladaptive strategy for replenishing connectedness, but this would need to be empirically tested.

4.6.2 Evidence that social daydreams regulate momentary socio-emotional well-being

Additional analyses support the idea that social daydreams may function to regulate momentary socio-emotional well-being because the positive effect of social daydreaming on momentary socio-emotional well-being emerged only when participants were lacking in positive feelings. Increases in happiness, love and connection were present only when participants were low, but not high, in these feelings before daydreaming (as might be expected under conditions of social threat). This pattern of results is consistent with the proposal that social daydreams function to regulate momentary socio-emotional well-being because it suggests that social daydreams may have compensated for deficiencies in social feelings serving the socio-emotional needs of the daydreamer at the time. This finding was shown to be unlikely due to a ceiling effect for participants who were high in these feelings before daydreaming. The fact that the same results were not observed for non-social daydreams also suggests that the finding is unlikely to be a result of regression to the mean. Although social threat in this study has been conceptualized as being 'low' in feelings of love and connection (i.e. social threat has been inferred and observed rather than experimentally manipulated) these results provides a firm starting point for idea that social daydreams are involved in the regulation of momentary socio-emotional well-being.

4.6.3 The positive effect of social daydreaming on momentary socio-emotional well-being depends on who is involved in the daydream

Results showed that increased positive social feelings (love and connection, as well as happiness) were only observed when the relationship quality between the daydreamer and most central person in the daydream was classified as 'high' but not 'low'. This

finding is consistent with previous research showing that actual or imagined interactions with close others have a particular benefit for socio-emotional well-being (e.g. Kumashiro & Sedikides, 2005; Laurenceau et al., 2005; Mar et al., 2012). However, this study is the first to demonstrate that the beneficial effect of close others on *momentary* socio-emotional well-being can emerge from the imagination during naturally occurring daydreaming, as well as from real events.

This finding also supports the idea that some social daydreams (i.e. daydreams that involve close significant others) may be better able to regulate momentary socio-emotional well-being. In daily life, connection is likely to be best replenished through meaningful contact with close others because doing so would affirm that one has meaningful interpersonal connections (Mikulincer & Shaver, 2007; Sommer, 2001). However, when meaningful social contact is not readily available, imagining close others during daydreaming may be particularly conducive to the momentary regulation of socio-emotional well-being because it can provide a means of simulating meaningful social contact with an accepting other when that contact is not available in reality. In this way, social daydreams involving close others may act as an imaginary substitute for social contact. Consistent with the content regulation hypothesis (Smallwood & Andrew-Hanna, 2013) these results highlight the need to examine the specific content of (social) daydreams to adequately characterize the effect of daydreaming on (socio-emotional) well-being.

4.6.4 Limitations

Although the results from this study provide vital initial evidence for my proposed model of socio-emotional well-being regulation via social daydreaming there are a number of limitations that should be considered. Most importantly, the correlational nature of the study design prevents causal interpretations from being drawn. The model proposed in Chapter 3 predicts that negative social emotions trigger social daydreams in attempts to replenish connectedness when meaningful social connection cannot be sought or may not be the optimal strategy. The results from this study cannot confirm whether feelings of social connection *caused* participants to engage in social daydreams (about close significant others), which then *caused* replenished connectedness by increasing momentary feelings of socio-emotional well-being. Indeed, the fact that feelings of love and connection before daydreaming were significantly greater before social (compared to non-social) daydreams (see Figure

4.1) suggests that the occurrence of social daydreaming may not be solely driven by low levels of positive social feelings. Additionally, the study cannot confirm whether social daydreaming occurred in response to feelings of social disconnection after other attempts at replenishing connectedness were attempted in the external environment. If social daydreams are functional for regulating socio-emotional well-being, then low levels of happiness, love and connection should predict the occurrence of social, rather than non-social, daydreaming. However, because participants reported on either their last social or last non-social daydream rather than their last daydream of any type, it is not possible to shed light on this issue. The reason for asking participants to report on their last social and non-social daydreams was to ensure that I obtained an equivalent number of social and non-social daydreams for comparative purposes. Given that daydreams with social content tend to be more frequent in daily life (see section 2.3.5) imposing this kind of restriction on daydreaming reports was justified to be able to compare the effect of social and non-social daydreams on feelings. Indeed, the fact that some non-social daydreams in this study had to be excluded because they contained social content suggests that non-social daydreams may occur less frequently in daily life.

Another potentially important variable that was not examined in the present study is the influence of events occurring at the time of the daydream, which may have affected the emotional state of the daydreamer both before and after daydreaming. For example, it might be expected that an experience of social exclusion would induce negative social feelings which might then trigger social daydreaming to up-regulate negative social feelings. However, it may equally be the case that environmental events have an influence on post-daydreaming feelings irrespective of social daydreams (e.g. a socially excluded person might receive a hug from a friend after the event which makes them feel more socially connected). It would therefore be important to establish that the effect of social daydreaming on social feelings is due to imagination as opposed to contamination from other external influences (e.g. the social environment). This might be achieved in future research by asking participants to describe the social content in which daydreams occurred in order to control for, or examine, the influence of social context.

Although this study provides initial evidence that social daydreams are associated with increased momentary socio-emotional well-being it is also limited due to the use of retrospective reports for daydreams, associated feelings before and after

daydreaming and measures of daydream valence and relationship quality. Participants reported on their most recent social or non-social daydream at four quasi-random intervals within four, three-hour blocks, but were not asked to estimate how long ago their daydream was experienced. The time between experience and recall may have influenced the validity of reports in ways that I cannot control for or explore (Bradburn, et al., 1987). However, given that daydreaming is thought to occupy between 30% and 50% of waking thought (Killingsworth & Gilbert, 2010; Klinger & Cox, 1987-88), I suspect that the interval between experience and recall would have been relatively small (i.e. minutes rather than hours) and hence the potential effects on accuracy would also be small.

Another possible consequence of the use of retrospective reports, particularly with reference to feelings before and after daydreaming, is that these results may reflect a demand characteristic or participants' own lay theories concerning how they should have been feeling before and after social and non-social daydreams. Although I cannot rule out these possibilities, I took steps to minimize potential demand characteristics. Pre- and post- daydreaming feeling measures were individually randomized meaning that participants could have completed the questions concerning their feelings on each dimension (happy, calm, excited, loving, connected) referring to before and after their last daydream (i.e. 10 items) in any possible order. In addition, each question (e.g. "How loving were you feeling before your daydream?") was completed on participants' smartphone screens individually such that participants were unable to view their previous responses. If participants reported emotion change to fit with their possible views on the study, then they would have had to remember their responses for each individual measure to use as a reference point for reporting feeling change. This limitation is also less applicable to the finding that increases in social feelings were greater when daydreams involved close significant others. If this finding were a result of a demand characteristic, then participants would have had to report greater feeling changes for happiness, love, and connection (but not calmness or excitement) and then report that they felt closer to, trusted, and liked the most central other person in their daydream.

Although I cannot be certain that lay theories about the influence of social and non-social daydreams on social feelings did not influence participant responding in the current study, this issue has been addressed in previous research (Poerio et al., 2013) which found no evidence to suggest that participants believe that daydreaming

has either predominately positive or negative effects on mood, or that lay beliefs are consistent enough across participants to systematically bias results. Although this does not specifically shed light on lay theories concerning how social daydreams relate to social feelings, there is no reason at present to suspect that people associate social daydreams in particular with increases in positive feelings. To address concerns associated with retrospective sampling of daydreaming and affect, a more intensive time-sampling approach could be used in future research where participants report on current daydreaming activity and current affective states at separate time points. However, whether this methodological benefit would outweigh the additional participant burden would need careful consideration (Stone, et al., 1991).

Despite these limitations, Study 1 provides initial support for the proposal that social daydreams might regulate momentary socio-emotional well-being. In order to provide additional evidence for the model, and overcome several of the limitation of Study 1, I conducted a laboratory study, which more directly examined the causal processes involved in the regulation of momentary socio-emotional well-being under actual, rather than inferred, conditions of social threat.

CHAPTER 5

STUDY 2: SOCIAL DAYDREAMS AND THE REGULATION OF MOMENTARY SOCIO-EMOTIONAL WELL-BEING

The results of Study 1 indicated that social daydreams, and in particular, social daydreams about close significant others, were associated with increased momentary socio-emotional well-being. Although additional analyses supported the idea that the positive effect of social daydreaming on momentary socio-emotional well-being occurred under conditions of social threat, social threat was indirectly conceptualized as being low in feelings of love and connection before daydreaming. In addition, the use of retrospective reports of daydreams and feelings, combined with the inability to manipulate social versus non-social daydreaming in daily life, casts doubts on whether social daydreaming is causally related to the up-regulation of momentary socio-emotional well-being. Study 2 was designed to more directly, and causally, investigate whether social daydreams about close significant others can replenish connectedness under conditions of social threat. Specifically, Study 2 experimentally induced social threat, manipulated social vs. non-social daydreaming, and, to provide evidence consistent with the proposal that social daydreaming can regulate momentary socio-emotional well-being, measured the effect of social daydreaming on (a) feelings and (b) later social behavior.

5.1 Inducing threat to socio-emotional well-being

To create a context of social threat I experimentally induced loneliness. Although there are several types of social threat induction that have been used in the literature on interpersonal rejection and belonging regulation (e.g. rejection, ostracism; see section 3.3.1 for details), I decided to induce and examine social threat in the context of loneliness. Loneliness is perhaps the most prototypical example of unmet belonging needs and a lack of socio-emotional well-being. Loneliness is a negative social feeling accompanied by the perception that one's social needs are not being met by the quantity or quality of one's social relationships (Russell et al., 1980). It is a universal, and common, feeling of social disconnection (Berguno, Leroux, McAinsh, & Shaikh, 2004; Victor & Yang, 2012), and has a demonstrated negative impact on physiological and psychological well-being (e.g. Holt-Lunstad et al., 2015).

Loneliness is therefore a distinctly social feeling that is inherently linked with decreased socio-emotional well-being. Although other forms of social threat induction such as rejection and ostracism reliably increase negative affect (Gerber & Wheeler, 2009) and might be expected to reduce momentary socio-emotional well-being, evidence that they reduce positive and/or increase negative *social* feelings is notably lacking in the literature (see section 3.3.2.1). In comparison to other social threat inductions, inducing loneliness should be more consistently associated with reductions in positive and/or increases in negative social feelings which should experimentally create the emotional conditions that would require socio-emotional well-being to be replenished. Indeed, loneliness itself is considered to be an evolved signal that motivates behavior towards seeking the social contact that would replenish connectedness (Cacioppo et al., 2014) meaning that examining the effect of social daydreaming after induced loneliness is a pertinent and relevant context for socio-emotional well-being regulation.

5.2 Manipulating daydreaming

To examine whether social daydreaming about a close significant other can regulate socio-emotional well-being after induced loneliness, participants were asked to either (a) daydream about a pleasant social interaction with a close significant other (social daydreaming), (b) daydream about a pleasant but non-social event (non-social daydreaming) or (c) complete a working memory task (control task). A comparison of these three conditions allowed an examination of whether social daydreaming, compared to non-social daydreaming or engaging in an external task, was linked with regulated momentary socio-emotional well-being (i.e. increased and decreased positive and negative social feelings respectively).

Although asking participants to deliberately daydream in experimental settings is relatively rare (see section 2.2 and for an exception, Langens & Schmalt, 2007, Study 2), manipulating, rather than measuring daydreams as they naturally occur, is a useful approach that allows researchers to establish causal relationships between daydreaming (and kinds of daydreaming) and other variables (e.g. momentary feelings). Indeed, deliberately manipulating the content of imaginative activity is a commonly used technique in the mental simulation literature (e.g. asking participants to imagine the pursuit or attainment of personal goals), which allows causal inferences about how the nature of imagination is linked with various outcomes of

interest (e.g. health behavior, Johannessen, Oettingen, & Mayer, 2012; academic performance, Pham & Taylor, 1999; and coping strategies, Rivkin & Taylor, 1999). Likewise, a large body of research on scene construction (i.e. the process by which a complex past or possible future scene or event is mentally generated and maintained in imagination) suggests that the ability to mentally represent episodic past and future events relies on brain regions and component processes involved in daydreaming (i.e. the default mode network) such as those involving the self, episodic memory, semantic memory, and mental time travel (Hassabis & Maguire, 2007). Although manipulating daydreaming in experimental settings lacks the ecological validity that methods of experience-sampling provide, previous research has shown that daydreaming is often deliberate (see section 2.1.4), and may also be used to deliberately regulate momentary feelings (see section 2.1.5). This suggests that, under certain circumstances in daily life, individuals may engage in volitional and directed daydreaming, albeit not directed by an experimenter's instruction. Nevertheless, manipulating daydreaming allows a more direct and causal examination of the idea that social daydreaming can regulate momentary socio-emotional well-being under conditions of social threat.

5.3 Evidence for the regulation of momentary socio-emotional well-being

To examine whether connectedness had been replenished by social daydreaming, I measured several social and non-social emotions before and after daydreaming. In addition to the measurement of positive social feelings used in Study 1 (love and connection), Study 2 measured feelings of belonging. This feeling state was chosen given the relevance of belonging to socio-emotional well-being (Baumeister & Leary, 1995). Study 2 also measured negative, as well as positive, social feelings (loneliness and social disconnection), which would expected to be particularly relevant given the loneliness induction and provided an extension to measuring positive only social feelings as in Study 1. Positive and negative affect was also measured using an established and validated scale (the PANAS; MacKinnon et al., 1999).

If social daydreams about close significant others (compared to non-social daydreaming or completing a control task) regulate socio-emotional well-being, then social daydreaming should be associated with increased positive, and decreased negative, social feelings (Hypothesis 4). I also measured positive and negative affect more generally to (a) provide evidence for the distinct effect of social daydreaming on

momentary feelings of socio-emotional well-being and (b) to examine whether the proposed effect of social daydreaming on social feelings held, over and above, the potential effect of social daydreaming on positive and negative (non-social) feelings. I expected that both social and non-social daydreaming would increase positive and reduce negative affect in general (compared to the control task) because both imaginative scenarios involved imagining a pleasant event. However, only *social* daydreams should result in reductions in negative, and/or increases in positive, social feelings, because only *social* imagination of a close significant other should provide the opportunity to simulate meaningful social contact which would generate the positive social feelings needed to replenish connectedness. This effect should still be present when statistically controlling for positive and negative affect more generally.

To provide two additional tests of whether social daydreaming can regulate momentary socio-emotional well-being, I used two indirect behavioral measures that would indicate whether connectedness had been replenished in social daydreamers (compared to non-social daydreamers and control participants). First, I measured participants' desire to interact with other people on a future task. Experimental studies of belonging regulation indicate that under conditions of social threat, individuals will engage in external behaviors aimed at replenishing connectedness (reviewed in section 3.3.2.2), which can be reflected in a desire to interact with other people (e.g. Maner et al., 2007). If, as I propose, the need for interpersonal connection can be replenished by social daydreaming, then social daydreamers (compared to non-social daydreamers and control participants) should be less likely to engage in behavior aimed at replenishing connectedness in the external environment. Social daydreamers (compared to other participants) should therefore express *less* of a desire to connect with other people in a subsequent task (Hypothesis 5), because their need for interpersonal connection has been replenished via imagination.

Second, I measured helping behavior. Previous research indicates that feelings of socio-emotional well-being influence the extent to which people help and act pro-socially. For example, feeling socially connected leads to increased helping behavior (Pavey, Greitemeyer, & Sparks, 2011) and feeling socially disconnected leads to decreased pro-social behavior (Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007a). If social daydreamers' feelings of interpersonal connection are replenished by daydreaming, then they should (compared to other participants) be more willing to help. Thus, social daydreamers (compared to non-social daydreamers and control

participants would be expected to offer to help more in a helping request (Hypothesis 6).[23]

5.4 Method

5.4.1 Participants and design

One hundred and forty three students and staff (24 staff; 17%) at a UK University participated in the study for £3, which was described as an investigation into the links between imagination and cognitive abilities. Seventeen participants were excluded from the study because they did not comply with experimental instruction (one participant in the social daydreaming condition did not describe imagining a significant other and 16 participants in the non-social daydreaming condition described social content). The final sample consisted of N = 126 (social daydreaming: n = 46, non-social daydreaming: n = 35, control: n = 45). The mean age of the sample was 23.37 years (*Range* = 18-65, *SD* = 7.01) and 87 were female. Sample size was determined *apriori* with G*power3 (Faul, Erdfelder, Lang, & Buchner, 2007) using a medium effect size (f = .25), an alpha level of .05 and power at .80.

5.4.2 Procedure

All participants underwent a loneliness induction individually and were then randomly assigned to condition (via the survey software Qualtrics) to complete the associated 3-minute task. Participants rated their feelings three times: before and after the loneliness induction, and after the experimental task. Participants completed some measures to assess the experimental manipulation, rated their desire to connect with others and completed a helping request.

[23] Note that helping behavior could potentially be regarded as a form of social interaction (or ingratiation with others), which might replenish connectedness. So it could be predicted that social daydreamers would be less, not more, likely to help compared to other participants. However, in this study, the helping request used was anonymous and directed towards future (not present) helping behavior that would not have involved social contact because it involved coding data. This suggests that offers to help in Study 2 would not be a means of replenishing momentary connectedness (but should instead reflect the state of connection of the individual at the time).

5.4.3 Loneliness induction

Using a procedure from Wildschut, Sedikides, Arndt, and Routledge (2006), participants completed an ostensibly valid loneliness scale by rating their agreement or disagreement (i.e. "*agree*" or "*disagree*") to 16 items, taken from the UCLA Loneliness Scale (Russell et al., 1980), which were worded to elicit agreement (e.g. "*I sometimes feel alone*"). Participants received bogus feedback on their level of loneliness and were told that they were in the 67th percentile of the loneliness distribution meaning they were "*much more lonely than average*". To strengthen the manipulation participants wrote down three reasons for their score. Due to the potentially aversive nature of this manipulation participants were informed as part of the debriefing that their loneliness score was bogus and in no way reflected their actual levels of loneliness compared to other people.

5.4.4 Daydreaming conditions

Participants were instructed to imagine themselves in a pleasant scenario of their own choosing with the constraint that it had to be based in reality (i.e. something that had already happened or might plausibly happen in the future). To manipulate daydreaming about a significant other, social daydreamers were instructed:

> *"What is important is that your scenario should involve interacting with another person that you have a close, positive, relationship with like a friend, family member, or a significant other. This person should be someone that you have regular contact with."*

Non-social daydreamers were instructed:

> *"What is important is that your scenario should just be about you. It shouldn't involve thinking about or interacting with anyone else".*

Participants were asked to write a sentence describing their chosen scenario, then imagine it with their eyes closed for three minutes, and write a description of what they had imagined (see Appendix B for some example descriptions of social and non-social daydreams reported).

5.4.5 Control condition

Participants completed a three-minute 1-back working-memory task (McVay, Meier, Touron, & Kane, 2013) in which they responded to a stimulus only when it matched the previous stimulus. The stimuli were 12, one-syllable semantically unrelated words

(*corn, fence, green, guard, jump, large, month, name, push, star, tape, waive*); participants pressed the space bar when the word displayed matched the preceding word which occurred 25% of the time. This task was chosen because working memory tasks decrease the frequency of daydreaming-related activity (e.g. Baird et al., 2012; Smallwood et al., 2009).

5.4.6 Feeling measures

Seventeen items (described below) measured current feelings. Participants rated the extent to which they felt each feeling "*right now*" from 1(*very slightly or not at all*) to 5(*extremely*). The order of all items was randomized for each participant each time they reported their feelings.

Positive and negative social feelings. A single item measured loneliness ("*lonely*") and three items, taken from the Social Connectedness Scale (Lee & Robbins, 1995), measured feelings of social disconnection ("*disconnected from the world around you*", "*distant from other people*", "*unrelated to anyone*"). These three items were averaged to create a score for social disconnection with higher values indicting greater social disconnection (average α = .82). Three items measured positive social feelings of connectedness ("*connected with others*"), love ("*loving*") and belongingness ("*a sense of belonging*"). These items were assessed separately for equivalence with Study 1.

Positive and negative affect. Positive and negative affect were measured using the 10-item short form of the Positive and Negative Affect Schedule (*PANAS*; MacKinnon et al., 1999) which consisted of 10 emotion-related adjectives; five measuring negative affect (afraid, upset, nervous, scared, distressed) (average α = .77) and five measuring positive affect (inspired, alert, excited, enthusiastic, determined) (average α = .87).

5.4.7 Manipulation checks

To check that participants had focused on their allocated task, they rated how much time they had spent thinking about each of the following: "*your chosen scenario/the working memory task*", "*a close significant other*", "*topics unrelated to the imagination/working memory task*" on scales from 1(*none of the time*) to 5(*all of the time*). A Kruskal-Wallis test confirmed that social daydreamers reported spending

significantly longer thinking about a close significant other (Mdn = 3) compared to non-social daydreamers (Mdn = 2, $p < .001$) and control participants (Mdn = 1, $p < .001$), $H(2) = 36.16$, $p < .001$.

Analyses also confirmed that there were no differences between conditions for time spent thinking about their allocated task, $F(2, 123) = .59$, $p = .520$, $\eta_p^2 = .01$ (social daydreamers: $M = 3.59$, $SD = .96$, non-social daydreamers: $M = 3.83$, $SD = .71$, control participants: $M = 3.67$, $SD = 1.09$), or task-unrelated thought, $F(2, 123) = .20$, $p = .819$, $\eta_p^2 = .00$ (social daydreamers: $M = 2.37$, $SD = 1.02$, non-social daydreamers: $M = 2.26$, $SD = .92$, control participants: $M = 2.24$, $SD = 1.11$).

Participants in the daydreaming conditions also rated the positivity of their daydream (*"The imagined scenario was…"*) from 1(*negative*) to 5(*positive*). A Mann-Whitney test confirmed that social (*Mdn* = 5) and non-social daydreams (*Mdn* = 5) were rated as equally positive, $U(79) = 703.00$, $p = .480$, $r = .08$.

5.4.8 Desire to connect with others

Using a procedure from Maner et al. (2007), participants were told that another part of the study would take place either alone or with several others, and that their preference would be considered. Participants answered the question, "*To what extent would you prefer doing the next task with a few other social partners?*" from 0(*not at all*) to 11(*extremely*) on a slip of paper which they handed to the experimenter. Higher scores were therefore indicative of a greater desire to be with others. Participants were informed in the debriefing that there would not be another task taking place.

5.4.9 Helping request

Using a procedure adapted from Vohs, Mead, and Goode (2006), participants were told that the experimenter was seeking help with coding data. They were told that each data sheet would take approximately five minutes to code, and were asked if they would be willing to help. The experimenter left the room to ostensibly prepare for the next task and participants indicated on a sign-up form how many data sheets (if any) they would code and provided their contact details.[24] Participants were informed in the debriefing that they would not actually be contacted for help.

[24] When participants offered to code a range of sheets (e.g. 5-10), the mid-point of the range was taken as their value (e.g. 7.5). Two participants offered to help but could not give an exact value and were excluded from analyses. Four participants offered to

5.5 Results

5.5.1 Effect of loneliness induction

After the induction, for social feelings, participants felt: lonelier (M = 1.72, SD = .92) than before (M = 1.56, SD = .84), $t(125) = 2.09$, p = .039, d = .18; more socially disconnected (M = 1.76, SD = .78) than before (M = 1.65, SD = .78), $t(125) = 2.05$, p = .042, d = .14; less connected with others (M = 2.80, SD = 1.07) than before (M = 3.09, SD = 1.09), $t(125) = 3.83$, $p < .001$, d = .27; marginally less loving (M = 2.92, SD = 1.18) than before (M = 3.04, SD = 1.15), $t(125) = 1.88$, p = .063, d = .10; and marginally less belonging (M = 2.85, SD = 1.15) than before (M = 2.98, SD = 1.03), $t(125) = 1.81$, p = .074, d = .12. Participants also felt less positive affect after the induction (M = 2.90, SD = .97) than before (M = 3.01, SD = .83), $t(125) = 2.85$, p = .005, d = .13, but did not feel more negative affect after the induction (M = 1.43, SD = .60) than before (M = 1.44, SD = .57), $t(125) = .38$, p = .702, d = .02, suggesting that the negative impact of the loneliness induction was mostly isolated to social feelings rather than negative affect more generally.[25] [26] Note that these analyses for the induction check are merely descriptive.

5.5.2 Did social daydreams replenish connectedness? (Hypothesis 4)

To test the hypothesis that social daydreaming would replenish connectedness compared to non-social daydreaming or a control task, I conducted two 2-within (Assessment point: pre-task, post-task) x 3-between (Condition: social daydreaming, non-social daydreaming, control task) MANOVAs (one for positive feelings; one for

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code a maximum number of sheets rather than specifying the number (e.g. "as many as possible"). These participants (one each in the social-daydreaming and non-social daydreaming conditions and two in the control condition) were given the maximum value of their condition. One participant in the social-daydreaming condition who offered to code 100 sheets was excluded from analyses as an outlier (> 2SD above the mean).

[25] Feelings of loneliness, social disconnection and negative affect were all significantly positively skewed. I attempted to transform these variables but no transformation was able to adequately normalize the distribution. Although I report parametric tests for these variables for consistency with other analyses, non-parametric tests produced equivalent results.

[26] Seventeen participants expressed suspicion of the loneliness induction. I re-ran analyses excluding these participants: results and conclusions were unaffected.

negative feelings). I was interested in significant interaction effects between assessment point and condition, which would indicate differences in the effect of condition on positive and negative feelings before and after the experimental task. Significant interactions were followed up with a series of 2-within (Assessment point: pre-task, post-task) x 3-between (Condition: social daydreaming, non-social daydreaming, control task) ANOVAs with each feeling state as the dependent variable, which were further investigated by comparing the simple main effects of time separately for each condition. Results are summarized in Figure 5.1.

For negative feelings, in contrast to hypotheses, the interaction between assessment point and condition was non-significant, $F(2, 123) = .63$, $p = .631$, $\eta_p^2 = .01$. However, a significant main effect of assessment point indicated that negative feelings decreased over time for all conditions, $F(2, 123) = 29.73$, $p < .001$, $\eta_p^2 = .20$. Specifically, reports of loneliness, social disconnection and negative affect decreased over time for all conditions (loneliness: $F(1, 123) = 7.57$, $p = .007$, $\eta_p^2 = .06$ [pre-task: $M = 1.73$, $SE = .08$; post-task: $M = 1.53$, $SE = .07$]; social disconnection: $F(1, 123) = 18.29$, $p < .001$, $\eta_p^2 = .13$ [pre-task: $M = 1.76$, $SE = .07$; post-task: $M = 1.56$, $SE = .06$]; negative affect: $F(1, 123) = 20.47$, $p < .001$, $\eta_p^2 = .14$ [pre-task: $M = 1.42$, $SE = .05$; post-task: $M = 1.52$, $SE = .03$].

For positive feelings, there was a significant interaction effect between assessment point and condition, $F(2, 123) = 13.07$, $p < .001$, $\eta_p^2 = .18$. This interaction effect was observed for all positive feelings when examined separately: connection with others, $F(2, 123) = 11.09$, $p < .001$, $\eta_p^2 = .15$; love, $F(2, 123) = 8.38$, $p < .001$, $\eta_p^2 = .12$; belonging, $F(2, 123) = 3.26$, $p = .042$, $\eta_p^2 = .05$; and positive affect, $F(2, 123) = 7.22$, $p = .001$, $\eta_p^2 = .11$. Social daydreamers felt more connected with others ($p < .001$, $d = .50$), whilst non-social daydreamers felt *less* connected with others ($p = .014$, $d = .37$) and control participants showed no change ($p = .276$, $d = .14$). Social daydreamers also felt more loving and belonging after compared to before daydreaming ($ps < .001$, $ds = .62, .41$) but non-social daydreamers ($ps = .083, .220$, $ds = .25, .16$) and control participants ($ps = .843, .857$, $ds = .02, .02$) showed no change in these feelings over time. Both social and non-social daydreamers felt more positive affect ($ps = .006, .042$ $ds = .23, .22$) whilst control participants felt less positive affect ($p = .035$, $d = .17$) after the task.

