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# Mixed Emotions: An Investigation of Their Source, Induction and Consequences for Well-Being

By

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*I want you to know  
one thing.*

*You know how this is:  
if I look  
at the crystal moon, at the red branch  
of the slow autumn at my window,  
if I touch  
near the fire  
the impalpable ash  
or the wrinkled body of the log,  
everything carries me to you,  
as if everything that exists,  
aromas, light, metals,  
were little boats  
that sail  
toward those isles of yours that wait for me.*

*Well, now,  
if little by little you stop loving me  
I shall stop loving you little by little.*

*If suddenly  
you forget me  
do not look for me,  
for I shall already have forgotten you.*

*If you think it long and mad,  
the wind of banners  
that passes through my life,  
and you decide  
to leave me at the shore  
of the heart where I have roots,  
remember  
that on that day,  
at that hour,  
I shall lift my arms  
and my roots will set off  
to seek another land.*

*But  
if each day,  
each hour,  
you feel that you are destined for me  
with implacable sweetness,  
if each day a flower  
climbs up to your lips to seek me,  
ah my love, ah my own,  
in me all that fire is repeated,  
in me nothing is extinguished or forgotten,  
my love feeds on your love, beloved,  
and as long as you live it will be in your arms  
without leaving mine.*

Pablo Neruda, "Si tú me olvidas" (1952).

To my wife, Carmen.



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Scientific dissemination derived from some of the studies reported in the present research project

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**Author's declaration**

*I confirm that I have right to publish the material from the aforementioned published papers in the present thesis. Likewise, I have obtained the permission from the co-authors to publish this material in the present thesis.*



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## ABSTRACT

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Despite abundant research on emotions, the more complex features of emotional experience, such as mixed emotions, have only been recently investigated. The present research project presents evidence from five studies dedicated to better understanding the origin and consequences of mixed emotions (i.e., the co-occurrence of oppositely valenced emotions, such as feeling happy and sad). Firstly, a meta-analytic review of the literature ( $k=63$ ) determined mixed emotions as a robust and a non-artifactual experience. Study 1 ( $N=35$ ) showed that goal conflict significantly predicted greater levels of mixed emotions compared to when no conflict was present. In Study 2 ( $N=57$ ) actual goal conflict experiences predicted greater levels of mixed emotions compared to another intergoal dynamic (i.e., facilitating goals). Findings of Study 3 ( $N=429$ ) supported the relationship between goal conflict and mixed emotions using a cross-sectional design, and confirmed a positive correlation between mixed emotions and different measures of eudaimonic well-being. Results of Study 4 ( $N=52$ ) demonstrated that eliciting mixed emotions in a sample of students about to graduate produced greater levels of eudaimonic well-being. Finally, Study 5 ( $N=73$ ) used an experience-sampling design to clarify the association between mixed emotions and eudaimonic well-being such that: (1) individual differences in mixed emotions interacted with goal conflict to predict greater levels of life-purpose; (2) fluctuations in mixed emotions mediated the relationship between goal conflict and efforts to resist temptations, (3) mixed emotions also interacted with efforts to resist temptations, which was associated with enhanced vitality. The findings of these five studies are integrated and discussed in terms of their implications for goal theory, well-being related outcomes and emotional complexity theory. Overall, this research project's main contributions are: that goal conflict is a prominent predictor of mixed emotions, and that mixed emotions can help people to overcome the negative consequences of goal conflict, enhancing eudaimonic well-being.

## 1. CHAPTER ONE: INTRODUCTION

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*“I certainly found being there an astonishing experience. Although I was witnessing the death of one who was my friend, I had no feeling of pity, for the man appeared happy both in manner and words as he died nobly and without fear, [...] I had a strange feeling, an unaccustomed mixture of pleasure and pain at the same time as I reflected that he was just about to die [...]”*

*Plato (Phaedo; e.59).*

**D**espite notable progress in the study of emotion, it is possible to observe certain paucity in the investigation of more complex features of emotional life, beyond the classic distinction between positive affect (i.e., emotional experiences characterised as positively valenced, including both activated and deactivated affect, such as happiness and relaxation) and negative affect (i.e., emotional experiences characterised as negatively valenced, including both activated and deactivated affects, such as sadness and anger). Questions such as how the covariation of different emotions can: (a) explain certain effects, (b) give rise to new emotional experiences and/or (c) result in the regulation of the activated emotion itself, are not well understood. Only in recent years have scholars been equipped with better methods, which have enabled their scientific exploration.

Defining the concept of emotion has been the subject of extensive debate in the history of Psychology (Gendron, 2010). However, at the present, it is mostly accepted that the concept of emotion is a description of its dominant uses, which implies a certain fuzziness and over inclusivity (Dixon, 2012). According to Mulligan and Scherer (2012), the minimum conditions that define an emotion are that: (a) emotions are directed towards an object; (b) emotions involve bodily changes that are felt; (c) emotions contain a subjective experience; (d) emotions are triggered by a certain evaluation of an external event, usually referred as an appraisal; and (e) emotions have functional implications for individual and/or social life.

Based on a survey administered to 35 distinguished scientists in the field, Izard (2010) defined emotions as “neural circuits (that are at least partially dedicated), response systems, and a feeling state/process that motivates and organised cognition and action” (p. 367).

Emotions have been also characterised as producing consistent patterns of feelings over time that distinguish one individual from another (Gohm & Clore, 2000). Emotions can be studied as individual differences in the tendency to experience certain emotions, the intensity of emotional experiences, and the expressiveness of emotions (Gohm & Clore, 2000). Contrasting with typical definitions of emotion, individual differences in emotions have been thought of as states of feelings or moods that do not require an object (Clore, Schwarz, & Conway, 1994). Moods are global and diffuse affective states, which also entail functional properties in the sense that moods may signal discrepancies between necessary and perceived resources available to the self; whereas emotions are specific and object-directed, and result from discrepancies between perceptions and any goal-related aspect of a situation (Morris, 1992).

Considering the functional implications of emotions and moods (usually covered under the general concept of affect; Batson, Shaw, & Oleson, 1992) for individuals' lives, the effect of affect on well-being has been one of the most studied (Izard, 2010). For example, multiple studies have consistently shown that positive affect improves life satisfaction and promotes better health (e.g., Seligman & Csikszentmihalyi, 2000; Tugade, Fredrickson, & Barrett, 2004), implying that negative affect reduces well-being. This tradition has reinforced the idea that the structure of affect is better represented as positive emotions and negative emotions lying at opposite extremes on the dimension of valence (e.g., Russell & Carroll, 1999; Yik, 2007). Thus, for example, happiness and sadness should be represented such that an increase in one necessarily implies a proportional decrease in the other.

However, distinguishing positive affect and negative affect may not be enough to understand the full range of emotional experiences, their antecedents or consequences. For example, in the field of the emotional determinants of well-being, recent studies indicate that greater fluctuations in positive emotions (i.e., high variations of positive emotions, such as feeling excited and minutes later feeling fully relaxed) predict lower well-being and life satisfaction, and greater depression and anxiety (Gruber, Kogan, Quoidbach, & Mauss, 2013). Similarly, new findings suggest that experiencing more flexible, wide-ranging emotional experiences offers additional benefits (beyond positive and negative emotions) for mental and physical health, such as decreased depression and fewer GP visits (Quoidbach et al., 2014). This evidence emphasises that emotional life is often more complex than traditional distinctions between positive and negative affect would imply.

One striking phenomenon that exemplifies the complexity of emotional life is mixed emotions, which are the focus of the current research. As noted by Plato, mixed emotions are defined as affective experiences characterised by the co-activation of both positive and negative emotions, such as feeling happy and sad concurrently (Larsen & McGraw, 2011; Larsen, McGraw, & Cacioppo, 2001). For example, participants in a study reported greater feelings of concurrent happiness and sadness after, compared to before, watching the film *Life is Beautiful* (a bittersweet film based on the fictional story of a boy and his father who tries to protect him from the horrors of a concentration camp during the second world war) (Larsen, et al., 2001, Study 1). Similarly, a study using a sample of first year undergraduate students, found that students who had just moved to their dormitories felt significantly sadder but also more excited than on a typical day before arriving at university (Larsen, et al., 2001, Study 2).

Take the following situation illustrated by Kristjánsson (2010) as an example of how mixed emotions may be felt in everyday life. Two very close friends - call them John and

June - are competing for the same job, both are very competent and the two of them have been short-listed for an interview. In the end June gets the job. How might John be feeling about the situation? Presumably John feels something like happiness and disappointment. He might feel happy because June got the job, she is his friend and they have shared many good things together; but he also might feel disappointed because he did not get the job. Thus, it seems that happiness and disappointment are linked to the same fact: June got the job. The rest of this chapter is dedicated to providing a broad overview of the concept of mixed emotions, and reviewing existing research in this area. This chapter also presents the aims of the current research project and a model, which summarises the main hypotheses that will be tested.

### **1.1. Understanding mixed emotions**

Acknowledgment of the presence of mixed emotions can be traced as far back as Plato's *Phaedo*, where he suggested that pleasure and pain may be experienced together, as the epigraph cited at the top of this chapter reveals. Aristotle's *Rhetoric* (trans. 2006) also mentioned that the same emotion might involve pleasure and pain un-paradoxically. Although these two philosophers lived hundreds of years apart, and mostly offered dissimilar conceptions about human spirit, it seems that they agreed on the existence of mixed emotions. Likewise, Hume (1739/1985) indicated that two different *passions* can be joined in the mind, particularly when those feelings are elicited by different objects or events. Hume argued that under some circumstances feelings such as hope and fear can be experienced together.

Although some classic philosophers agree about the importance of mixed emotions in human experience, the investigation of mixed emotions has aroused controversy since the beginning of the scientific Psychology era. Kellogg (1915) was one of the first to scientifically investigate and appropriately document the experience of mixed emotions. In

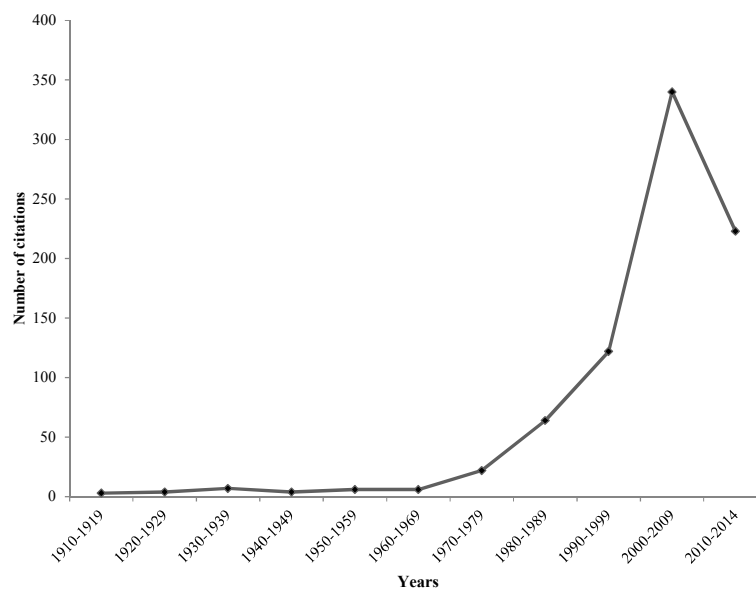


his study he presented rapidly alternating pictures of pleasant (e.g., a cat) and unpleasant (e.g., a surgical intervention) stimuli. Kellogg's findings indicated that rapidly alternating these pairs of pictures produced mixed feelings, but not in all participants and only when adequate levels of attention were present. He concluded that two opposite streams of feelings can operate continuously, unless one of these feelings has a much greater intensity, in which case, the stronger prevails. However, shortly after, Young (1918) argued that such mixed feelings represent a '*meaning error*'; that is, people confuse emotions felt with emotion intellectualisation, which refers to a rationalisation of an event using emotion words without the corresponding feeling. These conclusions were based on the fact that only a small portion of the reports in his study corresponded to clear descriptions of mixed feelings.

Over time, and particularly in the last fifteen years, research interest in mixed emotions has grown (see *Figure 1*) but controversies in the field survive. Critics have mostly argued that mixed emotions are merely a reactive phenomenon related to expectancies of participants and/or researchers and arise from confusion in reports of emotion (Barrett & Bliss-Moreau, 2009; Brehm & Miron, 2006; Greenspan, 2003; Russell, 2003). As a result, a substantial amount of research on mixed emotions has been dedicated to demonstrating that mixed emotions are not a product of: demand effects, lay theories of mixed emotions, vacillation, or measurement problems (Larsen & McGraw, 2011; Larsen et al., 2001; Rafaeli & Reville, 2006; Schimmack, 2001, 2005).

It is worth mentioning that mixed emotions should not be confused with three apparently related concepts: attitudinal ambivalence, meta-emotions, and emotional conflict. Attitudinal ambivalence refers to affective perceptions (opinions or ideas) about something (Kaplan, 1972), like for example, having both positive and negative attitudes towards gay marriage or political aspirants. Conversely, mixed emotions refer to one's own affective experience, not affective perceptions (opinions or ideas) about something. Meta-emotions

refer to recurrent emotional reactions about one’s own emotions (Mitmansgruber, Beck, & Schüßler, 2008). Meta-emotion implies that one’s current emotion serves as an object for a secondary emotion (Mitmansgruber, Beck, Höfer, & Schüßler, 2009). For example, feel angry for being sad. Thus, experiencing a meta-emotion requires that one emotion (e.g., anger) triggers a secondary emotion (e.g., sadness); one emotion is the cause of a subsequent emotion. This is not the case when experiencing mixed emotions. The concept of mixed emotions implies that the subjective experience is fused into one feeling containing two different affects. Finally, the concept of emotional conflict refers to feelings of ambivalence about expressing (or experiencing) certain emotions, like feeling conflicted about demonstrating affection towards other people (King & Emmons, 1990). Some authors have equated emotional conflict to mixed emotions (Carver, Sutton, & Scheier, 2000); therefore, emotional conflict demands closer examination to determine the nature of the relationship between emotional conflict and mixed emotions, which is investigated in later chapters.



*Figure 1.* Number of citations extracted from Scholar-Google including mixed emotions or related terms expressed in decades from 1910 until the first quarter of 2014.

## **1.2. Can two opposite emotions truly be experienced as occurring at the same time?**

Growing interest in mixed emotions has also led researchers to examine whether mixed emotions can have specific physiological patterns (Henderson & Norris, 2013; Kreibig, Samson, & Gross, 2013), with evidence showing that mixed emotions involve particular physiological responses that are not simply reducible to their constituent emotions. Yet, extant emotion research has, by and large, focused on the experience of singular rather than mixed affects (Lench, Flores, & Bench, 2011). In part, this has occurred because of assertions that positive affect and negative affect cannot coexist because they represent opposite ends of a bipolar dimension of valence (Russell, 2003; Russell & Carroll, 1999). According to the circumplex model of affect (Russell, 1980), valence is a *psychological primitive* (Barrett & Bliss-Moreau, 2009) that cannot be divided to combine positive and negative feelings.

To suggest that two opposite emotions, such as happiness and sadness, can be experienced concurrently is particularly contentious because the circumplex model of affect has been among the most popular and widely used theories of affect (Remington, Fabrigar, & Visser, 2000). According to some authors, mixed emotions do not reflect the co-activation of two opposite emotions, rather they are simply two distinctive, consecutive emotional responses regarding two unrelated events (Greenspan, 2003; Russell, 2003), and that reports of mixed emotions are merely an illusion (Barrett & Bliss-Moreau, 2009), a perceptual error, as suggested by Young (1918). Thus, for example, when people report having experienced mixed emotions after watching the bittersweet film *Life is Beautiful*, they summarised a *roller-coaster* of emotions experienced throughout the film that they, mistakenly, attributed as feeling two opposite emotions concurrently.

As a consequence of the aforementioned criticisms, new methods were developed to more accurately probe the simultaneous experience of mixed emotions. For example, Carrera and Oceja (2007) implemented a moment-to-moment measure of mixed emotions (an Analogical Emotional Scale, AES). Following an emotion elicitation procedure (a film clip), participants were instructed to draw two separate curves representing the intensity of two opposite emotions (e.g., happy and sad) over a space designated by an axis marking the intensity of emotions (vertical axis), and another axis marking time - since the beginning until the end of the emotional event (horizontal axis). This measure allows simultaneous and consecutive emotional reactions over time to be distinguished.

However, the AES relies on a retrospective evaluation of an emotional event, making viable the criticisms that two emotions may not be activated at the same time. As a result, a more refined simultaneous measure of mixed emotions was developed by Larsen and colleagues (2011). In this method, participants report on each emotion (e.g., happiness or sadness) by pressing separate buttons while being exposed to an emotional event (e.g., a film), having the possibility to press one, two or no buttons during the duration of the experiment. In this manner, mixed emotions reports are taken online, and confusion cannot be held as responsible for participants' responses because the two opposite emotions can be reported separately. Research using this measure has demonstrated that, for example, participants who watched a clip from the film *Life is Beautiful* pressed the two buttons simultaneously more than participants who did not watch this clip (Larsen & McGraw, 2011, Study 4).

Even this contemporary simultaneous measure of affect may be subject to criticisms, however. People's monitoring of their emotional experiences can lead to reactive responses. That is, requesting people to monitor their emotional states may produce distorted emotional responses (Russell & Carroll, 1999). To remedy this problem, Larsen and Green (2013, *Study*

2) used the simultaneous measure of affect in an experiment where participants monitored their emotions only once, when asked participants to do so by the researcher. Again, results confirmed that participants experienced more mixed emotions while watching the film *Life is Beautiful* compared to those watching an emotionally neutral film. Likewise, evidence derived from diary studies (e.g., Diener & Iran-Nejad, 1986; Oatley & Johnson-Laird, 1996), has shown that people sometimes report two opposite emotions together in everyday life, suggesting that this complex emotional experience may also take place in naturally occurring settings. However, it could be argued that mixed emotions do not reflect real co-activation but rather very rapid oscillations between two opposite affects (Brehm & Miron, 2006).

In part because of the novelty of the research on mixed emotions and the alternative approaches suggesting that mixed emotions cannot be experienced, many questions concerning mixed emotions have not been empirically assessed. For example, it is unknown whether the diversity of studies and measures used to investigate mixed emotions have produced consistent evidence to support mixed emotions. Similarly, little is known about how mixed emotions emerge or what effects experiencing mixed emotions has.

Precisely, this research seeks to better understand the influence of goal conflict as the main predictor of mixed emotions (chapter 3) and the effects of experiencing mixed emotions (chapters 4 and 5). Although the focus of this project is not to provide definite answers to current criticisms, it heeds the controversy in the field (further examination is provided in chapter 2). The approach of the present contribution understands the controversy as an opportunity to enlarge the horizons of a growing field of study in emotion science. According to Dascal (1998) the existence of controversy is what facilitates the expansion of existing conceptual limits of science, leading to radical scientific innovations.

Although the present contribution is much more modest than radical scientific innovation, it shares the enthusiasm for using controversies as a platform for gaining a greater understanding of a phenomenon, specifically, more clarity about the predictor and effects of mixed emotions. Ultimately, one way to provide support for the existence of psychological phenomena is to establish their antecedents and consequences on well-known phenomena.

### **1.3. Research domains where mixed emotions have been studied**

Before continuing with the description of the model proposed to examine the influence of conflicting goals on the elicitation of mixed emotions and effects of mixed emotions, it should be noted that the concept of mixed emotions has been explored in several research domains, most of the time using different terminology, but preserving the basic understanding that mixed emotions refer to the co-activation of opposite emotions.

The following paragraphs describe the research domains where mixed emotions have been studied, including research on mixed emotions in applied psychology (i.e., mixed emotions in consumer research); mixed emotions as an individual difference (i.e., synchrony); mixed emotions as a cultural hallmark (i.e., dialecticism); and the investigation of mixed emotions as a limited time experience (i.e., poignancy). Each of these aspects is briefly detailed below.

#### **1.3.1. Consumer research and mixed emotions**

Investigation on consumer research is mainly interested in understanding buying-related attitudes and behaviours; within this context, mixed emotions have been seen as an emotional determinant of consumer behaviours (Williams & Aaker, 2002). One phenomenon that has interested researchers is people's attraction to watching horror films; they have wondered whether mixed emotions play a role in this type of preference (Andrade & Cohen, 2007; Bee & Madrigal, 2013; Madrigal & Bee, 2005). For example, Andrade and Cohen

(2007, Study 3a) demonstrated that preferences for gory horror films are accounted for by the experience of mixed emotions of fear and happiness.

One interesting contribution of the investigation of mixed emotions in consumer research has been the acknowledgement of mixed emotions as a complex emotional experience (Aaker, Drolet, & Griffin, 2008). Previous findings have shown that people have more difficulties trying to recall past experiences involving mixed emotions, implying that greater resources are needed to process and to store these emotions in memory (Aaker, Drolet, & Griffin, 2008). Evidence has shown that the decline in memory for mixed emotions experiences are different from the patterns observed for memories of negative emotions. Compared to negative emotions, the memory of mixed emotions experiences had completely different slopes and intercepts in the regression models, implying that it is the complexity rather than the negativity that account for the difficulties recalling mixed emotional experiences (Aaker et al., 2008).

A final note worth mentioning about the studies of mixed emotions in consumer research is the link that some researchers have made between self-regulatory dynamics and mixed emotions; in particular, evidence suggests that the simultaneous experience of positive and negative emotions may be a result of indulgence consumption (Mukhopadhyay & Johar, 2007; Ramanathan & Williams, 2007). That is, people may experience mixed emotions as a result of having yielded to a temptation, such as buying an unwanted item that is against efforts people make to avoid compulsive purchases.

### **1.3.2. Mixed emotions as an individual difference**

Rafaeli, Rogers and Revelle (2007) investigated whether the experience of mixed emotions can be understood as an individual difference. This individual difference, which they called affective synchrony, was inferred from within person correlations between

energetic arousal and tense arousal, over and above other personality dimensions of affect (i.e., positive or negative mood). Across five intensive longitudinal studies, they found that the average within person correlation between positive and negative affect is close to zero, nonetheless, this average was qualified by large and stable individual differences identified via the random-effect coefficients in the studies. Synchrony's stability was tested in another study where 82 women completed records of affective experiences every 3-waking hours, during two non-consecutive weeks. This design allowed researchers to estimate separate synchrony indices for each week and then correlate both coefficients. Results revealed that the association between the two indices was large in magnitude and significant, which indicated that synchrony was stable over time; similar findings were observed in *Study 4* and *Study 5* of the present research project.

An independent research investigation (Wilt, Funkhouser, & Revelle, 2011), reporting two new experiencing-sampling studies, replicated these findings and also observed synchrony for pleasant and unpleasant affect. Furthermore, these studies determined that affective synchrony, for both energetic-tense and pleasant-unpleasant pairs, was predicted by a tendency to flexibly perceive threatening and pleasant situations as occurring together. The authors speculated that these findings suggested that people who, on average, felt emotions more synchronously may have noticed the potential benefits of negative situations (Wilt, Funkhouser, & Revelle, 2011). The concept of affective synchrony emphasises that mixed emotions can be characterised as an individual difference, which may lead some people to feel greater mixed emotions in everyday life, and in turn, could offer some benefits when facing difficult situations.



### **1.3.3. Cultural differences in the experience of mixed emotions**

The concept of dialecticism (Bagozzi, Wong, & Yi, 1999) considers that individuals are able to integrate both positive and negative aspects during complex situations, using both aspects to figure out alternative interpretations of external events (Bagozzi et al., 1999). This concept is based on elemental Chinese philosophical principles according to which people can accept contradiction by recognising the coexistence of opposites as a natural process during change, and by looking for the connections in the opposites as a way of development (Peng & Nisbett, 1999). The study of dialecticism has been situated in the field of cultural differences. Evidence indicates that Eastern cultures are more likely to experience dialectic emotions (Bagozzi et al., 1999; Scollon, Diener, Oishi, & Biswas-Diener, 2005). Dialectic emotions are characterised by combining positive and negative emotions without apparent contradiction. For example, Bagozzi and colleagues (1999) found that among Chinese population samples the correlation between positive and negative affect tended to be positive; whereas the opposite pattern was observed with US-American samples. Similar results have been obtained in other studies (Kitayama, Markus, & Kurokawa, 2000). Evidence has shown that the critical cultural feature that predicts emotional dialecticism is a dialectic philosophy within the country, and not merely a distinction between collectivistic and individualistic societies (Schimmack, Oishi, & Diener, 2002).

Dialecticism sheds some light on the subjective experience associated with mixed emotions. Given that emotional dialecticism is imbued by the dialectic philosophy, the subjective experience is characterised by feelings of integration and acceptance of opposite emotions as co-occurring (Bagozzi et al., 1999). However, the exploration of the subjective experience of mixed emotions has produced mixed results. In a study, a group of students were asked to report the extent to which they felt bittersweet on the day that they just moved-out to their dormitories and on a typical day (Larsen et. al., 2001, Study 2). Results failed to confirm

that participants on the move-out day felt subjectively more bittersweet. Other studies using different subjective measures have shown more auspicious results (Fong, 2006).

#### **1.3.4. Poignancy and the study of mixed emotions in the elderly**

Poignancy refers to a mixed emotions experience that occurs in the face of meaningful endings, such as graduation day (Ersner-Hershfield, Mikels, Sullivan, & Carstensen, 2008). For example, in one study, participants were guided to imagine the experience of being at their favourite place. The experimental group was guided to imagine themselves in their favourite location but as though this would be the last time that they would be able to visit it, whereas the control group continued imagining themselves in their favourite place normally. Results showed that participants in the meaningful ending condition reported more mixed emotions compared to the control group (Ersner-Hershfield et al., 2008, *Study 1*). This evidence emphasises that mixed emotions can be elicited by certain person-situation transactions characterised by contexts containing a pleasant component (i.e., a favourite location) and a threatening one (i.e., the last opportunity to visit a favourite location).

In a replication study, Zhang, Ersner-Hershfield, and Fung (2010) found that differences in poignancy can be accounted for by age; older people tend to experience greater poignancy compared to their younger counterparts. Similarly, other findings have revealed that the intra-individual correlation between positive and negative affect tends to turn positive with age (Carstensen, Pasupathi, Mayr, & Nesselrode, 2000; Ong & Bergeman, 2004), contrasting with typical findings from the circumplex model of affect (Russell & Carroll, 1999) which have reported a moderate negative correlation between positive and negative affect.

Interestingly, evidence has also shown that, among older adults (over 60-years old), the co-activation of positive and negative emotions is associated with greater resilience (Ong & Bergman, 2004). Individuals who scored higher on neuroticism and perceived stress (two variables usually related to experiencing less well-being) were more likely to experience emotions in a bipolar fashion, as either good or bad (Ong & Bergman, 2004).

In summary, six conclusions can be extracted from the brief review of the research domains where mixed emotions have been employed, although the last three mentioned here are of particular interest for the present research. First, evidence derived from consumer research has revealed the importance of understanding mixed emotions as a complex emotional experience, and not merely as the summation of isolated emotions. This is important because it suggests that these experiences can be distinguished from simple distinctions between positive and negative affect.

Second, studies on dialecticisms highlight the importance of understanding the subjective experience of mixed emotions, which is difficult to infer from self-reports using only emotional adjectives. For example, asking people to report their emotions using adjectives, such as happy or sad, do not inform researchers about people's inner feelings and the mental representations of these emotions. Understanding whether mixed emotions are represented as feeling contrasting emotions at the same time, may help to clarify the subjective experience of mixed emotions.

Third, one marked characteristic of this body of research is its diversity. For example, the majority of the research investigating mixed emotions substantially varies in terms of the measures used to evaluate the presence of mixed emotions (e.g., correlations between positive and negative emotions, simultaneous measure), and types of mixed emotions studied (e.g., happy-sad, fear-happy, energetic-tense). Although further details and implications of

this diversity are properly addressed in the following chapter (chapter 2), suffice to say that this evidence has not been systematised in order to estimate how robust the experience of mixed emotions is across a variety of methods.

Fourth, current evidence emphasises the importance of understanding the conditions that promote the emergence of mixed emotions. Since the first documented study on mixed emotions, the importance of contextual variables has been acknowledged (Kellogg, 1915). This also has been stressed by current research showing that situations containing pleasant and threatening components are favourable for eliciting mixed emotions (Ersner-Hershfield et al., 2008; Mukhopadhyay & Johar, 2007; Ramanathan & Williams, 2007; Wilt et al., 2011). However, researchers have not yet agreed what could be the origins of mixed emotions.

Fifth, it is interesting to note the link that some researchers have established between mixed emotions and self-control dilemmas (e.g., Mukhopadhyay & Johar, 2007; Ramanathan & Williams, 2007). For these researchers, mixed emotions may be the result of yielding to temptations. However, an unexplored path is to examine whether mixed emotions may also be involved during a self-control dilemma and not solely when evaluating outcomes once a decision has been made (e.g., after being purchased an unwanted item).

Finally, diverse sources of evidence suggest that mixed emotions may have beneficial effects for individuals. Studies on individual differences of mixed emotions have mentioned that synchrony may provide a buffer for coping with negative situations (Wilt et al., 2011). Similar evidence may be implied from research studying limited time experiences, with studies showing that poignancy may be associated with greater resilience among older adults (Ong & Bergman, 2004). Nevertheless, the effects of mixed emotions on individual well-being are poorly understood.

## **1.4. Aims of the current research**

In light of this research background, the aims of this research are threefold: *(a)* to evaluate the robustness of mixed emotions; *(b)* to determine the psychological factors that elicit the experience of mixed emotions; and *(c)* to examine the effects of mixed emotions on psychological well-being and self-control.

### **1.4.1. Evaluating the robustness of mixed emotions as a phenomenon**

As mentioned, it is helpful to evaluate the accrued evidence concerning mixed emotions in order to establish the robustness of mixed emotions as a phenomenon.

Robustness in the philosophy of science refers to the quality of a scientific phenomenon, according to which it is sufficiently invariant under a number of conditions to reach identical conclusions about the process under scrutiny (Wimsatt, 1981/2012).

Wimsatt (1981/2012) argued that in life and social sciences it is usual to find multiple models and techniques to investigate singular phenomena. Thus, finding consistency across a diverse set of evidence and approaches serves as a criterion of reality of entities (Wimsatt, 1981/2012). However, it is important to note that robustness does not confirm a theory, but it only helps to identify robust theories or principles (Weisberg, 2006); that is, theories that are consistent regardless of the approach used in the experimentation stage.

Hence, the first aim of this research project is to establish whether mixed emotions can be considered a robust phenomenon. As previously shown, research on mixed emotions has substantially varied in terms of the different approaches in which the co-activation of two opposite affects has been studied. This diversity is more complex when the different measures and underlying models are taken into account. In this scenario, there will always be room to question whether one experiment produced evidence supporting the experience of mixed emotions because it is simply an artifact derived from incorrect assumptions or an

imperfect measurement model. In contrast, it is unlikely that two or more utterly different models or techniques may be flawed and yet find consistent evidence between them (Trizio, 2012). Therefore, a systematisation of the accumulated evidence is necessary. A quantitative review of the literature will establish whether the evidence concerning mixed emotions produced similar results. The confirmation of the robustness of mixed emotions will establish that, regardless of the methods or models used to investigate mixed emotions, the phenomenon remains stable.

#### **1.4.2. Determining the predictor of mixed emotions**

The second aim is to determine the effect of conflicting goals in the activation of mixed emotions. Several views in emotion theory have argued that emotional experience is yoked to features of external situations. Arnold (1960), for example, proposed that emotions can be represented as affective perceptions in tone with relevant external situations. Similar notions have been incorporated in communicational models of affect (Parkinson, 1997), appraisal theories of emotions (Moors, 2013), and even by conceptualisations that dispense of any high evaluative process in the experience of emotions (Zajonc, 1984). Therefore, understanding affective experiences requires specifications about the conditions that promote the emergence of certain affective experiences, and this extends to mixed emotions.

Studies investigating poignancy emphasise the importance of the contextual factors that promote the emergence of mixed emotions (e.g., Ersner-Hershfield et al., 2008). Similarly, findings studying cultural differences in mixed emotions have explicitly concluded that situations involving loss, self-others comparison, and life transitions are related to experiencing mixed emotions (Miyamoto, Uchida, & Ellsworth, 2010). However, despite the importance of this evidence, it is still unclear what the psychological predictors of mixed emotions actually are.