These results suggest that social daydreaming, relative to both non-social daydreaming and the control task, increased positive social feelings of connectedness,

love and belonging. Whilst both kinds of daydreaming seemed to increase positive feelings in general, only *social* daydreams were associated with increased positive social feelings, which supports Hypothesis 4.

To check that the effect of social daydreaming on social feelings held over and above the effect of positive affect more generally, I conducted a series of ANCOVAs including pre- and post-task feelings of positive affect as covariates. Interactions between assessment point and condition remained significant for connectedness, $F(2, 121) = 10.29$, $p < .001$, $\eta_p^2 = .15$ and love, $F(2, 121) = 5.63$, $p = .005$, $\eta_p^2 = .09$, but not for feelings of belonging, $F(2, 121) = 1.66$, $p = .195$, $\eta_p^2 = .03$. Simple effects confirmed that social daydreamers felt more connected ($p < .001$, $d = .58$) and more loving ($p < .001$, $d = 1.05$) after daydreaming, whilst non-social daydreamers felt less connected ($p = .008$, $d = .79$) and showed no change in feelings of love ($p = .279$, $d = .36$). Control participants showed no change in either feelings of connection ($p = .520$, $d = .49$) or love ($p = .711$, $d = .06$). Although the interaction for belonging was non-significant, simple effects showed that social daydreamers felt a greater sense of belonging ($p = .001$, $d = .52$) after daydreaming but non-social daydreamers and control participants showed no change ($ps = .279, .426$, $ds = .54, .20$). Overall, these results confirm that the effect of social daydreaming on increases in positive social feelings held after controlling for positive affect.

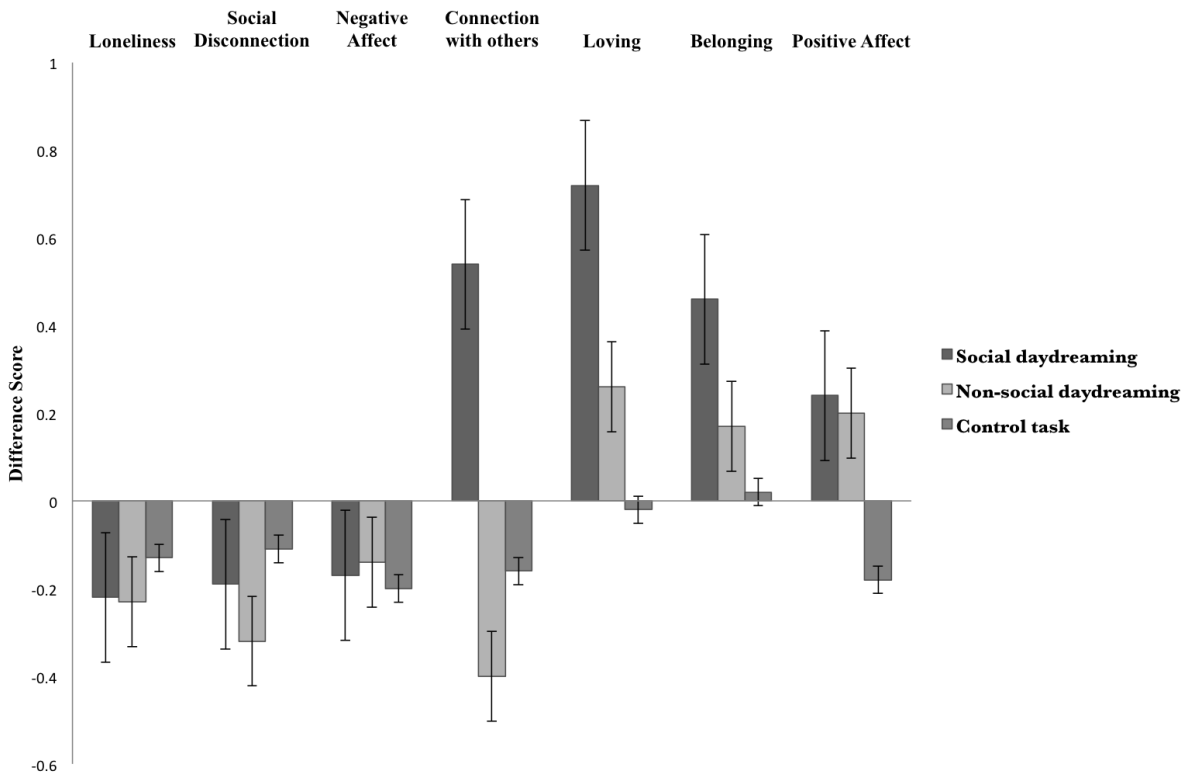

Figure 5.1. Mean difference scores (post-task feelings – pre-task feelings) as a function of condition. Error bars represent ±1 *SEM*.

5.5.3 Was social daydreaming linked with the desire to connect with others and helping behavior? (Hypotheses 5 & 6)

Desire to connect with others. A one-way between-subjects ANOVA revealed a marginally significant main effect of condition on desire to connect with others, $F(2, 123) = 2.57$, $p = .081$, $\eta_p^2 = .04$. Pairwise comparisons showed that social daydreamers expressed *less* of a desire to connect with others ($M = 4.87$, $SE = .41$) than non-social daydreamers ($M = 6.17$, $SE = .41$, $p = .037$, $d = .49$) but showed no difference compared to control participants ($M = 5.00$, $SE = .41$, $p = .822$, $d = .05$), partially supporting Hypothesis 5. Control participants were also marginally less likely to want to connect with others compared to non-social daydreamers ($p = .062$, $d = .41$).

Supplementary mediation analysis. Given that social daydreamers felt significantly more connected and non-social daydreamers felt significantly less connected with

others after daydreaming, I conjectured that feelings of connection would mediate the effects of condition on the desire to connect with others. Following Hayes and Preacher's (2014) procedure for mediation with multi-categorical independent variables, I created two dummy variables to examine the relative effects of being in one condition (control or non-social daydreaming, coded 1) relative to a reference category (social daydreaming, coded 0), with feelings of connection before each task as a covariate in the models (results summarized in Figure 5.2). Post-task feelings of connectedness exerted significant indirect effects in the control, relative to social daydreaming, condition (indirect effect = -.50; 95% bootstrapped confidence interval, CI: [-1.02, -.19]) and the non-social daydreaming condition relative to the social daydreaming condition (indirect effect = -.60; 95%CI: [-1.16, -.23]). Post-task feelings of connection mediated the effect of condition on the desire to connect with others, meaning that social daydreamers expressed less of a desire to connect with others partly because they felt more connected after daydreaming than both non-social daydreamers and control participants.

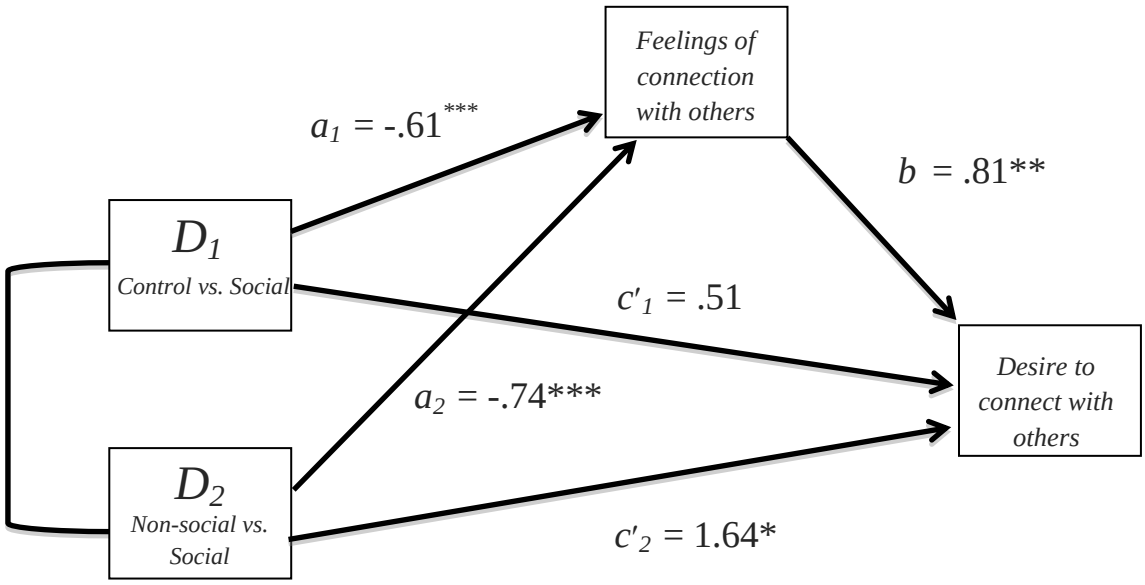

Figure 5. 2. Mediation model of the effects of condition on desire to connect with others as mediated by feelings of connection with others.

Social daydreaming is the reference category (coded 0), compared to the control group (D_1) and non-social daydreaming (D2) (coded 1). Unstandardized path coefficients are shown. Asterisks indicate significant coefficients (*p < .05, **p < .01, ***p < .001).

Helping. A one-way between-subjects ANOVA revealed a marginally significant main effect of condition on helping, $F(2, 121) = 2.85$, $p = .077$, $\eta_p^2 = .05$. Pairwise comparisons showed that social daydreamers offered to code significantly more data sheets ($M = 10.35$, $SE = 1.77$) than non-social daydreamers ($M = 4.32$, $SE = 2.05$, $p = .029$, $d = .44$) and marginally more data sheets than control group participants ($M = 5.73$, $SE = 1.81$, $p = .072$, $d = .34$), partially supporting Hypothesis 6. Non-social daydreamers and control participants did not differ in the help they offered ($p = .609$, $d = .19$).

I performed the same supplementary mediation analysis as with condition preference, to examine whether feelings of connection mediated the effects of condition on helping. These results are summarized in Figure 5.2. Although condition (control vs. social; non-social vs. social) had significant direct effects on helping, feelings of connectedness did not exert significant indirect effects in the control, relative to social daydreaming, condition (indirect effect = .31; 95% bootstrapped confidence interval, CI: [-.18, 1.44]) or the non-social, relative to social, daydreaming condition (indirect effect = .25; 95% bootstrapped confidence interval, CI: [-.11, 1.47]). Thus, although social daydreamers, relative to other participants, offered to help more, this effect was not due to increased feelings of social connection in these participants.

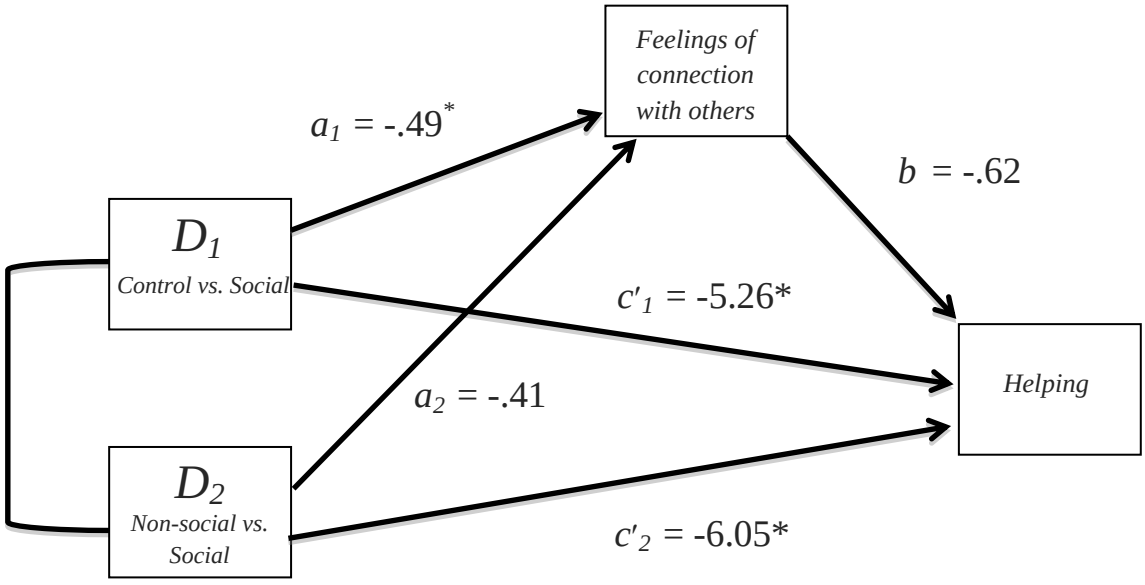

Figure 5.2 Mediation model of the effects of condition on helping with others as mediated by feelings of connection with others. Social daydreaming is the reference

category (coded 0), compared to the control group (D_1) and non-social daydreaming (D2) (coded 1). Unstandardized path coefficients are shown. Asterisks indicate significant coefficients (*$p < .05$).

5.6 Discussion

Study 2 has two main findings, which provide additional empirical support for the model of socio-emotional well-being regulation via social daydreaming proposed in Chapter 3. First, under conditions of social threat (i.e. loneliness) social daydreaming (compared to non-social daydreaming and completing a control task) was associated with increased momentary socio-emotional well-being (love, connection, and belonging). Second, social daydreaming was associated with later social behavior consistent with the proposal that social daydreaming had replenished connectedness. Specifically, social daydreamers (compared to other participants) were both less likely to want to interact with others in a subsequent task and more likely to offer to help in a helping request. I discuss each of these findings below, their implications, and the key limitations of the study.

5.6.1 Social daydreaming and regulated socio-emotional well-being.

Consistent with Hypothesis 4, social daydreamers showed significant increases in feelings of connection, love, and belonging compared to both non-social daydreamers and control participants. Although both social and non-social daydreams were associated with increased positive affect, only *social* daydreaming was associated with increased positive *social* feelings. The effect of social daydreaming on positive social feelings also remained after controlling for positive affect, indicating that the observed effect occurs over and above positive affect more generally. This suggests that whilst both social and non-social daydreaming can result in increased positive feelings under conditions of social threat, only *social* daydreams are capable of generating the positive social feelings required to regulate socio-emotional well-being. Presumably, this is because only the social daydreaming condition provided participants with the opportunity to simulate the meaningful social contact with a close significant other that would replenish connectedness. Indeed, imagining a pleasant, but non-social scenario was associated with decreased feelings of interpersonal connection (but not love or belonging) suggesting that non-social daydreams are not only incapable of replenishing connectedness but also that they

may exacerbate feelings of disconnection. Thus, daydreaming about pleasant, but non-social, events may potentially represent a maladaptive response to social threat, although this would need to be empirically determined.

The finding that social daydreams improved positive social feelings experimentally replicates the regulatory effect of naturally occurring social daydreams on positive social feelings observed in Study 1 but extends these results to show that daydreaming about a close significant other can regulate socio-emotional well-being under conditions of actual, rather than inferred, social threat. Importantly, Study 2 also provides additional behavioral evidence consistent with the idea that social daydreaming regulated momentary socio-emotional well-being. First, social daydreamers expressed less of a desire to interact with others in a future task. This finding was mediated by feelings of connection; social daydreamers felt more interpersonally connected, which in turn was associated with a decreased desire for potential social connection. The decreased desire for social future interaction is what would be expected if social daydreaming had replenished participants' sense of connectedness and regulated momentary socio-emotional well-being (Maner et al., 2007). This provides convincing evidence that social daydreaming regulated momentary socio-emotional well-being to the point that social daydreamers did not need to engage in attempts to replenish connectedness in the external environment.

Second, social daydreamers were more helpful than non-social daydreamers and control participants, offering to code, on average, nearly twice as many data sheets. This is consistent with research linking social connection with increased helping behavior (Pavey et al., 2011) and social disconnection with decreased pro-social behavior (Twenge et al., 2007a). Although this finding is what would be expected if social daydreaming had regulated momentary socio-emotional well-being I did not find evidence to suggest that the effect of social daydreaming on helping was mediated by feelings of social connection. Although social daydreamers helped more than other participants, this was not due to increased feelings of social connection, which is what might be expected from previous investigations. I would be hesitant to make a general statement about the effect of social daydreaming on helping behavior (i.e. that daydreaming about close significant others promotes helping) because the effect would need to be replicated by future research. However, this study suggests that the mechanism through which social daydreaming promotes helping may not be through increased positive social feelings.

An alternative explanation for the effect of social daydreaming on helping behavior might be that social daydreaming promotes a more other-focused mind-set or reduces a self-focused mindset, which might be needed to engage in prosocial behavior (e.g. to overcome the natural impulse towards self-interested behavior, DeWall, Baumeister, Gailliot, & Maner, 2008). Similarly, social daydreaming might increase self-other overlap which is a cognitive, rather than affective, indictor of social connection (i.e. perceptions of closeness and overlapping mental representation between self and other; Myers & Hodges, 2012), that has been linked to helping behavior (e.g. Cialdini, Brown, Lewis, Luce, & Neuberg, 1997; Maner, et al., 2002). Research in this area typically examines self-other overlap as a mediating mechanism for the effect of perspective taking on helping (Myers, Laurent, & Hodges, 2014), where participants simulate the perspective of the person who will be the target of a future helping request. One intriguing possibility is that simply imagining (close) others, with or without perspective taking, is enough to promote overlap between mental representations of the self and of others *in general*, and not just with the target of imagination. This general perception of 'oneness' with others may then have later positive effects on interpersonal behavior, such as helping.

5.6.2 Limitations

Although social daydreaming was uniquely linked to increased positive social feelings, it did not have the predicted effect on reducing *negative* social feelings. Instead, feelings of social disconnection and loneliness decreased over time for all conditions. A likely explanation for this is that participants reported only low levels of these feelings after the loneliness induction, leaving little opportunity for differential effects to occur (i.e. for significant reductions in these feelings in some conditions compared to others). Indeed, a limitation of this study is that the loneliness induction only produced mild levels of social disconnection and loneliness (means were 1.76 and 1.72 respectively on 5-point scales with higher scores indicating more negative social feelings). This suggests that the induction of social threat was, at best, only moderate, meaning that the findings can only truly be applied to contexts in which social threat provokes mild negative social feelings. Whether or not social daydreams are capable of regulating socio-emotional well-being in the context of more intense social threat is an open question. Future research might, therefore, use alternative methods to induce disconnection (e.g. Williams et al., 2001; reviewed in section

3.3.1) or investigate social daydreaming with chronically lonely individuals or under naturally occurring intense threat (as in Study 3).

Despite this limitation, reductions in positive social feelings and/or slight increases in negative social feelings should be sufficient to trigger the psychological system towards the regulation of socio-emotional well-being. Although research typically characterizes negative emotions as signals for regulation attempts (e.g. Cacioppo et al., 2014; Leary et al., 1995; Pickett & Gardner, 2005) reductions in positive emotions that deviate from an individual's socio-emotional well-being set point may also signal that regulation is required. For example, not feeling as connected as one would like is different to feeling lonely but might still be expected to prompt behaviors aimed at increasing socio-emotional well-being (e.g. arranging to go out with a friend). In fact, it could be argued that a more adaptive system for socio-emotional well-being regulation would be one that is calibrated to detect smaller fluctuations in both positive and negative social feelings which would motivate behavior towards replenishing connectedness before negative social emotions are experienced. Although the effects of negative social emotions on behavior and cognition (including daydreaming) might be more pronounced and detectable, a system that regulates smaller and less consequential social feelings may be more proactive and adaptive.

Another limitation of the present study was that it did not compare the effect of social daydreaming on momentary socio-emotional well-being under threatening versus non-threatening conditions. Two obvious questions might therefore be whether the observed effects would occur when social threat was either (a) not present (i.e. without the loneliness induction) and (b) when non-social threat is experienced (e.g. threats to competence or self-worth). The reason for not including 'no-threat' or 'non-social threat' conditions was a pragmatic one: to detect effects it would have required at least an additional hundred participants (based on power analyses). However, the most important and relevant experimental manipulation in this study was to compare social daydreaming with non-social daydreaming and not daydreaming (i.e. the control task). Having now established the basic effect of social daydreaming on momentary socio-emotional well-being regulation, future research might seek to extend the current paradigm to examine the effect of social daydreaming under manipulated conditions of social and non-social threat. For example, research could compare high versus low loneliness (e.g. Zhou, Sedikides, Wildschut, & Gao, 2008),

rejection versus acceptance (e.g. Twenge, et al., 2001; Twenge, et al., 2002), or social and non-social threat (e.g. threats to academic competence; Park, Crocker, & Kiefer, 2007, Study 1).

In addition, it would be interesting and informative to examine the relative effectiveness of social daydreaming about close significant others versus non-close others for the regulation of momentary socio-emotional well-being. Although Studies 1 and 2 (in addition to other previous research e.g. Kappes et al., 2012; Mar et al., 2012; Twenge et al., 2007b) suggests that daydreaming about close others may be better able to regulate socio-emotional well-being than daydreaming about non-close others, research could examine whether this is the case under conditions when the source of threat is from close others (e.g. in relational contexts). Research might also profit from examining whether imagining non-close others is either (a) effective at regulating momentary socio-emotional well-being (but less so than daydreaming about close significant others) or (b) potentially detrimental to the successful regulation of momentary socio-emotional well-being, potentially because it reminds a daydreamer of a current lack of meaningful social connection.

Despite these limitations, Study 2 provides the first empirical evidence that imagining close others is causally related to the regulation of momentary socio-emotional well-being. Although previous experimental research demonstrates that *writing* about a significant other can replenish connectedness (Twenge et al., 2007b) this is the first study to show that simply *imagining* a significant other can regulate socio-emotional well-being and impact on later social behavior. Taken together, Studies 1 and 2 provide empirical support for the proposed model of sicio-emotional well-being regulation. They suggest that (a) social daydreams can influence momentary positive social feelings, (b) that social daydreams can regulate these feelings under conditions of actual and inferred momentary social threat, and (c) that imagining close significant others may be particularly beneficial for the regulation of momentary socio-emotional well-being because it provides an imaginary substitute for meaningful social contact when that contact is not available in reality.

Studies 1 and 2 have therefore examined the effect of social daydreaming under conditions of immediate social threat on the momentary regulation of socio-emotional well-being. Although they provide initial evidence that social daydreaming is involved in the regulation of socio-emotional well-being they are unable to provide evidence that social daydreaming plays an adaptive role in the regulation of socio-

emotional well-being over time, which is a key principle of the model proposed in Chapter 3. The third and final empirical study of this thesis study was designed to provide an initial test of this portion of the proposed model. Specifically, unlike Studies 1 and 2, Study 3 examined naturally occurring social daydreams and socio-emotional well-being over time during a period of naturalistic and prolonged socio-emotional challenge.

CHAPTER 6

STUDY 3: SOCIAL DAYDREAMING, THE REGULATION OF SOCIO-EMOTIONAL WELL-BEING, AND ADJUSTMENT OVER TIME

Having provided initial evidence to substantiate the model of socio-emotional well-being regulation via social daydreaming for momentary socio-emotional well-being regulation in studies 1 and 2, this Chapter examines the role of social daydreaming in the regulation of socio-emotional well-being over time and social adjustment, using an experience-sampling study. To do so, I capitalized on young adults' transition to university as a period of prolonged socio-emotional challenge and measured social daydreaming during the first weeks of this transition in undergraduate students. Participants reported on their social daydreams (the content and emotional outcomes of these daydreams), their feelings (connection, positive and negative affect), and levels of loneliness and social adaptation to university.

6.1 Social daydreams and the regulation of socio-emotional well-being over time

Recall from Chapter 3 (section 3.3.3.4) how and why social daydreaming is implicated in the regulation of socio-emotional well-being over time. Threats or challenges to socio-emotional well-being can be prolonged and experienced over relatively longer periods of time (e.g. relationship conflict, separation from loved ones, life transitions), compared to momentary threats to socio-emotional well-being (e.g. being ignored during a conversation). When faced with prolonged socio-emotional challenges, these challenges become pertinent current concerns (or rather a series of related current concerns). This means that, during periods of socio-emotional challenge, social daydreaming activity will be biased towards addressing those concerns when doing so in the external environment is not possible. The nature and kind of social daydreaming activity during this time should predict how well an individual adapts or adjusts to socio-emotional challenge, which should be reflected in their levels of socio-emotional well-being at a later time. Adaptation refers to the process by which individuals regulate their behavior, thoughts, and emotions when faced with a prolonged environmental challenge. Adaptation theories (e.g. Cummins,

2010, Cummins & Nistico, 2002; Diener, et al., 2006; Frederick & Loewenstein, 1999; Heady & Wearing, 1989; Helson, 1964) predict that, over time, individuals will return to baseline levels of functioning (i.e. their set point).

Although previous research suggests that social daydreaming might be linked with positive effects on longer-term socio-emotional well-being (and in particular, loneliness; Honeycutt, et al., 1989; Mar et al., 2012, reviewed in section 3.3.3.4), this research is limited because it does not examine social daydreaming during the process of adjustment over time (see section 3.3.3.4). Adjustment is a temporal process, which means that to properly understand how social daydreams are related to adjustment, it is necessary to capture repeated observations of daydreaming over time in a situation where adjustment is required. Study 3 therefore used an intensive longitudinal design with repeated measurements of daydreaming, during a period of actual socio-emotional challenge (the transition to university). This type of design captures the dynamic nature of social daydreaming and considers adjustment as a temporal process.

In addition to examining daydreaming as a dynamic process it is also necessary to consider daydreaming as heterogeneous and measure both the emotional outcomes and characteristics of daydreams. The previously reviewed literature in Section 3.3.3.4, as well as the results from Studies 1 and 2, suggest some important social daydreaming characteristics that might be expected to predict adjustment: their emotional outcomes (connection, loneliness, and positivity), valence, and the relationship quality between the daydreamer and the most central other person involved in the daydream. Other literature also suggests that the fanciful nature of daydreams may relate to adjustment because fanciful thinking has been previously associated with negative outcomes (e.g. Kappes, Oettingen, & Mayer, 2012; Oettingen & Wadden, 1991).

Consistent with dimensional approaches to daydreaming and repetitive thought, which emphasize the need to consider the content of cognition and the context in which they occur to examine their adaptive or maladaptive consequences (e.g. Segerstrom et al., 2003; Smallwood & Andrews-Hanna, 2013; Watkins, 2008), social daydreams per se should not predict adjustment, but their characteristics and patterns of change over time should. If social daydreams were part of an adaptive response then they should, over time, become more constructive. Specifically, they should be associated with more positive emotional outcomes (greater connection and positivity,

and less loneliness), become more positively valenced, involve higher quality relationships, and become less fanciful. This pattern of constructive change over time should then predict later socio-emotional adjustment.

6.2 The transition to university as a period of socio-emotional challenge

To capture the dynamic and heterogeneous nature of social daydreams over time and their relationship to adjustment, I used ESM to sample social daydreams during a period of naturally occurring adjustment. Life events offer opportunities to study adjustment because they are episodes that involve a substantial change in an individual's daily routine and require a new behavioral response (Luhmann et al., 2012). Given that stressful life events cannot be experimentally induced, I chose to examine social daydreaming during students' first transition to university. I chose this context for two reasons. First, the transition to university is a stressful life event that requires an adaptive response; it is reported as one of the most stressful periods of adjustment in life (Shaver, Furman, & Buhrmester, 1985) and is associated with increased psychological ill-health (e.g. Bewick, Koutsopoulou, Miles, Slaa, & Barkham, 2010). Second, it is a time of *socio-emotional* challenge where social goals and emotions (e.g. preventing loneliness, social connection, making new friends) are likely to be important. Socio-emotional challenges are especially pertinent during such a transition, perhaps more so than academic or financial ones (Arthur & Hiebert, 1996; Bitsika, Sharpley, & Rubenstein, 2010), because moving to university disrupts existing social support networks and requires the formation of new relationships. As a consequence, loneliness is a commonly experienced feeling and issue for transitioning students, particularly in the first months (Cutrona, 1982; Shaver, et al., 1985).

6.3 Overview and hypotheses

To examine how social daydreaming was related to socio-emotional adjustment during this transition I measured the characteristics of social daydreams described above (i.e. emotional outcomes, valence, relationship quality, fanciful nature) twice daily for one month. I measured adjustment outcomes (loneliness and social adjustment to university) after two and four weeks of the study. The repeated measurement of social daydreaming and its characteristics enabled an examination of the temporal process of daydreaming during adjustment to university.

6.3.1 Daydreaming over time

I predicted that positive features of daydreaming would increase over time indicative of adjustment. However, I reasoned that because the process of adjustment is likely to first involve participants' reaction to the new environment followed by an adaptive response, evidence of positive change over time for social daydreams would be delayed. For this reason, I examined how social daydreams changed over time during the earlier and later stages of the transition separately. I expected the content of social daydreams to show positive and constructive patterns of change in the last weeks (when students are adapting) but not the first weeks (when students are reacting) (Hypothesis 7a). I also examined how feelings in general changed over time, specifically feelings of connection, positivity, and negativity. Like social daydreaming, I expected feelings to change over time, becoming increasingly positive, but only in the last weeks of the study (Hypothesis 7b).

6.3.2 Emotional inertia as an index of adjustment

As additional evidence of the role of social daydreams in adjustment, I drew on the concept of emotional inertia to further examine the emotional outcomes of social daydreams over time. Emotional inertia describes resistance to emotional change over time, and can be indexed by the extent to which a person's current emotional state is predicted by their emotional state at a previous time point (i.e. the autocorrelation between successive measurements of emotional states). High emotional inertia is thought to reflect psychological maladjustment (Kuppens, Allen, & Sheeber, 2010) because it indicates that emotional states are resistant to change, reflecting a maladaptive regulatory mechanism. This idea is supported by studies demonstrating that emotional inertia predicts depression (Kuppens et al., 2012) and ill health (Wang, Hamaker, & Bergeman, 2012). I reasoned that if social daydreams were linked to successful adjustment, then I would expect the emotional outcomes of daydreaming to show less evidence of inertia (i.e. show faster changes in the emotional outcomes of daydreams) in individuals who are currently maladjusted (i.e. participants who report being less adapted to university than others) (Hypothesis 8).

6.3.3 Social daydreaming and later adjustment

I also predicted that positive features of social daydreaming would predict better socio-emotional adjustment and well-being. I used loneliness and social adaptation to

university to index adjustment, and measured them after two (T1) and four (T2) weeks. If, as I propose, social daydreams promote socio-emotional adjustment, then the positive features of social daydreams should predict better adjustment at T2 controlling for adjustment at T1 (Hypothesis 9). Specifically, I predicted that social daydreams that were more positively valenced, involved higher quality relationships, were less fanciful and were associated with more positive emotional outcomes, would predict less loneliness and greater levels of social adaptation to university.

6.4 Method

6.4.1 Participants

One hundred and three first year students at a UK university (M_{age} = 19.34, SD = 2.34; Range = 17-29; 75 females) were recruited to the study, which was described as an investigation into first year undergraduates' thoughts and feelings. Sample size was based on recommendations that at least 100 groups at level-2 (i.e. participants in the current study) should be used when analyzing data with multi-level structural equation modeling (Hox, Maas, & Brinkhuis, 2010). Students were recruited at the start of their first year of university via email advertisement, flyers, word of mouth and participant referrals. Of the participants, 81% were home students and 19% were international students; the majority (89%) were in self-catered accommodation whilst 8% were in catered accommodation and 3% still lived at home. Thirty-eight percent of the sample were first generation university students, the remainder came from families where either both or one parent attended university (57% and 5% respectively). In exchange for participation, psychology undergraduates (59%) were given course credits; non-psychology students were given £10 worth of vouchers to spend in a university food outlet.

6.4.2 Procedure

Participants attended a group training session (maximum *n* = 8) where they were given written and verbal instructions for the study. Daydreaming was defined as stimulus-independent and task-unrelated thought using the same description as in Study 1. Social daydreams were defined as daydreams where another (real or imaginary) person or people are involved in the daydream (see Appendix A for details). Participants were given a demonstration of the experience-sampling method,

a verbal explanation of the meaning and response to each questionnaire item and instructions for how to complete the survey.

Figure 6.1 summarizes the study design timeline. The experience-sampling period began the day after the training session. Participants were signaled twice daily over 28 days via text message to their smartphones and reported on their current or most recent social daydream by answering an online questionnaire using their smartphone. Participants received the signals at random times each day between 10:00 and 22:00 (one between 10:00-16:00, the other between 16:00-22:00 with at least one hour between consecutive signals). Randomization of signals was used to prevent anticipation and to sample daydreams across a range of times and daily activities. Participants also completed two online questionnaires, prompted via email, at the end of the first two weeks of the study (T1) and at the end of the second two weeks of the study (T2), which measured loneliness and social adaptation to university over the past two weeks.

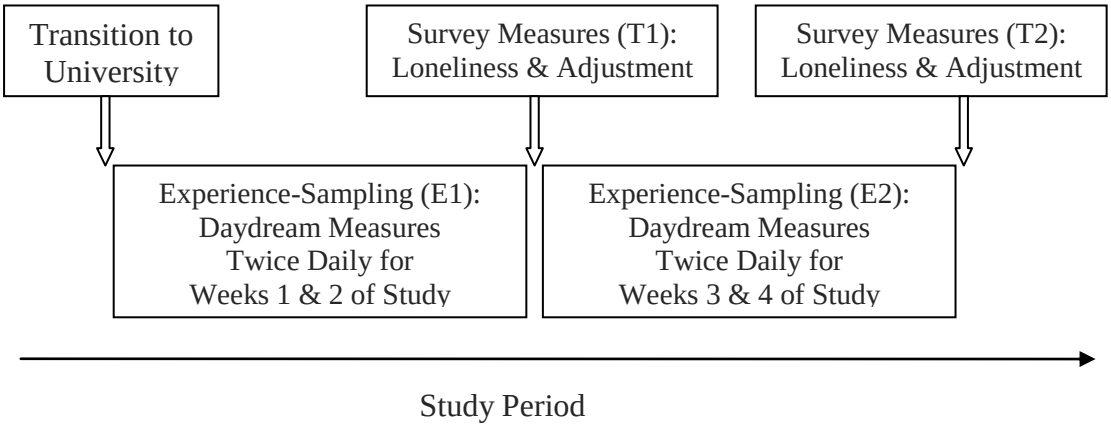

Figure 6.1. Study 3 Protocol

6.4.3 Experience-sampling measures

6.4.3.1 Daydreaming

Participants answered: "*Right before you were signaled, were you daydreaming?*" ("Yes" = 1, "No" = 0). If they answered affirmatively, then they answered: "*Did your daydream involve another person or people?*" ("Yes" = 1, "No" = 0). When participants did not experience a social daydream immediately prior to signaling, they were instructed, "*Please think about your last daydream that involved another person or people*". Participants then answered the questions described below in a randomized order.

6.4.3.2 Emotional outcome of daydream

Participants rated how their daydream made them feel compared to before it for three measures of emotion using 7-point response scales (1 = *much less*, 4 = *no different*, 7 = *much more*). Single items measured social connection ("*connected*"), social disconnection ("*lonely*") and a single item measured positive feelings ("*positive*") in response to the daydream. These items were chosen to be consistent with previous studies in the thesis.

6.4.3.3 Daydreaming characteristics

Participants rated the valence of their daydream from 1(*very negative*) to 7(*very positive*) and how fanciful their daydream was from 1(*completely realistic*) to 7(*completely fanciful*). Participants also rated the quality of the relationship between themselves and the most central other person involved in their daydream. Three items, based on previous research (Niven, et al., 2012) and used in Study 1, were used to index relationship quality: participants rated their general feelings of closeness, liking, and trust towards that person on scales from 1(*not at all*) to 7(*extremely*). Items were averaged to create an overall score for relationship quality ($\alpha = .90$).

6.4.3.4 Feelings

Participants rated the extent to which they had felt "*connected with others*", "*positive*" and "*negative*" so far that day, or since their last signal on that day on scales from 1(*not at all*) to 7(*a great deal*).

6.4.4 T1 and T2 measures

6.4.4.1 Loneliness

Loneliness was measured using the eight-item short-form of the UCLA Loneliness Scale (ULS-8; Hays & DiMatteo, 1987). Participants rated the extent to which they had felt socially isolated over the past two weeks (e.g. "*Isolated from others*") from 1(*never*) to 4(*always*). Items were averaged to provide a score for loneliness, with higher scores indicating greater loneliness. Internal reliability was high at T1 (α = .89) and T2 (α = .91).

6.4.4.2 Social adaptation to university

This was measured using the 20-item social adjustment subscale of the Student Adjustment to College questionnaire (SACQ; Baker & Siryk, 1989). Participants were asked to consider the past two weeks when indicating the extent to which several items indicating social adaptation (e.g. *"I am very involved in social activities in university", "I feel that I fit in well as part of the university environment")* apply to them from 1 (*applies very closely to me*) to 9 (*doesn't apply to me at all*). Negatively worded items were reverse-scored and items were then averaged to create an overall score for social adaptation to university with higher scores indicating greater social adjustment. Internal reliability was high at T1 (α = .93) and T2 (α = .93).

6.5 Results

6.5.1 Response rate

Participants completed 3697 out of a possible 5768 responses corresponding to a 64% response rate. Response rate was satisfactory (i.e. around 70%) and similar to other experience-sampling studies lasting four weeks with computerized methods (Christensen, Barrett, Bliss-Moreau, Lebo & Kaschub, 2003). On these occasions, participants reported that they were currently daydreaming 64% of the time and 92% of these daydreams were social. The percentage of social daydreams in the present study is notably higher than other estimates (e.g. 71%; Song & Wang, 2012). This fits well with the proposal that social daydreams become more frequent during times of social challenge. When participants were not daydreaming at the time of signaling, or

if their current daydream was not social, then they reported on their last social daydream, which occurred on 1532 occasions (41%).[27]

Ninety-nine participants completed the T1 questionnaire (a 96% response rate); at this stage two participants had dropped out of the study because they had left university, and one participant could not continue owing to difficulty tracking daydreaming experience. Ninety-seven of the 99 participants who completed the T1 questionnaire also completed the T2 questionnaire (a total response rate of 94%). Descriptive statistics for level-1 and level-2 variables are presented in Table 6.1.

Table 6.1. Means and standard deviations for level-1 and level-2 variables.

	M	*SD*
Level-1 Variables		
Emotional outcomes of daydreaming		
Connected	4.61	.60
Lonely	3.43	.71
Positive	4.62	.63
Daydreaming content		
Valence	4.89	.62
Fanciful	2.98	.92
Relationship quality	5.18	.73
Affect		
Connectedness	3.36	.53
Positive	3.55	.52
Negative	2.41	.62
Level-2 Variables		
Loneliness		
Time 1	2.08	.71
Time 2	2.00	.72
Social Adaptation to University		
Time 1	5.02	.98
Time 2	5.15	.97

Note. Values from level-1 variables were calculated from aggregating each person's observations and then calculating means and standard deviations across individuals (N = 3697). Level-2 variables represent responses from 99 participants at time 1 and 97 participants at time 2. All response scales for all variables ranged from 1-7 expect for loneliness, which ranged from 1-5.

[27] Current or last social daydreams did not show different associations to any of the experience-sampling dependent variables.

6.5.2 Did daydreams and feelings change over time? (Hypotheses 7a & 7b)

To examine whether daydreams and feelings showed significant patterns of change over time, I examined the effect of time on each dependent variable from the experience-sampling measures. The data had a natural two-level structure (i.e. responses collected over a series of time-points nested within individuals) so data were analyzed by multi-level modeling (Hox, 2010) using the Mixed procedure in IBM SPSS v.21 software. I examined the effect of time on daydreaming and feelings separately for the first and second experience-sampling periods (E1 and E2). The within and between subjects variance of each dependent variable was partitioned by fitting random intercept and slope terms for each individual. Non-independence of observations was modeled by fitting an autoregressive correlation structure (AR1) to level-1 residuals. Time since starting the study was tested as a fixed effect. Some participants began the study later than others so I created a variable representing lapsed time since starting university on commencing the study and entered this as a fixed effect in all models to control for its potential influence.[28]

Table 6.2 summarizes the effect of time on social daydreaming and feelings for E1 and E2. The first weeks of the study (E1) were not characterized by any significant patterns of change for the emotional outcomes or characteristics of daydreaming. For more general feelings, feelings of connection with others and feeling positive did not show significant patterns of change. However, feeling negative showed a significant and reliable increase during E1 (β = .06, B = .01 t(428) = 2.33, p = .020, 95%CI[.00, .02]), suggesting that the first weeks of university may have been a time associated with increased negative emotion.

As expected, the pattern of change over time was substantially different for E2. Over time, participants' social daydreams made them feel significantly more connected (β = .07, B = .01, t(575) = 3.22, p = .001, 95%CI[-.00, -.02]) and less lonely (β = -.07, B = -.01, t(573) = -2.98, p = .003, 95%CI[-.02, -.00]), but not more positive (β = .03, B = .01, t(571) = 1.37, p = .170, 95%CI[.00, -.01]). Participants' social daydreams also became significantly less fanciful in content (β = -.06, B = -.02, t(534) = -2.60, p = .009. 95%CI[-.03, -.00]) and involved higher quality relationships

[28] Time since starting the study was non-significant in all models except for predicting how lonely participants' social daydreams made them feel during E1. Specifically, participants' who started the study later, had daydreams that made them feel less lonely during E1 (β = -.02, t(101) = -2.09, p = .039).

(β = .08, *B* = .02, *t*(607) = 3.69, *p* < .001, 95%CI[.01, .03]); but did not become more positively valenced (β = .04, *B* = .01, *t*(601) = 1.45, *p* = .146, 95%CI[-.00, .02]). Likewise, participants reported feeling significantly more connected with others (β = .06, *B* = .01, *t*(489) = 2.40, *p* = .017, 95%CI[.00, -.01]), more positive (β = .07, *B* = .01, *t*(442) = 2.68, *p* = .008, 95%CI[.00, .02]) and less negative (β = -.05, *B* = -.01, *t*(475) = -2.23, *p* = .026, 95%CI[-.01, -.00]) over time.

I also repeated these analyses considering the whole sampling period (i.e. four weeks). Consistent with the results for E2, over the whole study period, participants social daydreams made them feeling increasingly connected (β = .08, *B* = .01, *t*(63) = 3.38, *p* < .001, 95%CI[.00, .01]), less lonely (β = -.06, *B* = -.01, *t*(69) = -3.00, *p* = .004, 95%CI[-.01, -.02]), and involved higher quality relationships (β = .07, *B* = .01, *t*(63) = 3.41, *p* = .001, 95%CI[.00, .01]). In contrast to the results from E2 participants' social daydreams made them feeling increasingly positive (β = .07, *B* = .01, *t*(64) = 3.58, *p* = .001, 95%CI[.00, .01]), the content of social daydreams became more positively valenced (β = .07, *B* = .01, *t*(60) = 2.61, *p* = .012, 95%CI[.00, .01]), but did not become less fanciful (β = .02, *B* = .00, *t*(72) = 1.63, *p* = .107, 95%CI[-.00, .01]). Participants also reported feeling increasingly positive (β = .04, *B* = .00, *t*(63) = 2.09, *p* = .037, 95%CI[.00, .01]) and less negative (β = -.04, *B* = -.00, *t*(63) = -2.50, *p* = .015, 95%CI[-.01, -.00]) but not more connected with others (β = .04, *B* = .00, *t*(52) = .80, *p* = .426, 95%CI[-.00, .00]) over the study period. Thus the results of the effect of time on social daydreaming and feelings also emerged over the study period, although examinations of E1 and E2 separately indicate that these effects occur, as predicted, later during the transition.

Because some students started the study later than others I repeated the analyses for the effect of time in E1 and E2 for two subgroups: early study starters (< two weeks of starting university, n = 55) and late starters (> two weeks of starting university, n = 48). In line with the idea that the adaptive response takes time, effects were most evident for the late starter group during E2. Specifically, significant effects of time were observed in the late starter group during E2 for how connected (β = .08, *B* = .01, *t*(297) = 2.74, *p* = .007, 95%CI[.00, .02]) and lonely (β = -.09, *B* = -.02, *t*(289) = -2.91, *p* = .004, 95%CI[-.03, -.01]) participants social daydreams made them feel. A marginally significant effect of time was observed for how positive participants social daydreams made them feel (β = .06, *B* = .01, *t*(282) = 1.85, *p* = .065, 95%CI[-.00, .02]). The effect of time was significant for the valence of

daydreams (β = .08, B = .01, t(280) = 2.12, p = .035, 95%CI[.00, .03]) and relationship quality (β = .11, B = .02, t(291) = 3.47, p = .001, 95%CI[.01, .03]) but not for the fanciful nature of daydreams (β = -.04, B = -.01, t(272) = -1.39, p = .164, 95%CI[-.02, .01]). Significant effects of time were not observed for the early starters in E1 or E2 but they were in the predicted direction, suggesting that effects of daydreaming take time to emerge. For instance, the results for early starters in E2 were as follows: how connected (β = .06, B = .01, t(277) = 1.68, p = .094, 95%CI[-.00, .02]), lonely (β = -.04, B = -.01, t(284) = -1.08, p = .279, 95%CI[-.02, .01]), and positive (β = .00, B = .00, t(286) = .10, p = .921, 95%CI[-.01, .01]) participants social daydreams made them feel, the valence (β = .01, B = .00, t(318) = .33, p = .740, 95%CI[-.02, .01]), and relationship quality (β = .05, B = .01, t(313) = 1.66, p = .099, 95%CI[-.02, .03]) of social daydreams. As an exception, early starters in E2 did show significant decreases in how fanciful their daydreams were during this time (β = -.09, B = -.02, t(264) = -2.32, p = .021, 95%CI[-.04, -.00])

6.5.3 Emotional inertia (Hypothesis 8)

I predicted that participants who reported being currently less adjusted to university would show faster changes in the emotional outcomes of their social daydreams (i.e. low emotional inertia) than those who were more adjusted. Given that the social emotional outcomes (connected, lonely) of participants' daydreams increased significantly during E2, I was interested in examining the extent to which they might show resistance or susceptibility to change depending on levels of social adaptation at T1. Evidence for this would be provided by a significant cross-level interaction between the autocorrelation of each dependent variable (i.e. the lag of the variables for connected and lonely) and levels of social adaptation (results are summarized in Table 6.3). A significant cross-level interaction would therefore indicate that participants' levels of inertia (i.e. resistance to emotional change as a result of daydreaming) differed according to levels of social adaptation at T1.

First, I examined the fixed effects of the lag variables on feeling connected and lonely, as an index of inertia. The fixed effects were positive and significant demonstrating autocorrelation between adjacent time points (i.e. feeling connected and lonely as a result of daydreaming at time t was significantly predicted by feeling connected and lonely at time t-1). Next, I justified the addition of a level-2 predictor (social adjustment) by examining the improvement in model fit by allowing slopes as

well as intercepts to vary. Improvement in model fit was only significant for the model predicting feeling connected, but not lonely. I therefore only examined the effect of social adjustment on connectedness and the cross-level interaction between social adjustment and the lag of connectedness, which, as expected, was significant (*B* = .08, *t*(64) = 2.72, *p* = .008, 95%CI[.02, .14]).[29] As shown in Figure 6.2, participants who were low (1sd below the mean), compared to high (1sd above the mean), in social adaptation showed lower levels of inertia (i.e. the autocorrelation for connected was lower/higher when participants were less/more adapted to university). This suggests that participants who were less socially adapted to university showed less inertia for feelings of connection as a result of their social daydreams, indicative of an adaptive response. Note that autocorrelations close to zero indicate little carryover between consecutive measurement points (i.e. less inertia) whereas autocorrelation parameters close to one indicate substantial carryover between consecutive measurement points (i.e. greater inertia).

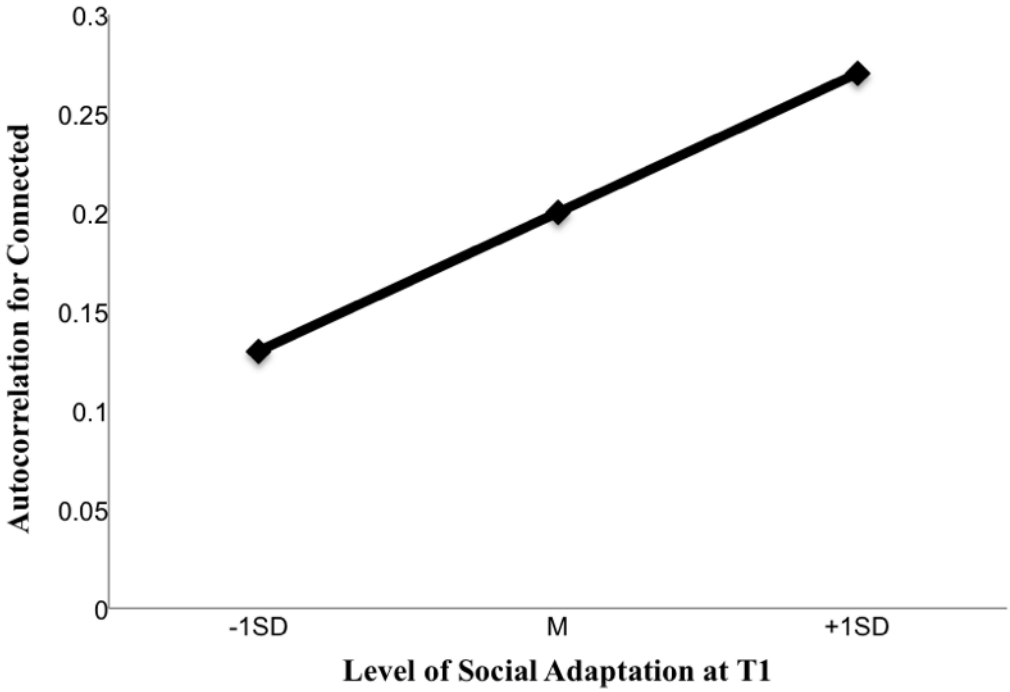

Figure 6.2. Emotional inertia for how connected social daydreams made participants' feel during E2 according to T1 levels of social adaptation.

[29] Equivalent results were obtained when the lag of connectedness was cluster mean centered (*B* = .07, *p* = .024). See Hamaker & Grasman (2015) for a discussion of centering in inertia analyses.

Table 6.2. Fixed effects of time on emotional outcomes, characteristics of daydreaming, and feelings over E1 and E2.

	E1					E2				
Fixed effects	df	Estimate (*SE*)	t	95% CI	ICC	df	Estimate (*SE*)	t	95% CI	ICC
Emotional outcomes of daydreaming										
Connected	618	-.00 (.00)	-.07	-.01, .01	.17	575	.01 (.00)	3.22***	.00, .02	.28
Lonely	585	.00 (.00)	.54	.01, -.01	.22	573	-.01 (.00)	-2.98**	-.02, -.00	.30
Positive	592	.01 (.01)	.97	.00, -.01	.18	571	.01 (.00)	1.37	.00, -.01	.23
Daydreaming content										
Valence	596	.01 (.01)	1.38	-.01, .02	.15	601	.01 (.00)	1.45	-.00, .02	.17
Fanciful	612	.01 (.01)	1.40	-.01, .02	.23	534	-.02 (.01)	-2.60**	-.03, -.00	.28
Relationship quality	615	-.00 (.01)	-.07	-.01, .01	.18	607	.02 (.00)	3.69***	.01, .03	.25
Affect										
Connectedness	546	-.00 (.00)	-.49	-.01, .00	.24	489	.01 (.00)	2.40*	.00, .01	.35
Positive	542	-.00 (.00)	-.99	-01, .00	.24	442	.01 (.00)	2.68**	.00, .02	.33
Negative	528	.01 (.00)	2.33*	.00, .02	.31	475	-.01 (.00)	-2.23*	-.01, -.00	.39

Note. SE = Standard error. Time since starting university entered as a fixed effect in all models. *$p < .05$, **$p < .01$, ***$p < .001$.

6.5.4 Did social daydreaming predict loneliness and social adaptation to university? (Hypothesis 9)

Given the significant patterns of change observed in social daydreaming during E2, I examined whether these daydreaming characteristics predicted later loneliness and social adaptation to university. These analyses required an examination of bottom-up effects (i.e. predicting level-2 outcomes from level-1). Traditional multi-level models do not allow level-2 variables as outcomes (only as predictors); I therefore used multi-level structural equation modeling (MSEM; Preacher, Zyphur, & Zhang, 2010) using Mplus software (Muthén & Muthén, 1998-2011). Mplus does not currently allow the modeling of autocorrelation by fitting an autoregressive correlation structure (Bolger & Laurenceau, 2013) so I entered the lag for each level-1 variable within the models (e.g. Totterdell, Wood, & Wall, 2006).

6.5.4.1 Loneliness

I examined the effect of daydreaming during E2 on T2 loneliness, controlling for T1 loneliness in all models (T1 loneliness significantly predicted T2 loneliness; all βs > .81, all ps < .001). Results showed that T2 loneliness was negatively predicted by daydreams that made participants feel connected (β = -.16, *SE* = .07, p = .020, 95%CI[-.30, -.05]) and positive (β = -.20, *SE* = .08, p = .010, 95%CI[-.33, -.07]), and positively predicted by daydreams that made participants feel lonely (β = .13, *SE* = .07, p = .041, 95%CI[.03, .24]). Likewise, T2 loneliness was negatively predicted by daydreams that were positively valenced (β = -.24, *SE* = .07, p = .001, 95%CI[-.36, -.13]) and involved high quality relationships (β = -.12, *SE* = .06, p = .042, 95%CI[-.21, -.02]), but was positively predicted by fanciful daydreams (β = .12, *SE* = .05, p = .021, 95%CI[.03, .21]). This indicates that participants were less lonely at T2 if their daydreams during E2 made them feel more connected, less lonely, and more positive, and their daydreams were less fanciful, more positively valenced and involved higher quality relationships.

6.5.4.2 Social adaptation

Using the same analytical procedure, I examined the effect of daydreams during E2 on T2 social adaptation to university controlling for T1 social adaptation (T1 social adaptation significantly predicted T2 social adaptation in all models, βs > .25, all ps < .05, except when examining relationship quality where this relationship was marginal,

β = .27, *SE* = .14, *p* = .062). Unexpectedly, social daydreams during E2 did not predict T2 social adaptation: social adaptation was not significantly predicted by the emotional outcomes of social daydreams (connected: β = .15, *SE* = .32, *p* = .642, 95%CI[-.38, .67], lonely: β = .35, *SE* = .33, *p* = .292, 95%CI[-.19, .89], positive: β = -.12, *SE* = .30, *p* = .687, 95%CI[-.60, .37]) or their characteristics (valence: β = .27, *SE* = .27, *p* = .312, 95%CI[-.17, .71], fanciful: β = -.07, *SE* = .22, *p* = .738, 95%CI[-.43, .29], relationship quality: β = .03, *SE* = .38, *p* = .929, 95%CI[-.59, .67]).