### **1.4.3. Examining the effects of mixed emotions on well-being and self-control**

The third and final aim is to examine the effects that mixed emotions might have on psychological well-being and self-control. Previous research investigating poignancy have speculated that mixed emotions may be important during stressful situations because these complex emotional experiences help individuals to get the best from negative life events (Ong & Bergman, 2004). Similar conclusions have been derived from studies on individual differences in mixed emotions (Wilt et al., 2011). However, so far, evidence demonstrating the beneficial effects of experiencing mixed emotions is notably scarce (see Hershfield, Scheibe, Sims, & Carstensen, 2013, for an exception).

On the other hand, some studies in the field of consumer research have indicated that mixed emotions may be a consequence of experiencing self-control dilemmas, such as wanting some chocolate and being on a diet (Mukhopadhyay & Johar, 2007; Ramanathan & Williams, 2007). However, as previous research has only investigated mixed emotions as a consequence of decision outcomes (examining mixed emotions as a result of purchasing unwanted items), it is legitimate to question whether mixed emotions may play a role *during* the self-control dilemma itself.

To address and better justify this aim, this section is separated into two brief subsections. Firstly, a general background to understand the concept of well-being, and some selected approaches to study it are provided. This background sets the definition and preferred approach that is then used in further chapters. Second, a brief background to self-control is provided, explaining the basic principles that guide the model detailed in the following section.

**Understanding well-being.** Well-being mainly refers to people's optimal experience and functioning; the concept of well-being gathers many of the aspects of what people usually call a "good life" (Ryan & Deci, 2001). As such, well-being is a complex construct, although the dominant approach understands well-being as the subjective beliefs, affective experiences and physiological correlates that make people happy and fulfilled (Diener, 1984; Diener, Suh, Lucas, & Smith, 1999; Kahneman, Diener, & Schwarz, 1999). This approach implies that people are driven by pleasure, and therefore, the presence of pleasant affect (e.g., happiness), the absence of negative affect (e.g., sadness), and greater levels of life satisfaction (i.e., a cognitive component of well-being) should be considered the hallmarks of a good life (Diener, 1984; Diener et al., 1999; Kahneman et al., 1999).

Evidence has supported the hedonic assumptions (e.g., Fredrickson & Joiner, 2002; Myers & Diener, 1995; Pressman, Gallagher, & Lopez, 2013); nevertheless, other approaches have been suggested. For example, Ryff's model of psychological well-being (Ryff, 1989, 1995; Ryff & Keyes, 1995; Ryff & Singer, 1998) suggests that hedonic conceptualisations of psychological well-being heavily rely on two assumptions: the distinction between positive affect and negative affect, and the relevance of life satisfaction as a determinant of a good life. However, she argued that the hedonic approach does not fully capture the key elements of human wellness (Ryff, 1995; Ryff & Keyes, 1995). She further proposed a multidimensional model of psychological well-being composed of six dimensions (autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance), and demonstrated this construct of psychological well-being fitted the data better than a model including a single-factor (e.g., life satisfaction scale only) or two-factor models (e.g., life satisfaction scale and positive-negative affect scale) (Ryff, 1989, 1995; Ryff & Keyes, 1995).



More recently, the eudaimonic well-being approach has emerged as an alternative to characterise human wellness. Eudaimonic well-being refers to trying to achieve congruency between values, ideals and individual actions (Ryan & Deci, 2001; Ryan, Huta, & Deci, 2008; Ryff & Singer, 2008); another way to understand eudaimonic well-being is the efforts that people invest trying to achieve significant goals in order to reach a meaningful life, even though sometimes this may involve postponing immediate gratifications (Ryan et al., 2008). Eudaimonic well-being is anchored in Aristotle's notions of virtue, according to which individuals' lives are driven by principles and not mere consummations of immediate desires (Ryan & Deci, 2001). The place of emotions in eudaimonic well-being is notably different compared to the hedonic well-being approach. The eudaimonic model of well-being suggests that positive emotions are not good per se, but rather it is the ability to experience emotions in accordance with the conditions that provoked them. For example, when facing a break-up with a significant partner it would be more functional to experience the natural negative emotions that follow this painful life-event (Ryan & Deci, 2001). One final important feature of the eudaimonic model of well-being is that emotions can be studied independently of well-being (Ryan & Deci, 2001). As emotions are not a component of the definition of eudaimonic well-being, these can be incorporated either as a predictor of eudaimonic well-being or an outcome.

The model of psychological well-being and the eudaimonic approach are connected. Ryff and Singer (2008) have suggested that the concept of psychological well-being relates to Aristotle's notions of virtue, according to which, wellness lies in the balance between different aspects of individuals' lives. In particular, Ryff (2014) suggested that autonomy, positive relationships, environmental mastery, personal growth, purpose in life, and self-acceptance are fundamental to bring balance, and constitute relevant components of eudaimonic well-being. Thus, henceforth the term well-being is taken to mean eudaimonic

well-being; in other words, the meaning-making process that creates balance between different spheres of individual life (including psychological well-being).

**Understanding self-control.** In the classic delay of gratification paradigm, children were measured in their willpower to resist eating one immediately available marshmallow in order to get two marshmallows later (Mischel, Ebbesen, & Raskoff-Zeiss, 1972; Mischel, Shoda, & Rodriguez, 1989). The ability to resist immediate temptations, gaining control over oneself to favour more relevant, distant, goals has been the common definition for self-control (Carver & Scheier, 2011). Since these classic studies on willpower, researchers have defined self-control dilemmas as conflicts between two motives or goals (Mischel, 1974; Mischel et al., 1989). More importantly, in recent years, multiple theories have asserted that the identification of conflicting goals is a fundamental step for exerting self-control (Fishbach & Converse, 2011; Fujita, 2011; Hofmann, Baumeister, Förster, & Vohs, 2012; Hofmann & Van Dillen, 2012; Myrseth & Fishbach, 2009).

For example, the two-stage model of self-control argues that the first stage involved in successfully regulating behaviour is the identification of conflict (Myrseth & Fishbach, 2009). Conflict identification further depends on whether individuals see the temptations as a single opportunity or one among many others (Myrseth & Fishbach, 2009). Perceiving a desire, such as wanting some chocolate, is not tempting in isolation, and as a consequence, the probability of satisfying this desire increases; whereas perceiving a desire as impeding future courses of action facilitates conflict identification and the temptation emerges, which in turn, increases the probabilities of displaying self-control strategies and pursuing goals (Fishbach & Converse, 2011).

Likewise, Hofmann and colleagues (Hofmann et al., 2012; Hofmann & Van Dillen, 2012) have demonstrated that the perception of goal conflict is a signal that recruits self-

control resources (i.e., resistance), which in turn, helps individuals to prevent self-indulgence in the presence of temptations. Thus, a temptation is the name given to a desire that conflicts with a current important goal (Hofmann et al., 2012); when someone sees an appetitive stimulus but its satisfaction lessens the probability of achieving a relevant goal, individuals experience a self-control dilemma.

One common consequence of resisting temptations is exhaustion. According to the strength model of self-control (Baumeister, Vohs, & Tice, 2007; Muraven & Baumeister, 2000), self-control resembles a muscle whose energy is limited and, ultimately, is depleted after previous efforts to resist temptations (i.e., ego-depletion; Baumeister, Vohs, & Tice, 2007; Muraven & Baumeister, 2000). Thus, after several attempts to resist temptations, individuals will be less able to resist temptations. The strength model has been recently questioned by the process model of self-control (Inzlicht & Schmeichel, 2012). In a nutshell, the process model of self-control argues that people fail to exert self-control after previous regulatory efforts because they switch between goals (Inzlicht & Schmeichel, 2012; Inzlicht, Schmeichel, & Macrae, 2014). Regardless of whether ego-depletion is better understood as a consequence of previous regulatory efforts or as a change in people's willingness of continuing efforts in a current goal and then deciding for other goals, trying to remain engaged in a current activity, and avoiding distractors influences motivation and usually results in exhaustion (e.g., Gaines & Jermier, 1983; Wright & Cropanzano, 1998).

The concept of exhaustion is closely related to vitality; it could be said that they are two sides of the same coin. Vitality has been defined as the experience of having energy available to one's self (Ryan & Frederick, 1997). Vitality is a concept linked to well-being in the sense that vitality helps people to keep motivated to pursue relevant goals (Ryan & Frederick, 1997), and pursuing relevant goals is one of the dimensions incorporated in the concept of psychological well-being (i.e., self-purpose; Ryff & Singer, 2008). Previous

evidence has shown that the negative consequences of continuous task engagement on vitality may be compensated via self-regulated actions (i.e., guided by intrinsic motivation) (Nix, Ryan, Manly, & Deci, 1999).

One last aspect worth mentioning is that very recent theory stresses that control itself is an emotional process, alerting individuals of its need and energising its execution (Inzlicht, Bartholow, & Hirsh, in press; Inzlicht, Legault, & Teper, 2014). For example, the *affect alarm model* (Inzlicht & Legault, 2014) suggests that negative affect – in particular distress – initiates efforts to act over conflict, because such feelings signal the presence of temptations, and as a consequence, motivate people to act to reduce the unpleasant feeling. The theory further suggests that aversive experiences derived from self-control dilemmas lead people to disengagement from current goals, while energising the pursuit of alternative desires (Saunders & Inzlicht, in press).

In sum, the examination of the effects of mixed emotions on well-being and self-control is guided by four basic principles. First, individuals not only pursue pleasure but a “good life” in which there is a balance between the different aspects of life. This idea is clearly reflected in the concept of eudaimonic well-being, which is adopted in the current research, and also extended within the concept of psychological well-being. Second, self-control is a result of a conflict between a current desire and an important goal. Whenever the consummation of a desire is incompatible with a goal, people usually experience a self-control dilemma. Third, sustained efforts in a current activity usually result in exhaustion or less vitality, which may lead people to decide to switch goals. Finally, self-control can be understood as an emotional process, which means that current emotions alert people to the presence of a self-control dilemma.

## **1.5. Hypotheses and research model proposed**

The aims explained above are anchored in a model that suggests some hypotheses about a predictor of mixed emotions and the influence of mixed emotions on well-being and self-control (see Figure 2, top panel A). In this section it is firstly explained why conflicting goals are likely to be the main predictor of mixed emotions. Second, two novel paths are proposed to explore the effects of mixed emotions on well-being, integrating the proposed predictor of mixed emotions (as a result of conflicting goals). Finally, the influence of mixed emotions on self-control efforts is explained, as well as how this may also assist well-being-related processes (i.e., vitality). The paths proposed in the model are fully assessed in the remaining chapters; the model and, hopefully, its verification constitute the chief contribution of this scientific effort.

### **1.5.1. Mixed emotions are elicited by the presence of conflicting goals**

Emotions have been thought to emerge from people's perceptions of current circumstances (Arnold, 1960). Appraisal theories usually suggest that emotions consist of patterns of interpretation and correlates of the activity of the nervous system (Ellsworth & Scherer, 2003). For example, Smith and Ellsworth (1985) postulated that evaluations of actual circumstances as pleasant and certain are normally associated with emotions of happiness.

Another approach to understanding how people respond to events is provided by goal theory, in particular Perceptual Control Theory (PCT; Powers, 1973). This theory provides the basis for understanding the predictor of mixed emotions as conflicting goals. Goals are representations of desired end states, which the individual is concerned to approach or to avoid (Austin & Vancouver, 1996). For example, trying exercise more or trying to quit smoking are common goals; although goals are sometimes much simpler, like remembering

to prepare dinner that night or trying to avoid putting organic products in the recycling bin. Goals also represent a fundamental framework in which to understand motivations to pursue and to attain multiple behavioural outcomes (Austin & Vancouver, 1996); goals energise and direct activities (Pervin, 1982), as well as give meaning to people's lives (Baumeister, 1989). For example, the goal of trying to eat healthy may lead people to intend buying more fruits and vegetables, and avoid behaviours such as consuming products with added sugar.

Goals are also intimately related to emotions, and in this respect, PCT (Powers, 1973) has significantly contributed to specifying the conditions under which goals give rise to emotional experiences. PCT is a cybernetic theory of behaviour, according to which behaviour is not a response to input, but perceptual input is controlled using behaviour (Powers, 1973). The critical feature that drives behavioural modification is the continuous monitoring between a perceptual input (i.e., representation of a meaningful signal in the environment) and internal reference values or goals (Powers, 1973). Goals act as internal standards that control perceptions from an expected threshold. Goals are also hierarchically represented in mind, ranging from high-level principles (e.g., "to be a good father") to low-level motor programs (e.g., muscles movements necessary to hold a baby); different levels in the hierarchy of goals are integrated and operate in cascade to produce a full range of behaviours, from cognitions to physiological responses.

When the resultant comparison between the perceptual input and a certain goal is large, an error signal is activated informing the control system to modify certain behaviours in order to re-establish the expected standard level (Carver & Scheier, 1999). Precisely, emotions arise when there is a non-zero error signal in a high-level control system (Powers, 1973). This error is transmitted to lower-level control systems producing a set of cognitive and physiological responses that people commonly identify as an emotion (Powers, 2014).

Particularly important for the research purpose in question, Powers, Clark, and McFarland (1960) observed that when discrepancy arises from separate goals (e.g., impulse and restraint) and no common low-level goals can resolve such demands, then conflict is produced. Earlier, Lewin (1935, 1951) described the activation of opposite or contradictory goals as goal conflict. Goal conflict is defined by Lewin as the presence of two forces acting in opposite directions (Lewin, 1935, 1951). Typically, when goals conflict, pursuing one goal lessens the motivational resources to pursue an additional active goal, and may also lead to oppositional outcomes, so that progress towards one goal occurs at the expense of another active goal (Cavallo & Fitzsimons, 2012).

Powers (1973) further asserted that conflict is usually accompanied by a continuous flow of different emotions because discrepancies between goals cannot be easily corrected. As shown in *Figure 2*, middle panel A.1, it is hypothesised that the activation of two or more contradictory goals may result in experiencing mixed emotions. Several theoretical approaches have mentioned that conflicting goals might be an antecedent for mixed emotions (e.g., Ellsworth & Scherer, 2003; Fishbach & Ferguson, 2007); nonetheless, this idea remains untested. In consequence, it is hypothesised that the experience of mixed emotions will be predicted by goal conflict (**Hypothesis 1**).

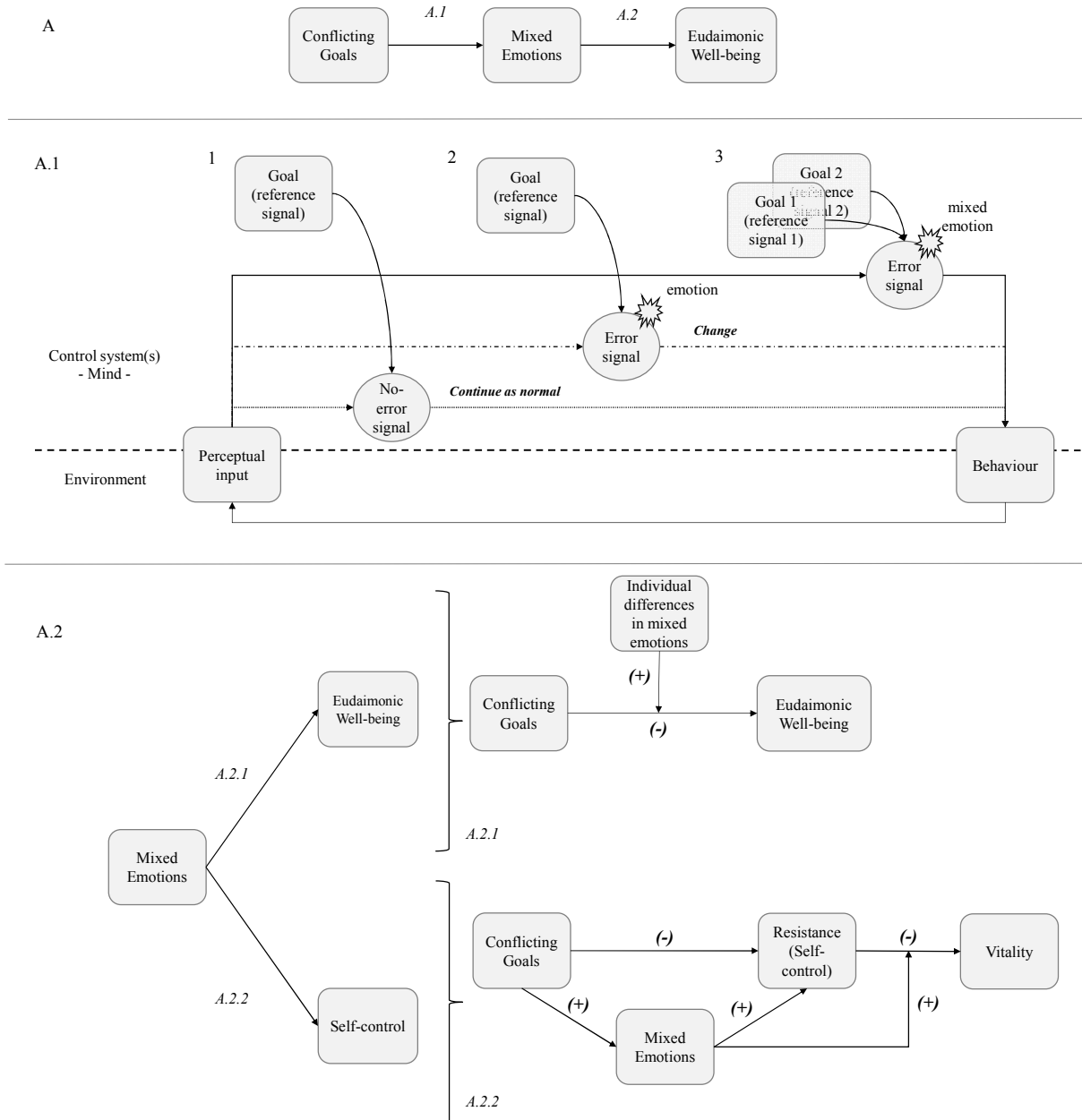


Figure 2. Descriptive model proposed for the current research. The upper panel A represents the simplified version of the model detailed in the panels below. Middle panel A.1 shows a schematic representation of the possible emotional outputs derived from the PCT (Carver & Scheier, 1982; Powers, 1973): (1) no emotional output; (2) experiencing a single emotion; and (3) the hypothesised emotional output resulting from the activation of two control systems: mixed emotions. This PCT diagram is not a functional model as described in a typical PCT control system because it omits aspects of the environment and it focuses on the error within higher level control systems rather than error within the multiple lower levels of a PCT hierarchy. Finally, the lower panel A.2 displays a representation of the anticipated effects that mixed emotions may have on eudaimonic well-being (including psychological well-being) and self-control, taking into account conflicting goals as a relevant antecedent.



### **1.5.2. Two paths to understand the effects of mixed emotions on well-being**

As mentioned at the beginning of this chapter, despite notable progress in the study of emotions, it is possible to observe certain paucity in the research of more complex emotional features, such as mixed emotions. In the context of individual well-being, this can be partially explained by the preponderance of approaches that only anticipate beneficial effects of experiencing positive affect only. Although proponents of the hedonic approach have demonstrated the negative impact of experiencing intense positive emotions on life satisfaction (Diener, Colvin, Pavot, & Allman, 1991), current research and theoretical approaches have started to investigate the benefits of experiencing negative emotions (McNulty, 2010; Nesse, 2004).

Two models have suggested that mixed emotions may have a positive impact on individual well-being. Firstly, the dynamic model of affect (DMA; Reich, Zautra, & Davis, 2003; Zautra, 2003) integrates positive affect and negative affect as complementary experiences during stressful events. The DMA departs from the idea that emotions are used to infer information about the environment (*cf.* Schwarz & Clore, 1983; Schwarz & Clore, 2003). The model further proposes that under conditions of low stress the affect system allows complex information processing, but under high stress, information processing is concentrated on immediate demands, and as a consequence, discrimination between positive affect and negative affect is simplified. Therefore, the DMA anticipates that high stress will result in negative correlations between positive affect and negative affect (Reich et al., 2003).

Importantly, the DMA also predicts that individual differences in the capacity to experience more complex affective patterns (i.e., mixed emotions) during stressful situations may be beneficial for individuals' health (Davis, Zautra, & Smith, 2004; Reich et al., 2003).

Individual differences in mixed emotions might buffer or moderate the negative consequences of stressful events on individuals' health (Reich et al., 2003). Thus, for example, some evidence has demonstrated that individual differences in experiencing mixed emotions are associated with more resilience during bereavement (Coifman, Bonanno, & Rafaeli, 2007).

The second model is the co-activation model of healthy coping (Larsen, Hemenover, Norris, & Cacioppo, 2003). According to this model, the co-activation of both positive and negative affect may facilitate sense-making processes during stressful situations, and in turn, this could allow individuals to gain control over their lives overcoming traumatic experiences. This approach calls for an optimal balance between positive and negative emotions when facing adverse situations. The model argues that the optimal proportion of positive affect necessary to benefit health will decrease as the intensity of the stressor increases. Finally, the model suggests that balanced co-activation of opposite affects facilitates problem solving and helps individuals to find meaning during stressful events by helping individuals to take the good with the bad; in other words, to turn adversity into advantage (Larsen et al., 2003).

The current approach shares some principles with the DMA and the co-activation model of healthy coping, although in some respect the current work also diverges from them. Firstly, the present work shares the idea that a model of mixed emotions that intends to predict changes in psychological well-being needs to take into account the conditions that instigate this complex emotional experience. However, contrasting with previous models, the current approach understands mixed emotions as a consequence of experiencing conflicting goals. Goal conflict has been largely identified as a negative predictor of well-being and several other health-related problems (e.g., Boudreaux & Ozer, 2012; Cantor, Acker, & Cook-Flannagan, 1992; Emmons & King, 1988; Emmons & Colby, 1995; King & Emmons,

1990, 1991); although it has also been said that it is not conflict itself that has a detrimental effect on well-being, but the inability to resolve goal conflict (e.g., Emmons, 1996; Emmons & Kaiser, 1996). Therefore, it is not necessary to investigate the effects of mixed emotions on well-being during stressful situations exclusively. This may extend the potential impact of mixed emotions on well-being to more common situations in everyday life, such as common personal dilemmas.

Second, the current approach shares the idea suggested by the co-activation model of healthy coping that mixed emotions may help individuals to make sense of complex situations, assisting the creation of meaning in life (Larsen et al., 2003). Accordingly, the model presented here (see *Figure 2*, bottom panel A.2.1) hypothesises that experiencing mixed emotions in response to goal conflict will positively predict eudaimonic well-being (**Hypothesis 2**). As previously reviewed, eudaimonic well-being is closely related to meaning-making processes (Ryff & Singer, 2008). Hence, it seems feasible that mixed emotions may have an effect on eudaimonic well-being.

Finally, the present model acknowledges the importance of individual differences in mixed emotions as a buffer against harm to well-being. The DMA suggests that individual differences in emotional complexity may moderate the relationship between stressful events and well-being. Similarly, the model proposed here anticipates that one mechanism through which mixed emotions may favour psychological well-being is via moderating the expected negative association between conflicting goals and well-being (see *Figure 2*, bottom panel A.2.1). Thus, it is hypothesised that people who, on average, tend to experience mixed emotions more often will not suffer from the negative impact of conflicting goals on psychological well-being (**Hypothesis 3**).

### **1.5.3. The effects of mixed emotions on self-control efforts and vitality**

One aspect not mentioned above, is that the present model shares with the DMA the principle that affective experiences have informational properties that assist individuals to interpret the environment; this idea is closely linked to the affect-as-information theory (Schwarz & Clore, 1983; Schwarz & Clore, 2003). For example, someone may desire eating a chocolate cake partly because of the anticipated feeling of pleasure when seeing it in the window of the bakery store.

Interestingly, if the desire to eat a chocolate cake interferes with a person's goal of trying to eat healthy, then the desire becomes a temptation, and a self-control dilemma emerges (Hofmann et al., 2012). As reviewed in the previous section of this chapter, self-control dilemmas represent a conflict between a current desire and an important goal (Fishbach & Converse, 2011; Fujita, 2011; Hofmann et al., 2012; Hofmann & Van Dillen, 2012; Myrseth & Fishbach, 2009). As a reminder, it is also important to note that recent contributions have suggested that self-control can be understood as an emotional process, alerting individuals of its need and energizing its execution (Inzlicht, Bartholow, & Hirsh, in press; Inzlicht, Legault, & Teper, 2014), which also accords with the affect-as-information theory (Schwarz & Clore, 1983; Schwarz & Clore, 2003).

Having identified the key features of self-control, and the importance of the identification of goal conflict in exerting self-control, it is now opportune to integrate the dynamics of self-control with the affective experiences derived from the identification of error-signals in the regulatory system. As suggested by PCT, error signals normally give rise to experiencing affective experiences, which in turn, initiates a sequence of changes aimed at restoring stability in the system (Carver & Scheier, 1982, 1999; Powers et al., 1960). Given that the proposed model suggests that conflicting goals result in the experience of mixed

emotions, and the importance of affective process in self-control, the question arises as to what role mixed emotions play in self-control. If goal conflict identification is a key component in resisting temptations (Myrseth & Fishbach, 2009), then affective experiences can carry useful information that assist individual's decision-making (Schwarz & Clore, 1983; Schwarz & Clore, 2003), it is therefore plausible that mixed emotions may provide information that helps individuals to resist temptations.

The model proposed here hypothesises that mixed emotions will mediate the association between goal-conflict and attempts to resist temptations (**Hypothesis 4**) (*Figure 2*, bottom panel A.2.2). Anchored in the informational theories of emotion (e.g., Forgas, 1995; Schwarz & Clore, 1983; Schwarz & Clore, 2003), the current approach argues that the identification of goal conflict is better understood as the activation of mixed emotions, which in turn, result in attempts of resistance. Mixed emotions signal the presence of goal conflict; therefore, the informative properties of conflicting goals are the result of experiencing mixed emotions when facing temptations. If this hypothesis is correct, then mixed emotions should be the proximal predictor of efforts to resist temptations.

The idea that emotions may influence self-control is not new, although evidence is not consistent. For example, some studies have shown that emotions of pride and guilt predict self-control (Hofmann & Fisher, 2012), and that negative self-conscious emotions (e.g., regret, shame) are associated with higher levels of self-control in response to delayed-cost dilemmas (e.g., eating something tasty but unhealthy; Giner-Sorolla, 2001). Additionally, Wegener and Petty (1994, 2001) found that positive affect undermines self-control; whereas other authors have shown that positive affect improves it (Aspinwall, 1998; Raghunathan & Trope, 2002).

Further efforts to integrate these discrepancies have claimed that emotions are signals to either adopt or to reject an accessible goal (Fishbach & Labroo, 2007). Thus, positive affect should promote self-control when a high-order goal is accessible (e.g., be a good father), but not when a low-level goal is accessible (e.g., remember to change nappies). Similarly, other approaches have suggested that people actively down-regulate the pleasant emotions elicited in the presence of temptations reducing their impact on behaviours (Hofmann, Friese, & Roefs, 2009; Metcalfe & Mischel, 1999).

Contrasting with previous approaches, the current model argues that mixed emotions are a critical constituent of the regulatory process. One marked characteristic of some of the aforementioned accounts is that emotions are seen as a by-product of the activity of complex cognitive processing systems; emotions accompany the self-control process but ultimately it is the nature of the goals or certain regulatory strategies that determine further courses of action. However, from the present point of view, mixed emotions are seen as an affective experience that is elicited by the presence of conflicting goals, and as such, they are essential for signalling the need for self-control. Supporting this approach, relevant theories in emotion emphasise the properties of emotions to recruit attentional resources and ready the person for action (Frijda, 1986; Frijda, Kuipers, & Ter Schure, 1989).

The current model suggests that mixed emotions do not merely coincide with self-control but are an integral, complex emotional feature. Interestingly, a number of studies derived from the DMA tradition have concluded that the co-activation of positive and negative emotions reflects the integration of a broad range of information, which allows individuals to flexibly respond at any given moment (Davis et al., 2004; Potter, Zatura, & Reich, 2000; Zautra, Smith, Affleck, & Tennen, 2001). This flexibility could be what permits mixed emotional experiences to address self-control dilemmas because different sources of information (e.g., the rewarding features of a desire, the negative consequences of yielding to

temptations, the long-term benefits of persistence) are accessible and integrated in a given moment.

Rozanski and Kubzansky (2005) argued that emotional flexibility may help people to preserve vitality when facing personal dilemmas. Thus, if mixed emotions can be also characterised as flexible emotional reactions that permit the accessing and integration of different sources of information, then it is possible that mixed emotions may also influence vitality. People who experience mixed emotions following a current self-control conflict are presumably more willing to resist temptations, and in turn, mixed emotions might also compensate for the negative effect that resisting temptations has on vitality. Consequently, the present model finally hypothesises that efforts to resist current temptations will reduce vitality, but that this effect will be compensated for by the experience of mixed emotions (**Hypothesis 5**) (see *Figure 2*, bottom panel A.2.2).

In summary, mixed emotions are considered to be a complex emotional experience which requires further examination; particularly with respect to their robustness. Mixed emotions are also proposed to be elicited from conflicting goals and to have four potential effects. First, mixed emotions may have a positive influence on well-being. Second, individual differences in the experience of mixed emotions may moderate the negative effect of goal conflict on psychological well-being. Third, mixed emotions may mediate the expected association between goal-conflict and resistance of temptations, supported in the idea that mixed emotions are an integral emotional experience that signals the need for self-control. Finally, the expected negative consequences of resisting temptations on vitality may be compensated for by the experience of mixed emotions following conflicting goals, revealing the motivational properties of mixed emotions during self-control dilemmas.

## 1.6. Overview of the remaining chapters

The present research project is divided into six chapters. In chapter 1 the fundamentals for the succeeding chapters are offered, emphasising the aims that this project looks to satisfy, and the model and hypotheses that guide empirical efforts developed in further chapters. As mentioned above, testing the model represented in *Figure 2*, and justified in this chapter, constitute the main contribution of this work.

Chapter 2 evaluates the robustness of mixed emotions as a phenomenon. In order to implement this evaluation, a meta-analysis is performed. A review of the literature showed that studies examining mixed emotions can be distinguished according to the structure of the underlying affect model – dimensional or discrete – as well as according to the type of mixed emotions studied (e.g., *happy-sad*, *fearful-happy*, *positive-negative*); therefore these variables are used as the main test for robustness. Additionally, several methodological (e.g. type of mixed emotions measure) and design (emotion induction procedure) variables are included as potential moderators of the effect sizes of the experience of mixed emotions.

Chapter 3 concentrates on the antecedents of mixed emotions. Two experiments are presented in order to determine whether conflicting goals predict mixed emotions. The experiments incorporate different measures of mixed emotions and diverse procedures to elicit emotions. One additional goal of chapter 3 is to establish whether mixed emotions can be distinguished from emotional conflict. This is considered as an important step before examining the effects of mixed emotions on psychological well-being, because emotional conflict has been found to be particularly pernicious for individual well-being, and has been equated to mixed emotions (Carver, Sutton, & Scheier, 2000; King & Emmons, 1990).

Chapter 4 provide an initial examination of the effects of mixed emotions on eudaimonic well-being. This part of the research model is firstly assessed using a cross-



sectional survey study. This study also incorporates a questionnaire of meaning in life, in order to determine whether the effect of mixed emotions is strong enough to predict eudaimonic well-being, over and above, meaning in life. An examination of the effect of goal conflict on mixed emotions and eudaimonic well-being is also presented. A second naturalistic experimental study also aimed to examine the effects of mixed emotions on eudaimonic well-being, in order to establish with more certainty whether mixed emotions facilitate meaning-making dynamics associated with eudaimonic well-being.

Chapter 5 examines the remaining hypotheses presented in the research model, that is: *(a)* the moderating effects of individual differences in mixed emotions on the association between goal conflict and psychological well-being; *(b)* the mediation of mixed emotions in the relationship between self-control dilemmas and the resistance of temptations; and *(c)* the compensatory effect of mixed emotions on vitality. To do this, a diary study is conducted over 10-consecutive days, including four measures per day. The implementation of an ecologically valid technique to evaluate the remaining portions of the model was preferred for two reasons. First, in consonance with recent evidence in the field of self-control (Hofmann et al., 2012), a diary study was chosen to observe the phenomenon of study as it occurs in everyday life. Second, intensive longitudinal methods, such as diary studies, permit one to simultaneously investigate the between-person portion of the model (i.e., individual differences in mixed emotions), as well as naturally occurring fluctuations in mixed emotions as a consequence of everyday temptations (i.e., within-person dynamics).