6.5.5 Supplementary mediation analysis

Given that social daydreams were significantly related to loneliness but had no direct effect on social adaptation, I wondered whether social daydreaming might indirectly influence social adaptation through its demonstrated effects on loneliness. To examine this, I constructed a series of multi-level mediation models to examine whether social daydreams during E2 had indirect effects on social adaptation via loneliness. In each model, I controlled for T1 loneliness and T1 social adaptation to university and included the lag of each associated level-1 variable. The results of these multi-level mediation analyses are summarized in Table 6.4.

In all models, lower levels of loneliness predicted greater social adaptation to university (i.e. path b: all β*s* < -.39, all *p*s < .001). Examination of paths *a* and *c* in each model (i.e. daydreaming predicting loneliness and social adaptation) largely reflects previous analyses that constructive daydreaming predicts less loneliness but not social adaptation.[30] Of critical interest were paths *ab* (i.e. the indirect effects of daydreaming on social adaptation via loneliness), which were significant for daydreams that made participants feel more connected (β = .12, *SE* = .06, *p* = .047, 95%CI[.02, .22]) and positive (β = .14, *SE* = .06, *p* = .033, 95%CI[.03, .24]), marginally significant for daydreams that made participants feel less lonely (β = -.13, *SE* = .07, *p* = .077, 95%CI[-.24, -.01]), and were more positive in content (β = .16, *SE* = .07, *p* = .013, 95%CI[.06, .27]), and less fanciful (β = -.19, *SE* = .09, *p* = .024, 95%CI[-.35, -.05]). This suggests that although social daydreams did not exert direct effects on social adaptation, they had an indirect effect on social adaptation via their effect on loneliness.

[30] Note that the effects for how lonely daydreams make participants feel and relationship quality are now marginal and non-significant respectively.

Table 6.3 Emotional inertia analyses for socio-emotional outcomes of social daydreaming during E2 with social adaptation at T1

Emotional outcome	Key Variable	-2*LL	-2*LLΔ	df	Estimate (*SE*)	p	95% *CI*	ICC
Connected								
Fixed effects	Lag of connected	5357.48	—	1760	.04 (.02)	.075	-.00, .09	.26
Random effects	Lag of connected	5337.22	20.25***	86	.04 (.01)	.005	.02, .07	.03
Level-2 fixed effect	Social adjustment	5314.46	22.76***	64	.22 (.06)	.001	.09, .34	.48
Interaction	Lag of connected*Social adaptation	5312.76	1.70	64	.08 (.03)	.008	.02, .14	.44
Lonely								
Fixed effects	Lag of lonely	5540.30	—	1758	.05 (.02)	.021	.01, .10	.27
Random effects	Lag of lonely	5540.17	.14	53	.00 (.01)	.764	.00, 1.44	.00

Note. SE = Standard error; LL = log likelihood. ***$p < .001$.

Table 6.4 Summary of multi-level mediation models examining the indirect effect of social daydreaming characteristics and emotional outcomes on social adaptation to university via loneliness

	Path *a*				Path *c*				Path *ab*			
	β	SE	p	95% CI	β	SE	p	95% CI	β	SE	p	95% CI
Emotional outcomes of daydreaming												
Connected	-.37	.18	.044	-.67, -.07	.01	.13	.922	-.21, .23	.12	.06	.047	.02, .22
Lonely	.39	.21	.063	.05, .73	-.04	.14	.799	-.27, .20	-.13	.07	.077	-.24, -.01
Positive	-.42	.19	.026	-.73, -.11	.00	.12	.991	-.19, .20	.14	.06	.033	.03, .24
Daydreaming content												
Valence	-.50	.19	.007	-.81, -.19	-.12	.12	.398	-.31, .10	.16	.07	.013	.06, .27
Fanciful	.60	.25	.017	.19, 1.01	.34	.19	.070	.03, .66	-.19	.09	.024	-.34, -.05
Relationship quality	-.31	.27	.244	-.76, .13	-.12	.17	.500	-.40, .17	.10	.09	.250	-.04, .25

Note. SE = Standard Error. All models include loneliness and social adaptation at T1 and the lag of the associated level-1 variable. Path *a* represents the effect of daydreaming on loneliness at T2, path *c* represents the effect of daydreaming on social adaptation at T2, and path *ab* represents the indirect (mediated) effect of daydreaming on social adaptation via loneliness. Path *b* (the effect of loneliness on social adaptation) is not represented here but was positive and significant ($p < .001$) in all models.

6.6 Discussion

The findings from Study 3 provide initial support for the proposal that social daydreaming is involved in the regulation of socio-emotional well-being over time via a process of adaptation to a prolonged challenge to socio-emotional well-being (i.e. the transition to university in this instance). Crucially, this study has four findings that implicate social daydreams, their emotional outcomes, and characteristics, in the process of adjustment or adaptation over time. I discuss each of these findings, what they reveal about how social daydreaming might regulate socio-emotional well-being over time, and the limitations of the study.

6.6.1 Social daydreaming and change over time

First, the emotional outcomes and characteristics of social daydreams showed consistent and significant patterns of change over time indicative of the process of adjustment to this period of socio-emotional challenge. Consistent with the notion of an adaptive, but delayed, response to environmental challenges in which daydreams become more constructive in nature over time, daydreams became more constructive in the later, rather than earlier, weeks of the study. In the early weeks of the transition, no reliable patterns of change were observed in participants' social daydreams but negative affect reliably increased during this time, indicating that the initial transition to university was a difficult period associated with negative feelings. In contrast, later study weeks were characterized by increasingly constructive social daydreaming over time; specifically, daydreams made participants feel more connected, less lonely, were less fanciful in nature and involved higher quality relationships. At the same time, participants also felt more connected with others, more positive, and less negative. The positive changes observed in the later weeks of the study are therefore consistent with the notion of an adaptive, but delayed, response to socio-emotional challenge in which social daydreams become more constructive in nature over time.

6.6.2 Social daydreaming and emotional inertia

Second, participants who reported being less socially adapted to university showed faster changes in how connected their daydreams made them feel than others; that is, they showed *less* evidence of emotional inertia in response their social daydreaming. High emotional inertia is considered an index of maladjustment (e.g. Kuppens et al.,

2010) suggesting that the lack of inertia for connectedness observed in participants who were less adapted to university was indicative of a functional affective response. Low emotional inertia is likely to reflect the adaptive nature of emotions, which enable individuals to flexibly respond to environmental challenges. Evidence of low emotional inertia for a positive social emotion (connectedness), as a result of cognition (social daydreaming) in a dynamic context (adjustment to university) contributes to the growing literature on the dynamics of emotion and adjustment (e.g. Kuppens et al., 2012). These results indicate that high inertia is not necessarily a pattern of emotion dynamics for those who are currently socially maladjusted. Rather, current social maladjustment may be characterized by low inertia when individuals are in the process of adjusting to social challenges, which is likely to be functional (c.f. Koval & Kuppens, 2012).

6.6.3 Social daydreaming and later socio-emotional well-being

Third, social daydreams with positive characteristics predicted less loneliness. Specifically, participants were less lonely if their social daydreams made them feel more connected, less lonely, and more positive and their content was less fanciful, more positively valenced, and involved higher quality relationships. These findings are consistent with dimensional approaches to repetitive thoughts, daydreaming, and adjustment, which argue that examining the characteristics (and not just the amount) of cognition is vital to understanding their (mal)adaptive outcomes (Segerstrom et al., 2003; Smallwood & Andrews-Hanna, 2013; Watkins, 2008). The present results extend these approaches by highlighting the value of exploring dimensions of *social* cognition and *socio-emotional* well-being, which have been largely overlooked. They also support and extend the results from Studies 1 and 2 by showing that social daydreams (and their characteristics) promote greater socio-emotional well-being over time, as well as in the moment. Indeed, the fact that, as a general pattern for most participants, social daydreams became more constructive in nature over time, and that these positive characteristics then predicted less loneliness at the end of the study, provides strong initial evidence for the proposal that social daydreaming is involved in the regulation of socio-emotional well-being *over time* during a period of naturally occurring prolonged socio-emotional challenge.

Fourth, social daydreams had an indirect effect on social adaptation to university via their influence on loneliness. Although I expected social daydreaming

to directly predict social adjustment, this was not supported. However, supplementary mediation analyses showed indirect effects of daydreaming on social adaptation via loneliness for daydreams that made participants feel more connected, more positive, and less lonely and that were more positively valenced and less fanciful in content. These results suggest that social daydreaming is especially linked to individuals' socio-emotional well-being (e.g. loneliness) which then impacts on cognitive evaluations of their social situation. It is also possible that social daydreaming may have a longer-term effect on cognitive well-being (e.g. life satisfaction), which was not captured in the current month-long study.

6.6.4 Mechanisms linking social daydreaming to adjustment

How does social daydreaming promote socio-emotional adjustment? The findings of Study 3 point to the value of the regulation of social emotions (in particular feelings of social connection) for the process of adjustment. Over time, participants showed increases in feelings of interpersonal connection as a result of their social daydreams. Such an increase may be adaptive because it reflects a process whereby feelings of social connection contribute to more positive social interactions and the building of personal resources. Just as negative cognitions before and after social interactions (anticipatory and post-event processing, Clark & Wells, 1995) contribute to negative social interactions and the maintenance of social anxiety (e.g. Taylor & Alden, 2011; Vassilopoulos, 2005) it is likely that positive cognitions might have an equivalent positive influence.

People who feel interpersonally connected after daydreaming may behave more positively towards others and have that positivity reciprocated in social interactions (Miller & Turnbull, 1986). Positive social interactions may lead to further feelings of social connection (Reis, et al., 2000) and greater social resources (e.g. social support, interpersonal trust, and intimacy, Burns et al., 2008; Kok & Fredrickson, 2010; Laurenceau, Barrett, & Pietromonaco, 1998). Over time, the interplay between social interactions, social daydreaming and social emotions may contribute to greater socio-emotional functioning and greater socio-emotional well-being (e.g. less loneliness, greater feelings of interpersonal connection).

In addition to emotional mechanisms, cognitive problem-solving processes might also explain why social daydreaming promotes adjustment and regulated socio-emotional well-being over time. Various cognitive theories of adjustment propose that

thoughts during significant life events, or problems, facilitate adjustment because they allow individuals' to process important events, make sense of them, and derive meaning from them (e.g. Park, 2010; Taylor, 1983). Part of this process may involve problem-focused coping attempts that aid self-regulation and adjustment through the formation of concrete plans for action (Taylor, Pham, Rivkin, & Armor, 1998). In particular, imagining past and possible future social interactions during social daydreams may facilitate learning, goal progress, problem-solving and effective planning in the interpersonal domain (c.f. Baumeister & Masicampo, 2010).

Research on mental simulation and goals consistently shows that imagining the process, rather than the outcome, of goal achievement is associated with the successful pursuit of personal goals (Freund & Hennecke, 2015). That participants' social daydreams became less fanciful over time, suggests that daydreams eventually become more concrete and based on actual or probable social interactions and situations following a transition. This shift could be indicative of a more process-orientated approach to social problem-solving or planning which, in turn, may have facilitated later interpersonal behavior and reduced loneliness.

This view is consistent with evidence that daydreaming in general is associated with autobiographical planning (Baird et al., 2011) and social problem-solving (Ruby, et al., 2013b). However, whether or not *social* daydreams function in this manner for interpersonal goals is an open question. Research on the effect of mental simulation on goal achievement and coping has tended to focus on intrapersonal goals such as academic achievement or task performance (e.g. Oettingen, Hönig, & Gollwitzer, 2000; Pham & Taylor, 1999; Vasquez, & Buehler, 2007) rather than on interpersonal goals that are directed towards socio-emotional well-being such as the formation and maintenance of positive social relationships.

6.6.5 Limitations and future directions

A skeptical reader might question whether social daydreams simply reflect the process of adjustment rather than contributing to it. That is, the characteristics of social daydreams may show the observed patterns of change over time and predict less loneliness because participants were adjusting to a new social environment rather than the other way around. Of course, daydreams will, in part, reflect one's current state of adjustment and the correlational nature of this investigation cannot unequivocally rule out reverse causation or third variable explanations. However, the

analyses examining how social daydreams predicted later loneliness (and social adaptation via loneliness) controlled for these variables during the preceding two weeks, thereby attenuating this concern. Whether or not social daydreams causally contributed to socio-emotional adjustment and well-being depends on whether imagination has a causal impact on later behavior and emotion. Various lines of research (reviewed in Baumeister, Masicampo, & Vohs, 2011) strongly suggest that conscious thought causes behavior albeit not immediately or directly, but the process by which social daydreams causally affect social behavior is a key question for future research. If this causal relationship is not supported, then we still have an epiphenomenon that is a potentially useful indicator of adjustment and socio-emotional well-being.

The present study only examined social daydreaming within one context of adjustment. I chose the university transition because it represents a stressful life event that is particularly associated with socio-emotional challenges. Whether similar findings can be observed during different life transitions should be addressed in future research. However, I expect that the theoretical rationale for why social daydreaming regulates socio-emotional well-being over time via the process of adjustment would apply to various types of transitions where social goals and needs are pertinent (e.g. bereavement, marriage, divorce, parenthood). I also only examined social daydreaming at the start of a transition and could not therefore consider the anticipatory effects of daydreaming. However, anticipatory coping may occur before a stressful event, particularly when the event is expected, as in the case of the university transition (Aspinwall & Taylor, 1997). I would therefore expect social daydreaming in the weeks preceding a transition to be associated with adjustment and socio-emotional well-being regulation as a form of pro-active coping (e.g. mental preparation for upcoming social interactions, thoughts about leaving established social networks, and expectations for the transition). Productive and unproductive social daydreaming in relation to an anticipated stressful event may be associated with later adjustment or maladjustment, and higher or lower levels of socio-emotional well-being, respectively (e.g. Feldman & Hayes, 2005).

In addition to not examining social daydreaming prior to the university transition, I also only examined the early stages of that transition. This was based on the assumption that the first months would be especially likely to capture both the reaction and initial adaptive response to the transition. However, the potential effects

of social daydreaming on adjustment and socio-emotional well-being may show different effects when examined over a longer time period. For example, this study revealed linear change in daydreaming characteristics over the latter weeks of the study, but longer sampling periods might reveal non-linear forms of change such as positive relationships that become weaker over time. It would be informative to examine the dynamics of social daydreaming over extended periods of time to adequately characterize the nature and form of change and how it relates to adjustment. Knowing the trajectory of social daydreaming in relation to adjustment could help to inform the timing of possible interventions directed at addressing social daydreaming to enhance socio-emotional well-being.

Despite these limitations, the present study offers a number of significant contributions to understanding the relationship between social daydreaming, adjustment, and the regulation of socio-emotional well-being over time. This is the first study to examine daydreaming repeatedly over time in the context of naturally occurring adjustment, showing that it is associated with an adaptive response and regulated socio-emotional well-being (i.e. less loneliness). It is also the first study to examine the emotional dynamics of the outcomes of cognition by linking daydreaming with emotional inertia, which may be important for understanding the conditions under which cognition and emotion interact to predict adjustment and later socio-emotional well-being. Finally, this study is the first systematic investigation of how the *social* content of thought is associated with *social* adjustment and *socio-emotional* well-being. It is notable that previous research and theory on daydreaming and repetitive thinking have focused primarily on self-focused thoughts. This study highlights the importance of exploring cognition that is focused on *others*, rather than just on the self, which is especially important given the amount of time spent thinking about others.

CHAPTER 7
GENERAL DISCUSSION

In this final chapter I reflect on the main research aims of the thesis, how they have been achieved, and to what extent. I review the present research findings in terms of the proposed theoretical model of socio-emotional well-being regulation via social daydreaming, discuss the extended theoretical contributions of the research, outstanding issues that require development, and what future research should do. I also discuss the limitations of the current research studies and their potential practical implications.

7.1 Research aims and overview of findings

The aim of this thesis was to provide an initial test of a model of socio-emotional well-being regulation via social daydreaming. I proposed that one of the core functions of social daydreams is to enable individuals to achieve a satisfactory level of socio-emotional well-being. Specifically, in Chapter 3, I drew on Perceptual Control Theory (PCT; Powers, 1973) to argue that social daydreams are involved in the regulation of socio-emotional well-being under conditions of social threat. According to this model, individuals have a set point of socio-emotional well-being to which they return (i.e. their reference value) which fluctuates across time and situations. Environmental threats or challenges act as an environmental disturbance, which reduce an individual's current level of socio-emotional well-being. Threats to socio-emotional well-being can be momentary (e.g. being insulted by a partner, or left out of a conversation with friends) or prolonged (e.g. relationship conflict, separation from loved ones, life transitions). An individual's current level of socio-emotional well-being acts as a signal for whether regulation is required. If an individual's current level of socio-emotional well-being is substantially different from the desired reference value (e.g. when experiencing negative social emotions such as loneliness) then regulation is required to reduce the discrepancy between the experienced and desired level of socio-emotional well-being (Leary et al., 1995; Pickett & Gardner, 2005). Regulation attempts can be varied but will often consist of external behavior directed at the present external environment (e.g. seeking interpersonal contact) (e.g. DeWall et al., 2009; Lakin et al., 2008; Williams & Somer, 1997). When an

individual is unable to take immediate or satisfactory action in the external environment to regulate socio-emotional well-being, then regulation attempts will often be mental, via social daydreaming. This proposition is founded on the current concerns theory of daydreaming (e.g. Klinger, 2013) which proposes that daydreams are triggered when overt action towards a goal in not possible (e.g. when an individual feels lonely but is unable to seek social connection through direct social contact) and means that daydreams allow an individual to make mental progress towards that goal when doing so in the external world is not feasible (e.g. by fostering feelings of interpersonal connection through the imagination).

Social daydreaming is proposed to have an immediate effect on socio-emotional well-being by replenishing connectedness through the regulation of emotion (by simulating meaningful social contact to replenish connectedness). The regulatory effect of social daydreaming on socio-emotional well-being can also emerge over time through a process of adaptation or adjustment to social challenges. The beneficial effects of social daydreaming, both on immediate and longer-term socio-emotional well-being are not guaranteed and depend on the content and nature of social daydreaming (e.g. who is being daydreamed about, the emotional outcomes of the daydream, its valence and fanciful nature).

The three empirical studies presented in this thesis provide preliminary evidence to substantiate the proposed model. Study 1 (Chapter 4) aimed to provide initial evidence for the model by (a) demonstrating that social daydreams are associated with changes in momentary socio-emotional well-being (i.e. that social daydreams can influence social feelings), (b) providing evidence consistent with the idea that social daydreams can regulate momentary socio-emotional well-being by examining the effect of social daydreams on social feelings when positive social feelings are lacking (i.e. low) as might be expected in momentary situations of social threat and (c) examining whether the impact of social daydreaming on momentary socio-emotional well-being depended on who was being daydreamed about (i.e. the relationship quality between the daydreamer and the most central other person involved in the daydream).

Study 1 used experience-sampling methodology (ESM) to sample social and non-social daydreams in daily life and social (love and connection) and non-social (happiness, calmness, and boredom) feelings before and after daydreaming. The results showed (a) that social, but not non-social, daydreams were associated with

increases in happiness, love, and connection but not calmness or boredom, demonstrating that naturally occurring social daydreams are associated with increased momentary socio-emotional well-being, (b) that increases in momentary socio-emotional well-being from before to after social daydreaming were observed only when participants were low, but not high, in these feelings before daydreaming, as might be expected under conditions of social threat, and (c) that increased positive social feelings associated with social daydreaming were only observed when the relationship quality between the daydreamer and the most central other person in the daydream was classified as 'high' but not 'low'. Taken together these findings are consistent with, and provide evidence for, the proposal that social daydreams are involved in the regulation of momentary socio-emotional well-being. Specifically, they suggest that in daily life, social daydreams about close significant others may compensate for deficiencies in positive social feelings serving the emotional needs of the daydreamer at the time. This suggests that simulating social contact with a significant other through imagination during daydreaming activity may be sufficient to replenish feelings of interpersonal connection and promote or replenish an individual's level of momentary socio-emotional well-being.

Study 2 (Chapter 5) built on the findings of Study 1 to provide more direct causal evidence that social daydreams involving close significant others can regulate momentary socio-emotional well-being under conditions of actual social threat. Specifically, participants underwent a loneliness induction (to induce social threat and influence social feelings) and were then randomly allocated to either daydream about a close significant other (social daydreamers), daydream about a pleasant but non-social scenario (non-social daydreamers) or engage in a working memory task (control participants). Although both social and non-social daydreams were associated with increases in positive affect in general, only social daydreamers (but not other participants) showed increases in feelings of connection, love, and belonging from before to after daydreaming. Subsequently, social daydreamers were less likely to express a desire for future social connection and were more willing to help with a helping request than other participants, suggesting that these feelings fulfilled their socio-emotional needs. These findings suggest that only social daydreams (and not positive daydreams more generally) generate the positive social feelings required to regulate socio-emotional well-being under conditions of social threat, and that this regulation is a result of social emotions rather than positive emotions more generally.

Having focused on, and provided evidence for, the momentary regulation of socio-emotional well-being via social daydreaming in Studies 1 and 2, Study 3 (Chapter 6) explored whether social daydreaming was associated with socio-emotional well-being over time, under conditions of prolonged socio-emotional threat during young adults' transition to university. Several lines of evidence from Study 3 were consistent with the view that social daydreaming over time in this context was associated with adaptation and better socio-emotional well-being. Social daydreams became more constructive over time both in terms of their content (i.e. they became less fanciful, and increasingly involved close others) and emotional outcomes (i.e. they were increasingly associated with feeling more connected and less lonely), indicative of an adaptive response to the transition in daydreaming activity. The constructive social daydreaming characteristics, which increased over time, then predicted less loneliness at a later time point (i.e. the end of the study), which also then predicted greater social adaptation to university, demonstrating that patterns of social daydreaming during this time were associated with better socio-emotional well-being. Currently maladapted participants (i.e. lonely participants) at the end of the first weeks of the study also showed less emotional inertia for how connected their social daydreams made them feel during the following two weeks of the study, which may be indicative of a functional affective response in daydreaming activity that may have facilitated socio-emotional adaptation over time.

Taken together, the studies in this thesis have provided support for a functional role for social daydreaming in daily life: to help individuals to regulate socio-emotional well-being under conditions of momentary and prolonged socio-emotional threat or challenge. The theoretical and empirical chapters have provided evidence for the proposed model of socio-emotional well-being regulation via social daydreaming, which has several distinct contributions to research and theory on daydreaming and belonging regulation.

7.2 Contribution to daydreaming research: Understanding the costs and benefits of daydreaming

The studies in this thesis provide indicative evidence that daydreaming can have a positive and beneficial role in individuals' lives (i.e. the regulation of socio-emotional well-being). To date, the benefits of daydreaming have largely been inferred or speculated and research has overwhelmingly tended to focus on the costs rather than

the benefits of daydreaming (Mooneyham & Schooler, 2013). The present research contributes to shifting the balance from the well-documented and empirically supported negative effects of daydreaming (see Section 2.4) to focus on its positive and functional outcomes, and provides empirical evidence for the beneficial effects of certain kinds of daydreaming. A core component of this contribution has been to build on the idea that the context and content of daydreaming are vital for providing a nuanced understanding of when, where, how, and for what, daydreaming might be functional (Smallwood & Andrews-Hanna, 2013). Specifically, this research has considered both the social content, socio-emotional context, and specific socio-emotional outcomes involved in this process (i.e. socio-emotional well-being regulation).

7.2.1 Daydreaming can have a positive effect on emotional well-being

The studies in this thesis offer a more precise perspective on how daydreaming is related to socio-emotional well-being. Previous research has associated daydreaming with negative emotional experiences such as depression, anxiety, and unhappiness in daily life, leading to suggestions that daydreaming might be a hallmark of mental ill health and unhappiness (e.g. Killingsworth & Gilbert, 2010). Other research has attempted to provide a more balanced view on the relationship between daydreaming and emotional well-being by showing that the relationship between daydreaming and negative emotional experiences depends on daydreaming content (e.g. Ottaviani et al., 2015; Poerio et al., 2013; Ruby et al., 2013a; see also Section 2.3.4). Relatively little research has examined how daydreaming might be related to positive emotional states and/or actually involved in the *regulation* of negative and positive emotional states, which depends on examining both the content and context of daydreaming and more specific conceptions of well-being. The present research represents a first step in this direction by demonstrating that *social* daydreaming and its characteristics are involved in the regulation of negative and positive *socio-emotional* states and *socio-emotional well-being* under conditions of social threat. Social daydreaming is therefore an important process that may help individuals to achieve the need for interpersonal connection and achieve a satisfactory level of socio-emotional well-being, which is especially important given the positive and negative effects of social connection and social disconnection respectively (reviewed in section 3.1.1).

7.2.2 The importance of daydreaming content

Previous research has identified the social nature of daydreaming as a common component underlying the experience (e.g. Andrews-Hanna et al., 2013; Diaz et al., 2013; Gorgolewski et al., 2014; Ruby et al., 2013a, 2013b) and other research suggests that social daydreaming may be more common than non-social daydreaming (e.g. Song & Wang, 2012). Despite the preponderance of social daydreaming, very little empirical research has examined how the specific social content of daydreaming is related to various functional outcomes. As an exception, Mar et al. (2012) associated the tendency to daydream about close significant others with socio-emotional well-being and the tendency to daydream about non-close others with socio-emotional ill-being (e.g. loneliness). Although this suggests that examining the social content of daydreaming may shed light on how daydreaming is related to socio-emotional well-being, the study was based on global, retrospective evaluations of social daydreaming tendency and measured socio-emotional well-being concurrently with daydreaming tendency in a decontextualized setting (i.e. a cross-sectional survey).

Crucially, the studies in this thesis have provided more direct and convincing evidence that the social (but not non-social) content of daydreams is related to socio-emotional well-being with a particular focus on naturally occurring and individual daydreams. In particular, Studies 1 and 2 demonstrated that only social daydreams but not non-social daydreams were associated with specific improvements in positive social (i.e. feelings of love, connection, and belonging), but not non-social (e.g. calmness and excitement), feelings and that these effects were not simply attributable to the valence of social daydreams. This demonstrates that the effect of social daydreaming on *social* feelings is specific and attributable to the *social* content of those daydreams, rather than for example, representing a general effect of daydreaming on social feelings. Interestingly, in Studies 1 and 2, non-social daydreaming was also associated with decreased positive social feelings suggesting that not only are non-social daydreams unable to up-regulate feelings of social connection, but also that non-social daydreams may have negative effects on socio-emotional well-being under conditions of socio-emotional threat.

Study 3 did not examine how non-social daydreams were associated with the regulation of socio-emotional well-being over time. Estimates of non-social

daydreaming frequency in Study 3 (only 8%) suggest that non-social daydreams may have been relatively rare in the context of a university transition, which might have made an equal comparison with social daydreams difficult. Nevertheless, Study 3 would have been strengthened had it been able to compare social and non-social daydreams during the context of the university transition, their patterns of change over time, and whether they predicted different social and non-social outcomes. For example it might be predicted that only social daydreams would be related to positive socio-emotional outcomes (e.g. feelings of connection), which would then predict less loneliness at a later time point. Likewise, a lack of negative social daydreams might be related to better academic performance because it may represent less pre-occupation with social concerns allowing students to focus on academic pursuits and goals in their daydreaming activity.

This highlights the importance of considering not only the specific content of daydreaming in relation to various functional outcomes (e.g. social daydreaming and social feelings) but also of having specific comparisons with other daydreaming content and outcomes (e.g. non-social daydreaming and non-social feelings). Future research might seek to demonstrate both significant associations between daydreaming content and outcomes with comparison conditions (or differential effects) to properly delineate that it is the specific content of daydreaming driving observed effects (rather than a general effect of daydreaming).

In addition to examining how the social content of daydreams was related to socio-emotional well-being both in the moment and over time, the studies here also examined the content of social daydreams specifically, including their social content (i.e. relationship quality), valence (Studies 1-3), and fanciful nature (Study 3). In particular, across the three studies, the relationship quality between the daydreamer and most central other person in the daydream emerged as a consistent and important factor in predicting the beneficial effect of social daydreaming on socio-emotional well-being. In Study 1, daydreams involving close significant others (compared to less close others) were associated with significant increases in positive social feelings. In Study 2, directed daydreaming about a close significant other (compared to daydreaming about a pleasant but non-social scenario) led participants to feel and behave in a manner consistent with the idea that imagining a close other replenished their sense of connection. In Study 3, the relationship quality between the daydreamer and most central person in the daydream significantly increased over time and

predicted feeling less lonely at the end of the study. Thus, the current studies indicate that not only was the social content of daydreaming associated with a beneficial outcome, but also that this further depended on the more specific content of social daydreams (i.e. who was being daydreamed about). The consistent finding that daydreams involving greater quality relationships were associated with beneficial outcomes for socio-emotional well-being highlights the potential role of close significant others in regulating feelings of interpersonal connection, which will be discussed more fully in the following section. However, this is not to say that social daydreaming about close significant others that are positive in content will *always* lead to beneficial outcomes for socio-emotional well-being. What it does suggest is that daydreams about close significant others may be one way in which to regulate feelings of social disconnection in daily life (in the moment and over time) under specific conditions of social threat.

7.2.3 The importance of daydreaming context

The positive effects of social daydreaming on socio-emotional well-being not only depended on their specific content but also on the context in which they occurred (i.e. under conditions of socio-emotional threat or challenge). Specifically, socio-emotional threat was examined (a) when participants were 'low' in feelings of love and connection before their daydream, as might be expected under conditions of social threat (Study 1), (b) when participants were made to feel lonely (Study 2), and (c) when participants were undergoing a stressful life transition associated with challenges to socio-emotional well-being (Study 3). This research has therefore specified how daydreaming content can have functional outcomes under certain conditions (contexts) rather than stating that daydreams have general positive and/or negative effects on well-being. This highlights the importance of not only examining the content of daydreaming in relation to specific outcomes but also the context in which specific content is related to functional outcomes.

The importance of daydreaming context is highlighted by the context regulation hypothesis (Smallwood & Andrews-Hanna, 2013), which proposes that the extent to which daydreaming has positive of negative effects depends on the context in which it occurs. Typically, 'context' is conceived of as the external present (i.e. the demands of one's current activity) but the studies in this thesis have considered 'context' in the broader sense of daydreamers' motivations (i.e. the need to belong),

emotional states (e.g. feelings of social disconnection) and life circumstances (e.g. challenges to socio-emotional well-being in the case of the university transition). This suggests that a broader conception of 'context' should be employed in daydreaming research in order to fully understand the costs and benefits of daydreaming under a variety of different situations, both specifically (e.g. what an individual is doing and feeling at the time of daydreaming) and also more generally (e.g. by considering the underlying goals and needs of an individual and their life circumstances).

The fact that social daydreams were related to the regulation of socio-emotional well-being in the moment and over time under conditions of social threat or challenge also means that the present findings should only be interpreted in relation to specific contexts (i.e. situations of socio-emotional threat). Social daydreaming may well have positive effects under conditions where social threat is absent, and daydreaming in general may also have other positive outcomes (e.g. for creativity or problem-solving) in different contexts, which the present research cannot speak to. However, this does highlight that in order to delineate the potential functional outcomes of daydreaming, research must consider whether the content of daydreaming is appropriate to the context in which it occurs. For example, daydreaming about a close significant other during a conversation with a work colleague may have a detrimental effect on momentary feelings of socio-emotional well-being (e.g. if the colleague notices that the individual is not paying attention in the conversation and reacts negatively). In this case, the content and occurrence of daydreaming (although it might fleetingly promote positive social feelings for the daydreamer) is probably not appropriate to the social context in which it occurs, which may have negative (social) effects.

Consideration of the life context in which daydreaming occurs (e.g. under conditions of prolonged social challenge in Study 3) also highlights the importance of: (a) examining daydreaming as a dynamic phenomenon that changes over time, and (b) considering the time course of effects that daydreams have on various outcomes. Study 3 represents the first examination of daydreaming over an extended period of time (one month) and actually examined how daydreaming changed over time, and related those patterns of change to functional outcomes (e.g. less loneliness and greater social adaptation to university). This shows that daydreams are not static experiences but ones that change in tandem with important disturbances to individuals' life circumstances. Examining patterns of change in the frequency,

characteristics, and emotional outcomes of daydreams may shed light on various processes involved in how individuals regulate their thoughts, feelings, and behavior over time. Increases in certain kinds of daydreams may be particularly important depending on the pertinent goals of an individual at any one time. For example, although social daydreams might be important during the transition to university, non-social daydreams may be more important (and show increases) during periods of academic challenge (e.g. exam time), which may then predict functional and/or dysfunctional outcomes.

7.2.4 The importance of considering the time course of daydreaming outcomes

It is also worth noting a particular conceptual contribution of Study 3. To my knowledge, Study 3 represents the first example of how daydreaming content at an individual level (i.e. repeated measurements of individual daydreams) is related to person-level variables (e.g. loneliness) at a later time point. This has been enabled by an examination of level-1 variables (e.g. the emotional outcomes of individual daydreams) influencing level-2 variables (e.g. global perceptions of loneliness), which is uncommon in many experience-sampling designs due to the constraints of statistical methods (i.e. level-2 variables cannot be considered as outcomes in traditional multi-level models; Preacher et al., 2010). The fact that social daydreaming content in Study 3 predicted later loneliness demonstrates that individual cognitions might be causally related to well-being at a higher level, which to my knowledge, is the first evidence of a bottom-up effect (also called micro-macro or emergent effects; Croon & van Veldhoven, 2007; Preacher et al., 2010) in daydreaming research.

This has implications for how daydreaming might be related to various outcomes that are amenable to change over time. For example, researchers might examine how individual patterns of social daydreaming over time are related to global relationship satisfaction, perceptions of one's partner and/or perceptions of social support. Researchers could also examine whether individual daydreams over time are related to learning and goal achievement. The ability to demonstrate that daydreaming content in particular contexts can have functional and potentially dysfunctional outcomes is an important step for future research in the field. Previous research on the functionality of daydreaming either examines the immediate outcomes of daydreaming (e.g. in particular laboratory situations) or relies on cross-sectional research, which typically examines daydreaming as a global and decontextualized

phenomenon. Given the nature of these previous methods, most research is likely to pick up on outcomes of daydreaming that occur immediately after daydreaming (e.g. during a laboratory session) or, due to the limits of cross-sectional research, is unable to develop convincing causal arguments for how daydreaming is related to various outcomes. The use of experience-sampling methodology to demonstrate bottom-up effects can circumvent these issues by repeatedly examining the content and context of individual daydreams and linking daydreaming to later functional outcomes over time.

The consideration of longer-term outcomes of daydreaming and the time course of effects is particularly worthy of attention because, in many cases, daydreaming may have distal effects. For instance, imagining how one might deal with an important problem for a short time is unlikely to completely solve that problem in the moment. However, repeatedly daydreaming about a problem and considering different alternatives as the problem develops is likely to result in more concrete plans and better understanding which may assist with problem-solving in the long term, by for example, affecting later behavior. This idea is well-illustrated in a convincing paper by Baumeister and colleagues (2010) who reviewed extensive evidence suggesting that rather than conscious thought being involved in the direct causation of behavior, conscious thought processes occur offline and have indirect effects on later behavior – usually after a delay between the experience of conscious thought (e.g. mental simulation) and the outcome of interest (e.g. exam performance). When applied to daydreaming research this suggests that researchers should examine individual patterns of daydreaming over time and consider when outcomes are likely to emerge. Daydreams tend to be focused on the future and current goal pursuits that extend beyond the present moment (see section 2.3.3), which strongly suggests that the beneficial outcomes of daydreaming are also likely to occur in the future rather than the present. Research would therefore benefit from carefully considering *when* functional outcomes are likely to emerge, which are likely to occur after a delay between the experience of daydreaming and the functional outcome of interest (e.g. goal achievement). Of course, part of the issue with this approach is that intervening variables between instances of daydreaming and the outcome of interest make it difficult to determine cause and effect (especially if the nature of daydreaming is not directed but captured as it naturally occurs). However, in potentially well-controlled experience-sampling designs which consider confounding and third variable

explanations, this approach could shed light on how daydreaming is related to functional outcomes that occur beyond the present moment.

Overall, the present research contributes to a more nuanced understanding of how the content and context of daydreaming is associated with a functional outcome, both in the moment and over time. Daydreaming is neither inherently functional nor inherently dysfunctional but its effects depend on the context of daydreaming, its context, and what particular outcomes are examined. One of the key challenges daydreaming research is to be able to delineate when, where, for whom, and for what, daydreaming has functional and/or dysfunctional outcomes. The studies in this thesis have highlighted and emphasized the need for a more meticulous approach for determining the functional outcomes of daydreaming. Researchers might therefore benefit from not only examining the content and context of daydreaming, but also (a) demonstrating that only certain kinds of daydreaming have positive effects (e.g. social vs. non-social daydreams), (b) considering daydreaming as a dynamic phenomenon that changes over time, (c) exploring the time course of functional outcomes and using longitudinal methods to capture potentially distal effects of daydreaming, and (d) considering the possibilities of emergent or bottom-up effects of individual daydreams using appropriate statistical methods. Consideration of these factors should lead to more specific predictions and designs regarding the functional outcomes of daydreaming and ultimately a more fine-grained analysis of when and why daydreaming is beneficial or not.

7.3 Contribution to the regulation of belonging and socio-emotional well-being: Imagination can replenish connectedness

The present research offers several distinct contributions to theories of belonging regulation. I have provided an extension to theories of belonging regulation, which typically examine how individuals regulate belonging through external behavior when faced with immediate and momentary threats (e.g. exclusion, rejection, or ostracism). For example, previous research has considered how individuals regulate the need for interpersonal connection including strategies such as ingratiation, seeking interpersonal contact, increased awareness for reconnection opportunities in the external environment, and appeals to social surrogates (e.g. DeWall et al., 2009; Epley et al., 2008; Gardner et al., 2000; Gardner et al., 2005; Gardner & Knowles, 2008; Hess & Pickett, 2010; Lakin et al., 2008; Williams & Sommer, 1997). What the

present research has proposed and empirically demonstrated is that social daydreaming, in particular imagining close significant others, is another potential strategy that people knowingly or unknowingly use to regulate their need to belong. This represents a novel contribution to the literature on belonging regulation because it suggests that individuals can appeal to their internal and well as external worlds to gain and maintain socio-emotional well-being under conditions of social threat, which to date, is an idea that has been largely overlooked in the belonging regulation literature.

In particular, I would argue that social daydreaming might represent a more naturalistic and automatic strategy to regulate feelings of interpersonal connection in daily life compared to other strategies that have been explored in previous experimental research. Typically, belonging regulation research has only considered the external behaviors of individuals (i.e. what people do) under conditions of social threat rather than their daydreaming activity (i.e. what people naturally think). In daily life, experiences of socio-emotional threat and resulting negative social emotions (e.g. loneliness, rejection) might be best regulated through direct contact with close, significant others (Mikulincer & Shaver, 2007). However, there may be situations in which contact is not possible or may not be the optimal strategy (e.g. when close others are unavailable or unresponsive). There is also reason to think that feelings of social disconnection cause individuals to withdraw from social and interpersonal behavior as a self-protective mechanism against further potential rejection. For example, emotional responses to interpersonal rejection such as sadness, loneliness, and hurt feelings are associated with action tendencies of inactivity and withdrawal, especially when an individual feels unable to adequately replenish connectedness in the present external environment (Leary et al., 2001). In such cases an individual is more likely to attempt to regulate their need for interpersonal connection through the imagination via social daydreaming, which should foster feelings of interpersonal connection. Social daydreaming may therefore represent a more naturalistic strategy through which individuals regulate their need to belong. There may therefore be circumstances under which social daydreaming, rather than regulating socio-emotional well-being when external behavior to replenish connectedness in the external environment is not possible, is actually a preferred or optimal strategy.

7.3.1 The role of close significant others

Studies 1 and 2 showed that social daydreaming, in particular about a close significant other, can replenish connectedness under inferred and actual conditions of social threat. Both studies showed that daydreaming about a close significant other (compared to non-social daydreaming) was associated with increased momentary positive social feelings and Study 2 further demonstrated that this effect extended beyond self-reported feelings because participants also behaved in ways consistent with the idea that social daydreaming had replenished their need for interpersonal connection. This provides some of the first evidence to suggest that connection can be replenished through daydreaming activity (both with naturally occurring daydreams and daydreams that were directed and deliberate). This implies that close significant others are a powerful resource that individuals can draw on for emotional benefit even in their physical absence.

The resource potential of significant others has been previously noted (Sedikides, 2005) and is an idea that has been particularly well explored in the attachment literature. Attachment theory proposes that mental representations of attachment figures consist of relational scripts which, in secure attachment, involves knowledge that a close significant other can be relied upon in times of distress to provide a secure haven and safe base (Mikulincer, Shaver, Sapir-Lavid, & Avihou-Kanza, 2009). Several investigations have demonstrated that simply activating mental representations of secure attachment (called 'security priming') can result in improved mood (e.g. Mikulincer, Hirschberger, Nachmias, & Gillath, 2001), reduced emotional distress (e.g. Selcuk, Zayas, Gunaydin, Hazan, & Kross, 2012), and even reduced perceptions of physical pain (e.g. Eisenberger et al., 2011; Younger, Aron, Parke, Chatterjee, & Mackey, 2010). Research typically primes secure attachment in laboratory settings in various ways including the presentation of attachment figure pictures or names, writing about attachment figures, guided imagery about supportive attachment figures, and visualization of an attachment figure's face (Mikulincer & Shaver, 2015). One interesting idea is that social daydreaming about close significant others may represent a kind of attachment priming, not only providing an imaginary substitute for meaningful social contact when that contact is not readily available, but also serving to remind people of the social resources they have and that they are positively regarded and valued by others.

The idea that close others can provide a source of imagined, as well as actual, support has interesting implications for relationship science. Research has typically examined how people actively seek out social support or social interaction in their external environments and how the quality and nature of supportive encounters help people to cope with adversity. For example, in a two-week diary study, participants who received emotional and informational support from others in response to stressful events reported less depressive mood, presumably because such support mitigated the negative impact of stressful events on mood (Cutrona, 1986). Likewise, intimacy in romantic couples (indexed by physical affection) has been associated with reduced levels of daily cortisol over one week, particularly when an individual was experiencing high levels of work-related stress, suggesting that physical intimacy may buffer against the negative effects of stress at work (Ditzen, Hoppmann, Klumb, 2008). Similar positive effects have been observed for the social sharing of emotions where talking about negative events with close others can lead to reduced distress (e.g. Nils & Rimé, 2012). Perhaps most convincingly, a large body of work on social support indicates its positive effects on mental and physical well-being and coping with adversity whereby social support networks provide coping assistance, and bolster self-esteem and competence (Cohen & Wills, 1985; Thoits, 1995). The present research suggests that social daydreaming may also represent a mechanism through which social support can be obtained, albeit through the imagination rather than real events, which would represent a novel extension to the social support literature.

One particularly intriguing idea is that there may be circumstances in which imagined supportive interactions with close others may be preferable and of more benefit than actual social interaction with loved ones. For example, certain individuals may not feel comfortable relying on others to regulate their distress (Florian, Mikulincer, & Bucholtz, 1995). Even when close others are available, they may not always be supportive or responsive to an individual's needs (Iida, Seidman, Shrout, Fujita, & Bolger, 2008). This may ironically exacerbate feelings of social disconnection and have deleterious consequences for that relationship (e.g. Feeney & Collins, 2003). However, imagination as a tool to foster connectedness and draw on social support resources has the advantage of being under the daydreamer's control to some extent, rather than relying on a positive response from others, allowing the daydreamer to simulate the contact that they desire.

Of course, drawing on close others for emotional benefit in imaginative activity would probably require at least one actual close and positive relationship on which to draw on during times of distress, but the imagining of close others may represent a way to capitalize on existing social support networks and past supportive encounters. In particular, daydreaming about close significant others may represent an additional mechanism through which people do not need to overtly rely on others to gain and maintain a sense of interpersonal connection. In this way, close others are a valuable resource that can be used in the imagination and unlike other resources such as actual social support (Hobfoll, 2002; Norris & Kaniasty, 1996), imagination is unlikely to be depleted by overuse. Of course, mental resources do have the potential to be depleted in similar ways to more tangible resources (e.g. Baumeister, Bratslavsky, Muraven, & Tice, 1998) but perhaps one of the core benefits of daydreaming is that it often tends to occur spontaneously and perhaps in a more automated and undirected fashion (Bargh, 1994) than other forms of goal-directed cognition and so may not suffer from depletion as a result of overuse.

Although the current research suggests an important role for imagining close significant others during daydreaming, imagining fictional or created others may also offer potential socio-emotional benefits. For example, research on imaginary companions during childhood suggests children who create imaginary companions (compared to those that do not) are more sociable (Manosevitz, Prentice, & Wilson, 1973), and have better coping skills (Seiffe-Krenke, 1997). However, other research suggests that the use of imaginary companions in childhood is associated with loneliness and emotional difficulties (Benson & Pryor, 1973), perhaps because they represent maladaptive attempts to replenish connectedness via social surrogacy. Whether or not imaginary companions and fictional others (e.g. television characters) are associated with better or worse socio-emotional well-being compared to imagining close significant others in adulthood is an open question for future research.

7.3.2 Socio-emotional well-being regulation occurs over time

In addition to examining how social daydreaming about close significant others is associated with the momentary regulation of socio-emotional well-being under conditions of immediate social threat, Study 3 examined how social daydreaming is related to socio-emotional well-being regulation over time. This is a novel

contribution to the literature on belonging regulation because research in the area typically examines cognitive and behavioral responses to momentary threat (as this is commonly how these experiences are induced and examined in laboratory settings). Belonging regulation literature (see for example, Molden & Maner, 2013; Pickett & Gardner, 2005) has not typically examined the ways in which individuals regulate the need to belong when threats or challenges to belonging are more prolonged and enduring. Study 3 suggests that daydreaming might be one way in which individuals regulate their need for interpersonal connection during prolonged social threat because the emotional outcomes and characteristics of daydreaming over time predicted less loneliness and greater social adaptation to university. The findings from Study 3 share many similarities with literature on coping and adaptation, which, unlike theories of belonging regulation, examine situations of prolonged challenge, typically characterized by coping with stressful life events.

Coping can be described as the process by which an individual perceives a threat to his or herself, brings to mind potential ways to deal with that threat and finally enacts various coping strategies that reflect attempts to deal with the stressor and promote adaptive outcomes (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). Coping strategies describe behavioral and cognitive attempts to deal with stressful events, which may be directed towards the specific demands of the situation (problem-focused coping strategies) or towards the emotions surrounding the situation (emotion-focused coping strategies), which enable individuals to overcome stressful circumstances (Folkman, 1984). The results from Study 3 might well be interpreted in line with this literature as cognitive efforts that represent attempts at problem-solving and emotion regulation. For example, the fact that social daydreams made participants feel more connected and less lonely over time may have represented successful attempts at emotion-focused coping. In addition, social daydreams became less fanciful over time, which may have represented a shift towards more concrete, problem-focused daydreaming (e.g. considering plans for action in the new environment) and more constructive problem-focused coping attempts. Although previous research has implicated mental simulation in the process of coping with stressful life events (e.g. Rivkin & Taylor, 1999; Taylor, et al., 1998) the present research suggests that coping through mental simulation may occur naturally during daydreaming activity with beneficial outcomes.

An interesting point to note here is that, to date, the coping literature has characterized and identified daydreaming as a maladaptive coping strategy; in particular, as a form of mental disengagement and emotional avoidance. For example, in measures of coping strategies, items indexing maladaptive coping efforts include items such as "Daydream about times in the past when things were better'" (Roger, Jarvis, & Najarian, 1993) and "Fantasize about how things might turn out" (Endler & Parker, 1994). The present research suggests that conceptualizations of daydreaming in the coping literature should be broadened to consider daydreaming as a potentially beneficial coping strategy, which might represent forms of active coping (e.g. planning, problem-solving) and adaptive emotion regulation (e.g. up-regulating negative social feelings). For example, certain kinds of daydreaming might be represented as task-orientated and adaptive coping strategies such as "Thinking about the event and learning from my mistakes", "Analyze the problem before reacting", and "Work to understand the situation". Thus rather than representing a means of distraction or escape from one's problems, daydreaming may often involve attempts to cope with current concerns, an idea supported by the fact that daydreams tend to be goal-oriented, personally relevant, and realistic rather than fanciful (e.g. Andrews-Hanna et al., 2013; Klinger & Cox, 1987-88).

7.3.3 Daydreaming and psychological defense

The present research findings also suggest that research and theory on psychological defense would benefit from examining how daydreaming is involved in the regulation of psychological threat. Theories of psychological defense (sometimes called ego-threat theories; Leary et al., 2009) assume that individuals are fundamentally motivated to protect themselves against various types of psychological threat, and explore the mechanisms though which threat protection occurs. A myriad of psychological defense theories exist including: (1) Terror Management Theory (Pyszczynski, Greenberg, & Solomon, 1999), which assumes that individuals are motivated to avoid existential terror, (2) Attachment and belonging theories (e.g. Baumeister & Leary, 1995; Mikulincer & Shaver, 2007), which argue that individuals are fundamentally driven to form and maintain positive and close interpersonal relationships, (3) Self-affirmation and control theories (e.g. Steele, 1988; Tesser, 2000, 2001), which view individuals as motivated to maintain a sense of self-integrity or self-esteem in order to view themselves as good and efficacious (i.e. have a sense

of personal agency) in the world and (4) various theories that posit underlying motives for certain cognitive states such as cognitive consistency (e.g. Festinger, 1957; Proulx, Inzlicht, & Harmon-Jones, 2012), meaning and sense-making (Heine, Proulx, & Vohs, 2006), and certainty (e.g. Tritt, Inzlicht, & Harmon-Jones, 2012).

Whilst many of these theories have been explored separately in different domains of psychology, recent attempts have aimed to integrate theories of psychological defense. For example, Hart (2014) notes that all theories of psychological defense involve a system of threat detection (and vigilance towards threat), and motivated attempts at compensatory responses. Although threats and defensive regulation may be different in content, Hart (2014) argues that they may often be interchangeable and proposes that they represent a unitary process of a "security system" that regulates various forms of psychological threat. Similarly, Leary, Raimi, Jongman-Sereno, and Diebels (2015) have argued that many research investigations of psychological defense that typically prioritize personal motives and intra-psychic processes (e.g. self-integrity, self-esteem, or the avoidance of cognitive inconsistency) might be better re-interpreted as reflecting interpersonal motives (e.g. the need to belong) which they argue exerts the most powerful influence on behavior.

In my view, all research and theory on psychological defense would benefit from examining how daydreaming is involved in the regulation of psychological threat. Daydreams commonly represent underlying goals and needs of an individual at any one time and involve mental attempts at pursuing goals when doing so in the external environment is not possible. Many of the fundamental goals and needs that motivate human behavior (e.g. the need for self-integrity, self-esteem or interpersonal connection) are likely to dictate daydreaming content, and the process of daydreaming may therefore be involved in the regulation of these needs through imaginative activity. The fact that daydreaming activity is so common in daily life supports the idea that many attempts to regulate psychological threats may occur, and/or be supported by imagination rather than immediate behavior in the external environment. Daydreaming may therefore represent a spontaneously and naturally occurring method of defensive regulation under conditions of threat (social or otherwise) and research in these fields would benefit from examining how, when, and why various forms of daydreaming can mitigate against various forms of psychological threat. The conceptual framework offered and tested in the current thesis represents a starting point for examining how this process might operate. The experience-sampling

approach used would also be beneficial for examining how daydreaming as a form of psychological defense is enacted in real world contexts, within-persons and over time under naturally occurring conditions of perceived threat, rather than examining and manipulating defensive mechanisms in laboratory situations which is the standard nomothetic approach within existing literature (Hart, 2014).

In particular, I consider the research presented here to share a number of parallels with self-affirmation theory, which I believe would benefit from considering how social daydreams can act as a spontaneous and naturally occurring self-affirmational resource under conditions of self-threat. Self-affirmation theory posits that under conditions of threat, affirming one's valued sources of self worth can protect the need for self-integrity or personal adequacy and facilitate processes of dealing with threats less defensively and more adaptively (Sherman & Cohen, 2006; Steel, 1988). Although many activities can positively affirm aspects of the self (e.g. spending time with friends, updating one's Facebook profile, or attending religious services; Cohen & Sherman, 2014), experimental research has typically focused on values affirmation manipulations which involve presenting participants with a list of values, where they chose and write about one or more of their most important values describing why and how that value is important to them (McQueen & Klein, 2006).

Interestingly, when asked to affirm important values participants overwhelmingly choose to write about close relationships (Cohen & Sherman, 2014), suggesting that social relationships are a fundamental self-affirmational resource. For example, in one study examining expressive writing in response to major life events, 70% of essay statements involved writing about close social relationships compared to, for example, writing about religion or spirituality (12%), hobbies (2%) or career or education (1%) (Creswell, Lam, Stanton, Taylor, Bower, & Sherman, 2007). Additional research has also suggested that self-affirmation manipulations buffer against threat because they tend to involve writing about close relationships, which in turn, promotes positive other-directed feelings of *love and connection,* which helps individuals to transcend concerns about self-integrity and respond more adaptively to threatening situations (Crocker et al., 2008). More generally, researchers have argued that writing about social belonging is the active ingredient for the positive effects of self-affirmation, and that writing about social relationships can buffer against threats both in domains unrelated to the source of the treat (e.g. threats to academic

competence) but also threats within the same domain (e.g. threats to social belonging) (Shnabel, Purdie-Vaughns, Cook, Garcia, & Cohen, 2013).

The studies in this thesis suggest that, in addition to regulating feelings of social belonging, social daydreams also affirmed the self (potentially through the promotion of positive other-directed feelings). Imagining close others in particular may have helped individuals to think about valued resources and self-worth (i.e. social relationships), which helped to mitigate threats to social belonging. One interesting implication from the self-affirmation literature is whether social daydreams might also compensate against forms of non-social threat, and whether non-social daydreams can also serve as sources of valued self-integrity in other non-social domains. One of the key issues highlighted in a recent review of self-affirmation was the need to examine whether and how individuals affirm the self spontaneously. Specifically, Cohen and Sherman (2014, p. 362) pose the following as a primary future issue in the field:

> *"Some people may affirm themselves spontaneously. Indeed, some people try to turn almost any writing exercise into a self-affirming one. What are the effects of these self-generated affirmations? How do they differ from experimentally induced affirmations? And how can researchers capture the spontaneous affirmation process and its effects in every day life?"*

Exploring (social) daydreaming in daily life might provide answers to these outstanding questions. Because (social) daydreams occur regularly throughout each day, they may often represent small but potentially significant attempts to automatically refresh an individual's sense of self-integrity and belonging.

7.4 Issues requiring development and future directions

Although the three studies presented here have provided initial substantiation for the role of social daydreaming in the regulation of socio-emotional well-being, there are a number of important issues that have not been addressed which require further development and empirical work. These fall broadly into the following categories: socio-emotional threat, later social behavior, individual differences, and negative outcomes of social daydreaming. I discuss each of these outstanding issues in turn and discuss how future research might tackle them.