Finally, chapter 6 discusses the main findings, integrates the results, and offer future research paths for mixed emotions both in the field of well-being and self-control. Chapter 6 will also articulate the contributions of this research into a broader conceptualisation of emotional complexity.

## 2. CHAPTER TWO: A META-ANALYSIS OF MIXED EMOTIONS

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*“Our truth is the intersection of independent lies”*

*Levins (1966, pg. 423).*

Levins sought to address the practical problems that arise when science produces multiple models or measures to investigate a single phenomenon, arguing that all models are incomplete and partially false, and as a consequence, finding the common pieces between them may allow researchers to establish robust theorems (Levins, 1966). Wimsatt took inspiration partially from Levins to propose that the triangulation of divergent models about a common phenomenon is a legitimate way to achieve plausible theories (Wimsatt, 1981/2012). Wimsatt (1981/2012) suggested that the concept of robustness is a meaningful way to determine whether different models, methods or techniques used to explore a single scientific phenomenon produce consistent evidence to demonstrate the plausibility of a construct.

Adopting this idea of using the informational value provided by multiple models, the present chapter assesses how robust mixed emotions are as a measurable phenomenon by examining whether researchers have been equally successful in experimentally eliciting mixed emotions when using different theoretical frameworks and different methods. Through a systematic review of the literature, it will be demonstrated that research on mixed emotions varies substantially in terms of several variables: (a) the underlying model of affect considered (i.e., dimensional or discrete emotions), (b) the type of mixed emotions studied, (c) the type of measure used to assess the presence and intensity of mixed emotions, and (d) the induction procedure used to activate mixed emotions. These variations are then used to examine the robustness of mixed emotions as an affective experience.

This chapter begins by reviewing different models of affect and the different types of mixed emotions that have been used to understand mixed emotions. Then the methods and procedures through which researchers have tried to reveal the activation of mixed emotions are described. To do this, a description of the basic assumptions behind the phenomenon of mixed emotions is provided to contextualise the methodological progress in the field. Finally, a meta-analysis of experimental studies investigating the elicitation of mixed emotions is presented, including a brief discussion of the main findings. Meta-analysis is the use of statistical methods to pool the results of independent studies (Chan & Arvey, 2011). Meta-analysis has been commonly seen as the preferred technique to increase the precision and to broaden the scope of a phenomenon, as well as help to build consensus about the nature of a psychological construct (Chan & Arvey, 2011), all of which are considered necessary at the current stage of the research on mixed emotions. Thus, the application of meta-analytic techniques in the present chapter is useful in order to clarify the construct of mixed emotions experience, its underlying models, and measures.

### **2.1. Mapping the terrain of mixed emotions: Underlying models and types**

It is worth starting by introducing the distinction between mixed emotions as the co-occurrence of oppositely valenced affects and blends of emotion as a category including all possible experiences combining more than one emotion (Scherer, 1998). Emotion blends have been largely studied and accepted in the literature of emotions (Diener & Iran-Nejad, 1986; Folkman & Lazarus, 1985; Izard, 1972, 1992; Oatley & Johnson-Laird, 1996; Polivy, 1981; Power & Dalglish, 1997; Scherer, 1998; Schwartz & Weinberger, 1980; Smith & Ellsworth, 1987). For example, people report combined feelings of both happiness and excitement or both anxiety and fear (e.g., Vansteelandt, van Mechelen, & Nezlek, 2005; Zelenski & Larsen, 2000). Thus, emotion blends of similar valence are uncontroversial. The debate about mixed emotions, however, is whether it is possible to simultaneously experience

oppositely valenced affects, such as happiness and sadness. Views about the possibility of experiencing two opposite affects depend, to an extent, on the underlying model of affect to which researchers subscribe, with the main distinction being between dimensional and basic models.

### **2.1.1. Mixed emotions and dimensional models of affect**

Dimensional models of affect propose that the best representation of the underlying structure of feelings is to locate them on dimensions. People usually describe their feelings as positive or negative, pleasant or unpleasant, which suggests that one of the fundamental dimensions is valence. Some dimensional models of affect have postulated that opposite ends of the positive-negative dimension (Russell & Carroll, 1999; Watson & Tellegen, 1999) and the underlying appetition-aversion affect systems (Grey, 1982; Lang, 1995) correspond to mutually exclusive feelings. The implication of this is that, for example, happiness and sadness cannot be experienced simultaneously, which challenges the idea that it is possible to experience mixed emotions.

In particular, scholars ascribing to the circumplex model of affect have asserted that mixed emotions are merely the result of measurement problems or a reactive phenomenon related to the expectancies of participants and/or researchers and arise from confusion in reports of emotion (e.g., Russell & Carroll, 1999; Barrett & Bliss-Moreau, 2009). For example, one alternative interpretation for the elicitation of mixed emotions is that people inferred that they were expected to report mixed emotions (Larsen et al., 2011). In the circumplex model, affect is represented by two orthogonal dimensions of valence and activation forming a circular space around which affect-items are descriptively organised (Russell, 1980). The dimension of valence reflects the level of pleasantness/unpleasantness felt; whereas the dimension of activation reflects the level of arousal. Affects lying at

opposite ends of each of these two bipolar dimensions are mutually exclusive, which means that an increase in high-activated pleasure implies the reduction of low-activated displeasure and vice versa. If an affective experience has a single location on these bipolar dimensions, mixed emotions are therefore an oxymoron.

In contrast, the Evaluative Space Model (ESM; Cacioppo, Gardner, & Bernston, 1999; Cacioppo, Larsen, Smith, & Bernston, 2004) contends that affect can be characterised by a dimension of positive affect and another dimension of negative affect forming a bivariate space in which it is possible to describe multiple variations of positive and negative emotions, including mixed emotions. The ESM (Cacioppo, et al., 1999; Cacioppo et al., 2004) stipulates that positive affect and negative affect are biologically basic substrates of the affect system with identifiable brain structures, functionally represented throughout different levels of the neural system. This *biological architecture* allows multiple activation patterns, such as reciprocal, independent or co-activation patterns (Norman et al., 2011; Norris, Gollan, Berntson, & Cacioppo, 2010).

### **2.1.2. Mixed emotions and theories of basic emotions**

Some theories of basic emotion also support the experience of mixed emotions. Theories of basic emotions usually consider emotional experiences as being measurable and physiologically distinct phenomena characterised by a small set of emotions (Izard, 1972). Izard (1992) argued that basic emotions can be blended to form new emotions in accordance with specific conditions occurring in the environment. Akin to a painter mixing paint colours on a palette, mixed emotions result from the different possible combinations of basic emotions, such as happiness, sadness, anxiety or disgust. Izard also noted that ‘one emotion can almost instantaneously elicit another emotion that amplifies, attenuates, inhibits or interacts with the original emotional experience’ (Izard, 1972, p. 77). Although this

conceptualisation is distinct from the definition of mixed emotions used in this study because it suggests the emergence of new emotions by blending basic emotions, it is interesting to note that, in this theory, emotions are freely allowed to interact regardless of valence, which suggests that mixed emotion experiences are feasible. This clarification is important because studies investigating blended emotions that form new emotions, as suggested by Izard (1992), do not fall within the focus of the present meta-analysis.

More closely linked to the current understanding of mixed emotions, Oatley and Johnson-Laird (1996) proposed that individuals react to events by making multiple cognitive evaluations, which in turn, may elicit multiple basic emotions simultaneously or in rapid alternation many of which are mixed emotions, giving rise to facial expressions that combine more than one basic emotion, as previously demonstrated by Ekman and O'Sullivan (1991). New evidence supports this assertion demonstrating that it is possible to identify 21 different and consistent facial expressions (Du, Tao, & Martinez, 2014), many of which reflect combinations of basic emotions (e.g., happily disgusted). It is important to note, however, that several studies exploring the activation of mixed emotions (e.g., Hemenover & Schimmack, 2007; Andrade & Cohen, 2007) have focused on discrete emotional experiences, thereby using a distinct model of affect, without explicitly ascribing to a basic emotion approach.

### **2.1.3. Types of mixed emotions**

Happy-sad has been the most common type of mixed emotion studied (e.g., Fong, 2006; Larsen & Green, 2013; Larsen et al., 2001; Williams & Aaker, 2002). For example, one study showed that students who had just moved to their dormitories felt significantly sadder but also happier than on a typical day before this event (Larsen, et al., 2001, Study 2). Nevertheless, several other types of mixed emotions have been investigated, including the co-

activation of fear and happiness (e.g., Andrade & Cohen, 2007), disgust and amusement (e.g., Hemenover & Schimmack, 2007), and hope and fear (e.g., Bee & Madrigal, 2013).

Furthermore, different studies have conceived the experience of mixed emotions as reflecting either the co-activation of different dimensions of affect such as positive and negative affect (e.g., Henderson & Norris, 2013), and pleasure-displeasure (e.g., Schimmack & Colcombe, 2007) or as reflecting the experience of different discrete emotions such as happy-sad or hope-fear. The diversity of types of mixed emotions, including both dimensional and discrete conceptualisations, implies relevant theoretical consequences, especially considering the fact that dimensional and basic (discrete) emotion approaches have discussed the experience of mixed emotions. If consistent evidence about the experience of mixed emotions is found across different models of affect, then it is possible to suggest that mixed emotions are a universal affective experience. That is, not necessarily restricted to certain commonly studied emotion combinations (e.g., happy-sad). Similarly, this diversity may suggest that the affective system is flexible enough to permit a plurality of affective experiences ranging from bipolarity to mixed emotions.

In summary, it is possible to describe mixed emotions as a multifaceted emotional experience, which involves the simultaneous experience of different combinations of opposing emotions. Both dimensional and basic approaches to emotions have theorised about the possibility of experiencing mixed emotions. An empirical examination of the consistency with which mixed emotions have been elicited for different underlying models of affect and different types of mixed emotions has not, however, previously been conducted. This examination is needed to determine whether mixed emotions apply to the universe of emotions, or whether they are restricted to particular kinds or combinations of emotions and therefore represent a more specific phenomenon.

## **2.2. Measurement and elicitation of mixed emotions**

Different measures and elicitation procedures have been developed to demonstrate that opposite affects can be experienced concurrently and that mixed emotions are a genuine affective experience (Larsen & McGraw, 2014). These two assumptions – *simultaneity of opposing emotions* and the *integral experience of mixed emotions* – organise ongoing efforts to demonstrate the experience of mixed emotions. This section describes these two assumptions, explains the measures used to evaluate the presence/intensity of mixed emotions and the procedures used to elicit mixed emotions.

### **2.2.1. The simultaneity of opposing emotions**

The assumption of simultaneity is that mixed emotions reflect the co-activation of different emotions, usually described as opposite. According to the ESM (Cacioppo et al., 1999; Cacioppo et al., 2004), simultaneity is achieved through two different mechanisms. Firstly, co-activation can result from perceiving both positive and negative features of a single stimulus or event (Cacioppo et al., 2012). This is supported by evidence that indicates that attention can be directed to at least two streams of information (de Gelder & Vroomen, 2000). Secondly, co-activation can also result from alternations between positive and negative stimuli that are fast enough to produce sustained activation of both (Norris et al., 2010; Schimmack & Colcombe, 2007). Thus, the experience of feeling two opposite affects simultaneously may result either from rapid alternation between two emotions or the co-activation of two emotions.

Other theories of emotion have asserted that only one emotion can be activated and consciously experienced at a given time (Brehm, 1999; Brehm & Miron, 2006; Russell, 2003). For example, Brehm (1999) proposed that emotions provide guidelines for behavioral responses, consistent with the level of difficulty to attain a certain outcome on a given



moment (i.e., deterrence). When deterrence is high enough a new affective response is activated, which may result in a rapid transition from one emotion to another, but they are not both consciously experienced at the same time (Brehm & Miron, 2006). However, this does not necessarily prohibit the experience of mixed emotions. As suggested by Kellogg (1915), the activation of two opposite affects in rapid succession can instigate the experience of mixed emotions until the intensity of one affect prevails, as demonstrated by Schimmack and Colcombe (2007).

### **2.2.2. The integral experience of mixed emotions**

If mixed feelings are a genuine emotional experience, then they should involve distinctive states of consciousness which are experienced as personal feelings. Mixed emotions are a complex affective experience and not merely a collection of independent emotions elicited in response to separate triggers. Even though people can report identifiable environmental sources of mixed emotions, the subjective feeling reflects the co-occurrence of both positive and negative emotions. This approach assumes that mixed emotions are more than the sum of the emotions involved; mixed feelings are in themselves a distinct and integral emotional experience.

Contrary to this assumption, Greenspan (2003) has suggested that emotions appear mixed when actually they are different emotional experiences pertaining to independent events. Thus, for example, people may report feeling happy and sad because they are feeling happy in relation to event 'A', and sad in relation to event 'B'. Similarly, people can perceive and verbalise the contrasting affective qualities of external events, without experiencing any distinctive change in affective experience (Russell, 2003).

However, the subjective experience of mixed emotions is grounded in the idea that feelings reflect two genuine affects converging upon one reference point, that is, ourselves.

For example, Hunter and colleagues (2008) found that musical pieces involving conflicting stimuli (i.e., musical pieces in fast tempo and minor mode) created more happiness and sadness compared to musical pieces involving non-conflicting stimuli. This study examined mixed emotions using one (indivisible) focus of attention, avoiding alternative interpretations based on the events surrounding the emotional experience and supported the assumption that mixed emotions are an integral experience.

### **2.2.3. Measures of mixed emotions**

Several measures have been developed in order to capture the simultaneity and the subjective experience of mixed emotions. Following Hershfield and Larsen (2012), it is possible to distinguish four different measurement methods. The first measures the extent to which people experience positive affect, negative affect, or both together continuously (e.g., Larsen & Green, 2013; Larsen & McGraw, 2011; Larsen, McGraw, Mellers, and Cacioppo, 2004). This “simultaneous measure” asks participants to press a button every time they feel good and release the button when they no longer feel good and press another button whenever they feel bad and release it when they no longer feel bad. Participants can press both buttons simultaneously, when feeling good and bad, and can abstain from pressing a button if they feel neither good nor bad. The measure is operationalised as the amount of time participants spend pressing both buttons simultaneously. This captures mixed emotions in real-time, avoiding confounding variables such as timescale or characteristics of the scale used.

Secondly, based on previous work on attitudinal ambivalence (e.g., Priester & Petty, 1996), the intensity of mixed emotions has been estimated using the minimum value between positive and negative emotions. For example, if an individual reports feeling ‘4’ for happiness on a scale from 1 to 5, and also reports feeling ‘2’ for sadness, the minimum index

of mixed emotions will be '2' (i.e., the minimum value). This index therefore reflects the intensity of the experience of mixed emotions. A measure of mixed emotions based on minimum values is considered more appropriate than a simple correlation between positive and negative affect because it reflects the intensity of mixed emotions (Schimmack, 2001, 2005). Other studies of mixed emotion have used similar measures based on a minimum value, such as the similarity intensity index (e.g., Hong & Lee, 2010; Williams & Aaker, 2002).

Thirdly, it is possible to infer the simultaneous experience of mixed emotions by counting the number of occasions during which people experience each emotion measured. By counting the occasions on which two or more emotions of opposite valence are experienced, it is possible to estimate the presence (or absence) of mixed emotions. For example, Oatley and Johnson-Laird (1996) provided evidence that people can experience mixed emotions (happiness/sadness) on almost 14% of occasions. Similar measures of mixed emotions can be constructed by evaluating the frequency of opposite emotions experienced across different groups (e.g., experimental versus control). For example, this may involve examining whether an experimental group experiences two opposite emotions to a greater extent than a control group where the manipulation is not present (e.g., McGraw & Warren, 2010).

Finally, mixed emotions can be measured by asking people directly whether they are experiencing mixed feelings. The specific subjective experience of emotions is an inherent part of emotional life (e.g., Helm, 2009), and self-reports of subjective feelings can be useful in this regard. For example, Fong (2014) demonstrated that subjective self-reports of mixed feelings are useful when exploring the effects of mixed emotions on creativity. Similarly, studies reported in chapter 3 of the present research project used a subjective measure to evaluate the effect of conflicting goals on mixed emotions (see also Berrios, Totterdell &

Kellett, 2015). Interestingly, this investigation (Study 2) produced equivalent results for subjective measures of mixed emotions and the minimum index.

#### **2.2.4. Elicitation of mixed emotions**

Several procedures have been developed to elicit mixed feelings. Common emotion induction procedures have been films (e.g., Larsen, 2001), music (e.g., Hunter et. al., 2008), pictures (e.g., Schimmack & Colcombe, 2007) and advertisements (Andrade & Cohen, 2007). For example, Larsen and colleagues (2011, Study 1a) demonstrated that people experienced both happiness and sadness whilst watching a film-clip from the movie *Life is Beautiful*. Furthermore, chapter 3 provides a more ecologically valid technique such as recalling personal experiences in response to conflicting goals to expand the current understanding of the precursors of mixed emotions.

In summary, different elicitation procedures have been developed and tested to investigate the presence and intensity of mixed emotions. Moreover, multiple measures have been developed to support both the simultaneity and the integral experience of mixed emotions. From the measures described, it is possible to suggest that the simultaneous measure of mixed emotions would more consistently identify the co-activation of opposite affects because it overcomes problems arising from the timescale and the measurement scale used. Furthermore, subjective measures of mixed emotions rely more on the second assumption, according to which mixed emotions can be both mentally represented and experienced. Evidence demonstrating the stability of this type of measure may represent an important step towards understanding mixed emotions as an integral experience. The diversity of measures and procedures used to study mixed feelings has yet to be integrated in terms of their relative influence in capturing and characterising the experience of mixed emotions.

### **2.3. Overview of the present meta-analysis**

The present chapter examines and quantifies the robustness of mixed emotions by meta-analysing extant research. If mixed emotions are a robust phenomenon, then they should be consistent over and above any artifactual variable (such as measurement error or design characteristic) and across different theoretical or methodological characteristics of the studies included. The meta-analysis investigated the effects of: (a) distinguishing between dimensional and discrete emotions approaches to the study of mixed feelings, and (b) the type of mixed emotions tested. Differences arising from separate models and different types of mixed emotions enable conclusions to be drawn about the extent to which mixed emotions are generalizable and specific. Several methodological characteristics were included as moderators to determine their impact in the elicitation of mixed emotions, including: (a) measures used, (b) induction procedures (c) design characteristics, and (d) demographic characteristics. The measures used are of particular value as they reflect different assumptions about mixed emotions (i.e., simultaneity of opposing emotions and the integral experience of mixed emotions), so evidence for the validity of these assumptions can be gleaned from the relative effect size produced. Induction procedures and design characteristics (i.e., within or between person designs) were included because they help rule out the possibility that mixed emotions are artifacts of study design, rather than a genuine emotional experience. Finally, demographic characteristics were included to enable future research to focus on promising samples. Specifically, age and gender were studied because several studies have found a positive association between age and the experience of mixed emotions (e.g., Carstensen, Pasupathi, Mayr, & Nesselroade, 2000; Ong & Bergeman, 2004), while other studies have shown variations in the experience of mixed emotions as a function of gender (e.g., Berrios et al., 2015; Larsen et al., 2001).

## 2.4. Method

### 2.4.1. Selection of studies

The sample of studies used in the meta-analysis was obtained by conducting a computerised search (via Web of Knowledge, and PsycINFO, Dissertation Abstracts International) for articles published before January 2014, using the keywords: “*mixed emotions*”, “*mixed feelings*”, “*emotional blends*”, “*emotional ambivalence*”, “*contrasting emotions*”, or “*emotional complexity*”. Articles had to include the respective terms either in the title, abstract or keywords. Reference lists in some articles were inspected to identify additional sources for inclusion. Furthermore, emails to relevant researchers in the field were sent in order to incorporate potential unpublished studies. Similarly, a public advertisement was placed on *ResearchGate* (an international online social network for researchers) inviting researchers to share any unpublished studies investigating mixed emotions. The literature search identified 826 articles and dissertations.

Four inclusion criteria were considered for the meta-analysis. The selection of four inclusion criteria was defined in order to appropriately circumscribe the characteristics of mixed emotions experience, as well as to prevent relevant biases from narrowing the number of studies, in accordance with suggestions for defining inclusion criteria (Halvorsen, 1994). First, studies had to employ an experimental design and recruit a human, nonclinical sample. Experiments were chosen because: (a) they provide a meaningful counterfactual condition(s) against which to compare the activation of mixed emotions, and (b) the allocation of participants is random – or at least quasi-random – enhancing the interpretation of the effect sizes. Experiments based on comparisons between cultures were only included if the samples contained participants from different cultural backgrounds randomly allocated to the experimental and control condition(s).

Second, studies had to manipulate the experience of mixed emotions using films, images, music or any other procedure that was deemed by the authors to instigate the experience of mixed emotions. Importantly, studies had to manipulate mixed emotions and report the effectiveness of this manipulation on participants' emotional experience in comparison with emotional experience in specific control condition(s) (i.e., between-participant designs) and/or in comparison with participants' emotional experience before the corresponding manipulation (between-within-participant designs). The inclusion of experiments that explicitly manipulated mixed emotions was important in order to provide a comparable estimation of the elicitation of mixed emotions across studies.

Third, studies had to measure mixed emotions, that is, studies needed to consider the experience of two opposite affects as co-occurring following the definition of mixed emotions presented in chapter 1; studies in which other emotional combinations were measured were not included (e.g., anxious-fear). The classification of mixed emotions was based on the hedonic valence of the emotions involved. Thus, studies were included if they tested a positively and a negatively valenced emotion. Similarly, if the study incorporated a dimensional approach, the following combinations were included; positive-negative affect, positive activated-negative activated affect, pleasant-unpleasant affect.

Fourth, studies had to report a measure of mixed emotions that reflected the magnitude of the mixed emotion experienced (for example, by using the common indices of mixed emotions described in section 2.2.3). Correlational indices were not considered unless two or more correlations were compared between experimental and control conditions (e.g., Andrade & Cohen, 2007, Study 3a). General correlational indices were not considered, as correlations are not an appropriate measure for the experience of mixed emotions (Schimmack, 2001; See also Appendix-1). For example, a correlation equal to zero between a

pair of opposite affect may hidden genuine co-activation as demonstrated by the minimum index (Schimmack, 2001).

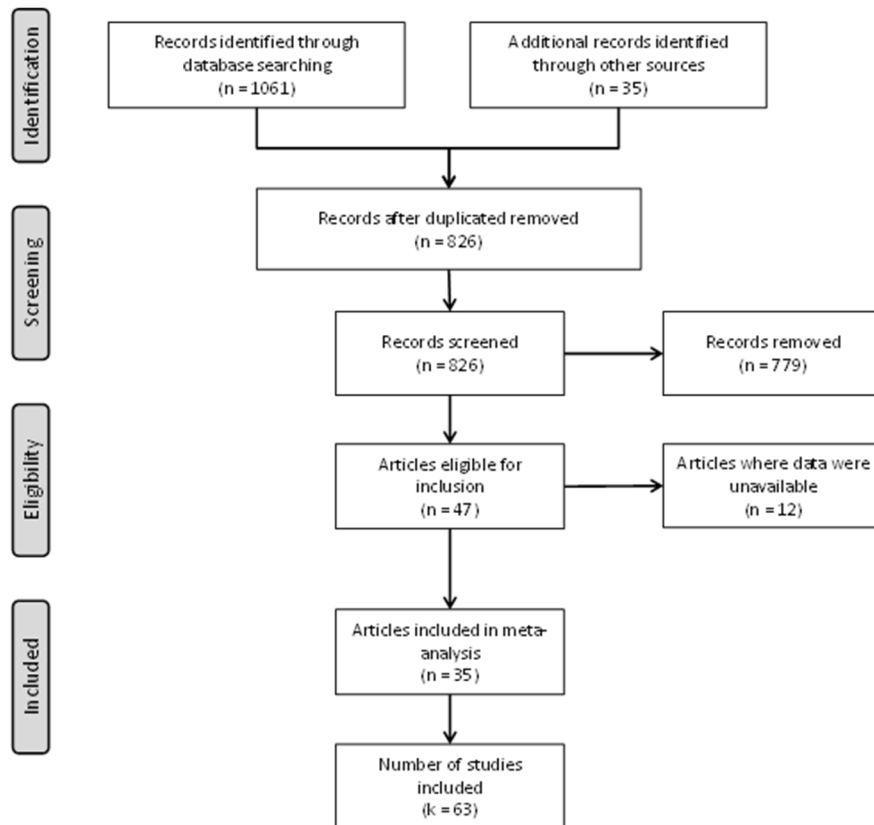


Figure 3. Flow of information through the different stages of the review.

Of the 826 articles and theses identified by the search, 47 articles met the inclusion criteria from which it was possible to compute effect sizes for 35 articles involving a total of 63 independent studies. Figure 3 shows the flow of information through the different stages of the review and the corresponding number of studies included/excluded in each stage. The other twelve articles were excluded because it was not possible to compute precise effect sizes nor estimate effects in the studies reported; authors were contacted where possible in an attempt to include these data. Each of the selected articles is identified by an asterisk in the reference list. Precise effect sizes were computed for 60 studies (95%) on the basis of



information in the article; whereas for 3 studies (5%), it was necessary to estimate some or all values based on the significance levels reported.

#### **2.4.2. Selection of comparisons within studies and selection of moderators**

Two types of comparisons were examined in order to provide information about the relevance of different models for investigating mixed emotions, and the nature of mixed emotions. Firstly, a comparison between dimensional models of affect and discrete emotions approaches was performed; studies considering dimensions of affect (e.g., positive-negative affect) were compared with studies in which discrete emotions were measured (e.g., happy-sad). Second, different types of mixed emotions were compared; that is, happy-sad, fear-happy, disgust-amusement, hope-fear, positive-negative affect, and pleasant-unpleasant affect. These comparisons were made to help clarify the generalizability and diversity of mixed emotions.

To evaluate the effect of the moderator variables, studies were coded according to two methodological factors and three study characteristics. Firstly, the measure of mixed emotions used was coded based on a fourfold classification: *(i)* simultaneous measures of mixed emotions, *(ii)* measures of mixed emotions using the minimum index or derivations of a similar formula, such as the similarity-intensity index (e.g., Williams & Aaker, 2002), *(iii)* measures of mixed emotions based on the frequency of opposing affects, and *(iv)* subjective measures of mixed emotions. Studies reporting a combination of measures were coded as involving a ‘mix of measures’, and the effect sizes obtained from each measure were averaged. Secondly, the emotion induction procedure was coded according to whether ads, films, music, pictures, personal experiences, simulation or imagination (e.g., participants imagine a situation or remember a recent event), or another – unclassified – induction

procedure was used. Thirdly, the design of each study was coded according to whether it used a within-person or between-person design. Finally, two demographic characteristics – mean age and percentage of women – were coded. These two sample characteristics were chosen because previous research on mixed emotions has suggested that older, compared to younger adults (e.g., poignancy; Ersner-Hershfield et al., 2008), and women, compared to men (e.g., Larsen et al., 2011), may produce different patterns of mixed emotions. Further details about the study characteristics and the effect sizes for each study are provided in *Table 1*.

### **2.4.3. Calculation of effect sizes**

The calculated effect sizes represented the degree to which mixed emotions were elicited following the manipulation of affect used in each study. Thus the presence of mixed emotions was represented by a positive effect size; whereas the absence of mixed emotions was represented by values close to zero. Although it seemed unlikely, more mixed emotions among the control, relative to the experimental, condition (or before, relative to after, the affect induction) would be indicated by a negative effect size. The inclusion of both between-person and within-person study designs meant that it was necessary to analyse data from different experimental designs. Therefore, Morris and DeShon's (2002) method for combining results across independent-groups and repeated measures designs was adopted. As the research question concerned the robustness and consistency in the activation of mixed emotions across different theoretical and methodological distinctions, all effect sizes were transformed into a common independent-groups metric ( $d_{IG}$ ) following formulations and procedures indicated by Morris and DeShon (2002). Transforming effect sizes into alternate metrics requires an estimate of the population correlation between pre- and post-test scores (Morris & DeShon, 2002). This is a common procedure to correct for measurement error which has been viewed as a typical study artifact in meta-analysis (Schmidt, 2010). This estimate was calculated using data from the strongest study available (Schimmack, 2005) in

terms of the sample size, encompassing 1,118 participants (16% of the total summed sample), and then the rest of the studies were corrected for this estimate ( $\rho = 0.35$ ).

#### **2.4.4. Meta-analytic techniques**

Computations were undertaken using SPSS macros designed by Wilson (2005). Weighted average effect sizes ( $d_{IG+}$ ) were based on a random effects model due to the assumption that the true effect sizes may vary as a function of the different models of affect, types of mixed emotions reported, and as a function of the characteristics of the population (i.e., proportion of women and men; age of the participants within samples; samples from different countries). The restricted maximum likelihood (REML) method was used to calculate the effect sizes, as it estimates more conservative standard errors (Raudenbush, 1994), and REML is more sensitive with small sample sizes (Thompson & Sharp, 1999). Effect sizes were interpreted using Cohen's (1992) guidelines which suggest that,  $d = 0.20$  should be considered a "small" effect size,  $d = 0.50$  is a "medium" effect size, and  $d = 0.80$  is a "large" effect size.

The homogeneity  $Q$  statistic (Cochran, 1954) was used to evaluate the variability in effect sizes from the primary studies.  $Q$  is a diagnostic tool that can be used to determine whether there is unexplained variability in the studies selected (Shadish & Haddock, 1994). Homogeneity is rejected when the  $Q$  statistic is significant. The homogeneity  $Q$  statistic was also used to compare effect sizes between different models of affect and different types of mixed emotions. METAF macro for SPSS (Wilson, 2005) was used to estimate differences between models of affect and types of mixed emotions. This macro performs the analogue to one-way ANOVA analysis and is suitable for estimating random effects models. Similarly, the METAREG macro for SPSS (Wilson, 2005) was used to conduct meta-regressions to evaluate 16 potential moderators of effectiveness in the elicitation of mixed emotions.

Table 1. Characteristics and effect sizes for studies included in the meta-analysis.

Study	Experiment	Type of mixed emotion	Mixed emotion indicator	Induction procedure	<i>N<sub>e</sub></i>	<i>N<sub>c</sub></i>	Effect size
Aaker et al. (2008)	2	Positive, negative	MIN	Ads	45		1.01
Andrade & Cohen (2007)	2	Fear, happy	SIM	Other	75		0.58
Andrade & Cohen (2007)	3a	Fear, happy	SIM	Other	81		2.12
Barrett et al. (2010)	1	Positive, negative	FRQ	Music	226		0.52
Bee & Madrigal (2013)	1	Hope, fear	MIN	Ads	54	106	0.41
Bee & Madrigal (2013)	2	Hope, fear	MIN	Ads	41	80	0.71
Berrios et al. (2014)	1	Positive, negative	SUB	Personal exper.	22	13	0.84
Berrios et al. (2014)	2	Positive, negative	MIX	Personal exper.	30	27	0.87
Carrera & Oceja (2007)	2	Happy, sad	FRQ	Pictures	37	39	0.94
Fong (2006)	1	Happy, sad	MIX	Personal exper.	27	75	0.79
Fong (2006)	2	Happy, sad	MIX	Film	74	64	0.94
Fong & Tiedens (2002)	1	Positive, negative	MIN	Simulation	27	25	0.59
Hemenover & Schimmack (2007)	1	Disgust, amusement	MIN	Other	49	53	0.48
Henderson & Norris (2013)	1	Positive, negative	MIN	Simulation	30		1.76
Hershfield et al. (2009)	1	Positive, negative	MIN	Simulation	22	23	1.37
Hershfield et al. (2008)	1	Happy, sad	MIN	Simulation	60	60	0.73
Hershfield et al. (2008)	2	Happy, sad	MIN	Simulation	51	59	0.45
Hong & Lee (2010)	1	Positive, negative	MIN	Pictures	45	46	0.60
Hong & Lee (2010)	2	Positive, negative	MIN	Pictures	37	38	0.59
Hong & Lee (2010)	3	Positive, negative	MIN	Pictures	125	125	0.43
Hong & Lee (2010)	4	Positive, negative	MIN	Pictures	74	75	0.20
Hong & Lee (2010)	5	Positive, negative	MIN	Pictures	108	109	0.78

Table 1 (continued).