7.4.1 Does socio-emotional threat naturally trigger social daydreaming?

A key principle of the proposed model is the idea that momentary and prolonged threats or challenges to socio-emotional well-being motivate attempts to replenish connectedness. I suggested that conditions of socio-emotional threat result in reduced positive social emotion and/or increased negative social emotions which act as a signal that attempts at regulation are required. I further suggested that when an individual cannot take steps to replenish connectedness in the external environment (e.g. seeking contact with close others) then attempts to replenish connectedness will be mental, via social daydreaming. Although the Studies 1-3 present evidence consistent with these ideas, they do not provide evidence that social threat, and the resulting changes in socio-emotional well-being, *naturally trigger* social daydreaming. For example, Study 1 did not examine whether social feelings predicted the occurrence of social (rather than non-social) daydreaming, Study 2 manipulated social vs. non-social daydreaming under conditions of social threat and associated changes in social emotions, and Study 3 only examined social daydreaming under conditions of presumed social threat during a life transition. Although these studies provide evidence for the regulatory role of social daydreaming (particularly about close significant others) by focusing on the outcomes of social daydreaming, they do not shed light on whether threats to socio-emotional well-being cause changes in the frequency and nature of social daydreaming, which is implied by the proposed model.

If social daydreaming represents mental attempts to regulate socio-emotional well-being then, under conditions of momentary and prolonged social threat, reductions in positive social emotions and/or increases in negative social emotions should predict the occurrence of social daydreaming (possibly of close significant others), and/or result in more frequent social relative to non-social daydreaming. Future laboratory studies might address this gap by inducing threats to socio-emotional well-being and measuring the frequency and type of subsequent naturally occurring daydreaming activity, relative to daydreaming activity in the absence of socio-emotional threat or under conditions of non-social threat (e.g. threat to self-competence). This could be achieved by for example, exposing participants to social and non-social threat (e.g. a loneliness induction; false feedback on a test of academic performance), and retrospectively measuring the content and frequency of participants daydreaming during a subsequent, non-demanding task (e.g. a sustained attention to

response task). A within-subjects design that also examines the content and nature of daydreaming in the absence of threat would provide a meaningful baseline to examine whether threat predicts increases in the frequency of social daydreaming (about close significant others) and various others content features (e.g. valence of daydreaming). Measurement of associated feelings would also be crucial to examine whether the effect of condition (social threat, non-social threat, no threat) on daydreaming activity is mediated by changes in positive and negative social feelings, which would be predicted by the model.

Experience-sampling studies might also be well equipped to examine how prolonged experiences of social threat are associated with changes in daydreaming activity and the role of social emotions in this process. For example, daily diary studies could measure individuals' daydreaming activity and the presence and absence of different kinds of social and non-social threats (e.g. using daily events checklists). If social threat triggers social daydreaming in attempts to regulate socio-emotional well-being then it might be expected that the presence of social threat on one day would predict an increase in social daydreaming (relative to non-social daydreaming) on subsequent days. It might also be predicted that stronger emotional reactions to social threat would be associated with more frequent social daydreaming activity. Longitudinal studies might also benefit from examining the relative frequency and nature of social and non-social daydreaming before, during, and after life events that are associated with social and/or non-social challenges. Examining the patterns of change in the relative frequency and nature of social daydreaming over time would be beneficial for the proposal that psychological threat has a causal influence on daydreaming activity over time. Natural experiments that capitalize on important changes would also be useful for examining the effects of daydreaming under conditions of psychological threat (e.g. examining the effects of daydreaming during reorganization in one section of a company compared to an equivalent section that does not reorganize).

7.4.2 How is social daydreaming related to different forms of socio-emotional threat and social feelings?

The studies in this thesis examined the regulatory role of social daydreaming under conditions of (1) inferred momentary threat to socio-emotional well-being (i.e. feeling low in love, and connection, Study 1), (2) actual and included momentary threat to

socio-emotional well-being (i.e. induced loneliness, Study 2) and (3) prolonged socio-emotional challenge during a stressful life transition (i.e. the transition to university, Study 3). Participants in Study 3 are likely to have experienced many different forms of social threat and associated social emotions. For example, transitioning students may have faced challenges associated with feeling lonely or ostracized, they may have experienced relational conflict with romantic partners that they can no longer be close to, or demands from parents and existing friends.

Although these studies have therefore examined social threat and social feelings in a number of contexts, they are unable to shed light on various other forms of threats to socio-emotional well-being that may be experienced by individuals in daily life. The studies here have also focused on feelings of love, connection, belonging and loneliness as general feelings indicative of socio-emotional well-being. Although many forms of social threat may generally affect these feelings there may be different types of social threat associated with more specific social emotions. Social threat can be broadly conceptualized as a form of perceived relational devaluation, which describes the extent to which "another person regards his or her relationship with an individual to be valuable, important, or close" (Leary, 2001, p. 7). However, there are many different forms of social threat, which differ in terms of relational evaluation and can be experienced in different relational contexts with different emotional outcomes (Leary et al., 2001). For example, jealousy is a social emotion that occurs when a third party intrusion leads an individual to believe that an existing relationship is less valued because of the new third party relationship. Jealousy may commonly be experienced in romantic relationship but also in families (e.g. a new parent becoming jealous when his or her partner's attention is directed towards the new child), work situations (e.g. when employees feel that their boss prefers the work of a colleague) and friendships (e.g. when an individual's best friend initiates a romantic relationship). Likewise, social anxiety appears to be a specific social emotional experience in which relational devaluation is anticipated in socially threatening situations (e.g. giving a presentation, meeting one's partner's parents, conversations with new people, and uncertain social situations), the root of which appears to be fear of negative evaluation from others (Schlenker & Leary, 1982). The idea that different forms of social threat are associated with different social emotions in various relational contexts, poses the question of whether and how different forms

of social daydreaming are involved in the regulation of different forms of socio-emotional threat.

Future research would therefore profit from examining how different types of social daydreaming are involved in the regulation of social threat experienced in different contexts and with different associated social emotions. For example, research might examine social daydreaming within the context of romantic relational threat, with socially anxious individuals, during initial relationship formation, and within organizational networks. Examining how the content of social daydreaming is associated with the regulation of socio-emotional well-being under different conditions of social threat in different relational contexts is likely to provide a more fine-grained analysis of how social daydreaming regulates socio-emotional well-being and will more fully capture the range and extent of socio-emotional threat as it is experienced and regulated in daily life.

7.4.3 Is social daydreaming involved in the regulation of anticipated threats to socio-emotional well-being?

Another issue requiring development is the idea that social daydreams may be involved in the regulation of anticipated (or indeed imagined), rather than actual, threats to socio-emotional well-being. I briefly mentioned this idea in the discussion of Study 3 where I noted that a limitation of the study was that it did not examine social daydreaming before the university transition and so could not pick up on any potentially anticipatory efforts to regulate socio-emotional well-being via daydreaming. Although social daydreaming may often be involved in the regulation of actual immediate and prolonged threats to socio-emotional well-being, social daydreaming is also likely to be involved in anticipation of threats to socio-emotional well-being and may therefore represent *pro-active* rather than reactive attempts to regulate socio-emotional well-being. For instance, social daydreams might represent attempts to deal with potential social threat such as when individuals imagine how they might feel or what they might do if social threat occurs, planning potential strategies and courses of action that might mitigate against social threat (e.g. seeking social support), considering past similar social situations and evaluating how past behavior was effective or ineffective, and mentally reappraising potential sources of threat in ways that dampen their emotional impact.

One of the benefits of daydreaming as a mental process is that it enables individuals to consider and imagine what might occur in different situations including how they (and others) might feel, behave, or think in different contexts. Daydreams may therefore be involved in the process of recognizing potential (social and non-social) threats and mobilizing early attempts to mitigate or prepare for a potential stressor before it occurs. The fact that daydreams tend to be predominately future focused (see section 2.3.3) might imply that individuals predominately use their daydreams to prepare for and anticipate future, rather than actual, threat, which fits well with proposals that daydreams are involved in anticipatory planning and future problem-solving (Smallwood & Schooler, 2015). Indeed, mental simulation has been described as a key process in proactive coping because it both reflects efforts to recognize threats before they occur and, by imagining how stressful events might unfold, provides an initial plan of action representing preliminary coping efforts (Aspinwall & Taylor, 1997). However, whether or not these processes are both involved in naturally occurring daydreams and result in adaptive coping mechanisms are open questions for future research.

Future research in this area might start by examining associations between individual differences in proactive coping styles (e.g. the Proactive Coping Inventory; Greenglass, Schwarzer, Jakubiec, Fiskenbaum, & Taubert, 1999), or proactivity in general (e.g. the Proactive Personality Scale; Siebert, Crant, & Kraimer, 1999) and tendencies towards daydreaming (e.g. using the Imaginal Processes Inventory; Singer & Antrobus, 1970). Another approach might be to content analyze descriptions of naturally occurring daydreams for different forms of proactive and reactive coping strategies (e.g. looking at differences in the content of past vs. future daydreams), or to examine naturally occurring daydreams before an impeding stressful event such as various life transitions, when anticipating aversive health outcomes (e.g. after receiving negative health diagnoses), before stressful academic or work-related events (e.g. examinations, changes in job roles), or in relational contexts (e.g. romantic relationship dissolution, parenthood, or bereavement). Other research suggests that proactive thinking and proactive coping strategies can be trained with beneficial outcomes (e.g. promoting educational performance, Kirby, Kirby, & Lewis, 2002; and well-being in older adults, Bode, de Ridder, Kuijer, & Bensing, 2007) which might suggest that similar approaches with mental simulation and daydreaming might

improve the ability to cope with stressful life events and enhance (socio-emotional) well-being.

7.4.4 What is the impact of social daydreaming on later social behavior?

A fundamental question unanswered by the present research is how the effect of social daydreams on later social behavior might contribute to socio-emotional well-being over time. Although Studies 1 and 2 demonstrate that social daydreams can have an immediate positive impact on socio-emotional well-being (and also later effects on social behavior immediately after social daydreaming), more fully examining the process by which social daydreams contribute to longer term socio-emotional well-being via social behavior, as suggested by Study 3, is a key direction for future research. Because social daydreaming is intimately linked to social goals and needs, over time, it might be expected that social daydreaming helps individuals to achieve core social goals (e.g. the formation and maintenance of positive social relationships), which in turn, contributes to and maintains an appropriate level of socio-emotional well-being. The mechanisms by which social daydreams support the achievement of social/relational goals are likely to be varied but there are a number of processes, which might help to explain how social daydreams facilitate social goal achievement.

Social daydreams allow individuals to mentally represent other people and social situations including past and possible future social interactions and consideration of how others and the self, think, feel and behave. Such mental simulation in daydreaming activity may facilitate goal achievement and interpersonal relationships in a number of ways, which suggests that there may be multiple mechanisms through which social daydreams affect later social behavior and longer term socio-emotional well-being (in addition to the regulation of immediate feelings). For example, social daydreaming may often involve mental rehearsal of possible future social interactions (i.e. pre-factual thinking, Sanna, 1996), which may help successful goal achievement through links with effective planning (action plan formation; Escalas & Luce, 2004; Rivkin & Taylor, 1999) as well as enhanced goal motivation (Langens, 2003). Social daydreaming may also increase feelings of preparedness and reduced anxiety for social interactions (Allen & Honeycutt, 1997), which may then have a positive impact on later interpersonal behavior. Imagining future social interactions during daydreaming may also set up expectations for social

interactions, which then elicit confirmatory behavior (Sherman, Skov, Hervitz, & Stock, 1981). For example, Anderson (1983) showed that imagining oneself enacting a particular behavior led to greater expectations that that behavior would be enacted. This effect increased with more frequent imagination of the scenario and lasted for several days. Other research has demonstrated that imagining the potential negative (compared to positive) aspects of an upcoming social interaction can be advantageous for that interaction when individuals respond with positive reactions and potential behavioral strategies (Showers, 1992).

Social daydreams may also allow individuals to mentally simulate different potential outcomes of a social situation including their own and others likely behaviors (a process likely to rely on the ability to infer the possible mental states and behaviors of others known as mentalizing; Frith & Frith, 2006). Trying out different combinations and possible alternative outcomes of social situations (e.g. by drawing on past experience and knowledge about others) may lead to more realistic characterizations of a social situation, which may facilitate social problem-solving and decision-making (Moulton & Kosslyn, 2009). Likewise, mentally simulating past social interactions in daydreams in a process of counterfactual thinking (Sanna, 1996) may also be involved in greater coping and emotional well-being (e.g. by thinking about how a situation could have been worse – downward counterfactuals) and possibilities of transforming past failures into future success opportunities (e.g. by thinking about how a situation could have been better – upward counterfactuals) (Markman, McMullen, & Elizage, 2008; Roese, 1994, 1997).

Social daydreaming is also likely to involve perspective taking which may help to promote understanding of other people and relationships. Reflecting on how other people think, feel, and behave during daydreaming may result in greater empathetic understanding and social sensitivity (Decety & Jackson, 2006). Such enhanced interpersonal skills may then translate into more sensitive and responsive interpersonal behavior in relationships, which has been identified as a key factor in developing and maintaining intimacy within different kinds of social bonds (Reis & Gable, 2015).

An important implication of these ideas is that negative social daydreams can also have positive longer-term consequences on socio-emotional well-being (e.g. via interpersonal goal achievement and enhanced social skills) even if they have an immediate negative impact on momentary socio-emotional well-being (i.e. through

the impact of negative daydreaming on emotion). This highlights that although positive social daydreams (about close significant others) may be associated with beneficial effects on emotion, the positive and functional outcomes of social daydreaming are unlikely to be constrained to positive social thoughts. Although research has associated daydreaming in laboratory settings with some of the specific functions noted here (e.g. problem-solving, decision-making; Baird et al., 2012; Ruby et al., 2013b), future research should examine how these processes are involved in naturally occurring daydreams in ecologically valid settings, and link these processes to specific positive (and negative) outcomes. One approach might be to examine individuals' current social goal pursuits, use experience-sampling to examine the extent to which daydreaming reflects the pursuit of these goals and whether they represent adaptive mechanisms (e.g. planning, problem-solving, understanding others), and then examine how daydreaming content is related to goal progress, motivation and achievement at a later time point. Other research might explore the role of social daydreaming in the development of intimacy in close relationships. For example, diary studies might examine how empathetic daydreaming (i.e. daydreaming that involves the consideration of another persons thoughts and feelings) is related to positive relationship behaviors within newly initiated romantic relationships, which over time, might contribute to intimacy and relationship satisfaction.

7.4.5 Individual differences: for whom and when does social daydreaming regulate socio-emotional well-being?

The research presented here has examined the general effects of social daydreaming on socio-emotional well-being. However, it would be premature to conclude that these effects occur in the same way for all individuals. Future research should examine not only how the content and context of social daydreaming is associated with adaptive or maladaptive outcomes but should also consider individual differences that might moderate any effects. For example, individuals might differ in the extent to which they: (a) tend to use social daydreaming to regulate socio-emotional well-being, (b) engage in certain kinds of social daydreaming (e.g. fanciful vs. realistic daydreaming, daydreaming about close vs. non-close others), and (c) have social daydreams that are effective or ineffective in regulating socio-emotional well-being. Consideration of how individuals differ in these respects will more appropriately characterize not only when and where social daydreaming is associated

with beneficial outcomes for socio-emotional well-being but also for whom. Several potential individual difference moderators of the effects of social on the regulation of socio-emotional well-being are particularly worthy of future investigation: attachment style, personality, and imaginative abilities, which I now discuss in turn.

Attachment style refers to individual differences in interpersonal reactions to threat or distress, which are underscored by two dimensions. Attachment-related *avoidance* describes the extent to which others are perceived as responsive in times of distress whereas attachment-related *anxiety* describes the extent to which the self is viewed as deserving of support from others (Mikulincer & Shaver, 2007). Research indicates that attachment style predicts whether and how individuals rely on attachment figures to regulate distress in the context of threat. Avoidantly attached individuals expect that others will not be responsive to their needs and tend to distance themselves from attachment figures rather than relying on them to regulate distress (Collins & Feeney, 2000; Simpson, Rholes, & Nelligan, 1992). Anxiously attached individuals however are concerned that attachment figures will not be as responsive as they desire and tend to be hypervigilant to threat, continually signal their distress, and seek excessive support from attachment figures (Ognibene & Collins, 1998). In terms of the present findings, it might therefore be expected that high (compared to low) avoidance individuals are less likely to use social daydreams about close significant others to regulate their distress. However, because imagination represents a potentially different compensatory strategy to actually relying on others to physically regulate distress, the opposite pattern could be predicted. High avoidance individuals might use social daydreams more to regulate their distress (because they may feel more able to use the imagination of attachment figures to regulate distress rather than relying on their physical presence) whereas high anxious individuals might not use social daydreaming to regulate their distress because they typically rely on excessive reassurance from others in their external worlds rather than in imagination. Of course, these predictions are open for future research and might also depend on complex interactions between the type of threat experienced (e.g. social vs. non-social) and the attachment style of the individual's primary attachment figure (Pietromonaco & Powers, 2015).

Personality is a key determinant of behavior, and can predict not only what people tend to be like but also how they might behave in different situations. The most commonly adopted personality framework is a five-factor model in which

individuals are thought to vary according to the five dimensions of extraversion, neuroticism, agreeableness, conscientiousness and openness to experience (McCrae & Costa, 2003) although there are disagreements as to whether these dimensions adequately capture personality (e.g. Ashton et al., 2004; Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). Of particular relevance for the present research is how personality is related to coping processes when dealing with threats or challenge. For example previous research has linked neuroticism with disengagement from stressors, withdrawal, and wishful thinking whereas extraversion tends to be associated with active coping efforts such as social support seeking, problem-solving and cognitive restructuring (i.e. positive reappraisal of stressors) (Carver, & Connor-Smith, 2010). Personality dimensions may therefore have implications for understanding (a) how frequently individuals engage in daydreaming as a means of coping with aversive situations and (b) what kinds of daydreams they tend to engage in under conditions of social threat or challenge. For example, neuroticism might be associated with more fanciful daydreaming as a means of disengagement whereas extraversion might be associated with less daydreaming in general (perhaps because of reliance on other behavioral coping strategies) and/or more constructive daydreaming patterns that involve active problem-solving or emotional reappraisal efforts. Although previous research has associated personality with daydreaming styles in general (Zhiyan & Singer, 1997) examining daydreaming and personality within the context of threat or challenge may show potentially different and important associations.

People differ in their imaginative abilities; that is, the extent to which they are able to vividly recreate sensory imagery in different modalities (e.g. visual, auditory, olfactory, tactile, and motor imagery) (Andrade et al., 2014). One might expect individuals who are better able to imagine in these modalities, to gain more emotional (and other) benefits from their (social) daydreams. For example, under conditions of momentary social threat an individual who can more vividly re-create a memory of a positive and supportive interaction with a loved one might experience greater increases in positive social emotions than an individual who struggles to create such a realistic and vivid imaginary depiction. Likewise, an individual who can more accurately and vividly imagine a future social interaction (e.g. how they and others might feel and behave) might be better able to anticipate the future, form effective concrete plans and solve potential future problems, which may ultimately translate

into more effective later social behavior. In support of this, recent research examining aphantasia (a 'condition' where individuals report experiencing no visual imagery), suggests that a lack of imaginative abilities is associated with reported emotional and relationship problems (e.g. being unable to imagine loved ones' faces or reminisce) (Zeman, Dewar, & Della Sala, 2015). Of course vivid imagination in daydreaming activity may also have potential downsides such as more intense negative emotion and associations with emotional disorders (Holmes & Matthews, 2010) and may be associated with mis-remembering or falsely remembering information (e.g. Gonsalves, Reber, Gitelman, Parrish, Mesulam, & Paller, 2004). Future research might therefore examine how individual differences in the capacity to imagine are linked with both positive and negative outcomes.

7.4.6 How is social daydreaming related to negative outcomes for socio-emotional well-being?

Although the focus of this thesis has been to examine the positive outcomes of social daydreaming, it also has implications for potential negative outcomes of social daydreaming for socio-emotional well-being. For example, the results from Studies 1 and 2 might be interpreted as showing that under conditions of social threat, daydreaming about non-social scenarios or non-close others may represent maladaptive or ineffective strategies for regulating momentary socio-emotional well-being. Likewise, the results from Study 3 might also be interpreted as showing that social daydreams that are associated with feelings of social disconnection, are fanciful, negative, and do not involve close others, predict greater loneliness in the context of a stressful life transition. Thus, although the thesis has concentrated on the positive effects of social daydreaming there may also be situations in which social daydreaming is not beneficial, which is likely to depend on the content of daydreaming.

One interesting avenue for future research implicated by the present findings is how daydreaming is involved in the development of chronic forms of social disconnection, in particular loneliness. If social daydreams are crucial to the regulation of socio-emotional well-being then this also implies that maladaptive forms of social daydreaming, over time, might contribute to or exacerbate, loneliness. For example, loneliness might develop if people do not daydream enough about close others (in ways that would remind them of their existing important social bonds and

allow them to capitalize on positive social experiences; *c.f.* Joiner, Lewinsohn, & Seeley, 2002), or that if they do daydream about close others, then they may not do so in an adaptive manner (e.g. they may engage in fanciful rather than realistic daydreaming) (e.g. Mar et al., 2012). Another possible route through which social daydreaming might lead to loneliness, particularly in early stages of development, is through a lack of social skills. If social daydreaming is an important factor for the development of social skills and interpersonal functioning (e.g. Immordino-Yang et al., 2012) then a lack of social daydreaming or ineffective social daydreaming may constrain the development of adequate social skills, which is perhaps the greatest predictor of loneliness (e.g. Segrin & Flora, 2000; Spitzberg & Hurt, 1987).

Finally, although this research has conceptualized positive daydreams about close significant others as beneficial for socio-emotional well-being there may be situations in which negative social daydreaming may have personal costs in other life domains. To the extent that social daydreaming often represents attempts to regulate interpersonal threat, it may interfere with the ability to constructively daydream about non-social goals and more non-social life domains that might regulate other important needs such as competence and autonomy (Ryan & Deci, 2001) and lead to improvements in other components of well-being such as meaning in life and self-acceptance (e.g. Ryff & Keyes, 1995; Waterman et al., 2010). Indeed, a *lack* of social daydreaming (compared to non-social daydreaming) might reflect that an individual has an adequate level of socio-emotional well-being which may allow them to progress with other non-social goals either through imagination or actual behavior in the external world. Hoffmann and colleagues (in press) recently provided evidence consistent with this idea demonstrating that increased momentary relationship satisfaction was related to personal goal achievement in daily life. Although they did not specifically measure daydreaming (or other cognitions) they reasoned that one of the mechanisms underlying this effect was that greater relationship satisfaction was associated with fewer intrusive relational thoughts, enabling individuals to instead direct their self-regulatory resources towards activities conducive to goal achievement.

7.5 General limitations

Although I have discussed the individual study limitations in each empirical chapter, there are a number of consistent limitations specific to the empirical studies presented

in this thesis, which have implications for the validity, reliability and generalizability of the present findings and conclusions. I discuss these general limitations below and offer some potential improvements that would strengthen future research in the area.

7.5.1 Conceptualization of socio-emotional well-being and its measurement

The studies in this thesis have been concerned with examining the effect of social daydreaming on socio-emotional well-being which has been conceptualized as the subjective feelings of interpersonal connection accompanying the perception that one has satisfying and fulfilling social relationships appropriate to one's social needs. I have measured socio-emotional well-being in terms of momentary positive social feelings (connection and love in Study 1 as well as belonging in Study 2) and negative social feelings (loneliness and social disconnection, Study 2) as well as more global evaluations of loneliness over a certain time period (i.e. two weeks, Study 3). With the exception of loneliness and social disconnection, measures of socio-emotional well-being have been single item measures. Although this approach has been used in previous literature to measure other-directed feelings in laboratory settings and cross-sectional surveys (e.g. Baumeister et al., 2013; Crocker et al., 2008) and is typically justified in experience-sampling studies to alleviate participant burden, other multi-item scales to measure socio-emotional well-being could be used to more reliably assess the concept of socio-emotional well-being to enhance the internal validity of future research in the area.

Reliable and valid measures to measure *momentary* positive feelings of social connection are notably lacking in the literature, at least in comparison to measures of emotion in general (Mauss & Robinson, 2009), momentary feelings of social disconnection (e.g. Derrick et al., 2009; Lee & Robbins, 1998), and global indicators of socio-emotional well-being such as the perception that one has close positive relationships and is engaged in positive social interactions (Ryff & Keyes, 2005). However, scales measuring feelings of connection to nature (e.g. Sparks, Hinds, Curnock, & Pavey, 2014: "I [feel a sense of affinity] [feel a bond] [identify] [feel connected] [empathize] with the natural environment") could be adapted for interpersonal connection, and state measures of empathy could also be used to capture state interpersonal connection (e.g. Oswald, 1996: "I feel… [concerned] [warm] [empathetic] [compassionate] [softhearted]").

In addition to more reliably measuring subjective feelings of momentary socio-emotional well-being, future studies might also seek to capture more indirect measures of socio-emotional well-being that are based on cognitive evaluations rather than affective responses. For example, research might capture changes in momentary cognitive perceptions from before to after daydreaming including social support (e.g. Zimet, Dahlem, Zimet, & Farley, 1988), mattering to others (e.g. Taylor & Turner, 2001), and self-other overlap (e.g. Aron, Aron, & Smollan, 1992; Cialdini, et al., 1997; Hodges, Sharp, Gibson, & Tipsord, 2013). Socio-emotional well-being over time might also be better captured by examining the frequency and quality of social interactions (e.g. positive and negative social exchanges; Newsom, Nishishiba, Morgan, & Rook, 2003), changes in social networks (Hanneman & Riddle, 2005), perceptions of interpersonal competence (Buhrmester, Furman, Wittenberg, & Reis, 1988), and relationship satisfaction (e.g. Funk & Rogge, 2007; Hendrick, 1988), which could be corroborated using third person reports (e.g. Gable, Reis, & Downey, 2003).

Examining the effect of social daydreaming on implicit measures of social connection might also be profitable to fully capture the effects of social daydreaming. For example, principles of the implicit association test (IAT; Greenwald, McGhee, & Schwartz, 1998) which uses response latencies to assess the strength of associations between concepts, could be modified to examine associations between the self, close others, and non-close others and valenced adjectives (e.g. positive and negative words). Indeed, this approach has been used with pictures of the self, close others, and non-close others as an implicit measure of social connection (Hutcherson, et al., 2008). Using multiple measures to assess the construct of socio-emotional well-being both in the moment and over time would provide convergent support for the proposal that social daydreams regulate socio-emotional well-being.

7.5.2 Limitations with using experience-sampling methods

The experience-sampling methods employed in Studies 1 and 3 required individuals to accurately categorize the contents of their current and/or most recent conscious experience of daydreaming including: (a) the ability to identify whether or not they were currently daydreaming according to the definition given (Study 3), (b) the ability to recall their last social daydream and, in the case of Study 1, their last non-social daydream, (c) the ability to report on the content of that specific daydream (e.g. the

relationship quality, daydream valence), and (d) the emotional outcomes of that daydream (e.g. emotions immediately before and after daydreaming in Study 1 or how the daydream made them feel after compared to before in Study 3). There are several issues with this approach to measuring daydreaming which may make certain kinds of daydreams over or under- represented in the current ESM studies, which might warrant a more cautious generalization of findings to daydreams in general.