Study	Experiment	Type of mixed emotion	Mixed emotion indicator	Induction procedure	Ne	Nc	Effect size
Hunter et al. (2008)	1	Happy, sad	MIN	Music	40		0.70
Hunter et al. (2008)	2	Happy, sad	MIN	Music	40		1.13
Hunter et al. (2010)	1	Happy, sad	MIN	Music	49		0.72
Kreibig et al. (2013)	1	Disgust, amusement	MIN	Film	43		2.50
Ladinig et al. (2012)	1	Happy, sad	FRQ	Music	61		1.20
Larsen & Green (2013)	1	Happy, sad	SIM	Film	40		2.39
Larsen & Green (2013)	2	Happy, sad	SIM	Film	55		0.17
Larsen & McGraw (2011)	1a	Happy, sad	SIM	Film	22	25	0.18
Larsen & McGraw (2011)	1b	Happy, sad	MIN	Film	17	22	0.19
Larsen & McGraw (2011)	2	Happy, sad	FRQ	Film	21	18	0.23
Larsen & McGraw (2011)	3	Happy, sad	SIM	Film	28	24	0.14
Larsen & McGraw (2011)	4	Happy, sad	MIX	Film	33	83	0.95
Larsen & McGraw (2011)	5	Happy, sad	MIX	Film	33	61	0.88
Larsen & McGraw (2011)	6	Happy, sad	MIX	Film	50	24	0.73
Larsen et al. (2001)	1	Happy, sad	FRQ	Film	177	177	0.88
Larsen et al. (2001)	2	Happy, sad	FRQ	Personal exper.	100	92	0.78
Larsen et al. (2001)	3	Happy, sad	FRQ	Personal exper.	115		0.72
Larsen et al. (2004)	1	Positive, negative	MIN	Simulation	20		0.86
Larsen et al. (2004)	2	Positive, negative	SIM	Simulation	20		0.76
Larsen et al. (2009)	2	Positive, negative	MIN	Personal exper.	19		0.97
Larsen & Statsny (2011)	1	Happy, sad	SIM	Music	21		0.59
Madrigal & Bee (2005)	1	Hope, fear	MIN	Ads	36		1.23

Table 1 (continued).

Study	Experiment	Type of mixed emotion	Mixed emotion indicator	Induction procedure	N <sub>E</sub>	N <sub>C</sub>	Effect size
McGraw & Warren (2010)	3	Disgust, amusement	FRQ	Simulation	36		0.73
McGraw & Warren (2010)	4	Disgust, amusement	FRQ	Simulation	80		0.81
McGraw & Warren (2010)	5	Disgust, amusement	FRQ	Simulation	73		1.27
Oceja & Carrera (2009)	1	Positive, negative	MIN	Pictures	37	69	0.98
Oceja & Carrera (2009)	2	Positive, negative	MIN	Pictures	61	29	1.05
Rees et al. (2013)	3a	Happy, sad	SUB	Simulation	53		1.80
Rees et al. (2013)	3b	Happy, sad	SUB	Simulation	652		1.56
Schimmack (1999)	1	Pleasure, displeasure	FRQ	Pictures	36		0.76
Schimmack (1999)	2	Pleasure, displeasure	MIN	Pictures	44		0.67
Schimmack (2001)	1	Pleasure, displeasure	MIN	Pictures	342		0.76
Schimmack (2005)	1	Pleasure, displeasure	MIN	Pictures	1118		0.39
Schimmack & Colcombe (2007)	1	Pleasure, displeasure	MIN	Pictures	80		0.50
Spencer-Rodgers et al. (2009)	1	Positive, negative	MIN	Other	54	53	0.46
Veilleux et al. (2013)	1	Positive, negative	MIN	Pictures	100		0.67
Williams & Aaker (2002)	1	Happy, sad	MIN	Ads	204		0.52
Williams & Aaker (2002)	2	Happy, sad	MIN	Ads	59	70	0.30
Williams & Aaker (2002)	3	Happy, sad	MIN	Ads	88		0.61
Zhang et al. (2010)	1	Happy, sad	MIN	Simulation	30		0.76
Zhang et al. (2010)	2	Happy, sad	MIN	Simulation	58		0.64

Note: N<sub>E</sub> = number of participants in the experimental condition; N<sub>C</sub> = number of participants in the control condition/s; MIN = minimum index or similar indicator; SIM = simultaneous measure of mixed emotions; FRQ = indicator of mixed emotions based on frequencies; SUB = subjective measure of mixed emotions; MIX = multiple indicators of mixed emotions (implies studies reporting more than one measure of mixed emotions).

## 2.5. Results

### 2.5.1. The magnitude of mixed emotions as a phenomenon

To determine the magnitude of elicited mixed emotions the sample-weighted average effect size from the primary studies was calculated. The result showed a significant large average effect size,  $d_{IG+} = 0.77$ ,  $z = 15.82$ ,  $p < 0.01$ , with a 95% confidence interval lying between 0.68 and 0.87, based on 63 studies and a total sample size of 7,157 participants. This indicates that mixed emotions were of sufficient magnitude to be reliably detected under a variety of conditions. The homogeneity statistic demonstrated the presence of unexplained heterogeneity,  $Q(62) = 341.11$ ,  $p < 0.01$ ,  $\nu = 0.10$ , which confirmed the pertinence of a random effects model for the present meta-analysis. The corresponding forest plot including all the studies and the weighted average effect size are shown in *Figure 4*; studies with larger sample sizes are represented using proportionally bigger square symbols, and the diamond symbol reflects the weighted average effect size. In general, studies with larger sample sizes (and consequently higher power) were closer to the weighted average effect size estimated, and only a small portion of studies – commonly those with the smallest sample sizes – diverged largely from the average effect size.

### 2.5.2. Comparing the experience of mixed emotion between models of affect and between different types of mixed emotions

There was no significant difference between studies that conceptualised mixed emotions using a dimensional or a discrete structure of affect,  $Q(1) = 0.83$ , *n.s.* (see *Table 2*). The average effect size of mixed emotions measured using dimensions of affect was large,  $d_{IG+} = 0.71$ ,  $z = 8.28$ ,  $p < 0.001$ , with a 95% confidence interval from 0.54 to 0.88, based on 24 comparisons and a total sample size of 3,339. Mixed emotions measured using a discrete emotions approach showed a large average effect size,  $d_{IG+} = 0.81$ ,  $z = 12.14$ ,  $p < 0.001$ , with

a 95% confidence interval from 0.68 to 0.94, based on 39 comparisons and a total sample size of 3,818. This means that dimensional and discrete emotions approaches produce similar estimates of the magnitude of the experience of mixed emotions.

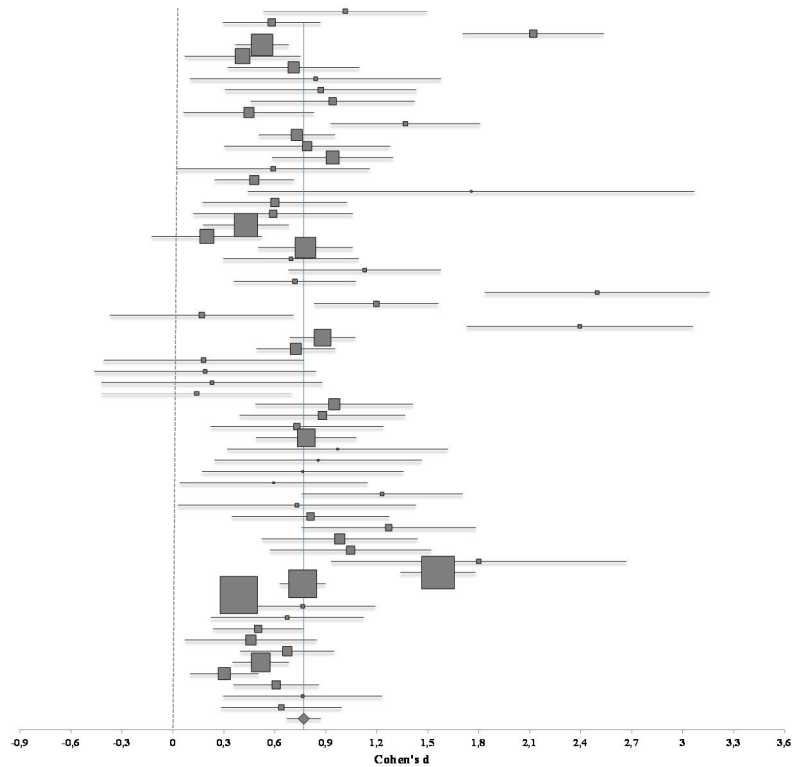


Figure 4. Forest plot of effect sizes from included studies incorporating 95% CI.

Note: The presentation of studies follows the alphabetic order displayed in Table 1.

No significant difference was found between the six types of mixed emotions measured in the primary studies,  $Q(5) = 8.06$ , *n.s.* Considering first the two types of mixed emotions included within the dimensional approach, the average effect size for a mixed emotion formed from the combination of *positive-negative* was large,  $d_{IG+} = 0.75$ , 95% CI = 0.58 to 0.94; whereas a medium to large effect size was observed for the pair *pleasure-displeasure*,  $d_{IG+} = 0.61$ , 95% CI = 0.28 to 0.93. A comparison between the two pairs of



mixed emotions within the dimensional model of affect yielded no significant difference,  $Q(1) = 0.99, n.s.$

In terms of the discrete mixed emotion pairs, a large effect size was found for the mixed emotion combination *happy-sad*,  $d_{IG+} = 0.77$ , 95% CI = 0.62 to 0.92. A large effect size was also found for the mix *fear-happy*,  $d_{IG+} = 1.28$ , 95% CI = 0.74 to 1.82, and *disgust-amused*,  $d_{IG+} = 1.07$ , 95% CI = 0.69 to 1.44. Finally, a medium effect size was found for the mixed emotion combination of *hope-fear*,  $d_{IG+} = 0.53$ , 95% CI = 0.08 to 0.97. These results indicate that different combinations of mixed emotions all produced substantial effects.

Table 2. Average effect sizes across models of affect and across different types of mixed emotions.

Variable	$d_{IG+}$	SE	$k$	$I^2$
<i>Model of affect:</i>				
Dimensional	.71**	.09	24	0%
Discrete	.81**	.07	39	34.9% <sup>a</sup>
<i>Type of mixed emotions considered:</i>				
Happy-sad	.77**	.07	29	17.1%
Fear-happy	1.28**	.27	2	87.3% <sup>b</sup>
Disgust-amusement	1.07**	.19	5	68.0% <sup>a</sup>
Hope-fear	.53*	.22	3	0%
Positive-negative	.75**	.09	19	0%
Pleasure-displeasure	.60**	.17	5	0%

Note: SE and  $k$  are standard error and number of studies, respectively.  $I^2$  is a quantification of the degree of heterogeneity calculated by  $I^2 = 100\% \times (Q - df)/Q$ , where  $Q$  is Cochran's heterogeneity statistic and  $df$  the degrees of freedom (Higgins, Thompson, Deek, & Altman, 2003). \*\*  $p < 0.01$ ; \*  $p < 0.05$ .  $a = Q_w$  significant at  $p < 0.05$ ;  $b = Q_w$  significant at  $p < 0.01$ .

Comparisons across the discrete pairs of mixed emotions showed no significant differences between any of the pairs: *happy-sad* and *fear-happy*,  $Q(1) = 2.63, n.s.$ ; *happy-sad*

and *hope-fear*,  $Q(1) = 1.07$ , *n.s.*; *happy-sad* and *disgust-amused*,  $Q(1) = 1.85$ ,  $p > .10$ ; *fear-happy* and *hope-fear*,  $Q(1) = 1.93$ , *n.s.*; *fear-happy* and *disgust-amused*,  $Q(1) = 0.10$ ,  $p > .10$ ; *hope-fear* and *disgust-amused*,  $Q(1) = 1.94$ , *n.s.* It should be noted, however, that a high level of unexplained heterogeneity was found for the mixed emotions *fear-happy*,  $Q_w(1) = 7.90$ ,  $p < .05$ , and *disgust-amusement*,  $Q_w(4) = 12.50$ ,  $p < .05$ .

### 2.5.3. Moderators of the effectiveness of mixed emotions elicitation

Several methodological factors and study characteristics were tested as potential moderators of the effectiveness with which mixed emotions were elicited (see *Table 3*). First, the type of measure used to evaluate mixed emotions was tested. Studies using the minimum index reported smaller effect sizes on average compared to studies not using this measure,  $\beta = -0.20$ ,  $z = -1.97$ ,  $p = .04$ . In contrast, studies using subjective measures of mixed emotions reported marginally larger effect sizes than studies not including this measure,  $\beta = 0.57$ ,  $z = 1.92$ ,  $p = 0.05$ . The use of simultaneous measures and frequency-based measures did not influence effect sizes.

In terms of the procedure used to induce mixed emotions, none of the induction procedures influenced effect sizes (see *Table 3*). Similarly, the type of experimental design, that is, within-person designs or between-person designs, did not influence effect sizes. Finally, considering demographic characteristics, the magnitude of the experience of mixed emotions was greater when there was a higher percentage of women in the sample,  $\beta = 0.89$ ,  $z = 2.56$ ,  $p = 0.01$ . Age did not influence the experience of mixed emotions.

Table 3. Moderators of the effectiveness of mixed emotions elicitation.

Moderator	Regression coefficient	Standard error	<i>k</i>	<i>n</i>	95% CI	<i>F</i> <sup>2</sup>
<i>Indicator of mixed emotions (absent, present):</i>						
Minimum index	-.20*	.10	28 / 35	2,823 / 4,334	-.40 / -.01	0%
Simultaneous measure	.10	.17	55 / 8	6,766 / 391	-.23 / .43	77.2% <sup>b</sup>
Frequency	.04	.14	52 / 13	6,046 / 1111	-.23 / .31	0%
Subjective measure	.57 <sup>†</sup>	.30	60 / 3	6,417 / 740	-.03 / 1.12	16.7%
Mix of measures	.10	.19	57 / 6	6,576 / 581	-.27 / .46	0%
<i>Mixed emotions induction procedure (absent, present):</i>						
Ads	-.25	.16	56 / 7	6,374 / 783	-.55 / .06	0%
Films	.07	.14	51 / 12	6,243 / 914	-.21 / .35	66.3% <sup>b</sup>
Music	.03	.17	57 / 6	6,720 / 437	-.32 / .38	0%
Pictures	-.16	.12	49 / 14	4,383 / 2774	-.40 / .07	0%
Personal experiences	.04	.19	57 / 6	6,637 / 520	-.33 / .40	0%
Simulation or imagination	.18	.13	48 / 15	5,686 / 1471	-.07 / .43	0%
Other	.24	.23	60 / 3	6,899 / 258	-.22 / .69	81.8% <sup>b</sup>
<i>Design characteristics:</i>						
Within-person design	.13	.10	32	3,619	-.08 / .38	30.6%
Between-person design	-.13	.11	31	3,583	-.34 / .08	0%
<i>Demographic characteristics:</i>						
Percentage of women (range 0%- 100%)	.89**	.25	46	5,097	.20 / 1.58	19.6%
Age (range 18-47 years)	-.01	.01	27	3,153	-.02 / .02	10.2%

Note: Columns *k* and *n* represent number of studies and number of participants, respectively. Where applicable, these are reported separately for each level of the moderator variable (indicated in parentheses at the end of each moderator name). Where a variable is coded as “absent, present,” absent was coded as 0 and present was coded as 1; thus, a positive regression coefficient indicates that studies in which the variable was present had larger effect sizes, and a negative regression coefficient indicates that studies where that variable was present had smaller effect sizes. \*\*  $p < 0.01$ ; \*  $p < 0.05$ ; †  $p < 0.10$ .  $b = Q_w$  significant at  $p < 0.01$ .

#### 2.5.4. Publication biases

Publication biases in meta-analyses arise as a result of the publication of statistically significant results (Begg, 1994). Studies that find statistically significant results are more likely to be published than studies that find non-significant results (Begg, 1994). Thus, publication biases are a relevant issue necessary to address because they may exaggerate the size of the effects (Begg, 1994) leading to inaccurate estimation of the magnitude in the elicitation of mixed emotions. This is particularly important in the present meta-analysis, where most of the studies correspond to published studies. To determine whether the estimated effect sizes were biased because of missing unpublished manuscripts with small or non-significant effects, the distribution of the effect sizes observed in the primary studies was examined using a funnel plot. The funnel plot shown in *Figure 5* revealed some signs of asymmetry: the tendency for large observed effect sizes was reduced when studies had larger samples and lower standard errors. However, applying statistical methods to detect publication bias did not provide evidence that this bias existed in the sample of studies. The Begg's Rank Correlation method (Begg & Mazumdar, 1994) did not show a significant presence of publication bias,  $\tau = 0.14$ ,  $z = -1.28$ ,  $p = 0.10$ . Furthermore, contemporary methods to detect publication bias using a conditional estimator (PET-PEESE; Stanley & Doucouliagos, 2014) did not reveal the presence of severe distortions in the effect sizes (see *Table 4*).

PET-PEESE is a meta-regression technique to estimate publication bias using a quadratic approximation, useful when there is a nonzero effect (Stanley & Doucouliagos, 2014), common in emotion sciences where neutrality (i.e., values of zero emotion) is normally hard to estimate. This technique estimates first a precision-effect-test (PET; similar to Egger's regression) which is a linear function between the effect sizes and standard errors, useful to detect genuine non-zero effect. Next the precision-effect-estimate-with-standard error (PEESE) is calculated; a quadratic function using the same parameters. Combining both

approaches PET-PEESE has the lowest average bias compared to applying only PET or PEESE (Stanley & Doucouliagos, 2014), demonstrating the advantages of using this technique to detect publication biases.

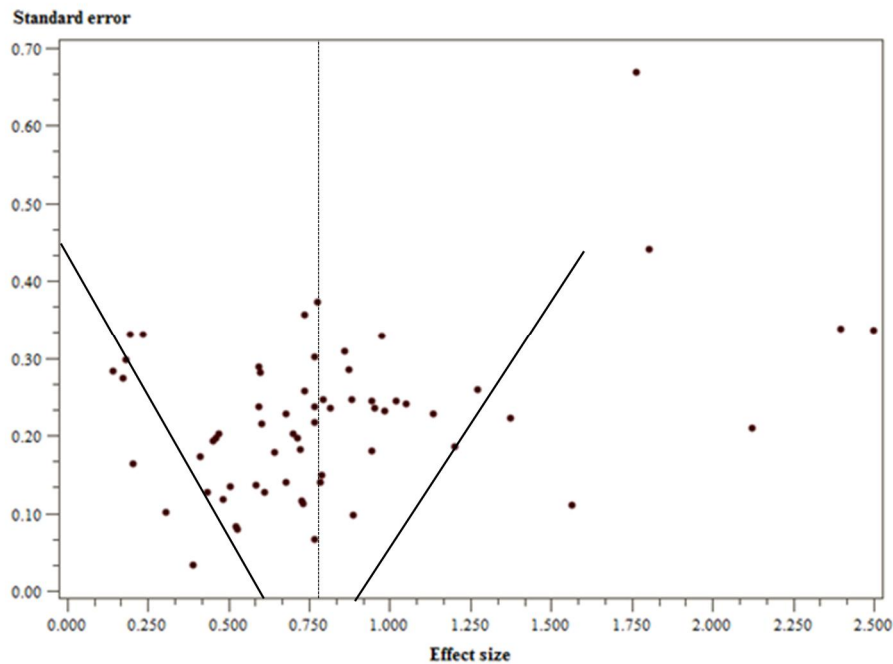


Figure 5. Funnel plot of effect sizes from included studies.

Thus, despite evidence of asymmetry in the funnel plot demonstrated by the coefficients in the regression models (i.e.,  $\beta_1$ ), results from applying PET-PEESE indicated that the null hypothesis that  $\beta_0 = 0$  using PET should be rejected and consequently the intercept from PEESE should be used as the best estimate of the true effect size. This was true considering both the full sample and separate samples based on the distinction between dimensional and discrete approaches. In detail, the results displayed in *Table 4* revealed that the estimated effect sizes ( $\beta_0$ ) for the full dataset and separate analyses for each model (discrete and dimensional) were quite close to the effect sizes reported in section 2.5.1 and 2.5.2, revealing only small distortions from the estimated effect sizes in the present meta-analysis.

Finally, a fail-safe N test for a meta-analytic random-effects model (Rosenberg, 2005) determined that 167 unpublished studies with zero effect size would have to exist in order to overturn the finding that mixed emotions are consistently elicited across the primary studies. The fail-safe N test for a fixed-effects model, similar to Rosenthal's fail-safe N (1979), determined that more than 10,000 studies would be needed to overturn the current findings; this number exceeds the suggested tolerance value of  $5n + 10$  (where  $n$  is the number of studies). Overall, the data appear to be resilient to publication bias.

*Table 4.* Results from PET-PEESE indicator based on Stanley and Doucouliagos (2014) approximation to reduce publication selection bias.

Sample	<i>PET</i>		<i>PEESE</i>	
	$\beta_0$	$\beta_1$	$\beta_0$	$\beta_1$
Full	.41** (.27, .54)	1.86**	.53** (.43, .63)	4.66**
<i>Model of affect:</i>				
Dimensional	.38** (.27, .48)	1.72**	.47** (.38, .55)	4.38**
Discrete	.55** (.21, .89)	1.28	.66** (.46, .86)	3.26

*Note:* Full = the full sample. For PET and PEESE,  $\beta_0$  = the intercept (i.e., the corrected estimate of the overall effect),  $\beta_1$  = the coefficient for standard error or variance (i.e., the test for funnel plot asymmetry). Numbers given in parentheses are the lower and upper limits of the 95% confidence intervals. \*\*  $p < 0.01$ .

## 2.6. Discussion

This meta-analytic review examined the extent to which mixed emotions have been elicited across a variety of theoretical and methodological contexts. Robustness was understood as the stability of effect sizes across a variety of theoretical and methodological conditions (Wimsatt, 1981). An assessment of robustness is a desirable goal for any model of affect in order to determine that accrued evidence is not a result of: methodological artifacts, the selection of certain measures, emotional adjectives, or chance. Accurate interpretation of

research findings can be hampered by the influence of design artifacts. Schmidt (2010) stated that an effective method of avoiding this problem in meta-analysis is to use a random effects model so as to not leave significant variability unaccounted for. Additionally, Schmidt urged researchers to correct for the biasing effects of measurement errors when conducting meta-analysis. In line with these recommendations, the current research used a random effects model and corrected for measurement error using the strongest study available, enhancing confidence that the elicitation of mixed emotions appears a non-artifactual emotional experience.

Numerous studies have investigated mixed emotions, especially following several articles at the turn of the millennia that debated the structure of affect and the possibility that people can experience two opposite affects concurrently (e.g., Russell & Carroll, 1999). The present chapter assessed the evidence available and found that elicitation of mixed feelings is a robust effect. The average effect size observed from  $k=63$  experimental studies was large, and the effect-sizes appeared to be resilient to publication bias. This finding serves two important goals for the following chapters. Firstly, it provides the necessary evidence to sustain that mixed emotions are a genuine emotional experience. Propositions from dimensional models of affect, such as the circumplex model of affect, sustain that experiencing two opposite emotions concurrently is questionable, and as a result, evidence for mixed emotions may simply reflect measurement problems (e.g., Russell, 2003; Russell & Carroll, 1999). The evidence presented in this chapter supported the experience of mixed emotions as a robust measurable phenomenon. That is, the experience of mixed emotions proved stable and consistent across a variety of different theoretical and methodological conditions. Secondly, this evidence provides an appropriate estimate to calculate necessary sample sizes in subsequent studies to achieve sufficient statistical power.

It is also important to note that this chapter considers the two major models of the structure of affect (i.e., dimensional and discrete) as a relevant comparison of the elicitation of mixed emotions. Findings showed that effect sizes were of similar magnitude regardless of whether the structure of affect was considered as dimensional or discrete and no significant difference was found when comparing effects from the different models. As a large amount of research has investigated the mixed emotions of happy- sad, an alternative account might posit that happiness/sadness constitutes an exclusive mixed emotion, because these emotions are specifically coupled in response to prompts of nostalgia (e.g., Barrett et al., 2010). However, current results indicated that it is unlikely that mixed emotions represent a peculiarity of certain opposing emotions (e.g., happy-sad). Findings also revealed that no-significant differences were found between the multiple comparisons of pairs of mixed emotions, supporting the previous assertion.

It is, however less clear under which circumstances the affect system follows a bipolar relation between positive and negative affect or activates complex affective experiences, such as mixed emotions. The evidence presented in this chapter emphasises the need to further investigate the antecedents of mixed emotions. Understanding the conditions that surround the elicitation of emotional experiences has been mentioned by a number of emotion theories emphasising the role of situations in the conceptualization of affective experience (e.g., Arnold, 1960; Clore & Ortony, 2013; Parkinson, 1997; Zajonc, 1984). Arnold (1960), for example, proposed that emotions can be represented as affective perceptions in tune with relevant external situations. Similar notions have been incorporated in communicational models of affect (Parkinson, 1997), and even by conceptualisations that dispense of any high level evaluative process in the experience of emotions (Zajonc, 1984). Therefore, understanding affective experiences requires understanding of the conditions that promote the



emergence of certain affects, and this extends to mixed emotions; an issue which is addressed in chapter 3.

In terms of the moderators, the present review found that use of the minimum index of mixed emotions was associated with smaller effect sizes, whereas subjective measures of mixed emotions produced marginally greater effect sizes. It is possible that the minimum index is a more conservative indicator of the presence of mixed emotions because it reflects the lower threshold in the experience of mixed emotions rather than the intensity of the overall experience. In contrast, subjective measures may be more liberal in their estimation of mixed emotions because they rely on self-reports of the direct experience of mixed emotions and thereby encapsulate the integral experience of mixed emotions. The larger effect size for subjective measures provides preliminary support for the assumption that mixed emotions are an integral experience.

In addition, evidence presented here showed that use of the simultaneous measure of mixed emotions produced a large amount of heterogeneity (expressed as  $I^2$ ). This is unexpected considering that the simultaneous measure of mixed emotions should be one of the strongest measures in terms of the methodological sophistication (Larsen & McGraw, 2014). However, it is possible that one explanation for the large amount of heterogeneity may stem from the lack of appropriate statistical tests to estimate the presence of mixed emotions when using simultaneous measures of mixed emotions. Commonly, researchers using button-press measures quantify the amount of time that subjects reported mixed emotions, and then they compare the proportion or distributions of ranked values obtained from each group in the experiment (e.g., Larsen & McGraw, 2011; Larsen et al., 2001). However, when normally distributed, non-parametric tests are less statistically powerful, and even under conditions of non-normality the power of non-parametric statistics vary across different distributions (Vickers, 2005). Thus, the heterogeneity observed may reflect different data distributions,

and as a consequence, different degrees of type-II error present across studies. Another explanation for the heterogeneity is the dependency present in the data using measures like the button-press technique. It is possible to say that time-points are nested within person giving place to a hierarchical data structure. This means that computation of the effect size may need further refinement when using simultaneous measures. One alternative may be the use of generalized linear mixed models (GLMM). GLMM analyses hierarchical data using categorical outcomes (Heck, Thomas, & Tabata, 2012), such as the dummy coded variables resulting from using the simultaneous measure of mixed emotions. Thus, applying this type of statistical technique, it is possible to reduce the uncertainty resulting from the nonindependence in the data structure, and potentially leading to more stable effect sizes across studies.

Other moderators, such as the elicitation procedure and methodological variables (i.e., between or within-subject designs) did not reveal an effect on the elicitation of mixed emotions experiences. However, one final finding of note is that gender moderated the elicitation of mixed emotions. Specifically, the present findings suggest that, compared to men, women either: *(a)* tend to experience more intense mixed emotions in response to induction procedures, *(b)* are more aware of experiencing mixed emotions or *(c)* are more inclined to report the experience. Fujita, Diener, and Sandvik (1991) reconciled previous research showing that women report as much happiness as men but simultaneously also report greater levels of unpleasant affect, demonstrating that women experience more intense positive emotions that balances any negative bias. Results of the present meta-analysis may offer an alternative explanation that is based on a gender difference in the experience or reporting of mixed emotions that is not effectively or adequately captured by the most commonly used affect measures.

**Limitations.** It is important to highlight that the current meta-analysis was based exclusively on studies involving experimental designs. This limitation means that it is not possible to infer the extent to which mixed emotions occur in everyday life. In order to address this limitation, chapter 5 will investigate the mechanisms linking mixed emotions, well-being and self-control using ecologically valid methods. This is important because several diary studies have explored the within-person association between positive and negative affect (e.g., Ong & Bergeman, 2004), so it is expected to contribute to a clearer understanding of mixed emotions applying methods such as experiencing sampling techniques.

Additionally, it is worth noting that the present review investigated the hypothesis that mixed emotions are consistently activated across different theoretical and methodological conditions. This involved testing the null hypothesis that, following an induction, people did not experience more mixed emotions than a control group, leading to effect sizes close to zero. However, in line with assumptions derived from the ESM which suggests that the affect system can operate in multiple modes of activation (Cacioppo et al., 1999; Cacioppo et al., 2004), future studies should investigate under which circumstances the affect system tends to activate one affect exclusively or two affects concurrently. This limitation is partly remedied in chapter 3, where one condition that might promote the experience of mixed emotions is studied; namely, goal conflict.

**Conclusion.** In summary, the current meta-analysis has made four distinct contributions to the present research project. Firstly, it has demonstrated that mixed emotions are a robust and non-artifactual experience. The evidence provided here shows that the average effect size for the elicitation of mixed emotions is large in magnitude, and that the effect is similar across different types of mixed emotions. Second, this meta-analysis has demonstrated that mixed emotions have been elicited when conceptualised as dimensions or

as discrete entities. Third, the effect size for mixed emotions was shown to be sensitive to the type of measure used (it is smaller for minimum index measures, and larger for direct measures) and to the gender makeup of the sample (larger for women) but not to the type of induction procedure used. Fourth, the results for the limited set of studies using subjective measures permit speculation that the experience of mixed emotions might be more than the sum of its constituent emotions, suggesting the importance of further investigating the subjective experience of mixed emotions. Overall, this meta-analysis provides a foundation for conducting further research on the nature, causes, and effects of mixed emotions.

### 3. CHAPTER THREE: CONFLICTING GOALS PREDICT MIXED EMOTIONS

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*“For pleasure is a state of soul, and to each man that which he is said to be a lover of is pleasant [...] Now for most men their pleasures are in conflict [...]”*  
*Aristotle (Nicomachean Ethics; I.8)*

Everyday life often reminds people that Aristotle was probably correct in asserting that our greatest pleasures usually collide. Imagine that you are finishing an important project at the office and need to call your partner to say that you will be late for dinner. On the one hand, it would feel good to finish your work and receive some recognition for it but, on the other hand, it would feel bad to hurt your partner’s feelings, especially if you wanted to spend more time together. So you experience mixed feelings as you decide what to do.

Following the model proposed in chapter 1, the aim of the present chapter is to determine whether conflicting goals can lead to the experience of mixed emotions. Another important goal of the present chapter is to distinguish mixed emotions from emotional conflict. Emotional conflict has been equated to mixed emotions (Carver, Sutton, & Scheier, 2000), and has also been associated with detrimental consequences for individual well-being (King & Emmons, 1990). Thus, the differentiation of these constructs constitutes an important step prior to investigating the potential benefits of mixed emotions for well-being.

In chapter 1 it was proposed that the proximal cause of mixed emotions is conflicting goals. This is consistent with recent conceptualisations of goal conflict (Ellsworth & Scherer, 2003; Fishbach & Ferguson, 2007), and it is also consistent with Perceptual Control Theory (PCT; Powers, 1973; Powers et al., 1960). Previous research in the field of mixed emotions has not dedicated much effort to understanding the antecedents of mixed emotions, and this is a pending question in the investigation of mixed emotions (Larsen & McGraw, 2014).

Alternative explanations for the origin of mixed emotions have been drawn from affective responses across different situations in Western versus Eastern cultures (Miyamoto et al., 2010). In two different studies, participants produced free descriptions of their feelings in a range of different situations (e.g., transitions into a new life, self-other comparison situations), and then rated their emotions using different emotional adjectives (e.g., happy, proud, jealous) which encompassed two broad dimensions of positive and negative affect. Miyamoto and colleagues (2010) found that, across both Western and Eastern cultures, some situations typically elicited greater levels of mixed emotions. In particular, situations related to self-success (e.g., admission to the university), self-failure (e.g., failing midterm exams), and transitions (e.g., leaving home and moving to a different town to study) commonly elicited mixed emotions.

A problem with investigating life events as determinants of mixed emotions is that they typically involve many individual situations which could elicit mixed emotions but do not accurately capture what it is about those situations that gives rise to the experience of mixed emotions. Thus, although the previous evidence is relevant because it demonstrates that common situational features across cultures produce similar levels of mixed emotions, conflicting goals could be the common variable underling the elicitation of mixed emotions. Instead of investigating multiple situations that may elicit mixed emotions, the present chapter hypothesised that the common feature that instigate the experience of mixed emotions is the presence of goal conflict.