The use of these self reports required participants to display a high degree of meta-awareness, not only of whether they were daydreaming or not, but also concerning the characteristics of their daydreams and their associated emotional experiences. Previous research has shown that many daydreams lack meta-awareness (i.e. the explicit knowledge of the current contents of thought; Schooler, 2002), suggesting that accurately reporting on the occurrence, content and emotional outcomes of daydreaming may have been difficult for participants. Estimates of daydreaming during cognitive tasks suggest that between 15 and 20% of daydreaming may operate without meta-awareness (Smallwood & Schooler, 2006) a figure estimated when individuals are 'caught' mind wandering rather than reporting when their minds wandered. Although this suggests that daydreaming without meta-awareness may be less common than daydreaming with meta-awareness the present studies may still have only captured daydreams that participants were aware of, meaning that results may only apply to certain kinds of daydreams (i.e. those with meta-awareness). This may not be so problematic if daydreams that are fleeting and pass unnoticed do not have particular consequences for the regulation of socio-emotional well-being (e.g. it may be that their content is relatively innocuous and unimportant) but this cannot be determined and it may be the case that daydreams without meta-awareness have particularly detrimental associations with negative mood (e.g. Deng et al., 2014)[31] which may not have been fully captured in the present research. A more general problem might be how meta-aware individuals are not only of the occurrence of their daydreaming experiences, but also more generally of their content. There might be differences within individuals but also systematic differences between individuals, which may have affected the results of Studies 1 and 3 in several ways. For example, it may be that people who consistently lack meta-awareness of

[31] This study examined the spontaneous and unintentional nature of daydreams and not necessarily those without meta-awareness. However, it does illustrate that the way that daydreams occur in consciousness is related to different outcomes.

their daydreams did not sign up for the study in the first place, reported less on their daydreams (i.e. responded to less signals), or dropped out (because they were finding it difficult). In fact, one participant in Study 3 dropped out of the study after a short time because they were experiencing difficulties in reporting on their current and last daydreaming experiences, suggesting that this may be a genuine problem (albeit not for the majority of participants). Although this may represent an issue for the representativeness of the current sample, individuals who lack meta-awareness of their daydreams would also need to be systematically different in their daydreaming experiences for this to matter with respect to the present findings (e.g. if their social daydreams make them feel less connected).

Even assuming that participants could accurately report on the contents of their current daydreaming experience, both Studies 1 and 3 used retrospective measures to assess the content and emotional outcomes of daydreams. Reliance on memory for reporting on daydreaming may have meant that daydreams with more memorable content (e.g. because of their emotional content, personal relevance or deliberate nature) were over-represented in the current studies. For example, a range of previous research investigations have shown that emotional (compared to neutral) events and stimuli are more commonly remembered, and tend to be represented with greater detail and vividness (reviewed in Kensinger & Schacter, 2008), suggesting that daydreams with greater emotional intensity may have been over-represented by the use of retrospective recall. The frequency of daydreaming in daily life (between 30 and 50% of waking thought) suggests that the time between experience and recall of daydreaming in the present studies may have been relatively small which may reduce potential biases in reports of daydreaming due to reliance on memory. In addition, Study 3 found no differences between current and retrospective daydreaming reports in terms of their characteristics (including the valence of daydreams) suggesting that differences between currently occurring and retrospective daydreams may have been relatively minor. An additional concern, particularly with regards to social daydreams, is the extent to which participants felt able to report on and disclose the content of their daydreams (especially in study 1 where they were asked to provide a description of their daydream). This may have meant that some daydreams (e.g., those with sexual content) were under-reported in the current research (although there are examples of sexual daydreams which can be seen in Appendix B).

To allay these concerns, future experience-sampling studies could measure various features of the daydreaming occurrence (e.g. "how difficult did you find it to report on your experience?" "how confident are you in your report?" "to what extent did your daydream start spontaneously or deliberately?"). These questions could be examined as control variables, potential mediators (e.g. the effect of daydreaming on task performance might be explained by a lack of meta-awareness) or moderators (e.g. the effect of social daydreaming on positive social emotions might be greater when people have high compared to low meta-awareness of their daydreams). Future research might also seek to examine how individual differences in meta-awareness (e.g. trait mindfulness) are related to daydreaming reports and the kinds of participants that take part in experience-sampling studies on daydreaming.

One interesting idea is that daydreaming research with experience-sampling methodology may actually heighten a participant's meta-awareness of their daydreaming with repeated introspection and reporting on the contents of conscious experience. This might represent an advantage for experience-sampling studies in obtaining potentially more accurate reports of daydreaming content and their effects (and may circumvent issues associated with meta-awareness) but it also highlights another potential limitation with the use of experience-sampling methodology which is reactivity. Reactivity describes the extent to which the phenomenon being studied changes over time as a result of being repeatedly measured and reported on (Wheeler & Reis, 1991). Although reactivity effects are not typically well-researched or understood, some research suggests that experience-sampling is not associated with changes in phenomena under investigation over time (e.g. Cruise et al., 1996; Franzoi & Brewer, 1984; Litt et al, 1998) whereas other research suggests that there may be initial changes in phenomena under investigation which decrease over time as participants habituate to repeated reporting (Gleason et al., 2001).

Anecdotally, some participants during the debriefing process of Studies 1 and 3 commented that, as a result of participation, they became more aware of how much they actually daydream and noticed patterns in what they daydream about or what their daydreams tend to be like. However, increased awareness does not necessarily entail a change in the experience of daydreaming itself, and reactivity effects would have had to be consistent across participants to have systematically biased the present results. Reactivity effects are most likely to have been an issue in Study 3 which took place over one month, and participants did demonstrate consistent changes in their

daydreams over this period (which would be consistent with daydreams displaying reactivity). However, reactivity as an alternative explanation to the effect of time on daydreaming in Study 3 is not likely to be a viable alternative explanation because it may not be able to explain why (a) daydreams became more constructive (rather than unconstructive) and/or (b) why certain characteristics increased over time whilst others did not.

Although reactivity may not have been a substantial issue in the present research, it would have been better to allay these concerns with empirical evidence. For example, future research might measure the amount of control, awareness and deliberate nature of daydreaming to see whether this changes over time (most profitably in situations where participants are not undergoing important life changes). Not only would this approach indicate whether reactivity is an issue, but it might also unearth whether some individuals who do become more reactive (e.g. increased meta-awareness of their daydreaming) show a benefit from doing so. For example, being more aware of the beneficial effects of daydreaming in regulating socio-emotional well-being may mean that individuals derive more of an emotional benefit from their daydreaming, which is consistent with ideas that experience-sampling can be therapeutic (Hurlburt, 1997). This is likely to depend on the content of those cognitions, and it may also be the case that increased awareness of daydreams could have negative outcomes. For example, individuals who typically have negative daydreams may focus on negative thoughts more than they might if not participating in a study, which could lead to negative effects on emotional well-being.

This latter point also highlights the potential ethical issues for examining daydreams in certain populations (e.g. those who are chronically lonely or depressed). Drawing attention to negative patterns of daydreaming might create discomfort and distress and there is reason to think that this may be a very real concern. One participant who originally signed up to take part in Study 1 contacted me to say that since they had expressed interest in the study, they had become more aware of the content of their daydreams and how they were related to an issue they were dealing with in therapy. They were concerned with how taking part in the study would require them to think more intensely about their daydreams which might be detrimental to their well-being and progress within therapy sessions. This not only suggests that studies requiring participants to focus on the content of their daydreams may pose ethical issues but it also implies that certain individuals who may have anticipated

distress as a result of taking part in the studies in this thesis may not have volunteered to participate. In general, experience-sampling studies, due to their intensive nature typically attract conscientious and motivated participants (Scollon et al., 2003) but an additional, and more specific concern here, is that individuals with emotional difficulties may have been under-represented in the current studies. This could mean that the positive effects of daydreaming may have been over-stated by the current finding (e.g. by only recruiting well-functioning individuals who were likely to benefit emotionally from daydreaming and show positive effects of daydreaming on adapting to a new environment). Future research using intensive longitudinal designs might seek to measure levels of emotional difficulties (e.g. depression, anxiety), as well as the personality variables of participants to determine the extent to which samples might be biased by the intensive and personal nature of daydreaming research.

7.5.3 Sample limitations

In addition to concerns about the representativeness of certain populations in the current experience-sampling studies, it should also be noted that the samples of all three studies were mainly limited to student populations. This was justified in Study 3, given that the study was concerned with the adaptation to university, but Studies 1 and 2 were notably less representative of the general population than would be desirable. That said, Studies 1 and 2 did attempt to recruit non-student participants (20% and 8% of each sample respectively), but non-student participants were comparatively rare. Studies 1 and 3 also relied on recruiting participants who had smartphones, which may have prevented certain people from taking part. Although smartphone ownership is around 500 million worldwide (and rising) (Miller, 2012) research suggests that certain personality traits (e.g. extraversion) and demographic variables may be associated with the adoption of new technologies (Devaraj, Easley, & Crant, 2008) and smartphone ownership (Lane & Manner, 2011), perhaps making extraverted, younger, and more open-minded individuals more prevalent in current experience-sampling studies. However, increasing global adoption of smartphones makes it likely that future experience-sampling studies with dedicated smartphone applications may well be able to attract larger, more representative and global samples, because participation and training can occur remotely and outside the geographical location of researchers (Miller, 2012).

This highlights a more general problem with much psychological research in terms of the extent to which samples are representative of people in general. Henrich, Heine, and Norenzayan (2010) describe samples upon which most psychological theory and research is based as WEIRD; that is, almost entirely based on Western, Educated, Industrialized, Rich, and Democratic individuals. Perhaps most interestingly, they demonstrate that WEIRD participants are particularly unrepresentative of human populations (representing a mere 12% of the world's population), calling into question the extent to which many psychological findings across many domains of psychology might actually apply outside of WEIRD populations and generalize to the human species at large. Given these considerations, of course, the present findings should not be assumed to apply to extended populations with for example different cultural, economic and social backgrounds. However, existing daydreaming research does suggest that certain features of daydreaming, such as its frequency, prospective bias and tendency to involve others do at least apply in different cultures (Iijima & Tanno, 2012; Song & Wang, 2012) and with more diverse and larger samples (Killingsworth & Gilbert, 2010; Mar et al., 2012, Study 1). Future research might therefore seek to replicate the present findings in different populations to more fully consider the generalizability of the present results. A future focus on individual differences in daydreaming will also shift the balance in daydreaming-related research from making explicit generalizations about the nature of daydreaming for all people in order to draw more nuanced conclusions about how the outcomes of daydreaming depend on its content, nature, content, and interactions with individual characteristics of the person.

7.6 Practical implications

One question that naturally follows from the present research is whether the current findings can (or should) be used to form interventions to improve socio-emotional well-being. Studies 1 and 2 suggest that daydreaming about close significant others in times of distress might be one way to counteract negative social feelings, and in particular, loneliness. Given the dramatic negative effects of loneliness on psychological and physical health (e.g. Holt-Lunstad et al., 2015), social daydreaming could represent one way that individuals might temporarily relieve feelings of social connection, at least until meaningful interpersonal connection can be sought. Study 3 also suggests that particular kinds of social daydreams might help individuals to deal

with prolonged challenges to socio-emotional well-being. Thus, encouraging or discouraging certain kinds of social daydreaming (e.g. daydreaming with positive and realistic content) might facilitate more productive forms of emotion and problem focused coping through imagination. Promoting certain kinds of social daydreaming may also have the potential to improve interpersonal skills and interpersonal relationships as well as potentially helping to target maladaptive forms of social cognition associated with loneliness, depression, and social anxiety.

The idea that daydreaming can be targeted to improve various aspects of socio-emotional well-being is important and interesting. A recent review on positive psychology interventions showed that even brief interventions involving mental imagery can have an impact on positive emotions and well-being (Quoidbach, Mikolajczak, & Gross, 2015) suggesting that there may be scope for daydreaming-related interventions. That said, I would be hesitant to suggest daydreaming interventions at least until more research has been conducted in the area. It may be that the benefits conferred by social daydreaming only occur in non-clinical samples (i.e. similar samples on which the current research has been conducted) and for those with particular individual differences (e.g. a secure attachment style). There is potential that asking chronically lonely, socially anxious, or depressed individuals to engage in particular forms of daydreaming may be distressing and have negative effects (e.g. by highlighting perceived deficiencies in social skills and social support systems) so more research would be needed to examine the daydreams of clinical populations and individual differences before daydreaming interventions could even begin to be developed.

There is also a more fundamental reason why developing daydreaming interventions may not be advisable or appropriate. Interventions that attempt to change the nature and content of daydreaming through directed imagination may alter one of the very aspects of daydreaming that is essential for its positive effects: its often spontaneous and undirected nature. By directing daydreaming and making it deliberate, interventions would essentially be altering the respondent nature of daydreaming making it more akin to operant thought. However, there is reason to think that the key benefits of daydreaming for certain outcomes lie in the spontaneous and non-deliberate nature of the daydreaming state. For example, daydreaming may benefit creative problem-solving precisely because it involves less conscious processing of alternatives and creative solution through ‘insight’ (e.g. Baird et al.,

2012; Zedelius & Schooler, 2015). Other research suggests that complex problem-solving may similarly benefit from unconscious thought processes, which enable individuals to integrate and consider large amounts of information at once, leading to better problem-solving and decision making (Dijksterhuis, 2004; Dijksterhuis & Nordgren, 2006).

Crucially, daydreaming may be beneficial because it often lies between fully automatic and unconscious processes and those that are fully deliberate or conscious. Although the distinction between controlled and automatic process is common in many psychological accounts of cognition (i.e. dual-processing accounts; Evans, 2008), daydreaming may be one example where the distinction between controlled and automatic, conscious and unconscious, thinking is blurred (Norman, 2010). For example, the content of daydreaming is 'conscious' to the extent that it can be perceived by the thinker at the time. However, it is commonly initiated automatically, unintentionally, and proceeds in a free-flowing nature, which may be some of the hallmarks of 'unconscious' thought (Bargh & Morsella, 2008). Future research would benefit from examining whether and how the respondent nature of daydreaming is linked to its potential functional outcomes by, for example, examining the links between daydreaming and unconscious goal pursuit (Fitzsimons & Bargh, 2003), reasoning (Hassin, 2013), and decision making and problem-solving (Newell & Shanks, 2012). Given the similarities between daydreaming and dreaming (Fox, Nijeboer, Solomonova, Domhoff, & Christoff, 2013) future research on the functionality of daydreaming might also examine whether daydreaming has similar benefits to dreaming such as the consolidation of memories in relation to current goal pursuits and problems (Graveline & Wamsley, 2015; Paller & Voss, 2004).

In light of the potential benefits conferred by the daydreaming state, perhaps future interventions, rather than directing daydreaming, might encourage individuals to spend more time daydreaming and pay more attention to their naturally occurring daydreams, by for example allocating specific times to daydream, or encouraging individuals to engage in activities that would promote daydreaming (e.g. automatized tasks). There may also be potential for educational interventions (e.g. within organizational settings), which emphasize the productive and potentially beneficial effects of daydreaming (e.g. creativity, feeling regulation, effective problem-solving and decision-making) to alleviate the guilt that might prevent and interfere with daydreaming activity and its benefits. Such interventions would therefore capitalize

on the potential benefits of daydreaming without disrupting its fundamental nature. A key direction of future research might also be to examine the difference between deliberate and controlled versus spontaneous and free-flowing daydreams, whether they represent potentially distinct forms of daydreaming, and might therefore have different antecedents and consequences. Indeed, Study 2 specifically examined deliberate daydreaming, whereas daydreams captured in Studies 1 and 2 may have represented both more/less deliberate daydreaming experiences as they naturally occurred. Although similar effects were observed between naturally occurring and experimentally directed daydreams (e.g. effects on positive social feelings) future research would be needed to discern whether deliberate and spontaneous daydreams are potentially distinct types of daydreaming or a dimension underlying the experience of daydreaming that might moderate its effects.

7.7 Conclusion

The purpose of this thesis was to provide an initial theoretical and empirical account of how imagining others during daydreaming activity can regulate the need for interpersonal connection. The studies in this thesis demonstrate that social daydreaming can regulate feelings of interpersonal connection under conditions of momentary and prolonged social threat or challenge, both in the moment and over time. Overall, these findings represent valuable and novel contributions to both the functionality of daydreaming and theories of belonging regulation, and motivate interesting and important questions for future research in the field. By integrating daydreaming research with social psychological theories, I have also provided a social psychological account of how the content and context of daydreaming might be functional and adaptive. Given the substantial proportion of daily life that is dedicated to imagining others, I hope that the present research stimulates future efforts to describe how, when, and for whom imagination helps individuals to navigate the social world and important interpersonal relationships. The need to love and be loved is vital to well-being and, as implied by the following quotation, imagination may play a more important role in this process than previously acknowledged by psychological research: "Love requires imagination more than experience"[32].

[32] Quotation from *Love begins in winter* by Simon Van Booy.

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APPENDIX A

DEFINITION AND DESCRIPTIONS OF SOCIAL AND NON-SOCIAL DAYDREAMS PROVIDED TO PARTICIPANTS IN STUDIES 1 AND 3.

What is a daydream?

When most people think of daydreaming they usually compare it to fantasy such as imagining things that you would like to happen. Daydreams can sometimes be like this. But they can also be about things that are realistic and/or unpleasant.

We would like you to consider a daydream as any mental content that you have (thoughts and/or images) that isn't about your external environment or what you're doing at the time. Whatever you are doing at the time doesn't have to be physical (e.g. writing an email), it can also be mental (e.g. planning out your week).

So for example, if you are walking to work (physical task) and you start to replay an argument that you had with someone over in your head, then this would be a daydream. Likewise, if you were calculating the amount of money you had to pay for something (mental task) and you started to imagine what you would be doing later that day, then this would also be a daydream.

For this study we would like you to consider daydreams as a *series* of thoughts and/or images about something rather than just a *single* thought or image. For example, suddenly remembering that you need to call your friend wouldn't be a daydream but imagining a phone conversation with her/him would be. Daydreams can be quite brief (e.g. a few seconds) but they should be longer than just a single thought or image that pops into your head.

Social and non-social daydreams

We would like you to make a distinction between daydreams that are 'social' and those that are not. *Social daydreams* are simply daydreams where *other people* are present in the daydream. These people could be real or imaginary. Non-social daydreams are daydreams that *don't* involve other people. An example of a social daydream could be imagining a conversation with somebody. An example of a non-

social daydream could be thinking about what clothes might be nice to wear for a special occasion.

Here are some examples of daydream descriptions that people have provided in the past:

Social daydreams:

"I was thinking about meeting up with my friend later this evening. I saw an ex-boyfriend last night and I was deciding whether to tell her or not."

"I was imagining what it would be like to live with one of my sister's friends and where we might live."

Non-social daydreams:

"I daydreamed attempting to do DIY, drilling through my hand, and ending up in accident and emergency."

"While I was doing my makeup I was thinking about how little work I had done today after leaving early."

APPENDIX B

EXAMPLES OF SELF-GENERATED SOCIAL AND NON-SOCIAL DAYDREAMS FROM STUDIES 1 AND 2

I have selected some daydream descriptions to provide readers with a flavor of the kinds of self-generated social and non-social daydreams upon which this thesis is based. Those from Study 1 are examples of daydreams that naturally occurred in daily life. Those from Study 2 are examples of daydreams directed according to experimental instructions for a three-minute spell of imagination (i.e. to deliberately imagine a positive scenario with a close significant other or to deliberately imagine a positive, but non-social, scenario). Note that all errors of typography and syntax are from the original daydream descriptions. Descriptions are presented in a random order.

DAYDREAM DESCRIPTIONS FROM STUDY 1

Social Daydreams	*Non-social Daydreams*
I was thinking that I would love to record a song with my friend as we use to do before.	Water filled an empty lecture hall and the whole place was flooded with floating furniture everywhere
I woke up and walked into my friends room and she was wearing the onesie I had bought and I got angry at her for stealing it.	Re-eating my lunch
I was chatting to J. and A. at Glastonbury and we were somehow united over shared music likes, and friendly with each other.	Am I going to be a success in my PhD? I was wondering how I am going to ever complete this and will it actually be any good?
Day dreamed about an event coming up for my brothers birthday and what we'd do in London during the weekend for it	I was daydreaming about going to the bank to get a bank statement and then to Starbucks to get a coffee
My kids are away in blackpool with my mother in law. I thought about what they would have been doing, like going on the rides at the pleasure beach, and what the weather is like	I was playing tetris battle on my computer and i hit a really high score. I could see the blocks fill up the screen perfectly.
Thinking about watching a film with the family, mum dad boyfriend sister and my sisters boyfriend and thinking about making a fire with my boyfriend	I was thinking about how much work I have to do when I get home
Thinking about tomorrow and the trip with my family to Manchester to visit old friends. Especially the program of the day and what we could bring with us as a present. The trip is also an occasion to celebrate or daughter first birthday.	Whilst in the shower I daydreamed about whether, if I cut my hair short I could be mistaken for a boy and which clothes I could wear to make that more likely. I then went on to have a social daydream.

imagining people's reactions when I turned up at my partners work for lunch, what people might look like who I'd heard about before, what they might think of me

Walking round the small shops in Oxford with my best friend

Thinking about a conversation in which I confront my partner on something they said that upset me.

Day dream about A.G about a day we had spent together and the activities we had done such as watching a film

I imagined my boyfriend's father going home to tell his wife that I forgot to ask him to say hello to his wife.

Thinking about friends back home

I was thinking about a conversation I had with one of my friends yesterday. It was about her relationship with her boyfriend and I was thinking about some advice that I gave her. I was mainly concern that I had been too honest and a little harsh on her. I was now worrying that she might be upset with me.

I daydreamed about my friends farm and helping her with the new piglets.

A friend who had been staying with me for a few days set off home today so I was imagining her doing her journey to the airport and wondering where she was and how she might be feeling.

I was thinking about what my boyfriend might be doing between his lectures and wondering why he hadn't texted me back since earlier this morning. I was worrying that he may have gone to town with a girl from his course as his university that he's getting close to.

Me and my fiancée on a polo lesson

I was thinking about doing the great north run in a couple of months. I was thinking about the lack of training I have done and was worrying that there wasn't enough time to build up my stamina. I was also thinking about whether I should drop out and if I decide to, how I would explain it to the charity I'm running for.

About some tracksuits- whether I should buy them or not

It was about whether I was going to go to work tomorrow or work from home. I was thinking about what I needed to do and whether I could do enough from home or needed to be in the office.

Swimming in a pool in France

I was Heeley City Farm and there was a black horse at the farm. It was stood at a distance from me but I imagined being kicked by the horse and just how much that would hurt. I started wondering if the force would be enough to kill me.

I thought that I probably should draw something and also recalled some of my old drawings

Daydreaming about having to get ready and finish my work and then get to my lecture, and everything I'll need... Just what I've got to do

I was trying to decide what to have for dinner tonight, specifically trying to visualise the content of my fridge and trying to figure out whether the chicken i think i have is still in date.

I was sat in an attic room writing a screenplay for a romantic film, drawing inspiration from the lyrics of the song that was playing at the time, 'In My Life' by the Beatles

Thinking about getting a new coat/boots as my feet keep getting wet on the way to uni and back

Daydreaming of drinking an indulgent gormet style iced coffee instead of the cardboard tasting cup of sludge I have here

right now! Imagining racing over to Starbucks round the corner from work, picking out a caramel frappachino, with extra caramel and cream, then enjoying it in the sunshine outside for lunch.

my flatmates and i were out on bonfire night watching fireworks and eating popcorn, playing on stalls etc

I imagined the make up I would do for dressing up for halloween

I imagined being on the phone to my boyfriend this evening and what i would say

The process of making cupcakes, step by step and the final products

I was walking on my way back to the dorms when the image of me choosing what to wear came to my mind. I was in front of the mirror getting dressed in a skirt and tights and I was choosing between my red/black wig and blonde wig.

Arm wrestling a female body builder. I lost.

I remembered a fb chat with my friend about my writings.

I was cooking and I dropped my bacon on the floor, then had to throw it away and eat cereal instead

I was remembering one of the times I went to the peaks. How I was climbing every hill I saw and running and getting dirty and falling down with some friends. I was thinking this wishing I could go hiking in the Alps with my boyfriend as he was complaining his friend isn't as adventurous as I am. And then I started picturing myself and him (my boyfriend) in the Alps.

All my washing shrunk because I left it in the dryer too long

I daydreamed about my interview tomorrow. I was thinking about how to display myself and how i would answer the ququestions. I am imagined the attitudes of the interviewers and how we wouls interact.

I just had a daydream that the frosting I made for my carrot cake last night was the worst bit and probably ruined the cake. The icing was too drippy and let a good cake down. It looked rubbish, nothing like it did in the picture.

Thinking about a memory of last summer when I spent the day on the beach with my grandma trying to get her to understand about science

I was thinking about my cycle route and whether there was a short cut and what that might be

I thought back to a time when I was with my grandma and she was ripping up chicken skin for me to eat even though I was like 16

Driving around in a car listening to music

I was daydreaming about a friend who was mother recently. I was daydream abou how she would feel and how life changes.

I was thinking about things i needed to do. I was making a list of tasks, a schedule whilst drying my hair and listening to the radio.

I was thinking about going out with my friends KH and JS this evening and that one of my other friends who is not going to be there had been moaning to us all about friend KH . I was worrying that friend JS might say something to KH and that it might upset her. I was thinking of what I could do to prevent that happening.

I was thinking about how best to tackle an electronics project and pondering how best to cheaply amplify a tone.

As I was watching a cooking show I was thinking how nice it will be if I'm able to

Logging onto muse on 5th july to receive my exam results and being excited but nervous.

cook good food for my family.

Reminiscing about going to Glastonbury 2011 with my friends, regretting not going this year

I was walking uphill to a friend's place with some dish that I'd prepared and a rose from my garden, and I was imagining a conversation with her. I imagined her finding the dish too bland, so I offer to add more chilli powder in it, and I imagined telling her "Oh I hope you've left some enchiladas for me!' I also imagined her finding the rose a bit funny but sweet at the same time. Then I was wondering why we haven't met in so long, and how it would be to see her after days.

My church mates died in a car accident whilst in their way back home from attending a wedding.

I was thinking about my friend in a rocking chair with a shotgun eating cookies muttering about where the traitors are

Replaying a conversation that I had last night with a group of friends

Daydreaming about the holiday I went on in the summer with my friends

Part of a phone conversation between me and dad before he passed away

Thinking about my friends playing pool

I am at Chatsworth with my new boyfriend. I am wearing a lovely victoriana style high necked lace dress. We walk through the gardens and lay down on the grass together. He pulls out a surprise bottle of champagne and we drink it together in the sunshine.

Imaging going on holiday with my dad and his family

Had a daydream about playing cards with my family while in Croatia while we sat in a restaurant looking out over the sea.

It was about my boyfriend coming to stay at the weekend, I was imagining us meeting at the train station and then showing him the flat and cooking him dinner

I thought about a conversation I had with my boyfriend on the phone and how I perhaps

I was thinking about applying to jobs in Newcastle and worrying about not getting one.

I suddenly thought the phrase 'a means to an end' sounded weird, which started looping in my head, with various iterations of the phrase flashing up in my mind.

First thought aboit tidyong up my shelf unit which is cluttered. Imaginwd it uncluttered. Them thought about an article in the Guardian "love your clutter" and thought that the shelf and its contents actually tell a story (our family stoty) and that my initial image pf a clutter free shelf would be too clinical and soulless.

Me riding on a skateboard

I was framing loads of pictures and getting them hung up all over the house. This is an outstanding job to be done in the house.

Daydream about the cupcakes I was about to make. It involved the making process and the way I wanted them to turn out in the end

I really hope I've turned my straighteners off

I imagined what it might be being the Hulk.

I daydreamed about riding my old horse across blackamoor reserve on a bright cold sunny day early in the morning with frost on the ground. I wished I could still ride and wondered how long it will be until I can get another horse to go riding again

I was planning a journey through sheffield to the places I need to go to on tuesday

i was daydreaming about walking down a beach in Melbourne at sunrise

I daydreamed about the laptop i would be getting for christmas

I was in Norway watching the northern lights and I was covered in snow

should have said something that I didn't say.

I was in asda with my boyfriend and we saw his ex girlfriend who proceeded to stalk us while we were shopping.

I was recalling a conversation with my friend when I was having lunch.

I was wondering whether a guy I like, likes me too. I figure he doesn't

It was about a friend a had in primary school. I've not seen her in over 10 years and she recently got in touch over Facebook asking to meet up. I don't recognise her at all anymore and seems completely different, I was trying to remember what she was like when I knew her and times if been over to her house. I was contemplating how weird and potentially awkward it would be if I was to meet up with her again.

I was imagining what it's going to be like when I go home this Thursday, especially focussing on my arrival and if everything is going to look different.

my boyfriend and I having an argument

My cousin and I were shopping and we bumped into a mutual friend of ours, so we decided to go for a coffee

I thought of the things I was going to do this afternoon until I leave home for the rehearsal.

I was imagining writing an email regarding my project and how it will be received by the performance artist (the addressee) and how great it will be if the project comes true.

I was on holiday in Brussels with my boyfriend. I imagined a sort of montage of lovely things we might do. It was sunny and colourful. We were eating good food, watching music, dancing, getting caught in the rain, wondering down streets taking pictures and staying up until dawn watching the sun rise. I imagined that we might take a beautiful photo of us together which I could put in a frame and keep in my bedroom

I imagined going home and surprising my boyfriend

If my boyfriend had to work away in another country and whether we would work or what we would do

Thinking about administrative papers I have to fill and trying to remember where I put the form or if I could find them online.

Talk to new landlord to change the time to collect the key. And before collecting the key, I need to talk to the reception of the current accommadation to talk about the deposit and the go to withdraw the rent for new accomdation tomorrow.

I was thinking about my undone work when I was walking home

I was writing down my schedule for the week when I thought of myself making a Halloween costume. I saw myself DIY an asylum patient shirt, cutting and sewing and painting on it.

a couple days ago I was boiling rice and it went horribly wrong

Whilst walkin I thought about a career I would like to do and what I would need to get there

Whether or not my room is clean enough

Was thinking about things I needed to do tomorrow, and a particular art project I want to do some more work on

Daydreamed about going on holiday at the end of the month: sunbathing on the roof and reading.

Walking to the city centre to buy a gym kit

My last day dream was when I was in the shower this morning and I was thinking about the work I had to do this week and when I

would be able to do it

I was thinking of going jogging. I was thinking what time would be the best as the sun outside is terribly hot. I was also thinking I didn't want to go jogging but that I needed it to keep my weight. Then I started thinking I wanted to eat crisps with hot sauce and lime and other sort of junk food. Then I linked that to self control and thought I'm not very good at it

Was daydreaming about seeing boyfriend later and what we might do

Me and my friends CR and FMcK were walking around Santa Ponsa

Having a shower in a swanky hotel

I had a daydream about seeing my family tomorrow, I imagined going for a meal

I was thinking about driving my car when I get home

Considered whether I would be able to resist a spread of snacks at a party. Considered if i should allow myself a few treats or stick to the healthy ones. Imagined how guilty i'd feel, thought about calories etc...

Looking forward to heading back to Singapore and reuniting with my loved ones back in my country.

Disappointed that my brother and I didn't get tickets to see Beck live and wondering what that gig would be like - imagining getting tickets for Andy and time at gig

Planning what topics I need to revise

Day dreaming of embarking on a fitness plan to start getting in shape for the summer! Imagining what sport activities I might be good at, which would help me get fit quickest and be the easiest to stick to. I imagined myself cycling on the exercise bike tonight and upbeat songs that would keep me focused.

I was thinking about whether I should buy or make a card to give to my employer when I have worked my last shift and which one she would prefer to receive.

imagining a medieval battle between my imaginary king's forces and oppositional forces.

That I was a martial arts expert

What would it be like if my friend and her boyfriend broke up and how sad she would be. Also, whether we would hang out more or less.

Imagining my comfy warm bed and listening to Harry Potter audiobooks

Daydreamed about going home for a weekend and seeing my family and dog, in particular I was walking up the front path to my house and they opened the front door and I saw them all again.

I was reminiscing about my last job in the Shard, cooking in the kitchen and enjoying the views

I imagined what would happen if I was offered a job, and how events in the coming weeks might effect my notice period, and whether or not my boss would be angry

Thinking about running and how it night improve my qualitative of life

I was imagining phoning my Dad and imagined what we would be talking about - what I am diing today, how I am etc

Imagining future self

I imagined what would happen if I randomly attended an "open invite" party held by J. and A. in London, and the awkwardness that

I was thinking about running and going to the gym and how I wish I had more motivation to go and be fit

would probably result.

I was thinking about meeting up with my friend as I had seen a girl that looked like her

I was brushing my teeth when a past conversation between me and my flatmates popped in my mind. We were in the kitched discussing a recent article about a poisonous spider found in north England. It ended with me checking my shoes for spiders

I remembered me and my friend discussing Game of Thrones, the characters that we like and how some people do not understand the depth of the problems raised there and only see the shallow level, which we both found upsetting and ridiculous

Me and Dexter. Having dinner. Private

Whether Beth, my friend, wants to come to plug for Halloween or whether she'd rather go to carver street. And because she's not texting back, does that mean she doesn't want to go to plug like me and my flat mates.

My last daydream involved my grandma and grandad. They have gone on holiday and are back today so I thought about them and when they would be getting back to their house

Daydream about seeing of my london based friends in a few weeks time

I was daydreaming about current changes for researchers. I was daydreaming abou myself as a future researcher and coming challenges for my friends and myself

Today I caught one of my school friend online on Facebook who is also doing his masters in London. I had a chat with him and then I was wandering to ask rather convince him to come for Europe tour with us. we would have great fun, meeting after so many years.

Day dreaming about being at Wimbledon next year with friends drinking cava on murray mount - imagining how myself and 3 friends could feasibly get tickets without having to skip work and queue up.. Imagining what excuses we could make in order to go missing for a few days away from work and coinciding the week with a concert in london, reminiscing about the times we were at university and free to travel whenever we pleased.

Planning my costume for Halloween, thinking about what character I could be and what I need to buy for it

After calling the doctor and being unable to get an appointment I started to wonder when to go to the walk-in surgery, and was anxious about the fact that I'd have to go without any make-up on the rash on my face, as usually I try to cover it up.

Bidding on an item on eBay

Whilst reading my textbook I thought about what I was going to cook for my lunch and what time I needed to cook it

What job i could actually get if i got a good degree and whether it would be worth it and how to get there

What clothes i want to buy and how i will afford them. Whether to go to sheffield or meadowhall and buy new shirts for winter.

Thinking about how I really need to tidy up the house and garden (distraction from doing my work)

I was daydreaming about the stress of moving house. Unpacking and packing. Feels frustraying. Just want to get it done.

I was imagining myself being sat at the laptop working late and not getting the work done and feeling really disappointed with myself.

This is very geeky. I was mind wandering of how could we detect the presence of a virus in sperm cells. And use it as a diagnose of infection in men and probably infertility.

I saw some pictures of my friends from back home on a night out at dreamed about being there

I was imagining going back in time, founding Amazon, and leading a life of enormous wealth and luxury, and how my relationships with my (actual) friends and colleagues would be, consequently.

I was at a gathering with my closest friends, Liam and Gammon were having a typically heated debate about some kind of social policy, I was contributing with some excellent points.

I was having a drama lesson in the secondary school. I was with my friends who i am familiar with.

Thought how my boyfriend was coming home soon from work and how we were going out for tea

Thinking of a meeting I have coming up and imagining what I would say and what questions people would ask

Planning a birthday surprise for a friend

Daydreaming about a friend and thinking about seeing him soon. Wondering what to say to him

I was strawberry picking with Juliet, for every one we picked we ate one. We tried to act unsuspicious when paying the farmer but had strawberry all round our mouthes, so we ran, laughing, back to my car

I watched a video of friendship and how we can be very mean to our own friends. Years ago I was playing with my two best friends. We were throwing firecrackers at each other. It was like a mini war. So much fun. It made me laugh.

I am using my ex-housemate's empty room to do work and while I was in there doing work I imagined telling him that I come up to his room more than I did when he lived here and wondered what he would have to say to that.

Having a romantic walk through a park with someone.

An imagined argument with my friend who rang the a few days ago and said that she was going to a bonfire instead of coming to mine before we go out on my birthday.

Wondering if i will get a phd interview, and how long until ill find out if my application is sucessful.

Thinking about what I was going to make for dinner later on and what ingredients I had in the fridge

I was daydreaming towards what outfit I should be wearing tomorrow for my plane flight (ie. if my outfit is warm enough to brave the cold, yet cooling enough to withstand the heat in Sunny Singapore.)

I was imagining running for the train and missing it

Thinking about recording a programme that I wanted to watch on tv

What time I would get home and If I needed any shopping whilst on the bus

I remembered that I need to buy train tickets to get home this weekend and whilst making breakfast I daydreamed about buying the tickets and then actually getting to the train station itself.

Washing the pots thinking about how tired I am/ what to have for tea/ how much of a mess the flat is

I remembered that i need to write two important emails and imagined myself writing them.

Thought about messing up my phd

I was thinking of the clothes I want to wear for tonight salsa dancing (I pictured lots of combinations in my head)

During the end of my lecture deciding what items I needed to buy for lunch today so I knew which route to walk home

My last daydream that did not involve other people was about my Halloween outfit. We are having a Halloween party so I saw an advert on TV for Halloween and it made me think of the bits of my outfit I still needed to get

Imagined what it would be like to have a family, mostly focused on a little baby

I was thinking I was in kind of an acting class and my ex boyfriend was there with his current girlfriend and my boyfriend told me that she was pretty stupid. Then my boyfriend and me went to the attic to be alone and I suggested going to play golf. So we grab the car and drove under a tunnel that was going to take us to the golf course.

Thinking about my grandmas upcoming birthday and all my family gathering at her house and imagining what is likely to happen

Having a family of my own

My last daydream that involved other people was about half an hour ago. I was thinking about my plans for the weekend. I'm going home to Manchester to see my parents and sisters so was planning what we would do and what I needed to take with me

What I was going to do with my partner when he came down to visit

I was thinking about my friend OH and trying to forget about the comments my flat mates made about how we should go out. I Daydreamed different situations about my relationship with OH
I was wondering whether I should wait to be invited on a second date or suggest it myself. The first date was loads of fun and I'm worried that its going to be hard to think of a date idea that will be as good as the first.

I daydreamed about a trip to France (that is going to happen) I was imagining a trip to the vineyards and how we would include a friend who is pregnant. I was speaking in French in the daydream

I had a daydream about a phone conversation I had with my Dad a few nights ago

I was imagining sitting down with a cuppa tea and phoning my mum, I've done all my chores and the house is spotless. We chat about my sister.

i daydreamed about attempting to ski but ended up falling over and being buried under snow.

Breaking a window blind in two in a fit of rage

Recently I had a moment when I was watching the video of new Mac os X on Apple website. I was just wandering about the new improvements done in it, and it's like so smart integration they had with calendar, maps and ibooks... I thought it could resolve problems like buying a separate Kindle.
What outfit I am going to wear to dinner with my production crew. I was thinking all white and gold accessories , with red lipstick

Was thinking how im going to stop playing poker

I was thinking about how far I had come in what I know about my area of work, and that I feel I know so much now about my work.

I was thinking about how much my workload is going to be in the coming months and worrying about how much time I will have to do everything.

Imagined lab setup for experiment at work

I was looking for information about swimming lessons in Sheffield and I imagined myself being an excellent swimmer and during a holiday, I jump into a sea from a boat, only to realize that I'm being chased by a shark. Then I swim as fast as I can to get back onto the boat and to safety.
Walking around t-mobile trying to decide which iPhone I want to upgrade my contract to

I smashed up my computer

I had a daydream about a conversation I need to have with my flat mate about an essay that we are both writing. I daydreamed about talking to a friend about how my other friend was feeling and being. I reflected on my own response and whether it was acceptable. I felt irratable.	I dreamt I was late for lecture and not allowed to enter the lecture hall. I was thinking about how I was going to eat healthy when up in Edinburgh next month

DAYDREAM DESCRIPTIONS FROM STUDY 2

Social Daydreams	*Non-social Daydreams*
I went with my family with a husband and two children - a boy and a girl - to my brother's new house with his family. He had a wife and a boy. All our children were of similar age. When we came in they welcomed us. My brother's wife and my husband went in to talk and I stayed near the doorway with my brother. I spoke to and hugged his son for a bit. Then I spoke to my brother. We hugged and I told him I miss him. Then we talked about how our parents are doing. There were lots of pictures of family on the walls. I was happy to see him.	I am a man in his early twenties who is exhausted. I enter the living room, which is a normal living room complete with TV, sofa and table. I take my favourite seat, and sink into its leathery glory. My feet now up, I turn on the TV to find my favourite film starting - Pulp Fiction. I turn up the volume until the sounds and lights from outside are drowned out. The curtains are drawn anyway, and they are a horrible flowery patterned curtain you expect to see at you grandparents'. I found my guitar in hand, a beautiful black Les Paul Epiphone Ultra II. It is already connected. I run my hand down its strings. The alchemical sounds vibrate through my bones and probably into next door's walls. It is quite enjoyable picking away in solitary, occasionally practicing some exercise, with a background of dark comedy. A plate is before and in this plate is a pizza. A simple cheese and tomato one - no need for anything fancier. I unashamedly scoff it down.

My first thoughts were of how me and my girlfriend arrived on the hilltops - this was by car which brought back good memories of when I used to have a car. We then walked down a field with a well trodden path slightly down hill leaving the car on a deserted country road. After climbing over a couple of dry-stone walls, we lay down on the grass with the shade only covering us a little by a small tree nearby. The grass was quite short and there were cows in a field two to the right. We had some food we had bought from the local shop which consisted of sandwiches and snacks. I was wearing shorts and t-shirt and my girlfriend a white dress and headband. I read a book out loud at one point which we both enjoyed and got immersed in the story.

I imagined walking out of the grey and tall Psychology building, hearing the sound of the automatic doors opening and the sun shining. I then crossed the road really fast as there were lots of cars and the traffic lights were about to go off and were bleeping. I went down the steep road that goes near the hospital and saw a girl jogging in pink shorts with ponytails. I carried on walking and was amazed that I could cross the road as soon as I arrived despite it normally being an impossible task. The smell of pasties drifted through the air and as I approached Greggs I got out my £1 coin which was cold and brand new. I headed in and ordered my vanilla slice. It felt cold in the packet. I then headed back home. This involved going past some derelict looking buildings and going through two nice mini grassy areas. One with a bench and the other with flowers. There were some cats walking about, a ginger one and a black & white one. As I got close to home, I got out my keys and entered. (For a bit of the task I also kept wondering why 3 minutes was so long)

Sitting on my bed in my room with the fan on the desk blowing cool air, eating a bowl of fresh-made soup and watching the football on the laptop with my boyfriend sitting in the desk chair eating his soup and watching football too. The window was open so there was a slight breeze and the sound of people walking past outside.

I was sitting by the French windows at home, on my own, nobody in the house, no worries , no pressures. The sun was shining through the trees and yes I was drinking a cup of tea, not alcohol, at the time. I was listening to the birds chattering away in the trees and there was a slight breeze blowing. It was nice and peaceful and only the sound of the occasional car going by which could be heard in the back. There was no sound of crying children, just heavenly peace and warmth from the sun. Nicely chilling out and relaxing!

I'm lying on the beach, my weight heavy pressed into the sand. The sun is warm on my skin, there's a cool breeze that stops me feeling to hot and feels soft against my skin. I'm reading a predictable chicklit type book, it's almost boring and the writing is terrible, but it feel more indulgent to spend my time in such a wasteful way so I love it. I skim the pages so it's not too much effort. Sheer bliss. No need to think or do anything. I have a mojito next to me, it's so refreshing, I'm aware I could drink it too fast. I put the book down and sit up, taking a slow sip and relishing it. I look at the sea. It smells so inviting and looks so cool. I stand up, leave my towel, book and drink and walk towards the shore, taking my time, feeling the sand between my toes. I reach the shore and I paddle in the water, it feels amazing to cool my feet. I look out at the sea and breathe deeply, letting myself relax completely. I head back to the towel and lie down, leaving the book and the drink I think about the sensation of sun on may face, and tanning, and I let myself doze.

me and my mum are extremely close and enjoying time with each other. A couple of weeks ago, we went on a lovely 8 mile walk in the Lincolnshire Wolds. It was a very scenic walk, the weather was lovely (sunny and hot, unlike today!), we saw some interesting wildlife and met some other walkers. Once we had finished the walk we went into Lincoln and had coffee and cake. It was even more perfect as there was no sister around to spoil it!

I imagined myself and my daughter (who is 11) lying on a pool in a hotel in Tunesia. We are both lying on a sun lounger each, next to each other. It is warm, but not too hot. I am reading aloud from a book (a children's book called "wonder") and she is reading along. We share the feelings and excitement and sad bits of the book together and every now and again stop to chat about it. I can smell her body and her wet hair, smelling pleasantly of sun, sun lotion and sun warm skin. I imagine how I feel, happy for having quality time with my daughter, being close to her, having time and no stress as we are on holiday. Also imagined the sounds around the pool - people talking, children shouting and splashing but it doesn't disturb us.

Exploring using calligraphy nibs and inks, for the first time, trying out the stroke techniques, testing the different ink colours.

I imagined I was back in my home country and I was with my best friends in my friends house. We usually gather there and hang out with their parents, because they are really cool and are friends with us. I imagined that it's next year when me and my best friend will live together by ourselves.

I imagined that I was walking along the coast towards a bench where I ate burger and chips whilst looking out to sea. There was a slight breeze in the air that had that distinct sea smell to it, but not too strong. Then I went over to the bay and feed sardines to the stingrays in the area whilst sitting on a rock. Then I got in the sea and swam around with the stingray and other fish, occasionally taking in the sight of the beach and the piers around it.

Me and Lydia my house mate pulled all the sofas to around the side of the room. We then turned on Come on Eileen to full blast on the speakers and danced around the kitchen singing it at full volume, with the windows wide open.

I was travelling around Asia viewing the surroundings and experiencing Asian culture. I saw beautiful sights and visited calm and peaceful surroundings with rivers flowing through. I also visited big cities which were busy and vibrant. I tried the local food and drinks, which were all delicious. I visited various landmarks, which were both interesting and breath taking.

I was lying on the sand on Praia do Luz beach in Portugal and at the time there were swelling waves. I was imagining my significant other surfing and fooling around in the sea and trying to make me laugh. There are two large cliffs which encompass the beach and people stand on top of those to watch the sunset. The air is still warm and I can feel the heat of the sun on my skin. There are distant noises of cars passing along the beach. The beach is almost empty, only a few people walking around in the late afternoon.

I'm in bed and I feel really fresh and clean. My hair's damp so it stands up away from my face so that it doesn't bother me. I pull my pyjama legs up to the knees so that I can feel the smoothness of the clean sheets on my legs and stretch my back and my shoulders. I hold my mug of hot chocolate mainly for the warmth because it's still a bit too hot to drink. I flip the pages of my book and it still has that fresh print smell. I have my cuddly bear next to me and I start reading with it cuddled under one arm. I keep moving my feet around to warm up the cold patches of the bed. The room around me is tidy and the curtains are drawn. My phone's on silent and on the cabinet on the other side of the room so that no one can disturb me. There's a candle on the other side of the room, but it's only a tea light so I know that I won't have to bother getting up to blow it out before I sleep. It smells like red berries. My pyjamas and sheets are new so they smell fresh and like lavender, and the hot chocolate by my bed smells sweet and hot.

I imagined that I arrived home and my mum was in the kitchen and she hugged me and asked me how I was doing. She told me she was pleased I was home and asked me if I was happy all my course work was handed in. We talked about my plans for the weekend and she asked me what I wanted to do whilst I was visiting.

I began by entering the Botanical gardens through the stone archway, passing into the cool shadow before emerging into sunlight and warmth. The path slopes gently downwards; there are lawns and flower beds at its sides. The sweet smells of blossom and flowers fill my nostrils. The colourful flowers and swaying branches of the trees catch my eyes. As I walk down the path, I pass a pond on my left and hear the babble of a brook. I can also hear children playing in the grounds of a school beside the garden. Further still down the path, I see a fountain to my right, the water splashing around it, and now I smell cherry blossom, and wood chippings. I feel the warmth of the sun on my face, and hear the breeze in the foliage.

I chatted with my flatmate in our kitchen. We talk about something trivial (what we did last weekend, for example) and enjoyed the deed of talking as it is (rather than the content of our chat). We also enjoyed throwing a beach ball to each other, and he patted me on my head as if he were my elder brother.

My mother and I are walking along the promenade on one of the islands in the Venetian lagoon. The sun's heat is warm on my skin but my clothes are light and I feel comfortable, not hot and sticky. I wear my bright red travel bag, for once not too heavy or rammed full of guidebooks. It is comfortable to walk on the cool, white stone of the promenade. The light shimmers on the deep turquoise water in the lagoon and in the distance the city of Venice wobbles slightly in the heat haze, an indistinct orange-brown mass of jumbled buildings with uncountable belltowers poking up into the sky. We have wandered away from the crowds on the main street and the only sounds are birds and the gentle metallic chinks from the boats as they bob gently on the tide. We wander past a row of houses, our gazes drifting over land and sea as we chat together happily - reminiscing about past experiences and discussing future plans. There is no hurry, no rush to be anywhere and we amble along contentedly. I can see that my mother is happy, immersed in the moment and not worrying about anything and it makes my heart light. We have an exciting day planned for tomorrow with plenty of interest, and a restaurant in mind where we will eat tonight. There are so few people about, only the odd gentleman tending a boat or an elderly woman sweeping her front step. The sky is a dreamy pale blue with only the faintest wisp of white- more a suggestion of a cloud than a solid mass.

I was sitting on a beach in Batam, Indonesia. It was around 6pm, and the sun was just setting over the water. The sounds of the waves gently crashing on to the sand and the birds flying above were the only sounds I could hear. I got up and picked up a stone and threw it into the water. I tried looking for seashells on the beach.

I was very nervous and i opened envelope with my exam results inside and looked down the page and saw I had achieved what I had aimed for and I was really shocked and happy

the imagined scenario was based on a sunny day. I was seated in the garden outside my grandmother flat. the door to the flat was open to allow sun and air to come in . I was drinking a cup of orange juice while my grandmother was drinking coffee. In the background the noises of children could be heard playing on their little plastic cars and a football. I remember having an issue in mind that is worrying me and my grandma patiently listening to me and showing sympathy and understanding. The issue was regarding feeling left out and not understood or given attention by some classmates. The advice she thereafter offered was very soothing and made me feel so much better , confident and helped me gain knowledge on what to do next.	I imagined myself making the food that I was about to eat. The radio was on fairly loudly and I made a ham and cheese sandwich with a packet of crisps and a big glass of juice. I walked to the living room, turned the telly on and lay down on the sofa. It was a hot day and I was in shorts and a t-shirt. The sun was shining through the windows brightly. The Simpsons was on. I started putting my crisps in the sandwich, one by one, making sure the whole sandwich was covered. I ate the sandwich quickly, as I was very hungry and drank all my juice. I started to relax and spread my feet out on the sofa and continued to watch the telly.
I imagined being at my circus school, practicing aerial silks with my friend James. I was teaching him different tricks, and he was teaching me things too. He is a really positive, happy person who is always smiling so being around him makes me feel positive and happy too.	It was noon and 34 deg C outside. I dived into the wonderfully cool water and swam slowly. With each stroke I lifted my head and felt the sun on the back of my neck as I breathed in the familiar smell of chlorine. It was quiet all around me except for the sound of water gushing into the drains at the side. I swam a length and turned around, kicking off the pool wall and letting myself glide easily through the water, the pressure against my skin like the gentlest massage. In that moment, I was without a care in the world.
sex with my husband and how pleasurable it would be for me	I imagined getting a dissertation in the nuclear industry. I imagined getting a job after that and I realised how my contributions to making nuclear energy a safe source of energy would have an impact on everybody's life
I am chatting with my partner and we are enjoying ourselves. The scene is decent and the environment is very calm without any disturbance. It is comfy and lovely.	Started off with the original scenario of me driving in LA but ended up jumping to thinking about being in University and then towards graduation. With the original scenario of LA in between the later scenes.

Lying in a field on a Summer's day, looking up at the blue sky and the birds. I began to watch some clouds drift by. Other details and senses began to come into focus, such as the sound and feel of a soft breeze on my skin and the way it moved the grass in the field around me. I imagined the scenario from different perspectives (I was trying to focus on looking at the sky, but I started to see in third person). I felt the pleasant sensation of the warmth of the sun and the soft soil beneath me. I saw birds in trees around the field, and then I imagined a rabbit or a deer running through the field, but I tried to ignore it as I was focusing on relaxing. I imagined being sleepy, but I wanted to stay awake to enjoy the moment. I came back into first person perspective, looking at the sky. I rewatched the birds, then I saw an airplane drift by.

husband and I were on holiday somewhere moderately warm (nowhere specific). scenes of activities we did included: attending a concert/festival (night), riding around in scooters, swimming/hottub, walking on a beach, hiking on/in a mountain/jungle and finished with a beautiful scenery from above, enjoying good food

I am sitting alone in my sitting room at home / other than the classical music to which I am listening, there is no sound / I tend to 'sing along' with the music / my thoughts tend to range over various things both in my life now and from previously / having started to think about one thing, I do tend to find it difficult to focus on whatever it is and quickly move on to another thought / I enjoy listening to whole pieces of music and get frustrated if only snatches are played

I imagined seeing my fiancée for the first time in over a month. I drove down to see her and got out of the car. She was there waiting for me at the front door and ran to the car when I arrived. We embraced and cuddled, and stood there for a long time without saying anything. We spent the whole night talking, kissing and lying in each others arms. It was very peaceful and happy, and I felt that I was in the right place.

We were sat on a grassy bank overlooking a stately home, it was a huge, Georgian design with perfect rectangular symmetry and dozens of large, square windows lining it. Directly opposite where we sat was an archway leading through to the gravelled court yard and, as it was mid summer, there was a steady stream of people entering - though predominantly older people dropped off right out front by a travel coach. To the left was an area that seemed to be entirely mothers and young children, I'm not sure if they knew each other but they all seemed to be playing together and were just far enough away that all we could hear were the screams and laughter off the children. In a clearing just behind where we sat two mothers had broken off from this group with their infant sons are were having an in depth conversation about whether it was the right thing to do to make your child a facebook profile now (one of the women's husbands had just made one for their dog so making one for the child seemed the obvious next step). Me and Ed meanwhile had found another nice clearing amongst some trees, we sat back to back, reading our various books, me a Julian Barnes novel and him some Sci-Fi. We just sat and read for a couple hours, every now and then pointing out a squirrel, or a cool bird or a deer crossing the grounds out beyond the house. It smelled quite a lot of freshly cut grass, though Ed smelt mostly of cars and root bear - which he'd spilt on himself on our journey there. It overall was incredibly relaxed, with reading only being punctuated periodically by having to remove ants that were attracted to my yellow dress and persistent in climbing up my legs.

I was getting off the bus to return to work at a Summer camp in New Hampshire in the USA where I had previously worked. It was on a poorly maintained road, looking over a big grassy hill, with a playing field and basketball courts at the bottom, with a lake visible behind a line of trees behind the playing field. I was standing at the top of the hill under the shelter of a tree in front of a large barn, repurposed for use as the main office. There was a smell of grass and woodland, and the air was full of the sound of cicada's chirping. It was a gloriously sunny day. In the distance, children could be heard playing and shouting.