Individuals often face situations where they need to decide between multiple potential courses of action both of which simultaneously offer benefits, and undesired consequences derived from the impossibility of achieving both ends. The model examined in this chapter is anchored in the PCT (Powers, 1973; Powers et al., 1960), which is briefly outlined in the following section. Next, current theories suggesting an association between conflicting goals

and mixed emotions are discussed. Then, two experimental studies are presented which examine the association between goal conflict and mixed emotions. Finally, a brief discussion summarises the implications of the findings for the current research model and mixed emotions in general.

### **3.1. Perceptual Control Theory, goal conflict and emotions**

According to PCT, organisms control perceptions, not observed actions (Powers, 1973; Powers et al., 1960). This means that people do not necessarily monitor their behaviour when trying to achieve a goal, but instead they monitor the *discrepancy* between goals and perceptual inputs (Carver & Scheier, 1982; Powers, 1973). Behaviour is varied, not controlled; what matters is whether people are successful in creating or conserving certain desired states despite environmental disturbances or individuals' actions (Bourbon, 1995).

For example, if a student is urgently finishing an important assignment and suddenly realises that she has made a mistake meaning that a large section will need to be re-written, an emotion will likely emerge; the palms of her hands may start sweating and thoughts about how to work quickly and accurately will begin to cross her mind. An error signal was detected because a discrepancy was perceived between the need to complete the assignment soon (her goal) and the perception of a mistake that may seriously delay the process (perceptual input). Thus, control systems work in closed-loops including perceptual inputs that act as feedback signals and are compared against mentally represented goals or reference signals. Comparisons between perceptual inputs and reference signals are continuously monitored, correcting potential discrepancies and changing behaviour (Carver & Scheier, 1982; Powers, 1973).

Critically, PCT states that control systems are hierarchically organised (Carver & Scheier, 1982; Powers, 1973), such that the outputs of goals higher in the hierarchy

(principles, such as “be a good father”) are the reference signals or goals for lower systems (behaviours as simple as muscles movements necessary to hold a baby). Thus, reference values become more concrete and specific as one moves down the goal hierarchy (Carver & Scheier, 1999; Powers, 1973).

According to PCT, emotions arise from discrepancies between goals high in the hierarchy (principles and programs in Powers’ terminology) and progress towards (or away from) such goals (Powers, 1973, 2014). Perceptual inputs are compared against internally represented standards or goals; if no discrepancy is observed, then there is no need for change and individuals can continue with current behaviours (Carver & Scheier, 1982; Powers, 1973, 2014). However, if an error signal is detected then an emotional experience is created, which activates a cascade of changes involving cognitions and motor responses to correct perceived deviations (Powers, 1973, 2014). In other words, emotions arise as a consequence of the efforts of the system to restore certain states; these emotions *inform* people about the need to adjust behaviours until equilibrium is achieved.

An important feature of PCT is that perceptions can be controlled by several control systems working in parallel, usually interacting. Importantly, when discrepancies arise from the activation of two different control systems, goal conflict is usually observed (Powers et al., 1960). Powers (1973, 2014) emphasised that conflict is usually accompanied by a continuous flow of different emotions because discrepancies between goals cannot be easily corrected. It is plausible that this continuous flow of emotions when facing goal conflict, described by Powers (2014), may correspond to the experience of mixed emotions.

### **3.2. Goal conflict and mixed emotions**

Two different approaches have been suggested to understand the relationship between conflicting goals and mixed emotions. Firstly, some theories have suggested that conflicting



goals are a relevant source of mixed emotions (Ellsworth & Scherer, 2003; Fishbach & Ferguson, 2007) such that mixed emotions may derive from conflicting goals. According to Fishbach and Ferguson (2007), setting multiple goals may hinder the attainment of some goals which can lead to the experience of mixed emotions, especially when the means available for progress on one of these goals are incongruent with the means necessary to progress on another. For example, mixed emotions may arise when a scholar evaluates a recent offer to move abroad with very advantageous conditions in light of her spouse's recent promotion that requires that they do not relocate. In this way, mixed emotions can be thought of as resulting from conflicting goals, rather than being the conflict itself.

In contrast, other theories have considered mixed emotions as a particular type of emotional conflict (Carver, Sutton, & Scheier, 2000). According to Carver et al. (2000), people's lives can be characterised by conflicting tendencies between eagerness (conceptually related to the approach affect system) and anxiety (conceptually related to the avoidance affect system) which make people vulnerable to experiencing mixed emotions. Closely linked with this is the notion that people can experience high levels of ambivalence over the emotions that they feel in one particular moment (King & Emmons, 1990). Emotional conflict has been viewed as a pernicious type of conflict, negatively influencing well-being and health-related variables (King & Emmons, 1990). This might indicate that mixed emotions are not elicited by conflicting goals, but instead represent a particular type of conflict related to emotional ambivalence, a particularly pernicious type of conflict (King & Emmons, 1990).

Previous evidence has supported the idea that conflicting goals may be a proximal predictor of mixed emotions (Boudreaux & Ozer, 2013; Mukhopadhyay & Johar, 2007). For example, Mukhopadhyay and Johar (2007, Study 1) investigated the affective responses triggered when people make decisions about unintended purchases in consumer scenarios.

Unintended purchases can be thought of as a scenario where goal conflict is present because the scenario activates both the goal of avoiding spending money unnecessarily and the goal of acquiring and using products (Mukhopadhyay & Johar, 2007). Results showed that participants who decided to buy a product felt happier, guiltier, and more remorse than participants who decided not to buy the product, which could be conceived of as initial evidence for the idea that goal conflict elicits mixed emotions.

However, the fact that the *buyers* experienced higher average scores for different emotions does not demonstrate the presence of more mixed emotions compared to those who did not buy; in fact, the study did not provide a clear indicator of the presence of mixed emotions (e.g., minimum index). As shown in chapter 2, different measures of mixed emotions exist, but Mukhopadhyay and Johar (2007) did not report a measure of mixed emotions. Furthermore, it is not clear whether the people who decided not to buy experienced more, equal, or less conflict between goals compared to those who bought an item; therefore it is difficult to conclude that the outcome of this study reflects the influence of conflicting goals on mixed emotions.

In another study, Boudreaux and Ozer (2013) surveyed a sample of participants in two different occasions. On each occasion participants rated both their goals in terms of the degree of commitment, ambivalence, and stress and their subjective well-being and psychological distress. In this study, the measure of ambivalence was equated to mixed emotions (i.e., “*Do you have mixed feelings about wanting to work toward and attain this goal?*”). Participants also rated the degree of perceived conflict between their goals (i.e., “*judge whether working toward one goal interferes with working toward and attaining another goal*”), and the degree of facilitation among goals (i.e., “*judge whether working toward one goal helps support your efforts at working toward and attaining another goal*”). Results showed that people who experienced more conflict among their goals also reported

greater levels of mixed feelings (i.e., ambivalence) compared to goals that facilitated each other. However, this study captured mixed emotions using a single item measure, which casts some doubts as to whether mixed emotions can be distinguished or not from emotional ambivalence. Furthermore, in this study, it was not possible to infer a causal relationship between goal conflict and mixed emotions because no experimental procedures were implemented.

In sum, initial theoretical and empirical contributions suggest that goal conflict may be linked to the experience of mixed emotions. However, to date, this hypothesis has been only partially tested in a few studies without directly investigating the influence of conflicting goals on mixed emotions. It is also unclear whether mixed emotions are best conceptualised as a form of emotional conflict related to the concept of emotional ambivalence, meaning that the concept of mixed emotions have no additional explanatory value.

### **3.3. Overview of Study 1 and Study 2**

The basic hypothesis tested in this chapter, and also explained in chapter 1, is that the experience of mixed emotions will be predicted by goal conflict; this hypothesis is studied in two experimental studies. Study 1 examined whether people dealing with an elicited conflict between a pro-social goal and a self-interest goal would experience more mixed emotions compared to people dealing with the same goals when they were not in conflict (*hypothesis 1.1*). The distinction between pro-social and self-interest goals has been commonly viewed as one of the basic conflicts that people face when navigating social encounters (Van Lange, De Cremer, Van Dijk, & Van Vugt, 2007). Living in a society involves making continuous valuations between individual versus societal interests, and as such is a prototypical example of goal conflict.

Study 2 also examined whether mixed emotions were a consequence of conflicting goals but this time using naturally occurring goal activation. The study specifically compared conflicting goals and facilitating goals to verify that it is the conflict, and not just multiple goal activation, that predicts mixed emotions. Recent theoretical contributions have suggested that multiple goal dynamics can be described (Cavallo & Fitzsimons, 2012). One of the main distinctions is between goal conflict and goals that facilitate each other (e.g., Boudreaux & Ozer, 2013). Goal facilitation is understood as the activation of multiple goals that help each other in the consummation of their respective ends, such as, for example, trying to learn more about your field of study, dedicating more time to revise, and avoiding parties before an exam. Thus, the hypothesis was that mixed emotions would be higher following conflicting goals compared to facilitating goals (*hypothesis 1.2*). Study 2 also examined whether experiencing mixed emotions is simply a reflection of the individual's tendency to experience emotional conflict, or should be treated as a separate construct.

### **3.4. Study 1**

#### **3.4.1. Method**

**Participants.** The participants in this experiment were 35 student volunteers ( $M_{age} = 29.60$  years,  $SD = 9.18$  years; 22 females) who completed the study online. The expected sample size was  $N = 50$  participants, which was estimated to be adequate to achieve a 80% power given the average effect size estimated in the meta-analysis presented in chapter 2. However, due to a programming error when preparing the study, a portion of the sample was lost because the dependent variable was inadvertently randomised. Once the error was corrected, the remaining sample was  $n = 35$ . This study received ethical approval from the Department of Psychology ethics sub-committee (DESC) prior to beginning the data collection process. For reasons related to the accessibility of the sample, participants were

recruited from a student volunteers list. Participants were informed that the study aimed to better understand the relationship between personal goals and emotional experiences. Once the informed consent form was read and accepted, participants initiated the participation in the experiment.

**Procedures.** Participants completed a procedure designed to activate goals, similar to the procedures used in previous studies (e.g., Köpetz, Faber, Fishbach, & Kruglanski, 2011). Firstly, participants completed two separate questions to indicate the level of importance that they attached to trying to contribute to charitable organisations (*pro-social goal*; “*I try to contribute to charitable organisations*”) and to trying to use their time efficiently (*self-interest goal*; “*I try to save my time and use it efficiently*”), using a scale ranging from 1 (*not important at all*) to 5 (*very important*). To ensure activation of goals, participants were asked to write two reasons why they believed in contributing to charity and trying to use time efficiently.

After this initial goal activation procedure, participants were informed that they were about to make a real decision involving the two goals. Following these instructions participants were assigned by a computer program to either an experimental or a control condition. The experimental group ( $n = 22$ ) was instructed to choose between two conflicting options, in which the first had higher self-interest value and the second had higher prosocial value. The first option implied that the researcher would donate £4 to a charitable organisation in return for the participant spending three minutes completing a task. The second option implied that the researcher would donate £24 to a charitable organisation in return for the participant spending 18 minutes completing the same task. In contrast, the control group ( $n = 13$ ) was presented with two non-conflicting options. One option implied that the researcher would donate £24 to a charitable organization and in return the participant

would spend five minutes completing a task; the second option kept the amount of money offered identical, but involved spending seven minutes completing the same task.

A four-item self-report scale was used to directly measure mixed emotions was administered immediately after participants saw the options in both conditions ( $M = 2.38$ ,  $SD = 1.05$ ;  $\alpha = 0.90$ ; i.e., “*I’m feeling contrasting emotions*”; “*I’m feeling a mixture of emotions*”; “*I’m feeling different emotions at the same time*”; “*I’m feeling a combination of different emotions at the same time*”). This scale was constructed by the author and its construct and convergent validity, as well as its reliability was appropriately tested in a large sample of participants ( $n > 400$ ; Berrios, Totterdell, & Kellett, 2013). Participants were requested to rate the extent to which they were experiencing mixed emotions while deciding between the options presented on a five-point Likert format-scale from 1 (*Not at all*) to 5 (*Very much*).

Conflict was measured using two separate items: (1) rating whether contributing to a charitable organisation had harmful effects on time-saving ( $M = 1.77$ ,  $SD = 1.09$ ; “*Did contributing to the charity have harmful effects on saving your time?*”) and (2) rating whether saving personal time had harmful effects on contributing to a charitable organization ( $M = 2.14$ ,  $SD = 1.31$ ; “*Did saving your time have harmful effects on contributing to the charity?*”), using a 5-point Likert format-scale from 1 (*Not at all*) to 5 (*Very much*).

### **3.4.2. Results**

Simple correlations showed that the items corresponding to the subjective measure of mixed emotions were all positively and significantly correlated, with correlations indices ranging between 0.53 and 0.82. A significant and moderate correlation was also found between the subjective measure of mixed emotions and the average of the items measuring goal conflict ( $r = .41$ ,  $p < 0.05$ ; 95% *CI*: 0.19 and 0.63), suggesting only a moderate overlap between these constructs. The mixed emotions variable was approximately normally

distributed for each category of the independent variable (goal conflict vs. no goal conflict) and no outliers were identified.

Manipulation checks demonstrated that participants in the conflicting goals condition ( $M = 2.10$ ,  $SD = 1.23$ ) perceived more harmful effects of contributing to the charity on saving personal time,  $t(33) = 2.42$ ,  $p < 0.05$ , compared to participants in the no-conflicting goals condition ( $M = 1.23$ ,  $SD = 0.44$ ). Participants in the conflicting goals condition ( $M = 2.64$ ,  $SD = 1.36$ ) also perceived more harmful effects of saving personal time on trying to contribute to the charity,  $t(33) = 3.29$ ,  $p < 0.01$ , compared to the no-conflicting goals condition ( $M = 1.31$ ,  $SD = 0.63$ ).

More importantly, results showed that participants in the conflicting goals condition ( $M = 2.69$ ,  $SD = 0.98$ ) felt significantly more mixed,  $F(1, 33) = 5.98$ ,  $p < 0.05$ ,  $d = 0.84$ , compared to the control group ( $M = 1.85$ ,  $SD = 0.99$ ). Significant differences were found for gender on mixed emotions,  $t(33) = 2.28$ ,  $p < 0.05$ , such that women tended to experience greater mixed emotions than men. However, the inclusion of gender in the model did not change the main effect observed,  $F(1, 32) = 5.67$ ,  $p < 0.05$ . The results support *hypothesis 1.1* that eliciting conflicting goals can significantly instigate mixed emotions when compared to a condition where the same goals are not in conflict.

In summary, Study 1 showed that mixed emotions can be elicited by manipulating the degree of conflict between a pair of artificially activated goals. Perceived conflict between a pair of goals significantly predicted greater levels of mixed emotions compared to a condition where the same goals were not in conflict. However, it is possible that this effect could have been due to chance (i.e., the sample size was very small). Furthermore, Study 1 cannot determine whether mixed emotions are similar to emotional conflict or emotional ambivalence. Finally, it is possible that mixed emotions are elicited by the simultaneous presence of multiple goals, regardless of whether they are in conflict. To address these

limitations, a second study was conducted which evaluated the association between mixed emotions and emotional conflict. Study 2 also compared the elicitation of mixed emotions with alternative goal dynamics (i.e., facilitating goals) and incorporated an alternative measure of mixed emotions based on the minimum index in order to determine the consistency of the findings, regardless of the measure of mixed emotions.

### 3.5. Study 2

#### 3.5.1. Method

**Participants.** Participants were fifty eight undergraduate students ( $M_{age} = 19.41$  years,  $SD = 2.46$  years; 48 females) who voluntarily participated in exchange for course credits and were told that the study intended to understand the effects of recalling recent events related to personal goals on their affective experiences. The sample size was estimated a-priori using G\*Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007) in order to achieve 80% power, with two groups, a probability error of .05, and a medium to large effect size (based on the meta-analysis presented in chapter 2). One female participant was excluded from the sample because she dropped out of the study before completing the experimental procedure, so the final sample size was composed of 57 participants.

**Procedure.** Participants were randomly allocated (using a computer randomiser) to one of two conditions. In the conflicting goals condition ( $n = 30$ ), participants were asked to recall as vividly as possible a recent event involving conflicting goals. A specific definition of goal conflict (i.e., “*when goals conflict it means that working toward one goal interferes with working towards and attaining another goal*”) and some examples (e.g., “*Maintain or increase my current GPA, spend more time with my friends*”) were provided.

Participants in the facilitating goals group ( $n = 27$ ) were instructed to recall a recent event involving facilitating goals and were provided with a specific definition of facilitating



goals (i.e., “when goals complement each other it means that working toward one goal helps support your efforts at working towards and attaining another goal”) as well as some examples (e.g., “Get in shape for the summer, eat healthier”). In both conditions, participants wrote a detailed description of the event. Participants were encouraged to write what happened in the event, what they thought about, and how they felt.

Mixed emotions were measured directly using four items designed to capture the subjective experience of mixed emotions (i.e., “I’m feeling contrasting emotions”; “I’m feeling different emotions at the same time”. See Table 5), on a five-point Likert format-scale from 1 (*Not at all*) to 5 (*Very much*). This brief scale included two new items that were reverse-coded to exclude instances where participants experienced multiple emotions of one valence (positive or negative; i.e., *I’m feeling clearly positive or negative emotions, not both; “I’m feeling mostly one type of emotion”*). Averaged scores produced a single subjective measure of mixed emotions ( $M = 3.15$ ,  $SD = 0.98$ ;  $\alpha = 0.74$ ).

In order to calculate the minimum index (estimated using the minimum value between positive and negative affect of mixed emotions, Schimmack, 2001), participants completed a scale based on 16-emotion adjectives. This was adapted from a measure developed by Giner-Sorolla (2001) using a unipolar format. Dimensions of positive affect (i.e., enthusiasm, proud, calm, excited, confident, at ease, satisfied and relaxed;  $\alpha = 0.91$ ) and negative affect (i.e., sad, nervousness, angry, frustrated, worried, regretful, bored and ashamed;  $\alpha = 0.81$ ) were calculated. For those emotions that were recorded as felt (i.e., marked as “yes”), the scale ranged from 1 (*very little*) to 7 (*extremely*). Emotional adjectives marked as “no” were coded as zero.

The level of conflict between goals was measured after mixed emotions using one item (“To what extent did one goal have harmful effects on the other goal?”) that evaluated the extent to which one of the goals had harmful effects over the other, using a scale ranging

from 1 (*not at all*) to 5 (*very much*). The level of facilitation between goals was also measured using one item (“*To what extent did one goal help the other goal?*”) that measured the extent to which one of the goals had beneficial effects over the other one (same response scale). Finally, participants completed a short 12-item version of the ambivalence over emotional expression questionnaire<sup>1</sup> (AEQ; King & Emmons, 1990) – e.g., *I would like to express my affection more physically but I am afraid others will get the wrong impression* ( $\alpha = 0.81$ ) – in order to measure emotional conflict. Response were made on a five-point Likert format-scale from 1 (*Not at all*) to 5 (*A great deal*).

*Table 5.* Descriptive statistics and Spearman rho correlations for the direct items to measure mixed emotions in Study 2 (N = 57).

	<i>M</i>	<i>SD</i>	1	2	3	4
1. I'm feeling contrasting emotions.	2.79	1.24	-			
2. I'm feeling different emotions at the same time.	3.02	1.20	0.58**	-		
3. I'm feeling clearly positive or negative emotions, not both.	2.44	1.46	-0.43**	-0.40**	-	
4. I'm feeling mostly one type of emotion.	2.84	1.37	-0.38**	-0.23 <sup>†</sup>	0.42**	-

*Note:* <sup>†</sup>  $p < 0.1$ ; \*\* $p < 0.01$ .

<sup>1</sup> Original item numbers extracted from King and Emmons (1990) were: 1, 3, 4, 5, 6, 8, 10, 11, 15, 23, 26, and 28.

### 3.5.2. Results

Correlations (see *Table 6*) revealed that the minimum index was positively and significantly related to the subjective measure of mixed emotions ( $r = 0.45$ ; 95% *CI*: 0.21 and 0.60). Importantly, both the minimum index of mixed emotions and the subjective measure of mixed emotions showed similar patterns of association with positive and negative affect. These findings provide greater confidence in the appropriateness of the subjective measure of mixed emotions. The variable reflecting mixed emotions was approximately normally distributed for each category of the independent variable (goal conflict vs. facilitating goals) and no outliers were identified.

Manipulation checks showed that participants who wrote about a recent event involving conflicting goals ( $M = 3.70$ ,  $SD = 1.06$ ) reported significantly more harmful consequences between the goals involved,  $t(55) = 8.98$ ,  $p < 0.01$ , compared to participants who wrote about a recent event involving facilitating goals ( $M = 1.37$ ,  $SD = 0.89$ ). Furthermore, participants in the conflicting goals group ( $M = 1.43$ ,  $SD = 1.01$ ) reported significantly less beneficial effects between the goals involved,  $t(55) = 12.43$ ,  $p < 0.01$ , compared to the facilitating goals group ( $M = 4.37$ ,  $SD = 0.74$ ). So as intended, the recent conflicting goals event was perceived as having more harmful effects and less beneficial effects between goals compared to the facilitating goals event.

A multivariate omnibus test showed that the conflicting goals condition produced, on average, higher mixed emotion scores compared to the facilitating goals condition,  $F(2, 53) = 6.83$ ,  $p < 0.01$ . In particular, results yielded a significant effect of condition on the subjective measure of mixed emotions,  $F(1, 54) = 12.94$ ,  $p < 0.01$ ,  $d = 0.98$ . Participants in the conflicting goals condition reported more mixed emotions ( $M = 3.54$ ,  $SD = 0.78$ ) than participants in the facilitating goals condition ( $M = 2.67$ ,  $SD = 1.01$ ). Similarly, the test of the between-subject effect of condition on the minimum index of mixed emotions produced a

significant effect,  $F(1, 54) = 4.47, p < 0.05, d = 0.57$ . Participants in the conflicting goals condition reported more mixed emotions ( $M = 0.68, SD = 0.75$ ) than participants in the facilitating goals condition ( $M = 0.34, SD = 0.38$ ), using the minimum index. These results remained significant after the inclusion of emotional conflict as a covariate. The effects of emotional conflict on both measures of mixed emotions were not significant,  $F$ 's  $< 1.5, p > 0.10$ ). ANOVA revealed no significant differences for gender or age on mixed emotions,  $F$ 's  $< 1$ . Overall, the evidence supports ***hypothesis 1.2***, which stated that mixed emotions will be greater when describing recent conflicting goals compared to describing recent facilitating goals.

As shown in *Table 6*, the raw correlation between positive and negative affect in the conflicting goals group was medium and non-significant ( $r = -0.28; 95\%CI: -0.62 / 0.13$ ); whereas the facilitating goals group exhibited a strong and significant negative correlation ( $r = -0.75; 95\% CI: -0.89$  and  $-0.44$ ). These findings are in line with the **Hypothesis 1**, which broadly states that mixed emotions are elicited following the activation of conflicting goals. This pattern remained similar when using polychoric correlation, as suggested by Schmukle and Egloff (2009).

Although not hypothesised, mixed emotions correlated positively with positive affect and correlated negatively with negative affect in the conflicting goals condition, but showed the inverse relationship in the facilitating goals condition (see *Table 6*). Finally, the non-parametric correlation between mixed emotions and emotional conflict was almost null ( $r = -0.01; 95\%CI: -0.28 / 0.25$ ), with the same pattern as the correlation between the minimum index of mixed emotions and emotional conflict, ( $r = -0.11; 95\%CI: -0.37 / 0.16$ ). This provided additional evidence to support the idea that emotional conflict and mixed emotions are separate and distinct constructs.

Table 6. Descriptive statistics and Spearman rho correlations for the different measures of affect in Study 2 (N = 57).

	<i>M</i>	<i>SD</i>	Positive affect	Negative affect	Emotional conflict	Subjective measure	Minimum index
<b><i>Conflicting goals group</i></b>							
Positive affect	0.79	0.88	-				
Negative affect	2.26	1.19	-0.28	-			
Emotional conflict	2.91	0.82	-0.26	0.38*	-		
<i>Mixed emotions indices</i>							
Subjective measure	3.54	0.79	0.38*	-0.24	-0.13	-	
Minimum index	0.68	0.75	0.98**	-0.22	-0.20	0.36*	-
<b><i>Facilitating goals group</i></b>							
Positive affect	2.75	1.91	-				
Negative affect	0.63	0.81	-0.75**	-			
Emotional conflict	2.64	0.70	-0.20	0.34 <sup>†</sup>	-		
<i>Mixed emotions indices</i>							
Subjective measure	2.67	1.00	-0.42*	0.53**	-0.01	-	
Minimum index	0.34	0.38	-0.45*	0.76*	-0.06	0.50**	-
<b><i>Full sample</i></b>							
Positive affect	1.70	1.75	-				
Negative affect	1.50	1.31	-0.69**	-			
Emotional conflict	2.78	0.78	-0.28*	0.39**	-		
<i>Mixed emotions indices</i>							
Subjective measure	3.15	0.98	-0.25 <sup>†</sup>	0.37**	-0.01	-	
Minimum index	0.53	0.62	0.18	0.24 <sup>†</sup>	-0.11	0.45**	-

Note: <sup>†</sup>  $p < 0.1$ ; \* $p < 0.05$ ; \*\* $p < 0.01$ . Polychoric correlations showed a similar pattern between positive affect and negative affect across groups: conflicting goals group = -0.29, *ASE*: 0.18; facilitating goals group = -0.80, *ASE*: 0.08; full sample = -0.72, *ASE*: 0.07. *ASE*: asymptotic standard error.

### 3.6. Discussion

Study 1 showed that mixed emotions were triggered by activating goal conflict and demonstrated that mixed emotions emerge when a person decides about a situation involving conflicting goals *in the moment*. This effect has only been previously recorded when evaluating the outcomes of personal decisions (e.g., Larsen, McGraw, Mellers, & Cacioppo, 2004). In Larsen et al.'s study, participants reported their emotional experiences immediately after being exposed to a series of gambling tasks manipulated to generate mixed outcomes (i.e., disappointing wins or relieving losses) or outright outcomes. Results showed that people experienced greater mixed emotions after winning less than they expected or losing less than they expected compared to outright wins. However, Study 1 evaluated mixed emotions during the decision-making process adding value to the idea that mixed emotions are not a by-product of certain outcomes; rather, mixed emotions are produced by a situation involving decisions where an actual goal conflict is present.

Study 2 confirmed that it is conflict between goals that prompts mixed emotions, rather than multiple goal activation of another kind (i.e., facilitating goals). Moreover, Study 2 showed that the effect of goal conflict on mixed emotions was equivalent when two different measures of mixed emotions were employed: a subjective measure of mixed emotions, and an indirect measure using the minimum index. Finally, Study 2 showed negligible correlations between emotional conflict and both the subjective measure of mixed emotions and the minimum index suggesting that emotional conflict is distinct from mixed emotions. Overall, Study 1 and Study 2 support notions derived from PCT that conflicting goals are followed by a flow of emotions. The flow of emotions originally described by Powers (2014) may be the experience of mixed emotions. Although other flows of emotions may be equated with Powers' ideas, the evidence of these two studies indicates that goal conflict is a significant precursor of mixed emotions.

**Contributions.** This chapter has made three distinct contributions to the understanding of mixed emotions. Firstly, the studies presented identify goal conflict as a meaningful precursor or antecedent of mixed emotions. This finding is in accordance with previous conceptualisations of goal conflict as a predictor of mixed emotions (e.g., Ellsworth & Scherer, 2003; Fishbach & Ferguson, 2007), but extends these conceptualisations by, for the first time, providing empirical evidence that goal conflict elicits mixed emotions. Specifically, conflicting goals were found to be a reliable predictor of mixed emotions, both for artificially activated and naturally occurring goal conflicts.

In light of recent research showing that experiencing conflicting goals seems to be the rule rather than the exception in life (Köpetz et al., 2011), the current evidence about the impact of conflicting goals on mixed emotions suggests that mixed emotions have a pervasive role in everyday life. It has previously been argued that mixed emotions may be a rare event (Larsen et al., 2003; Larsen & McGraw, 2011), but several studies have demonstrated that conflicting goals occur frequently (Hofmann, Vohs, & Baumeister, 2012; Köpetz et al., 2011), and as a consequence, mixed emotions may be similarly ubiquitous.

Secondly, the present research suggests that previous conceptualisations of mixed emotions as equivalent to emotional conflict may not be accurate. Carver and colleagues (2000) conceptualised mixed emotions as the emotional ambivalence that results from conflict between approach and avoidance motivations, which in turn, may produce negative consequences for individual well-being. However, the evidence presented in Study 2 showed that mixed emotions are only moderately correlated with emotional conflict. Mixed emotions do not represent a marked emotional conflict itself, but instead appear as an expected consequence of goal conflict. Mixed emotions and emotional conflict should therefore not be treated as the same construct.

The schism between mixed emotions and emotional conflict that was established is important for understanding how mixed emotions may contribute to well-being. Previous research has shown that feelings of self-worth (self-esteem) assist in the resolution of goal conflict, alleviating people's tension resulting from situational risks involving incompatible action tendencies (Cavallo, Holmes, Fitzsimons, Murray, & Wood, 2012). Similarly, other studies have suggested that optimism may moderate the association between goal conflict and well-being, helping people to overcome the negative consequences of experiencing conflict. However, the distinction between emotional conflict and mixed emotions suggests that another way by which people can overcome the negative consequences of goal conflict on well-being (e.g., Emmons & King, 1988; Emmons & Colby, 1995; King & Emmons, 1990, 1991) is through the experience of mixed emotions. The elicitation of mixed emotions from goal conflict is, therefore, a fundamental step towards examining the association between mixed emotions and well-being, which will be fully explored in forthcoming chapters.

Finally, this chapter also contributed with new evidence about the utility of using a subjective measure of mixed emotions. Previous studies have led some researchers to maintain that directly asking people to report whether they are experiencing mixed emotions could be inappropriate (e.g., Larsen et al., 2001). However, the evidence provided here supports the utility and validity of subjective measures of mixed emotions. This resonates with previous ideas presented in chapters 1 and 2 about the importance of the subjective experience of mixed emotions. Chapter 1 emphasised the relevance that the subjective experience of complex emotions has to understanding phenomena such as dialecticism. Similarly, the conclusions presented in chapter 2 stressed the importance of incorporating a broader conceptualisation of mixed emotions, which recognises the subjective experience as a constituent component of "feeling mixed". The evidence presented here substantiates these



assertions, and provides initial support for the conceptualisation of mixed emotions as an integral experience.

Importantly, across two studies, the subjective measure of mixed emotions reflected the expected influence of conflicting goals on mixed emotions. Moreover, the subjective measure was significantly correlated with measures of mixed emotions inferred from the minimum value between positive affect and negative affect, which, discussed in chapter 2, has been used extensively in the mixed emotions literature. It is possible that previous attempts to measure mixed emotions using subjective measures did not produce consistent findings (e.g., Larsen et al., 2001) because they assessed combinations of emotions (e.g., bittersweet) rather than directly assessing the subjective experience of mixed emotions. The advantage of using a subjective measure of mixed emotions is that it does not require measurement of a large set of emotional adjectives to estimate the presence of mixed emotions. This may be particularly useful in intensive longitudinal designs where the use of emotional adjectives to infer mixed emotions would be cumbersome.

**Limitations.** It is important to take into account several limitations of the current studies. Firstly, the generalisability of the findings reported in Study 1 and 2 is limited. It is possible that different types of conflict, especially conflict involving long and short-term goals may not result in the experience of mixed emotions. Furthermore, the samples consisted mostly of students which may limited the generalisability of the present findings to other, more diverse, populations.

Additionally, the evidence presented here focussed only on emotional conflict related to emotional expression. The variable used to evaluate emotional conflict was the degree of ambivalence over emotional expression. Although previous research has shown an association between emotional expression and actual feelings (e.g., Kraft & Pressman, 2012), it is possible that the association between mixed emotions and emotional conflict could be

different using alternative measures of emotional conflict, such as inner feelings. This limitation should be addressed in future studies incorporating broader and different methods to unravel the relationship between emotional conflict and mixed emotions. Further replications of the association between goal conflict and mixed emotions may also help to clarify the distinction between emotional conflict and mixed emotions.

Another limitation of the studies presented in the current chapter is that they were exclusively based on experimental designs, which although provide evidence for causal processes, suffer from reduced ecological validity. For example, it is possible that conflicting goals do not predict mixed emotions in everyday life, and that the evidence presented here is an artifact produced by the experimenter or participants biases, such as desirability.

**Conclusion.** In sum, as expected from **Hypothesis 1**, evidence derived from two experiments demonstrated that goal conflict was a relevant antecedent of mixed emotions. Importantly, mixed emotions were also found to be distinguishable from emotional conflict. This is important because emotional conflict (i.e., ambivalence over the expression of emotions) has shown consistent negative associations with well-being (e.g., Emmons & King, 1988; Emmons & Colby, 1995; King & Emmons, 1990, 1991). Thus, further research investigating the association between mixed emotions and well-being may hypothesise that mixed emotions have beneficial effects, as suggested in chapter 1. The investigation of the beneficial effects of mixed emotions on eudaimonic well-being is the main goal of chapters 4 and 5. Studies presented in the following chapters will incorporate different designs (e.g., experience sampling methods, cross-sectional designs) to confirm the effects of goal conflict on mixed emotions and will examine the association between mixed emotions and eudaimonic well-being. Finally, several of the limitations identified in the present chapter will be addressed in the following chapters by using different study designs (i.e., cross-sectional design in Study 3 and experiencing sampling design in Study 5) and different

analytical techniques (e.g., structural equation modelling, multilevel modelling) in order to provide additional support for the idea that goal conflict predicts mixed emotions.

#### 4. CHAPTER FOUR: MIXED EMOTIONS AND EUDAIMONIC WELL-BEING

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*“And this very thing constitutes the virtue of the happy man and the smooth current of life, when all actions promote the harmony of the spirit dwelling in the individual man with the will of him who orders the universe.”*

*Diogenes Laertius (Lives of Eminent Philosophers; VII.87).*

**D**iogenes Laertius wrote these lines reflecting on the contribution of Zeno of Citium in defining what constitutes living a life guided by virtue, in balance with nature.

According to Diogenes Laertius (trans. 1925), a good life for Zeno was linked to a sense of harmony between human and natural order. This notion of well-being was later continued by Aristotle, who developed his own rationale of virtues. For Aristotle, the ultimate aim of life is *eudaimonia* (trans. 1999). In Aristotelian ethics, *eudaimonia* corresponds to the cultivation of all the virtues accessible to the human spirit in correct and well balanced proportions. For example, Aristotle mentioned that bravery is an important human virtue, which needs to be moderated with the correct regulation of our own appetites, the virtue of temperance (trans. 1999). Aristotelian ethics also conceive that *eudaimonia* is about living consistently with one's true self (*daimon*), exploiting human potential through virtue (trans. 1999). Thus, the concepts of harmony between the different aspects that constitute human existence and integrity have been largely acknowledged in philosophy to define human wellness.

Likewise, in psychology, eudaimonic well-being refers to the integration of multiple human potentials that permit people to live congruently with their values, ideals, and actions (Ryan & Deci, 2001; Ryff & Singer, 1998, 2008). Similar approaches to eudaimonic well-being have emphasised the importance of achieving goals that foster a meaningful life, in spite of momentary restraint (Ryan et al., 2008). The eudaimonic principles of balance

between different aspects of life and the development of human potential are therefore preserved in the psychological concept of eudaimonic well-being.

The concept of eudaimonic well-being diverges from the positive psychology approach which emphasises that positive emotions and satisfaction with life are the hallmarks of a good life (Diener, 1984; Diener et al., 1999; Kahneman et al., 1999). Although eudaimonic and hedonic approaches are distinct constructs, they are related to, and predicted by, similar factors (e.g., education, age; Keyes, Shmotkin, & Ryff, 2002). Hedonic accounts assume that people are driven by pleasure, and therefore, that well-being is enhanced to the extent that pleasure is maximised and pain is minimised (Diener, 1984; Diener et al., 1999; Kahneman et al., 1999).

However, research has started to provide initial evidence suggesting that negative as well as positive emotions may have beneficial effects for individuals' well-being (e.g., Tamir & Ford, 2012; McNulty, 2010). For example, Tamir and Ford (2012) found that people who preferred to feel angry in situations characterised by confrontation and happy in situations characterised by collaboration reported higher levels of psychological well-being and life satisfaction, and also had better University grades; whereas those that preferred to feel happy in confrontation situations or angry in collaborative situations reported lower psychological well-being and life satisfaction. These findings reveal that the experience of positive emotions is not sufficient to predict a better life; the examination of the conditions under which certain characteristics promote or hinder well-being are equally important.

The relevance of the antecedents that promote certain emotional experiences which may positively influence well-being has been also recognised by the dynamic model of affect (DMA; Reich et al., 2003; Zautra, 2003). The DMA argues that people who experience mixed emotions when facing stressful situations can benefit from these complex emotional

experiences and boost their well-being (e.g., Coifman et al., 2007; Reich et al., 2003). For example, recent evidence has shown that inducing emotional experiences characterised by sadness and joy in the context of nostalgia-provoking events significantly predicted resilience to stress (Braniecka, Trzebinska, Dowgiert, & Wytykowska, 2014, Study 3).

In accordance with theories emphasising the importance of the conditions that promote well-being (McNulty & Finchman, 2011), the approach considered in this research project is that goal conflict is the main precursor of mixed emotions (as shown in chapter 3), and in turn, that the experience of mixed emotions may help people to overcome the negative effect of these conflicting goals, benefiting from their resolution. This research therefore expands the implications of mixed emotions on individual well-being beyond recovery from (or resilience to cope with) stressful situations. Understanding goal conflict as the main predictor of the experience of mixed emotions insinuates that transient mixed emotions experiences may be beneficial under some circumstances.

Precisely, the present chapter explores whether mixed emotions can positively influence eudaimonic well-being. Responding to complex social environments usually involves dealing with conflicting scenarios, offering multiple courses of action. In such situations, gaining a balance between different needs, ideals, and behaviours may be particularly difficult. Mixed emotions are proposed to be responsible for helping individuals to consider the full nature of the situation, assisting equilibration between multiple aspects of complex events, and ultimately, enhancing eudaimonic well-being.

Hence, the goal of chapter 4 is to investigate the effects of mixed emotions on eudaimonic well-being. This goal looks to satisfy **Hypothesis 2** presented in chapter 1, which states that experiencing mixed emotions in the context of goal conflict will positively predict eudaimonic well-being. Firstly, two approaches to understand eudaimonic well-being are

described to offer support for this hypothesis. This section of the chapter is useful because it reflects two main methodological streams employed to investigate the construct of eudaimonic well-being, which in turn, serves as general background for the selection of the eudaimonic well-being measures used in this chapter and chapter 5. Next, research linking mixed emotions and well-being is presented. This section includes research showing an association between mixed emotions and well-being as a broad concept (not specifically related to eudaimonic well-being as it is understood here). This section does not include longitudinal research directly investigating the association between mixed emotions and well-being (e.g., Hershfield et al., 2013), which has mainly relied on correlational indices of mixed emotions (Appendix 1 can be consulted on this respect). Finally, two studies investigating the effect of mixed emotions on eudaimonic well-being are reported and later discussed in terms of what they contribute to the investigation of eudaimonic well-being and the relevance of mixed emotions for individuals' life.

#### **4.1. Conglomerated and meaning-based theories of eudaimonic well-being**

As mentioned in chapter 1, eudaimonic well-being is understood as the meaning-making process that creates balance between different spheres of an individual's life (e.g., purpose in life, autonomy, social relationships). Eudaimonic well-being also entails individual engagement with life challenges and goals (Keyes et al., 2002), and congruency between personal goals and individual values (Sheldon & Elliot, 1999).

The concept of eudaimonic well-being is important because it introduces the idea that human thriving can be understood as progression towards meaningful goals and equilibrium between multiple strands of experience, contrasting with approaches that favour hedonistic principles (e.g., Diener, 1984; Diener et al., 1999; Kahneman et al., 1999). Experiencing greater eudaimonic well-being has been also associated with relevant health-related variables.

For example, Wood and Joseph (2010) investigated the association between eudaimonic well-being and depression. A sample of 5,556 individuals completed the psychological well-being scale and also completed a validated measure of depression 10-years later. Results revealed that people who scored lower on the psychological well-being scale were seven times more likely to be depressed 10 years later, even after controlling for relevant personality, socioeconomic, and health-related variables.

Theories of eudaimonic well-being can be classified into two types. The first type emphasises the integration of multiple features of people's lives (conglomerated theories; Ryff, 2014; Ryff & Singer, 1998, 2008; Seligman, 2002, 2011); this approach stresses the multifaceted nature of well-being by integrating different aspects of human flourishing. Conglomerated theories of eudaimonic well-being emphasise the integration of different aspects of eudaimonic well-being. Emulating Aristotle's tradition, conglomerated theories favour the balance of multiple virtues as the main definition of eudaimonic well-being.

The second type of theory emphasises the meaning-making processes that facilitate the realisation of human potential (meaning-based theories; Huta & Ryan, 2010; Ryan et al., 2008; Waterman, 1990a, 1990b, 2008). Meaning-based theories understand eudaimonic well-being mostly as personal integrity or living consistently with one's goals and actions. The notion of integrity is similar to Aristotle's idea of finding the true self through virtues. These theories usually understand the construct of eudaimonic well-being as a unidimensional construct, even though they acknowledge that the concept of eudaimonic well-being is constituted by multiple aspects (e.g., Waterman et. al., 2010).

Of course this classification is arbitrary because most theories of eudaimonic well-being commonly acknowledge both aspects as relevant determinants of eudaimonia (e.g., Jayawickreme, Forgeard, & Seligman, 2012; Ryff, 2013), but the distinction between



conglomerated and meaning-based theories is useful in terms of the methods used to investigate the antecedents and consequences of eudaimonic well-being. This distinction is also useful because it can be used to address previous criticisms about the relevance of separating hedonic and eudaimonic well-being (Kashdan, Biswas-Diener, & King, 2008). It has been mentioned that making finer distinctions between hedonic and eudaimonic well-being may be scientifically inappropriate because the lack of measurement tools to tap into the construct of eudaimonic well-being (Kashdan et al., 2008).

The distinction between conglomerated and meaning-based theories of eudaimonic well-being accounts for recent methodological advances in the measurement of eudaimonic well-being. Measures corresponding to each approach vary from scales such as the psychological well-being scale (Ryff, 1989), which encompasses six dimensions, to scales such as the eudaimonic well-being scale (Waterman et al., 2010), which is a unidimensional scale that privileges the congruency between values and goals as the key components of eudaimonia. This distinction also reflects the inflections that different psychological theories have given to a conceptualisation of well-being mainly inherited from Aristotelian conceptions of what it is to live *a good life*. The present chapter emphasises a meaning-making perspective, whereas chapter 5 uses the psychological well-being model (Ryff, 1989, 1995; Ryff & Keyes, 1995; Ryff & Singer, 1998), which is closer to the conglomerated approach.

#### **4.1.1. Conglomerated theories of eudaimonic well-being**

The psychological well-being theory (Ryff, 1989, 1995; Ryff & Keyes, 1995; Ryff & Singer, 1998) can be characterised as a conglomerated theory of eudaimonic well-being. According to this theory, the philosophical roots of well-being as well as classic existential and humanistic theories have proposed a number of overlapping conceptions to understand

positive psychological functioning (Ryff, 1995, 2013, 2014; Ryff & Singer, 2008). The theory distils points of convergence between these different psychological and philosophical traditions into six key strands of well-being: *Self-acceptance*, which refers to having positive perceptions towards oneself; *positive relations with others*, defined as having warm, trusting interpersonal relationships; *autonomy*, understood as self-determination and an internal locus of evaluation; *environmental mastery*, which refers to having the ability to choose or create environments appropriate to healthy psychological conditions; *purpose in life*, defined as holding beliefs about individual's meaning in life; and *personal growth*, related to developing one's potential and thriving as a person. These dimensions are measured using the psychological well-being scale (Ryff, 1989; Ryff & Keyes, 1995).

Each of these dimensions represents critical aspects of well-being (Ryff & Singer, 1998). People who maintain satisfactory levels on these dimensions are presumed to be fulfilled and healthy. Furthermore, it is said that balance between these dimensions and making progress in each of them characterises what it is to feel well and fully functioning (Ryff & Singer, 2008). Human fulfilment is achieved by personally developing these dimensions and, as in Aristotle's virtues, finding a middle ground between excess and deficiency (Ryff & Singer, 2008).

Research evaluating the impact of the six dimensions of psychological well-being has shown that Ryff's approach is not only a valid and reliable method to assess individual well-being (Ryff, 1989; Ryff & Keyes, 1995), but also that higher scores on the measure are associated with health-related outcomes. For example, a study investigating the neurobiological correlates of psychological well-being showed that higher scores on the psychological well-being scale predicted lower levels of salivary cortisol and lower levels of inflammatory markers (both common physiological markers of stress), as well as higher level of HDL cholesterol (commonly called the "good" cholesterol) (Ryff, Singer, & Love, 2004).

Similarly, data from the Survey of Midlife Development in the US (MIDUS; Morozink, Friedman, Coe, & Ryff, 2010) demonstrated that psychological well-being moderated the association between low socioeconomic status and elevated inflammatory markers. In particular, people from low socioeconomic groups who scored higher in environmental mastery, positive relations with others, purpose in life, and self-acceptance had lower levels of IL-6 (interleukin, associated with pathogenic inflammatory processes) compared to people from the same socioeconomic group who scored lower on the same psychological well-being dimensions.

Another theory that fits with the conglomerated approaches is Seligman's well-being theory (Seligman, 2002, 2011). This theory states that five dimensions define well-being: *engagement*, defined as the state of being fully concentrated in what one is doing; *positive relationships*, defined as the pursuit of gratifying relationships for their own sake; *pursuit of meaning*, which involves having beliefs about the importance of certain goals beyond immediate gratifications; *accomplishment*, which refers to the sense of achievement of relevant goals; and finally, *positive emotions*, which consists of maximising happiness.

Contrasting with the psychological well-being theory, this approach recognises the importance of maximising pleasure, much like hedonistic theories. Furthermore, the decomposition of well-being into five dimensions is neither exclusive nor exhaustive, but rather represents a preliminary approximation of the scientific exploration of what constitutes a good life (Jayawickreme et al., 2012). Therefore, a fulfilled life can be obtained by pursuing or attaining one or more of these five aspects of well-being (Seligman, 2011).

#### **4.1.2. Meaning-based theories of eudaimonic well-being**

Self-determination theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000) has embraced a meaning-based conception of eudaimonic well-being. According to SDT, individuals are driven to pursue three basic psychological needs: autonomy, competence, and relatedness, from which people foster the most elevated forms of motivation. SDT also asserts that if people are unable to support some of these basic needs, then they will experience detrimental consequences for well-being. Thus, SDT states that the fulfilment of these three psychological needs accounts for psychological growth and well-being (Deci & Ryan, 2000; Ryan & Deci, 2000, 2001).

Importantly, SDT maintains that the fulfilment of these needs fosters eudaimonic well-being (Ryan & Deci, 2001). Fulfilment of these needs is what delineates the meaning and purposes behind human actions, which ultimately, permits people to live well (Ryan & Deci, 2000). One interesting correlate of this approach is that well-being is maximised by achieving congruency between multiple needs and outputs (Ryan & Deci, 2001). For example, someone would feel happier if she managed to be successful while feeling autonomous performing her actions compared to just being successful (Nix, Ryan, Manly, & Deci, 1999). By attaining congruency between different needs and behavioural outputs it is possible to reach a sense of vital functioning (Ryan & Deci, 2008). For example, one study found that declines in vitality observed while performing repetitive actions were reversed in those participants who experienced a greater sense of competence while performing the same task (Ryan, Rigby, & Przybylski, 2006).

In a recent upgrade of the eudaimonic well-being approach derived from the SDT, Ryan and colleagues (Ryan, Huta, & Deci, 2008) argued that eudaimonic well-being concerns the processes and facets of life that help people to live well, whereas hedonic well-

being is the result of improving eudaimonic well-being (Ryan et al., 2008). People are likely to achieve enduring happiness to the extent they are able to live a life that is full of meaning. In contrast, too much emphasis on hedonic outcomes (e.g., positive affect, life satisfaction) may lead people to live a life that is devoid of depth (Ryan et al., 2008). Thus, eudaimonic well-being is “a way of living that is focused on what is intrinsically worthwhile to human beings” (Ryan et al., 2008, pg. 147). This means that eudaimonia is associated with the preeminence of intrinsic, meaningful goals (e.g., love, coherence; Ryan et al., 2008). The attainment of meaningful goals is thought of as satisfying the three basic needs suggested by the SDT, and in turn, satisfaction of those basic needs benefits well-being.

In an effort to gauge the validity of the aforementioned ideas, Huta and Ryan (2010) developed the hedonic and eudaimonic motives for activities questionnaire measure. This measure evaluates the extent to which people pursue hedonic-related goals (e.g., seeking pleasure) or eudaimonic-related goals (e.g., seeking meaning). Findings showed that people who scored higher in both hedonic and eudaimonic motives also had higher levels of satisfaction with life, positive affect, meaning in life, and vitality. In accordance with the theory, people who had higher scores on the eudaimonic-motive dimension reported more meaning in life and vitality compared to those who scored higher on the hedonic-motives dimension only (Huta & Ryan, 2010). Finally, results from an intervention study (Huta & Ryan, 2010, Study 4) showed that higher levels of eudaimonic-motives were associated with greater well-being (vitality and positive affect) after three months; whereas stronger hedonic-motives produced greater well-being (vitality and positive affect) at short-term follow-up.

Another approach that can also be classified as a meaning-based theory is Waterman’s personal expressiveness construct (Waterman, 1990, 1993). Waterman argued that if an individual engages in an activity and as a result she/he reports one or more of the following experiences: *(a)* an intense involvement, *(b)* a special fit with the activity, which is not

characteristic of daily activities, (c) a feeling of being completed or fulfilled, (d) strong impression of meaningfulness, and (e) feelings of being alive, then this person is experiencing an activity as *personally expressive* (Waterman, 1990, 1993). An activity is personally expressive to the extent that such activities aid the development of goals that are consistent with purpose in life (Waterman, 1990). This approach emphasises the subjective experience of eudaimonic well-being. Eudaimonic well-being is the subjective “by-product of engaging in actions consistent with the development and expression of one’s best potentials and the pursuit of intrinsic goals” (Waterman et al., 2010, pg. 42). Eudaimonic well-being is driven by the value and meaning of the activities in which individuals are engaged, rather than the feelings that may accompany these experiences or pure enjoyment (Waterman, 1990). The subjective experience of eudaimonic well-being is used as an indicator to evaluate whether relevant goals are furthered (Waterman et al., 2010).

This theory states that experiences of personal expressiveness are conceptually related to intrinsic motivation (Waterman, 1990). In fact, one study found that participants who generally had higher scores in the subjective scales of intrinsic motivation also reported having a greater amount of activities perceived as personally expressive (Waterman, Schwartz, Goldbacher, Green, Miller, & Phillip, 2003). Another study (Waterman, 1993) found that feelings of personal expressiveness related more strongly to perceptions of striving for excellence (i.e., self-realisation) compared to hedonic enjoyment. Similarly, personal expressiveness was associated with making progress on personally significant goals and feelings of being alive – vitality (Waterman, 1993).

In a recent effort to develop a stronger measure to evaluate the aforementioned notions of eudaimonic well-being, Waterman and colleagues (2010) developed the questionnaire for eudaimonic well-being. This scale is grounded in the ideas of personal expressiveness, according to which eudaimonic well-being mainly refers to the pursuit of

excellence and self-realisation. Evidence has shown that this measure has good validity and reliability (Waterman et al., 2010). Confirmatory factor analyses confirmed that a unidimensional construct fitted the data very well. Additionally, participants who scored higher on this scale also reported stronger personal identity and greater development of personal potentials (Waterman et al., 2010).

Overall, both conglomerated and meaning-based theories of eudaimonic well-being have received considerable attention and have also developed appropriate measures to assess eudaimonic well-being, either emphasising the congruency between multiple facets of individual life or considering self-concordance and meaningful experiences as key determinants of eudaimonic well-being. Of the approaches reviewed here, the psychological well-being model is one of the most studied and widely employed in the literature. Within the meaning-based theories of eudaimonic well-being, Waterman's approach (1990; Waterman et al., 2010) and the evidence derived from the SDT have produced useful measurement instruments that have been proved to be reliable and valid.

#### **4.2. Mixed emotions and well-being**

Evidence connecting mixed emotions and eudaimonic well-being is scarce. The two theories reviewed in chapter 1 that have recognised the importance of mixed emotions in improving well-being - the DMA (Reich et al., 2003; Zautra, 2003) and the co-activation model of healthy coping (Larsen et al., 2003) – have not considered that mixed emotions may benefit eudaimonic well-being. Both theories emphasise the importance of experiencing mixed emotions when facing difficult situations to boost individuals' well-being, but only the DMA provides empirical evidence for this idea.

The DMA (Reich et al., 2003; Zautra, 2003) asserts that individual differences in mixed emotions when facing a stressful situation may be beneficial, with evidence

investigating the impact of individual differences in mixed emotions on health-related variables. For example, Dowd, Zautra and Hogan (2010), investigated the effects of stress on the experience of positive affect and negative affect and how this influenced cardiovascular reactivity and recovery. In this study, participants were artificially exposed to a stressful situation (giving a speech in front of a camera) and were then asked to report on their positive and negative affect, while cardiovascular activity was monitored throughout exposure to the stressful stimulus. Findings showed that those participants who experienced higher levels of positive affect and negative affect during the stressful event had greater cardiovascular recovery, which is an indicator of healthy stress-coping.

The remainder of this subsection briefly overviews three aspects of the literature relevant to the relationship between mixed emotions and well-being. First, indirect findings are reviewed linking mixed emotions and well-being from the socioemotional selectivity theory (Carstensen, 2006; Carstensen, Isaacowitz, Charles, 1999). This approach has linked aging, mixed emotions and well-being, although it has not provided direct evidence of the effects of mixed emotions on well-being. Second, some evidence is reviewed that has tried to establish a negative effect of mixed emotions on well-being, emphasising the conditions that may explain these effects. Finally, some evidence is presented that predicts a direct and positive association between mixed emotions and well-being.

#### **4.2.1. The relationship between mixed emotions and well-being from the socioemotional selectivity theory**

Evidence based on socioemotional selectivity theory (SST; Carstensen, 2006; Carstensen et al., 1999) suggests a link between aging, poignancy – mixed emotions in the face of meaningful endings – and well-being (e.g., Carstensen et al., 2000; Carstensen et al., 2011; Ong & Bergeman, 2004). SST is a life-span theory of motivation that asserts that, as



people age, they are increasingly aware of time constraints and the fragility of life, and as a consequence, they prioritise emotionally meaningful goals in the present that lead them to focus on the most important aspects of life. In contrast, young adults tend to pursue knowledge-related goals and seek new experiences as they perceive the future as expansive (Carstensen, 2006).

Theoretically, these differences are a result of contrasting perceptions of future time, with older adults perceiving time from a limited time perspective, whereas young adults perceive broader time horizons (Carstensen et al, 1999). A main assumption of this theory is that time perspective influences the selection of expansive goals (e.g., making new social contacts) or goals related to feelings (e.g., balancing emotional states) (Carstensen, Fung & Charles, 2003). Whenever time is assessed as limited, individuals will prioritise more present-oriented goals, regulating their emotions to maximise meaningful experiences (Carstensen et al., 1999). The foremost emotional consequence of experiencing a limited time event (e.g., graduation) is poignancy (Ersner-Hershfield, et al, 2008). When facing a limited time experience, people of all ages tend to experience mixed emotions of happiness and sadness concurrently (Ersner-Hershfield, et al, 2008).

However, evidence is not conclusive in demonstrating that the experience of poignancy in the elderly predicts better well-being or health. For example, in one study, Carstensen et al. (2000) surveyed a sample of 184 people, ranging in age from 18 to 94 years. Participants completed a questionnaire designed to evaluate a set of physical and mental health-related problems, and they then reported their affective states five times daily for one week using a list of emotional adjectives. Results showed that mixed emotions, measured as the within-person correlation between positive affect (i.e., the average for positive emotions) and negative affect (i.e., the average for negative emotions), were associated with age but were not related to better mental health. Both older and younger adults experienced

comparable negative emotions in terms of intensity, but older people were more successful at regulating negative emotional states, recovering to a state of positive affect more quickly (Carstensen et al., 2000). This evidence is consistent with research showing that older adults have a greater sense of control over their emotions (Gross, Carstensen, Pasupathi, Tsai, Götestam-Skorpen, & Hsu, 1997).

Similar evidence was found in another study, which showed a high prevalence of mixed emotions in older adults, but again, this is only indirect evidence of their impact on individuals' well-being. Specifically, Carstensen and colleagues (2011) found that people tended to more commonly report feelings of both positive and negative emotions during the same sampling episode when they were older. Furthermore, growth curve analyses showed that positive emotions outweighed negative emotions as people aged, and in turn, positive emotions predicted less mortality, whereas mixed emotions were unrelated to mortality.

#### **4.2.2. When feeling mixed might be bad**

McNulty and Fincham (2011) proposed that a number of constructs that have been traditionally seen as beneficial for well-being could be harmful under certain circumstances. For example, they showed that positive thoughts and optimistic expectations in marriage are beneficial for individual well-being, but only among couples who are satisfied with their relationship. In accordance with this approach, the current research project has suggested that mixed emotions may have beneficial effects on eudaimonic well-being in the context of experiencing conflicting goals. Experiencing mixed emotions under different circumstances may not necessarily predict better well-being.

An example of this is a recent study that showed that mixed feelings in the context of close relationships predicted poorer well-being (Fingerman, Pitzer, Lefkowitz, Birditt, & Mroczek, 2008). In this study, families reported on their positive feelings (e.g., "How much

does he or she makes you feel loved and cared for?”) and negative feelings (e.g., “How much does he or she criticise you?”) towards each other, and also completed measures of well-being. Results showed that, when a family member felt more positive and negative feelings concurrently towards another member of the family, s/he also had higher levels of psychological distress. One possible interpretation of these results (derived from the evidence presented in chapter 3) is that people experienced a form of goal conflict towards a family member (e.g., wanting to be loved, but not wanting to be criticised), but serious conflicting goals within a family might be particularly difficult to solve because of the challenges of getting away from a family member. This in turn, may explain the detrimental effects of mixed emotions.

Another situation where mixed emotions may predict poorer well-being is in the context of contrahedonic motivation (Riediger et al., 2009). Contrahedonic motivations correspond to momentary tendencies to intensify negative affective experiences or to lessen positive ones (Riediger et al., 2014; Tamir, 2009), such as when someone wants to intensify her feelings of anger in order to demonstrate how disappointing an event made her feel. Evidence has shown that mixed emotions may result from such contrahedonic motivations (e.g., Andrade & Cohen, 2007). For example, students who enjoy horror movies are more likely to experience both fear and happiness simultaneously compared to people who avoid horror movies (Andrade & Cohen, 2007, Study 1). Riediger and colleagues (2009) found that contrahedonic motivation was associated with lower levels of emotional well-being, measured as the difference between positive and negative affect. That is, participants who reported the motivation to inhibit positive affect experienced less positive affect on average; whilst when they reported the motivation to enhance negative affect, they also experienced greater negative affect on average. Interestingly, mixed emotions were commonly associated with increased motivation to maintain negative affect, but not the motivation to maintain

positive affect (i.e., prohedonic motivation; Riediger et al., 2009). However, it is less clear from these results whether mixed emotions in the context of contrahedonic motivation produced poorer well-being beyond differential effects between positive and negative emotions. It is possible to presume that these findings only reveal affective fluctuations that do not necessarily predict lower levels of well-being using common well-being measurement instruments, such as those reviewed in section 4.1.

#### **4.2.3. Beneficial effects of mixed emotions on well-being**

Miyamoto and Ryff (2011) investigated the beneficial effects of mixed emotions on well-being in the context of cultural differences between Japanese and American samples in the experience of mixed emotions. Mixed emotions were understood as dialectical emotions, which are characterised as the propensity to experience both positive and negative emotions over time, maintaining a balance between the two (Miyamoto & Ryff, 2011). Cultural differences in the experience of mixed emotions were investigated as a function of differences in the frequency with which individuals experienced these complex emotions over time. Thus, it was hypothesised that mixed emotions experienced moderately frequently within Eastern cultures may be better for individuals' well-being compared to highly frequent mixed emotions or infrequent experiences of mixed emotions. This hypothesis was founded in the notion of an East Asian cultural script which emphasises maintaining balance between positive and negative emotions, contrasting with a Western cultural script which values maximising positive emotions and minimising negative emotions.

Results showed that Japanese participants experienced more mixed emotions as compared to their American counterparts (Miyamoto & Ryff, 2011). Furthermore, Japanese participants were more likely to experience a moderate amount of mixed emotions; that is, they experienced moderately frequent mixed emotions, whereas American participants were

more likely to report a high frequency of positive emotions only (Miyamoto & Ryff, 2011). More importantly, Japanese participants who experienced mixed emotions in moderate amounts reported better health and fewer symptoms related to illness; the opposite pattern was observed for American participants who experienced mixed emotions moderately frequently, after controlling for cultural differences in the level of health (Miyamoto & Ryff, 2011). One explanation for these findings is that a measure of subjective well-being was used (i.e., life satisfaction), which is different from eudaimonic approaches suggested in the current chapter.

The aforementioned research demonstrates the beneficial effects of mixed emotions on well-being for Eastern cultures exclusively. It is worth noting that these findings indicate that the beneficial effects of mixed emotions on well-being can be observed at moderate levels. Too much or too few mixed emotions, measured in terms of either intensity or frequency, could be detrimental for individuals' well-being when experiencing conflicting goals. This evidence sits comfortably with eudaimonic approaches which suggest equilibrium as a means to achieve optimal wellness (e.g., Ryan & Deci, 2001; Ryff & Singer, 1998, 2008).

Recent theoretical contributions (Fredrickson, 2013; Grant & Schwartz, 2011; Warr, 2007) have stressed the importance of investigating non-monotonic effects on well-being, whereby beneficial variables reach inflection points at which their effects turn detrimental. For example, Warr (1987, 2007) proposed that certain job characteristics such as job demands and job autonomy resemble vitamins A and D because, above certain thresholds, they can have negative consequences for employee well-being (i.e., job-related anxiety, reduced job satisfaction, emotional exhaustion). Research in emotion science has also found that individuals who experience high cheerfulness are more likely to engage in risky behaviours (Martin, Friedman, Tucker, Tomlinson-Keasey, Criqui, & Schwartz, 2002) which

are detrimental to well-being, suggesting a nonlinear trend in the relationship between the positivity of emotions and well-being.

Grant & Schwartz (2011) reviewed a large body of evidence showing that variables which have been traditionally seen as linearly predicting well-being (e.g., optimism, vitality, self-esteem), are in fact better represented as curvilinear effects, demonstrating that a mechanism that accounts for balanced levels in the form of an inverted-U curve may fit the data better. Thus, following previous evidence and recent theoretical contributions, it is relevant to explore whether nonmonotonic effects of mixed emotions on well-being may provide further evidence about the benefits of experiencing mixed emotions.

In conclusion, evidence linking mixed emotions and well-being is unfortunately limited and mostly indirect, such as the evidence derived from tests of socioemotional selectivity theory (e.g., Carstensen et al., 2000; Carstensen et al., 2011; Ong & Bergeman, 2004). Other research has even suggested that mixed emotions negatively predict well-being, such as feeling mixed towards significant others (e.g., Fingerman et al., 2008). Crucially, none of these previous findings, or the evidence that directly demonstrates the beneficial effects of mixed emotions (Miyamoto & Ryff, 2011), have investigated the potential effects of mixed emotions on eudaimonic well-being. The concept of eudaimonic well-being is a relevant construct that should be explored in conjunction with mixed emotions. If, as suggested in previous chapters, mixed emotions facilitate the integration of complex information, helping individuals to gain equilibrium between disparate courses of action when facing conflicting goals, then it is reasonable to speculate that mixed emotion may participate in the process through which individuals engage in meaningful goals, achieving balance among multiple strands of individual experience. Finally, in this exploration, it is also worth investigating whether the effect of mixed emotions on eudaimonic well-being follow a

non-monotonic pattern, as previous evidence (Miyamoto & Ryff, 2011) and recent theoretical accounts would imply (e.g., Grant & Schwartz, 2011).

### **4.3. Overview of Studies 3 and Study 4**

The main goal of chapter 4 is to evaluate whether the experience of mixed emotions positively influences eudaimonic well-being. In doing so it is expected to provide evidence for **Hypothesis 2**, which states that experiencing mixed emotions, in the context of goal conflict, will positively predict eudaimonic well-being. This was achieved by conducting two studies, numbered Study 3 and Study 4 in the current chapter.

Study 3 used a cross-sectional design to firstly confirm whether mixed emotions are experienced after situations involving conflicting goals, as presented in chapter 3 dedicated to test **Hypothesis 1**. Secondly, Study 3 had the objective of distinguishing the concept of mixed emotions from the concept of emotional conflict. This was also done in Study 2, but it is necessary to provide further evidence of the extent to which these constructs can be distinguished because previous findings have demonstrated the negative impact of emotional conflict on well-being (e.g., King & Emmons, 1990). Examination of the distinguishability of these constructs was performed by testing their respective association with positive and negative emotions. Thirdly, Study 3 evaluated the association between mixed emotions and eudaimonic well-being, over and above emotional conflict and meaning in life. It is important to demonstrate that the hypothesised effect of mixed emotions experiences on eudaimonic well-being is supported accounting for related constructs, because the concept of eudaimonic well-being derived from meaning-based theories strongly emphasises purpose in life and the relevance of meaningful experiences (e.g., Huta & Ryan, 2010; Waterman et. al., 2010).

Study 4 used an experimental design, which predicted that experiencing mixed emotions in the face of a meaningful ending (namely, graduation from University) would

enhance perceptions of eudaimonic well-being. The selection of a situation involving a meaningful ending was chosen because it provides a context to assess the main hypothesis of this chapter using a well-tested paradigm (i.e., poignancy; Ersner-Hershfield et al., 2008, 2009). Proximity to graduation was chosen because it has been linked to opposing tendencies (e.g., wanting to maintain close-relationships, whilst simultaneously, expecting to further expand interpersonal horizons in the near future; Zhang & Fung, 2009), which is close to the notion of conflicting goals investigated in this research project. Study 4 also explored the potential for non-monotonic effects of mixed emotions on eudaimonic well-being.

Formally, the following hypotheses were therefore derived (as more specific versions of **Hypothesis 2**).

**H2.1:** Mixed emotions will be positively associated with both positive and negative emotions.

**H2.2:** Ambivalence over emotional expression (i.e., emotional conflict) will be negatively related to positive emotion and positively related to negative emotions.

**H2.3:** Mixed emotions will positively predict eudaimonic well-being, over and above emotional conflict and meaning in life.

**H2.4:** Mixed emotions will be positively associated with eudaimonic well-being in response to a poignant event (graduation).

#### **4.4. Study 3**

##### **4.4.1. Method**

Four hundred and twenty nine students (295 females and 134 males,  $M_{age} = 23.7$  years;  $SD = 6.9$  years), participated in the study in exchange for the opportunity to win vouchers worth £40. The sample size required for the present study was based on the general



recommendations of Bentler and Chou (1987) for conducting Structural Equation Modelling (SEM) analyses. They suggested that the ratio of sample size and number of free parameters should be close to 5:1. For the present study, the models had between 20 and 90 free parameters, which meant that a sample size of about  $N=400$  was appropriate to detect inaccurate models for most of the models tested. This study received ethical approval from the Department of Psychology ethics sub-committee (DESC) prior to beginning the data collection process. Because of reasons related to the accessibility of the sample, participants were recruited from a list of volunteer students and completed a set of questionnaires online. Participants were informed that the study aimed to better understand the relationship between personal goals and emotional experiences.

**Measures.** Once the informed consent form was read and accepted, participants completed the following scales.

***Conflicting goals scale.*** A new measure of conflicting goals was developed based on the strivings instrumentality matrix, which is a self-report measure that evaluates an individual's most important goals (Emmons & King, 1988). The measure consisted of a list of personal goals likely to be relevant to the sample (see *Table 7*) using the goal taxonomy provided by Austin and Vancouver (1996). From the list of goals presented, participants selected the five currently most important goals for them. Based on this selection, participants were asked to rate the extent to which these goals had been in conflict within the last few days by answering three different items, based on the same items used by Emmons and King (1988) in the strivings instrumentality matrix (e.g., “*I think that pursuing some of these goals hurts the pursuit of the other ones*”; “*these goals usually compete for my time*”) on a five-point Likert format-scale from 1 (*Disagree strongly*) to 5 (*Agree strongly*) ( $M = 3.43$ ,  $SD = 0.97$ ;  $\alpha = 0.69$ ). This measure was less time-consuming to complete than the original scale,

which involves generating a list of goals and then comparing each goal with every other in terms of goal conflict.

***Ambivalence over emotional expressiveness questionnaire (AEQ).*** Participants completed the same short version of the AEQ (King & Emmons, 1990) used in Study 2. This scale measures the level of conflict in emotional expression. Participants were required to rate the extent to which each statement represented their feelings on a five-point Likert format-scale from 1 (*Not at all*) to 5 (*A great deal*) ( $M = 2.78$ ,  $SD = 0.86$ ;  $\alpha = 0.88$ ).

***Mixed emotions scale.*** This was the same scale used in Study 1, but this version was re-phrased to measure the presence of mixed emotions in relation to an important event or experience in the last few days. Participants rated the extent to which they had been experiencing mixed emotions within the last few days (e.g., “*I felt contrasting emotions*”), on a five-point Likert format-scale from 1 (*Not at all*) to 5 (*Very much*) ( $M = 3.31$ ,  $SD = 0.98$ ;  $\alpha = 0.85$ ).

***State basic emotions scale.*** Participants completed a validated state basic emotions scale (Power, 2006), which measured five basic emotions experienced during the last few days. Participants were asked to rate the extent to which they felt twenty one affective adjectives comprising five basic emotions: happiness (e.g., *cheerful*;  $M = 4.59$ ,  $SD = 1.23$ ;  $\alpha = 0.86$ ), sadness (e.g., *despair*;  $M = 2.67$ ,  $SD = 1.29$ ;  $\alpha = 0.84$ ), disgust (e.g., *guilt*;  $M = 2.29$ ,  $SD = 1.05$ ;  $\alpha = 0.81$ ), fear (e.g., *tense*;  $M = 3.88$ ,  $SD = 1.32$ ;  $\alpha = 0.84$ ), and anger (e.g., *irritation*;  $M = 3.37$ ,  $SD = 1.15$ ;  $\alpha = 0.79$ ), on a seven-point Likert format-scale from 1 (*Not at all*) to 7 (*All of the time*).

Table 7. List of personal goals used in Study 3 ( $N = 429$ ).

Personal goal	Mentions	Percentage
Getting a good qualification.	321	14.8%
Having a healthy life style.	204	9.4%
Gaining more knowledge in my field of study.	175	8.0%
Keeping positive thoughts in my mind.	138	6.3%
Having an active social life.	137	6.3%
Spending more time with a partner / close friends.	128	5.9%
Earning some money.	124	5.7%
Saving some money.	124	5.7%
Learning new skills (e.g., playing an instrument, speaking foreign languages).	105	4.8%
Stop overthinking in my daily life.	101	4.6%
Trying to eat right.	86	4.0%
Reading more frequently.	77	3.5%
Having more intimate relationships.	71	3.3%
Being personable.	63	2.9%
Engaging in beneficial social activities (e.g. charities, volunteering).	53	2.4%
Avoiding being dependent on others (e.g., boyfriend/girlfriend, friends, parents).	48	2.2%
Being open to new relationships.	44	2.0%
Trying to think more before I speak.	43	2.0%
Avoiding being selfish.	43	2.0%
Avoiding being hurt by others.	31	1.4%
Avoiding being rejected by others.	24	1.1%
Being tidier.	19	0.9%
Quitting smoking.	16	0.7%

*Note:* Goal preference percentages were calculated on the basis of total mentions, and are sorted in descending order.

**Meaning in life questionnaire.** Participants also completed a validated measure of meaning in life, the Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi, & Kaler, 2006). This scale evaluates two dimensions of meaning in life. The presence of meaning in life dimension evaluates the degree to which people are certain about the sense of significance in their lives (e.g., “*my life has a clear sense of purpose*”;  $M = 4.37$ ,  $SD = 1.52$ ;  $\alpha = 0.91$ ). In contrast, the dimension of searching in meaning in life refers to personal motivations to find out meaning in life (e.g., “*I’m seeking a purpose or mission for my life*”;  $M = 4.48$ ,  $SD = 1.45$ ;  $\alpha = 0.90$ ). Participants were required to rate the extent to which 10 statements represented what makes their life important and meaningful on a seven-point Likert format-scale from 1 (*Absolutely untrue*) to 7 (*Absolutely true*).

**Hedonic and eudaimonic motives for activities.** Finally, participants completed the hedonic and eudaimonic motives for activities questionnaire (*HEMA*; Huta & Ryan, 2010). This is a 10-item questionnaire which evaluates the degree to which people approach their activities according to hedonic and eudaimonic principles. The hedonic well-being sub-scale was evaluated using five items (e.g., “*seeking pleasure?*”;  $M = 4.65$ ,  $SD = 1.00$ ;  $\alpha = 0.80$ ) presented on a seven-point Likert format-scale ranging from 1 (*Not at all*) to 7 (*Very much*). The eudaimonic well-being sub-scale was evaluated using four-items (e.g., “*seeking to use the best in yourself?*”;  $M = 5.37$ ,  $SD = 0.99$ ;  $\alpha = 0.76$ ). This scale has shown correspondence with alternative measures of well-being (e.g., life satisfaction, positive and negative affect) both in cross-sectional and longitudinal studies (Huta & Ryan, 2010).

#### **4.4.2. Data analysis**

The data analysis section is presented in a separate sub-section to help the reader to find the information on data analyses easier when examining the results. Much of the data analyses for the current study were conducted using *Mplus 7.3* (Muthén & Muthén, 2012), a

dedicated statistical package to perform a broad range of structural equation modelling (SEM) analyses. SEM is the mathematical integration of factor analysis and path analysis (Wang & Wang, 2012). The critical characteristic is the estimation of unobservable latent constructs (i.e., what researchers think they are measuring, such as motivation or self-esteem) from observed indicators (i.e., the items which purport to measure the corresponding constructs; Wang & Wang, 2012). These latent constructs can be associated, as in regression analysis, but SEM also takes into account measurement error in the observed indicators of the model. Thus, SEM can simultaneously assess the quality of measurement and investigate relationships between constructs (Wang & Wang, 2012).

SEM was used to analyse the data of Study 3 because this technique addresses several limitations that arise from cross-sectional designs, such as lack of control over the variables in the study and the consequent increase in measurement error. Furthermore, SEM enables the researcher to model multiple relationships using more than one dependent variable, also providing several indices (usually called goodness of fit indices) to determine whether the proposed model fits the data well. In other words, SEM makes it feasible to determine whether the model suggested is the best representation among multiple possible associations between the constructs being studied (Wang & Wang, 2012).

Goodness of fit indices can be classified in two types: relative fit indices and absolute fit indices (Little, 2013). Relative fit indices use the null model (i.e., no relationships between variables, also called the worst-fitting model) to index the improvement in model fit that the hypothesised model achieves (Little, 2013). In contrast, absolute fit indices compare the hypothesised model to the saturated model (i.e., the model without degrees of freedom, also called the perfect-fitting model; Little, 2013). *Table 8* provides a description of the most common goodness of fit indices reported in the literature, and used in the current study, as well as some guidelines to interpret them.

The data analysis strategy consisted of three stages. In the first stage, each model was formulated, specifying the constructs and parameters to estimate; this stage involved preparing the structural figures and necessary codes in *Mplus* (Muthén & Muthén, 2012). In the second stage, each model was estimated using maximum likelihood. This stage provided the estimates (beta values, standard errors, and p-values), as well as the goodness-of-fit indices. Finally, in the last stage, each model was evaluated using the guidelines provided in *Table 8*.

At the end of the results section, ancillary analyses are provided to explore potential mechanisms that may mediate the effects of mixed emotions on eudaimonic well-being. Although chapter 5 elaborates in greater detail the mechanisms behind the beneficial effects of mixed emotions on eudaimonic well-being, these analyses serve to extract as much information as possible from Study 3. All these analyses were conducted using PROCESS (Hayes, 2013). This is a dedicated application for conducting a large range of mediation and moderation analyses using bootstrapping, and provides direct and indirect effect size calculations, as well as confidence intervals and standard errors (Hayes, 2013). The main statistics reported are effect sizes and confidence intervals for the indirect effect (the effect of the independent variable on the dependent variable passing through the mediator), the direct (the effect of the independent variable on the dependent variable only), and the total effect (the aggregated effect of the independent variable on the dependent variable, the mediator variable on the dependent variable, and the indirect effect), following Hayes (2013) recommendations for conducting mediational analyses using PROCESS. The effect sizes selected were the proportion of the total effect accounted for by the indirect effect ( $P_M$ ; Wen & Fan, 2015), and the kappa-squared effect size (Preacher & Kelly, 2011).

Table 8. Description and interpretation guidelines for the goodness-of-fit indices used in Study 3.

Goodness-of-fit index	Abbreviation/ symbol used	Description	Interpretation guideline for a good model
Chi-square test	$\chi^2$	Calculated using the degrees of freedom and number of parameters in a model. It follows the Pearson chi-square statistic, so that the higher the value the poorer the model fit.	$\chi^2/df$ ratio > 3 (Tay & Drasgow, 2012) Although the utility of this ratio is matter of debate (Brown, 2014).
Comparative fit index	CFI	The CFI is a relative fit index that indicates how much the hypothesised model fits better than a model assuming there are zero covariances, adjusting for sample size.	$\geq 0.95$ (Hu & Bentler, 1999).
Root mean square error of approximation	RMSEA	The RMSEA is an absolute model fit index calculated using the $\chi^2$ and degrees of freedom of the hypothesised model. It estimates the amount of error per model degrees of freedom, taking sample size into account.	$\leq 0.08$ , plus 90% CI. (Browne & Cudeck, 1992).
Standardised root mean square residual	SRMR	The SRMR is an absolute model fit index calculated using the standardised difference between the observed correlations between variables and the predicted correlations based on the saturated model.	$\leq 0.08$ (Hu & Bentler, 1999).

#### 4.4.3. Results

The results of Study 3 are separated into three subsections. The first subsection sought to replicate the findings presented in chapter 3. In particular, it assessed whether conflicting goals predicted mixed emotions, and secondly, whether mixed emotions were distinct from emotional conflict. The second sub-section is dedicated to examining the influence of mixed

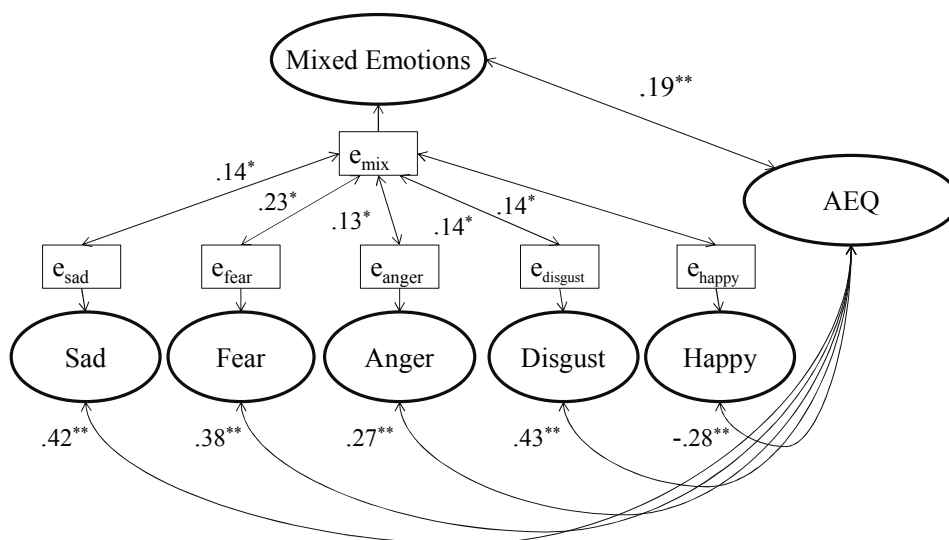
emotions on eudaimonic well-being. Finally, some ancillary analyses are reported describing potential mechanisms that might mediate the effect of mixed emotions on eudaimonic well-being.

**Conflicting goals, mixed emotions, and emotional conflict.** Firstly, the path model representing the effect of conflicting goals on mixed emotions, controlling for gender and age, exhibited satisfactory goodness-of-fit indices,  $\chi^2(25, N = 392) = 34.56$ ,  $CFI = 0.99$ ,  $RMSEA = 0.03$  [ $90\%CI: 0.001 / 0.055$ ],  $SRMR = 0.03$ . More importantly, findings showed that conflicting goals significantly predicted mixed emotions,  $\beta = 0.14$ ,  $p < 0.05$ , though the explanatory power was low,  $R^2 = 0.06$  ( $SE = 0.03$ ),  $p < 0.05$ . This association did not change after the inclusion of emotional conflict as a predictor in the model. Interestingly, the reversed path for mixed emotions predicting conflicting goals was not significant,  $R^2 = 0.03$  ( $SE = 0.02$ ),  $p = 0.16$ . This finding mirrored the evidence presented in chapter 3, and confirmed, once again, **Hypothesis 1** that perceptions of greater goal conflict predict higher levels of mixed emotions.

The correlation between emotional conflict and mixed emotions was estimated using SEM. The model fitted the data well,  $\chi^2(102, N = 429) = 388.77$ ,  $CFI = 0.91$ ,  $RMSEA = 0.08$  [ $90\%CI: 0.073 / 0.090$ ],  $SRMR = 0.06$ . Importantly, the correlation between emotional conflict and mixed emotions was positive and significant,  $r(429) = 0.28$ ,  $p < 0.05$ , but it was not large in magnitude, suggesting a modest overlap between the two constructs. In order to further explore whether mixed emotions can be equated with emotional conflict, the partial correlation between mixed emotions and basic emotions was computed, partialling out the influence of emotional conflict. The model estimated using SEM revealed satisfactory goodness-of-fit indices,  $\chi^2(608, N = 429) = 1632.20$ ,  $CFI = 0.87$ ,  $RMSEA = 0.06$  [ $90\%CI: 0.059 / 0.066$ ],  $SRMR = 0.06$ . A positive and significant correlation was found between mixed emotions and all the basic emotions (happiness, sadness, anger, fear, and disgust). Emotional



conflict was significantly and positively correlated with sadness, fear, anger, and disgust, but significantly and negatively correlated with happiness (see *Figure 6*). Thus, mixed emotions behaved in accordance with the theory by exhibiting a positive association with all the basic emotions, a markedly different pattern compared to emotional conflict. This evidence provides support for both *hypothesis 2.1* and *hypothesis 2.2*. Despite the correlations being small in magnitude, mixed emotions manifested a positive correlation with all the basic emotions measured; whereas emotional conflict showed a positive correlation with the negatively valenced emotions and a negative correlation between emotional conflict and happiness.



*Figure 6.* Conceptual model of the relationship between mixed emotions and the basic emotions scale, controlling for AEQ. \*\*:  $p < 0.01$ ; \*:  $p < 0.05$ .

**Mixed emotions as a predictor of eudaimonic well-being.** In order to determine the influence of mixed emotions on eudaimonic well-being, a preliminary model was built using SEM including mixed emotions as the independent variable, and hedonic well-being and eudaimonic well-being as the dependent variables, controlling for searching for meaning in life, presence of meaning in life, emotional conflict, and the gender and age of the sample.

The model exhibited satisfactory goodness-of-fit indices,  $\chi^2(611, N = 429) = 1620.65$ ,  $CFI = 0.86$ ,  $RMSEA = 0.07$  [90%CI: 0.061 / 0.069],  $SRMR = 0.07$ . As expected, the path analyses showed significant positive associations between mixed emotions and eudaimonic well-being,  $\beta = 0.14$ ,  $p < 0.05$ , and mixed emotions and hedonic well-being,  $\beta = 0.15$ ,  $p < 0.05$ .

Searching for meaning in life also significantly positively predicted eudaimonic well-being,  $\beta = 0.26$ ,  $p < .05$ , but not hedonic well-being,  $\beta = 0.05$ ,  $p = 0.45$ . Presence of meaning in life significantly positively predicted both eudaimonic well-being,  $\beta = 0.40$ ,  $p < 0.05$ , and hedonic well-being,  $\beta = 0.12$ ,  $p < 0.05$ . Emotional conflict did not predict eudaimonic well-being,  $\beta = -0.07$ ,  $p = .30$ , or hedonic well-being,  $\beta = -0.07$ ,  $p = 0.28$ . Finally, age significantly positively predicted eudaimonic well-being,  $\beta = 0.12$ ,  $p < 0.05$ , and significantly negatively predicted hedonic well-being,  $\beta = -0.12$ ,  $p < 0.05$ . Gender did not significantly influence eudaimonic or hedonic well-being. It is also worth noting that the subjective experience of mixed emotions was positively related to searching for meaning in life ( $r = 0.17$ ,  $p < 0.01$ ), whereas a negative association was found between mixed emotions and presence of meaning in life ( $r = -0.15$ ,  $p < 0.05$ ). The structural model is shown in *Figure 7*.

Altogether, the model explained  $R^2 = 0.21$  ( $SE = 0.05$ ),  $p < 0.05$  of the variance in eudaimonic well-being, and  $R^2 = 0.05$  ( $SE = 0.02$ ),  $p = 0.05$  of the variance in hedonic well-being. These findings indicate that mixed emotions positively predicted eudaimonic well-being, even after controlling for relevant variables such as meaning in life. There was also an effect of mixed emotions on hedonic well-being, although its magnitude was small and the amount of variance explained was only marginally significant. All in all, this evidence supports *hypothesis 2.3* that mixed emotions are a positive predictor of eudaimonic well-being, over and above other relevant construct such as emotional conflict and meaning in life.

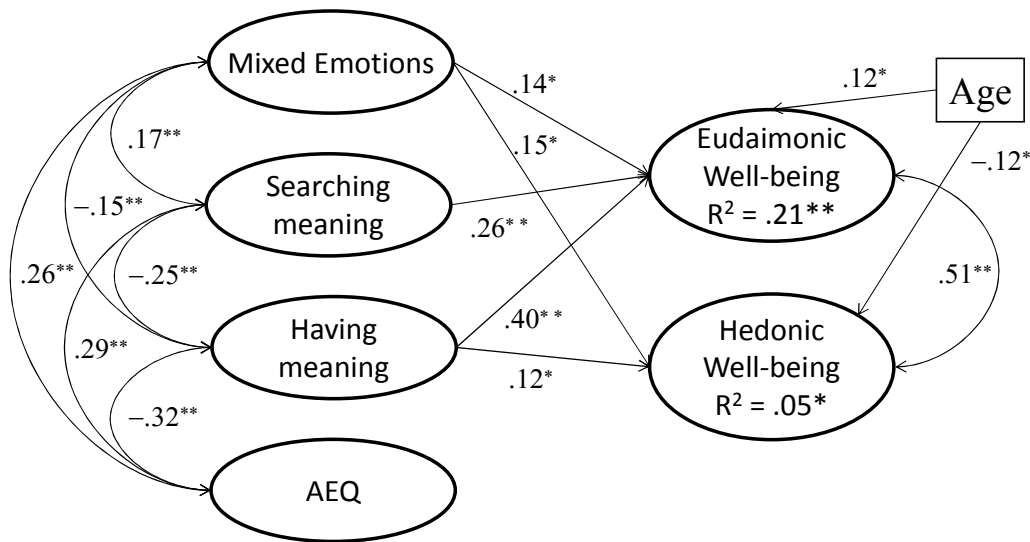


Figure 7. Conceptual structural model of the effect of mixed emotions on well-being, controlling for relevant variables. \*\*:  $p < 0.01$ ; \*:  $p < 0.05$ .

**Ancillary analyses.** Several supplementary analyses were conducted in order to (a) examine whether mixed emotions mediate the relationship between conflicting goals and eudaimonic well-being; (b) evaluate potential mechanisms through which mixed emotions may impact eudaimonic well-being; and (c) assess previous theoretical assumptions presented by the eudaimonic well-being approach derived from SDT.

Firstly, it was tested whether mixed emotions mediated the relationship between conflicting goals and eudaimonic well-being. Results from over 10,000 bootstrap resamples yielded no significant total indirect or indirect effects. Although conflicting goals did positively predict mixed emotions,  $t(419) = 1.99, p < 0.05$  [95%CI: 0.01 / 0.19], conflicting goals did not account for eudaimonic motives through mixed emotions, as interpreted from the effects sizes and corresponding confidence intervals,  $P_M = 0.20$  [95%CI: -0.06 / 25.31],  $k^2 = 0.01$  [95%CI: 0.00 / .03]. Similarly, conflicting goals did not directly predict eudaimonic well-being motives,  $t(417) = 0.79, p > 0.05$ , [95%CI: -0.06 / 0.14].

Secondly, it was tested whether the mechanism through which mixed emotions enhanced eudaimonic well-being was via facilitating the initiation of searching for meaning in life. Results showed that although the direct effect was not different from zero,  $t(418) = 1.70$ ,  $p = 0.09$  [95%CI: -0.01 / 0.18], the total effect was significant,  $t(417) = 2.12$ ,  $p < 0.05$ , [95%CI: 0.01 / 0.20]. More importantly, the indirect effect of mixed emotions on eudaimonic well-being through searching for meaning in life was statistically different from zero,  $P_M = 0.19$  [95%CI: 0.01 / 1.51],  $k^2 = 0.02$  [95%CI: 0.01 / 0.05], providing evidence of a mediational process because the 95% confidence intervals did not include zero. This model also accounted for a small but significant amount of variance,  $R^2 = 0.01$ ,  $F(1, 418) = 4.49$ ,  $p < 0.05$ . Thus, greater levels of mixed emotions appeared to be associated with greater eudaimonic well-being, as a result of a heightened search for meaning in life.

Thirdly, it was explored whether mixed emotions enhanced hedonic well-being as a result of increasing eudaimonic well-being. Results showed that although the direct effect was not different from zero,  $t(418) = 1.50$ ,  $p = 0.13$  [95%CI: -0.02 / 0.17], the total effect was significant,  $t(417) = 1.97$ ,  $p < 0.05$  [95%CI: 0.01 / 0.20]. The indirect effect from mixed emotions on hedonic well-being through eudaimonic well-being was statistically different from zero,  $P_M = 0.25$  [95%CI: 0.01 / 2.06],  $k^2 = 0.02$ , [95%CI: 0.01 / 0.05], supporting a mediation explanation due to the corresponding 95% confidence intervals not including zero. This model also accounted for a small but significant amount of variance,  $R^2 = 0.01$ ,  $F(1, 419) = 3.86$ ,  $p < 0.05$ . Thus, participants who reported greater levels of mixed emotions appeared to also have higher levels of hedonic well-being as a result of heightened eudaimonic well-being.

Finally, the previous two mediational models were put together in a serial multiple mediation model (see *Figure 8*). Results revealed that the direct effect of mixed emotions on hedonic well-being was not different from zero,  $t(419) = 1.57$ ,  $p = 0.12$  [95%CI: -0.02 / 0.18], whereas the total effect was marginally significant,  $t(419) = 1.94$ ,  $p = 0.05$  [95%CI: -0.01 /

0.20]. However, the indirect effect of mixed emotions on hedonic well-being transmitted via searching for meaning in life and, in turn enhanced eudaimonic well-being was different from zero,  $P_M = 0.05$  [95%CI: 0.01 / 0.65], providing preliminary evidence of a serial multiple mediation. Furthermore, although the overall explanatory power of the model was modest, it was possible to observe an improvement from the simple model of mixed emotions predicting searching for meaning in life,  $R^2 = 0.02$ ,  $F(1, 418) = 4.55$ ,  $p < 0.01$ , to the more complex model including two mediators in series,  $R^2 = 0.06$ ,  $F(3, 416) = 8.66$ ,  $p < 0.01$ . Age and gender were not significant when included in the model. Findings support the mediation of searching for meaning in life and eudaimonic well-being as key mechanisms for explaining how mixed emotions can yield hedonic well-being.

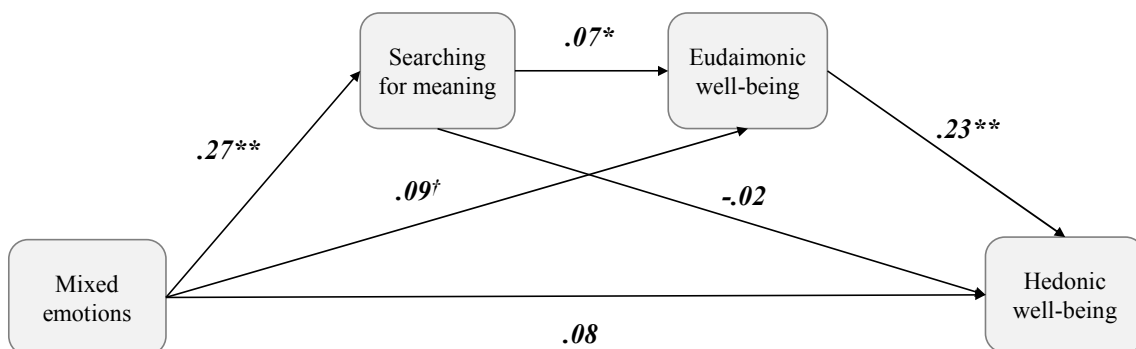


Figure 8. Conceptual diagram of the serial multiple mediation model involving mixed emotions predicting hedonic well-being, through the effect of searching for meaning in life and eudaimonic well-being. \*\*:  $p < 0.01$ ; \*:  $p < 0.05$ , †  $p < 0.10$ .

## 4.5. Study 4

### 4.5.1. Method

**Participants.** Fifty eight students in the final year of their undergraduate or postgraduate studies (36 females and 22 males,  $M_{age} = 24.0$  years;  $SD = 4.3$  years), participated in the study in exchange for the opportunity to win vouchers worth £30. The sample was exclusively composed by students who were about to shortly leave University. From this sample, six participants (two females and four males) dropped out of the study, so the final sample size was composed of  $N = 52$  participants. This sample size satisfied calculations of the required sample size for the present study. The power analysis was performed using G\*Power 3.1 (Faul et. al., 2007) in order to achieve 80% power, with a within-person design involving one group, two measurement points (pre-post), a probability error of .05, a medium effect size (based on the meta-analysis presented in chapter 2), and a correlation of zero between the repeated measure variables (use of zero correlation between within-person variables means a more stringent criterion has been applied). This study received ethical approval from the DESC, prior to beginning the data collection process. Because of reasons related to the accessibility of the sample, participants were recruited from a student volunteers list and completed the experiment online. Participants were informed that the study aimed to understand how watching a short video-clip about life in the University affected their thoughts and feelings.

**Procedures.** This study was conducted at the end of the academic year and was specially designed for those students about to leave the University. This information was communicated in the invitation email sent to the student volunteers list. At the beginning of the experiment participants were asked to confirm whether they were leaving University that year, which all participants confirmed. Next, participants read the informed consent form. Those participants who agreed to take part in the study ( $N = 58$ ) were requested to self-report

how they felt right now, using six emotional adjectives extracted from a measure of state-affect containing eight emotional adjectives (Eisenkraft & Elfenbein, 2010), excluding the emotional adjectives “calm” and “angry”, in order to make the scale shorter. This measure of state-affect has been demonstrated to clearly reflect discrete emotional adjectives that are opposite in valence (Eisenkraft & Elfenbein, 2010). The measure assessed the intensity with which each emotional adjective was felt using a Likert-format scale ranging from 1 (*Not at all*) to 5 (*A great deal*). The order of the emotional adjectives was randomised to help overcome potential order effects. The list of emotional adjectives used and their descriptive statistics are shown in *Table 9*.

After assessing participants’ emotional state, they were informed that they were about to watch a short video-clip (two minutes) about life in the University. The video-clip was a compilation of pictures of the city of Sheffield and the University of Sheffield. Accompanying the pictures were messages suggesting that participants were ending one stage in their lives and beginning a new one (e.g., “*You’ll miss the University and the friends you’ve made...but you’re also looking forward to the future and the exciting possibilities it holds*”). The messages were displayed in conjunction with the musical piece *La Noyée* (Yann Tiersen, 2011). The video-clip can be watched in the following web link:

<https://www.youtube.com/watch?v=ymyZkeHmcg4>

This video-clip was the experimental manipulation because it was designed to elicit mixed emotions. Previous studies in consumer research have used a combination of pictures and messages to elicit mixed emotions (e.g., Aaker et al., 2008; Williams & Aaker, 2002). The sample was about to graduate so it was possible to anticipate that they would be likely to experience mixed emotions in response to images and messages about university life (i.e., poignancy; Ersner-Hershfield et al., 2008, Study 2). Furthermore, the particular musical piece that was chosen to accompany the images and messages had been demonstrated to elicit

mixed emotions (Hunter et al., 2008) because it combines conflicting musical cues (i.e., musical pieces in fast tempo and minor mode).

*Table 9.* Descriptive statistics and correlations between mixed emotions indicators and the respective emotional adjectives used to calculate the minimum index in Study 4 ( $N = 52$ ).

<i>Emotional adjectives</i>	<i>PRE</i>		<i>POST</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Sad	2.23	1.23	2.48	1.00
Stressed	2.52	1.26	2.10	1.21
Enthusiastic	2.65	1.08	2.62	1.16
Bored	2.10	1.10	1.98	1.11
Happy	3.00	1.02	2.71	1.02
Relaxed	2.92	1.33	2.58	1.04
MI happy-sad	1.81	0.77	2.10	0.87
MI enthusiastic-sad	1.71	0.80	1.96	0.71
MI positive-negative	1.76	0.47	1.73	0.42

<i>Correlations</i>	<i>r</i>	<i>r</i>
MI happy-sad <i>with</i> happy	0.05	0.50**
MI happy-sad <i>with</i> sad	0.71**	0.60**
MI enthusiastic-sad <i>with</i> enthusiastic	0.31*	0.47**
MI enthusiastic-sad <i>with</i> sad	0.61**	0.57**

*Note:* MI = minimum index of mixed emotions. \*  $p < 0.05$ ; \*\*  $p < 0.01$ .

Once participants had watched the video-clip, they immediately completed the same state-affect measure used at the beginning of the experiment (see *Table 9*). The order of the emotional adjectives was again randomised. Previous studies evaluating mixed emotions in



students close to graduation revealed that the most common mixed emotion experience was *happy-sad* (e.g., Ersner-Hershfield, et al., 2008, Study 2; Larsen et al., 2001, Study 3). Thus, for the sake of parsimony, and following previous evidence, the measures of sadness, enthusiasm and happiness were used to calculate two mixed emotions indices using the minimum index (Schimmack, 2001): *enthusiasm-sad* and *happy-sad*. Additionally, in order to control for demand effects resulting from requesting the same emotional report twice, the average of all of the positively valenced emotions and the average of all of the negatively valenced emotions were used to calculate another minimum index score (*positive-negative*).

Next, participants completed a brief version of the questionnaire for eudaimonic well-being (Waterman et al., 2010). This scale evaluates the level of eudaimonic well-being using 21 statements concerning perceptions and personal beliefs about current life, and has been validated in a previous study (Waterman et al., 2010). In the current experiment three items ( $M = 2.63$ ,  $SD = 1.04$ ;  $\alpha = 0.85$ ) were selected based on factorial loadings of the original questionnaire and the correspondence with the measure of eudaimonic well-being used in Study 3. These items were answered using a Likert-format scale ranging from 1 (*Strongly disagree*) to 5 (*Strongly agree*). The items, correlations and descriptive statistics are shown in *Table 10*.

Lastly, participants completed two short questions to evaluate whether they finished the experiment in one sitting (“*Did you complete this study in one round?*”), and whether they were interrupted while completing the experiment (“*Did you complete this study without interruptions (e.g., mobile calls, friends around)?*”); both of these questions were answered in a *yes/no* format. These last two questions were included to establish whether interruptions or delays in completing the study may have influenced the results, as the experiment was completed online and it demanded participants’ attention while watching the video.

Participants were thanked at the end of the study and were given the opportunity to provide their email to participate in the raffle prize, under the condition of complete confidentiality.

*Table 10.* Descriptive statistics and Pearson correlations between the items of the eudaimonic questionnaire (Waterman et al., 2010) in Study 4 (N = 52).

	<i>M</i>	<i>SD</i>	1	2	3
1. I believe I have discovered who I really am.	2.88	1.29	-		
2. I can say that I've found my purpose in life.	2.56	1.62	0.59**	-	
3. I believe I know what I was meant to do in my life.	2.46	1.11	0.53**	0.88**	-

*Note:* \*\* $p < 0.01$ .

#### 4.5.2. Results

Preliminary analyses did not identify significant outliers and eudaimonic well-being was approximately normally distributed. Descriptive statistics shown in *Table 9* revealed that, on average, participants reported feeling more intense negative emotions (e.g., sad, bored, stressed) after watching the video-clip compared to before watching it. In contrast, participants reported feeling less intense positive emotions (e.g., happy, inspired, relaxed) after the video-clip. Paired sample *t*-tests revealed significant differences between sadness pre- and post-video,  $t(51) = -2.59, p < 0.05, M_{\text{difference}} = -0.39$  [95%CI: -0.68 / -0.09], stress pre- and post-video,  $t(51) = 3.18, p < 0.05, M_{\text{difference}} = 0.42$  [95%CI: 0.16 / 0.69], happiness pre- and post-video,  $t(51) = 2.48, p < 0.05, M_{\text{difference}} = 0.29$  [95% CI: 0.05 / 0.53], and relaxed pre- and post-video,  $t(51) = 2.48, p < 0.05, M_{\text{difference}} = 0.35$  [95% CI: 0.07 / 0.63]. In terms of the quality control variables (i.e., whether participants completed the experiment without interruptions and in one round), only one participant did not complete the study in one round, and two participants reported being interrupted while completing the experiment. No effects

were found after including these variables as between-subject factors in the elicitation of mixed emotions ( $p > 0.15$ ). All participants were considered for subsequent analyses.

As mentioned above, in order to evaluate the presence of mixed emotions, two minimum indices were calculated: *enthusiasm-sad* and *happy-sad*. In accordance with previous research, it was expected that the video-clip would elicit a combination of sadness and happiness and/or sadness and enthusiasm. The descriptive statistics (shown in *Table 9*) showed that, on average, participants reported more mixed emotions after, as compared to before, watching the video-clip. One may think that because negative emotions had lower values, on average, compared to positive emotions, the minimum index tended to track negative emotions. However, correlational analyses (shown in *Table 9*) revealed that the minimum indices after the experimental manipulation were positively and strongly correlated with the corresponding positive emotions and negative emotions alike, suggesting that mixed emotions estimated using the minimum index did not correspond with the effect of negative emotions only. Furthermore, the difference test of the minimum index positive-negative before watching the video-clip was not different from zero compared to the minimum index positive-negative after the video ( $p > 0.60$ ), indicating that changes in mixed emotions were not necessarily the result of demand effects.

**Manipulation checks.** A paired sample *t-test* based on 10,000 bootstrapped samples was conducted to estimate whether participants felt more mixed emotions after the video-clip compared to before. Results showed that participants felt significantly more *enthusiastic-sad* after ( $M = 1.96$ ) compared to before ( $M = 1.71$ ) having watched the video clip,  $t(51) = -2.04$ ,  $p < 0.05$ ,  $M_{\text{difference}} = -0.25$  [95%CI: -0.48 / 0.00],  $d = 0.57$ . Likewise, participants reported feeling more *happy-sad* after ( $M = 2.10$ ) compared to before ( $M = 1.80$ ) they watched the video-clip,  $t(51) = -2.27$ ,  $p < 0.05$ ,  $M_{\text{difference}} = -0.29$ , [95%CI: -0.56 / -0.04],  $d = 0.63$ . The inclusion of the mixed emotion positive-negative, and the age and gender of the sample did

not influence the experience of the mixed emotions of *happy-sad* or *enthusiastic-sad* ( $p > 0.20$ ).

**Effect of mixed emotions on eudaimonic well-being.** In order to determine whether mixed emotions predicted eudaimonic well-being, hierarchical linear regressions based on 10,000 bootstrapped samples were used to test a set of models. Firstly, the pre-video measure of the mixed emotion *enthusiastic-sad* was entered at step 1 and the post-video measure of mixed emotion *enthusiastic-sad* was entered at step 2. The minimum index for *enthusiastic-sad* measured after participants had been exposed to the video-clip explained a significant amount of the variance in eudaimonic well-being,  $F(2,49) = 4.06$ ,  $p < 0.05$ ,  $R^2 = 0.14$ . The analysis showed that greater mixed emotion experience of *enthusiastic-sad* significantly predicted eudaimonic well-being,  $\beta = .58$ ,  $p < 0.05$  [95%CI: 0.20 / 0.96]. It was notable that *enthusiastic-sad* before the video-clip did not predict eudaimonic well-being at step 1,  $\beta = -0.06$ ,  $p = 0.75$  [95%CI: -0.44 / 0.30], or at step 2,  $\beta = -0.22$ ,  $p = 0.19$  [95% CI: -0.60 / 0.12].

A second model included the mixed emotion *happy-sad* before having watched the video-clip at step 1, and the post-video measure of the mixed emotion *happy-sad* at step 2. Mixed emotion pre-video at step 1 did not predict eudaimonic well-being,  $\beta = -0.02$ ,  $p = 0.93$ , [95%CI: -0.51 / 0.36]. At step 2, the minimum index for *happy-sad* post-video explained a significant amount of the variance in eudaimonic well-being,  $F(2,49) = 4.67$ ,  $p < 0.05$ ,  $R^2 = 0.16$ . The mixed emotion *happy-sad* after the video-clip significantly predicted eudaimonic well-being,  $\beta = 0.52$ ,  $p < 0.01$  [95%CI: 0.14 / 0.84]; the pre-video measure of mixed emotion *happy-sad* did not predict eudaimonic well-being at step 2,  $\beta = -0.25$ ,  $p = 0.19$  [95%CI: -0.64 / 0.13].

The previous models were re-ran including sadness after watching the video-clip at step 3 to control for potential effects of changes in sadness as a predictor of eudaimonic well-

being. There was no significant effect of sadness on eudaimonic well-being for the model including the mixed emotion *enthusiastic-sad* ( $p = 0.70$ ) or for the model including the mixed emotion *happy-sad* ( $p = 0.88$ ); the main effects of the corresponding mixed emotion indices on eudaimonic well-being were still significant. Similarly, the inclusion of happiness after watching the video-clip at step 3 did not reveal a significant effect on eudaimonic well-being for the model including the mixed emotion *enthusiastic-sad* ( $p = 0.65$ ) or the model including mixed emotion *happy-sad* ( $p = 0.61$ ); the main effects of the corresponding mixed emotion indices on eudaimonic well-being were still significant.

Overall, these results indicate that the experience of the mixed emotions of *happy-sad* and *enthusiastic-sad* experienced post-video predicted eudaimonic well-being, and that the effect of mixed emotions was prompted by the video. This evidence supports ***hypothesis 2.4*** that mixed emotions will be positively associated with eudaimonic well-being in response to a poignant event (graduation). This was true over and above the inclusion of sadness or happiness in the corresponding models.

To evaluate a potential non-monotonic effect of mixed emotions on eudaimonic well-being the squared terms for the mixed emotion *enthusiastic-sad* pre- and post-video were entered at step 3 in the model. The squared term for *enthusiastic-sad* after the video-clip explained a significant amount of eudaimonic well-being variance,  $F(4,47) = 3.60$ ,  $p < 0.05$ ,  $R^2 = 0.23$ , which was larger than the amount explained at step 2. Furthermore, the squared term for *enthusiastic-sad* post-video significantly predicted eudaimonic well-being,  $\beta = -0.53$ ,  $p < 0.05$  [95%CI: -1.10 / -0.07], which indicated a concave curvilinear effect, as shown in *Figure 9*. The figure suggests that the beneficial effect of mixed emotions on eudaimonic well-being was greatest when mixed emotions were experienced at moderate intensity. No significant effects were found for the squared term of mixed emotions before the video-clip ( $p > 0.25$ ).

Similarly, the squared terms for the mixed emotion *happy-sad* were entered at step 3. Likewise, mixed emotions of *happy-sad* pre- and post-video were entered at step 3 in the second model. The mixed emotion of *happy-sad* explained a significant amount of eudaimonic well-being variance,  $F(4,47) = 3.34, p < 0.05, R^2 = 0.24$ , which was a greater amount than at step 2. The squared term for mixed emotion *happy-sad* after the video was this time marginally significant,  $\beta = -.27, p = 0.08$  [95%CI:  $-.75 / 0.07$ ], whereas the effect of the squared term for mixed emotion *happy-sad* before the video was non-significant ( $p > 0.10$ ). Thus, the curvilinear effect was only clearly supported for the mixed emotion of *enthusiastic-sad*.

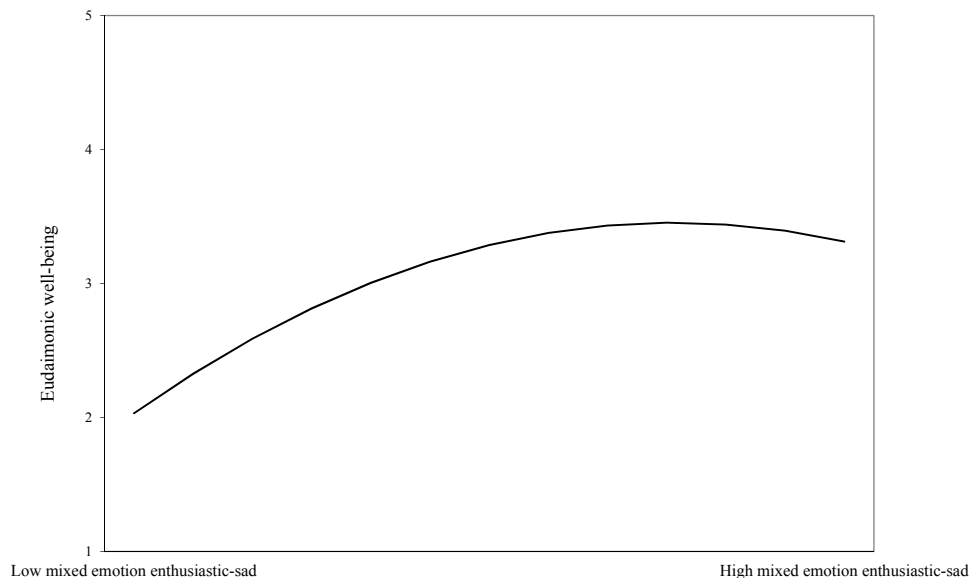


Figure 9. Curvilinear effect of mixed emotion enthusiastic-sad on eudaimonic well-being in Study 4 ( $N = 52$ ).

#### 4.6. Discussion

The goal of this chapter was to determine whether mixed emotions, in the context of goal conflict, may have beneficial effects on eudaimonic well-being. This goal was in keeping with **Hypothesis 2**, as stated in chapter 1. Two studies provided evidence to support the idea that mixed emotions may positively influence eudaimonic well-being. The studies

varied in design (cross-sectional, Study 3; experimental, Study 4), measures (different measures of eudaimonic well-being and mixed emotions) and a diversity of statistical methods. Overall, the findings supported the hypothesis that the experience of mixed emotions can have beneficial effects on eudaimonic well-being.

In Study 3, a large sample of participants completed a survey designed to evaluate whether conflicting goals predict mixed emotions, continuing with the evidence presented in chapter 3 about the conditions under which mixed emotions are displayed. Findings showed that conflicting goals significantly predicted mixed emotions and that the reverse path did not fit the data. Furthermore, Study 3 distinguished the concepts of mixed emotions and emotional conflict. This distinction was made by comparing the association between each construct and five basic emotions (happiness, sadness, disgust, anger, fear). Following previous research (Larsen & McGraw, 2011, Larsen et al., 2001; Schimmack, 2001), mixed emotions should positively relate both with positively valenced emotions (e.g., happiness) and negatively valenced emotions (e.g., sadness). Evidence confirmed this assumption revealing that mixed emotions had a positive association with all the basic emotions, having controlled for the effects of emotional conflict. The distinction between emotional conflict and mixed emotions was affirmed by the former construct correlating positively with the negatively valenced emotions only, whereas a negative association was found between emotional conflict and happiness (in contrast to the positive association found between mixed emotions and happiness).

The previous findings provide the necessary framework to determine whether mixed emotions positively influence eudaimonic well-being. Having separated the constructs of emotional conflict and mixed emotions, it was possible to establish whether mixed emotions foster eudaimonic well-being; contrary to what would have been expected if mixed emotions were equivalent to emotional conflict. Thus the last objective of Study 3 was to determine the

influence of mixed emotions on eudaimonic well-being. Results confirmed that mixed emotions predicted eudaimonic well-being and hedonic well-being, over and above relevant constructs such as emotional conflict and meaning in life. Furthermore, it was found that age was positively associated with eudaimonic well-being, but negatively associated with hedonic well-being. Despite the limited age range of the sample in Study 3, this evidence seems to indicate that, as people get older, they tend to report greater eudaimonic well-being. This is consistent with the SST (Carstensen, 2006; Carstensen et al., 1999), which stipulates that as people age they tend to attribute greater importance to more meaningful experiences.

Study 4 used an experiment based on a real event (i.e., graduation) to further demonstrate that mixed emotions foster eudaimonic well-being. In this study, a sample of participants who were about to graduate watched a video-clip that was intended to elicit mixed emotions and completed the eudaimonic well-being questionnaire immediately after the video. Participants experienced more mixed emotions after watching the video clip, and positive changes in mixed emotions were related to higher scores on the measure of eudaimonic well-being. Manipulating mixed emotions in real-time and using an ecologically valid paradigm (experiencing poignancy in response to a life transition) provided stronger evidence to support the hypothesis that mixed emotions can enhance eudaimonic well-being.

Additionally, Study 4 provided initial evidence of the curvilinear effects of mixed emotions on eudaimonic well-being. This evidence is in accordance with recent conceptualisations that have called for exploration of whether variables that presumably benefit well-being may reach inflection points after which their positive effects decay (Fredrickson, 2013; Grant & Schwartz, 2011; Warr, 2007). In particular, in the field of emotion science, Fredrickson (2013) has argued for the importance of testing for nonlinear trends when evaluating the effects of positive emotions on human flourishing. The current evidence updates this conceptualisation by suggesting that not only positive emotions may



reach inflection points in the form of an inverted-U, but also that mixed emotions follow nonlinear trends, placing complex emotional experiences at the heart of contemporary approaches in the study of emotions and individual well-being.

**Contributions.** Overall, chapter 4 has made four distinct contributions to this research project. Firstly, chapter 4 has added new sources of evidence to demonstrate that the experience of mixed emotions results from experiencing conflicting goals. Although cross-sectional designs lack control of the variables under investigation, the evidence presented in Study 3 supported the idea that conflicting goals are the primary cause of experience of mixed emotions. Something similar could be inferred from Study 4. Although the experiment conducted in Study 4 did not evaluate whether graduation is a form of goal conflict, Zhang and Fung (2009) have shown that graduation gives rise to poignancy only among students who identify more with their university, suggesting that the degree of engagement with the university versus the willingness to expand personal horizons might be the underlying desires that conflict and thereby trigger mixed emotions.

Secondly, chapter 4 has further distinguished the concept of mixed emotions and emotional conflict. This distinction is not trivial because previous research has shown that experiencing conflict between two emotional tendencies, such as wanting to express affection but being afraid of being hurt can have a negative impact on individuals' well-being and physical health (e.g., Emmons & Colby, 1995; King & Emmons, 1990; Porter, Keefe, Lipkus, & Hurwitz, 2005). Therefore, by separating these constructs it is possible to speculate that their impact on well-being may also be different.

The third contribution of this chapter is the evidence derived from the two studies indicating that the experience of mixed emotions has a positive influence on eudaimonic well-being; this is the first time that this type of evidence has been reported. People perceived

their lives as more meaningful and more in accordance with relevant goals and values when they experienced greater levels of mixed emotions, either in response to recalling relevant goal-conflict situations that had occurred in the last few days (Study 3), or in the moments after watching a video-clip designed to enhance poignancy (Study 4).

Finally, the fourth contribution of chapter 4 is the provision of preliminary evidence that may help to explain how mixed emotions can impact well-being. Ancillary analyses in Study 3 revealed that mixed emotions initiated the search for meaning in life, which in turn, was associated with enhanced eudaimonic well-being. Although this finding is based on cross-sectional data, from which it is not possible to establish causality or ruled out third variable explanations, it is interesting to note that this evidence is consistent with the idea that mixed emotions facilitates the integration of complex information. In particular, facilitating the searching for meaning that ultimately made participants perceived greater eudaimonic well-being.

A mechanism formally tested in this chapter was the hypothesised mediational effect of eudaimonic well-being in predicting hedonic well-being. According to SDT (Ryan & Deci, 2001; Ryan et al., 2008), eudaimonic well-being represents the process through which people can engage in relevant activities that favour the achievement of three basic needs (autonomy, competence, and relatedness). The satisfaction of these needs leads to hedonic outcomes, such as pleasant emotions and greater satisfaction with life (Ryan et al., 2008). Evidence reported in this chapter lends support for this idea. Mixed emotions predicted eudaimonic well-being, and in turn, eudaimonic well-being mediated the effect of mixed emotions on hedonic well-being. Moreover, the evidence partially supported a complex model including searching for meaning in life as a mediator of the association between mixed emotions and eudaimonic well-being.

**Limitations.** Although these supplementary analyses are interesting, several limitations cast some doubts on the relevance of meaning in life as the chief psychological processes explaining the beneficial effects of mixed emotions on eudaimonic well-being. Firstly, some authors have viewed meaning in life as resulting from experiencing greater eudaimonic well-being (e.g., Steger, Kashdan, & Oishi, 2008; McMahan & Renken, 2011), whereas others have considered meaning in life as a predictor of better well-being (e.g., Ho, Cheung, & Cheung, 2010; Steger, Oishi, & Kesebir, 2011). For example, Steger and colleagues (2008) investigated the characteristics that best describe eudaimonic well-being in everyday life. They argued that many of theories of eudaimonic well-being prescribe activities that foster greater well-being (e.g., cultivating positive relationships, maintaining a positive self-image), and as a consequence, it should be possible to translate these activities into a set of everyday behaviours. Thus, a pool of 46 behaviours was created (e.g., “volunteered my time”, “gave money to a person in need”) representing a eudaimonic lifestyle; these behaviours were then surveyed in a diary study over 20-days (Steger et al., 2008, Study 1). Results showed that the more individuals engaged in eudaimonic behaviours over time, the greater their sense of meaning in life, life satisfaction and positive affect reported (Steger et al., 2008, Study 1). Thus, the reverse path of eudaimonic well-being predicting meaning in life is perfectly feasible, making it difficult to clearly determine the causal direction.

Related to the previous concern, it is clear that there exists a certain theoretical equivalence between eudaimonic well-being and meaning in life. Meaning-based theories of eudaimonic well-being have asserted that engaging in activities that are congruent with personal values and meaning in life are components of the definition of eudaimonic well-being (Ryan et al., 2008; Ryff, 1995; Waterman, 1990). Thus, it is possible that these two constructs are so closely related that it does not add much value to consider them in a

sequence to explain the process through which mixed emotions foster eudaimonic well-being. It seems to be more appropriate to consider meaning in life as part of what has been called eudaimonic well-being, such as the dimension of purpose in life in psychological well-being theory (Ryff, 1989, 1995).

Other limitations of the current chapter include that the experimental design presented in Study 4 lacked a control group. Therefore, it is not possible to clearly infer a causal effect of mixed emotions on eudaimonic well-being. Although the incorporation of an alternative mixed emotions index (minimum index positive-negative) is useful to address potential demand effects, it is still possible that general demand effect on self-report could explain the result. Finally, it was not possible to clearly demonstrate that mixed emotions followed goal conflict to crucially determine the incremental benefits on eudaimonic well-being. Probing a mechanism that includes conflicting goals, mixed emotions and eudaimonic well-being is particularly relevant considering that chapter 3 showed that conflicting goals were the main predictor of mixed emotions.

**Conclusion.** In conclusion, the evidence presented in this chapter is consistent with the proposal that mixed emotions have a positive effect on eudaimonic well-being. Although the mechanisms that may explain this effect are less clear, the two studies reported here represent the first attempts to investigate the impact that mixed emotions can have on eudaimonic well-being. The investigation of the association between mixed emotions and eudaimonic well-being is particularly important considering that the concept of eudaimonic well-being is closely linked to the achievement of relevant goals and engaging in meaningful activities, which may be threatened when experiencing conflicting goals. Thus, understanding how mixed emotions may help people to integrate disparate courses of actions when experiencing conflicting goals and how this ultimately can promote the improvement of eudaimonic well-being is the focus of chapter 5.

## 5. CHAPTER FIVE: EXPLAINING THE EFFECTS OF MIXED EMOTIONS ON EUDAIMONIC WELL-BEING

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*“With regard to the pleasures and pains [...] it possible to be in such a state as to be defeated even by those of them which most people master, or to master even those by which most people are defeated; among these possibilities, those relating to pleasures are incontinence and continence, those relating to pains softness and endurance. The state of most people is intermediate, even if they lean more towards the worse states”*

*(Aristotle, Nicomachean Ethics, VII.7).*

Aristotle’s wisdom envisioned that people’s wellness mostly consists of gaining balance between multiple desires that normally collide. Sometimes people struggle to overcome the bitterness of having to decide between two equally important goals. Other times those conflicts lead people to fluctuate between restraint and self-indulgence, trying to keep themselves on track for important goals when facing temptations. Desires, conflict, and the regulation of ongoing behaviours are continuously intertwined as people attempt to find what is meaningful and worthy of their efforts, the constituents of eudaimonic well-being.

This research project has thus far established that mixed emotions experiences are a result of the presence of conflicting goals. As such, it makes sense to connecting the emergence of conflicting goals with the experience of mixed emotions and eudaimonic well-being. A considerable amount of evidence has shown that it is the inability to resolve goal conflict which impairs satisfaction with life (Emmons & King, 1988; Emmons & Colby, 1995), increases physical symptomatology and GP visits (King & Emmons, 1991), as well as prompting depression and anxiety (Emmons & King, 1988), rather than the presence of goal conflict itself. For example, when individuals display strategies to resolve goal conflict, such

as goal facilitation, they report an improvement in well-being (Riediger & Freund, 2004). Theory concerning goal conflict resolution also suggests that individuals actively try to resolve goal conflict, and that success in these attempts may help them to achieve better well-being (Emmons, 1996; Emmons & Kaiser, 1996). Given that mixed emotions arise from goal conflict (chapter 3) and contribute to eudaimonic well-being (chapter 4), it seems likely that mixed emotions play a part in the conflict resolution process.

However, one pending question is to understand the mechanisms that explain how feeling mixed emotions might be good for individuals. Some authors have demonstrated the beneficial effects of mixed emotions on well-being (e.g., Hershfield et al., 2013), although they have explicitly acknowledged that future work needs to consider the situations under which people experience mixed emotions in order to better understand the processes explaining these results. Similarly, chapter 4 discussed the need for greater clarification of the processes that explain the influence of mixed emotions on eudaimonic well-being.

The present chapter proposes two psychological processes that might explain how mixed emotions positively influence eudaimonic well-being. One psychological process, which I shall refer to as the “restorative” mechanism, suggests that individual differences in mixed emotions will ameliorate the negative consequences of conflicting goals on eudaimonic well-being; whereas the other process, which I shall refer to as the “balancing” mechanism, implies that mixed emotions can help people to balance short and long term gratifications, enabling individuals to resist temptations when experiencing self-control dilemmas (i.e., conflicts where one relevant, long term goal is threatened by the immediate demands of another goal, a temptation).

These processes build on the evidence presented in chapter 3 and chapter 4. In previous chapters was found that mixed emotions are primarily elicited following conflicting

goals, and mixed emotions foster eudaimonic well-being. Both of the proposed processes share the assumption that mixed emotions facilitate the integration of complex information thus enhancing the process that permits people to create meaning in their lives, engage in relevant, meaningful activities, and maintain a balance between the multiple possibilities that life commonly holds.

Therefore, the main goal of this chapter is to examine how mixed emotions may positively influence eudaimonic well-being, in the context of experiencing conflicting goals. This goal will be achieved by evaluating **Hypothesis 3**, **4**, and **5**. **Hypothesis 3** states that individual differences in mixed emotions will moderate the negative effect of conflicting goals on psychological well-being (a conglomerated construct of eudaimonic well-being). Mainly derived from the dynamic model of affect (DMA; Reich et al., 2003; Zautra, 2003), the restorative mechanism suggests that those people who are more susceptible to experiencing mixed emotions in general, will be able to soften the hypothesised negative impact of experiencing conflicting goals on eudaimonic well-being.

Concurrently, the present chapter also aims to evaluate **Hypothesis 4** which states that mixed emotions will mediate the association between goal-conflict and attempts to resist temptations. Perceptions of goal conflict help individuals to resist temptations (Hofmann et al., 2012; Hofmann & Van Dillen, 2012). Thus, it is presumed that the identification of goal conflict is driven by the experience of mixed emotions, which in turn, signals the need to recruiting self-control resources.

Finally, this chapter also hypothesises that efforts to resist temptations will reduce vitality, but that this effect will be compensated by the experience of mixed emotions (**Hypothesis 5**). That is, people will experience exhaustion (less vitality) as a result of investing efforts to resist temptations. However, the accompanying experience of mixed emotions should permit individuals to address self-control dilemmas more efficiently because

different sources of information (e.g., the rewarding features of a desire, the negative consequences of yielding to temptations, the long-term benefits of persistence) are accessible and integrated at a given moment, and may therefore compensate for the negative impact of resisting temptation on vitality. Hence, mixed emotions will enable individuals to integrate complex information and promote greater behavioural flexibility (Cacioppo et al., 2004; Davis et al., 2004; Potter, Zatura, & Reich, 2000; Zautra, Smith, Affleck, & Tennen, 2001).

These hypotheses were tested in an intensive longitudinal study, where participants completed a short questionnaire several times a day over ten consecutive days (i.e., an experiencing sampling method was used; Bolger & Laurenceau, 2013). However, before presenting this study and its results, the present chapter firstly explains the theoretical reasoning supporting the two psychological processes described above (i.e., a restorative mechanism and a balancing mechanism).

### **5.1. Processes explaining the beneficial effects of mixed emotions on eudaimonic well-being**

Emotions fluctuate in a fashion that is attuned to changes in the environment (Mesquita & Boiger, 2014; Parkinson, 2009; Scherer, 2009, 2004). Even emotions in facial expressions, which have been thought to be tightly linked to evolutionary pressures (e.g., Ekman, 1993), are determined by social situations (e.g., Fernandez-Dohls, Carrera, Barchard, & Gacitua, 2008) or contextual variables such as body-posture (Aviezer et al., 2008). Parkinson (2009) eloquently suggested that emotions align objects and people, helping individuals to create meaning. People do not need to appraise the meaning of a situation before experiencing emotions; rather, meaning emerges as a result of the continuous adjustment of emotions to the current situation (Parkinson, 2009). Similarly, Mesquita and Boiger (2014) asserted that emotions and situations constitute a single system which



determines the social function of emotions; for example, being angry with your child is not the same as being angry with a colleague.

One notable corollary of understanding emotions as a continuous adjustment to environmental demands is that emotional experiences are not only defined in terms of their constituent components (e.g., somatovisceral changes, feelings, and appraisals), but also in terms of their functions. Frijda (2009) argued that emotions are better described by their functions, rather than as distinct categories relying on dimensions or discrete approaches. For some authors (e.g., Niedenthal & Brauer, 2012), emotions are endowed with the function to regulate social perception and interactions. For example, the ability to process the facial expression of fear in others facilitates the perception of people in need, boosting prosocial behaviours (Marsh, Kozak, & Ambady, 2007).

Both the Evaluative Space Model (ESM; Cacioppo et al., 1999; Cacioppo et al., 2004) and the communicative model of emotion (Oatley & Johnson-Laird, 1996) anticipate that one consequence of experiencing mixed emotions is that they enable disparate courses of action to be followed. An organism that processes both positive and negative affects in parallel is capable of displaying a larger set of behaviours appropriate to the circumstances. At the simplest level, consider a springbok drinking at the shore of the river, while a crocodile watches nearby. This springbok is ready to flee and yet still willing to keep drinking. The DMA (Reich et al., 2003; Zautra, 2003) also asserts that individual differences in mixed emotions reflect differences in the capacity to respond to changes in the environment in a flexible way. Thus, mixed emotions facilitate the integration of complex information at a given moment, providing greater behavioural flexibility to respond to incompatible cues in the environment.

A common stance between the aforementioned understanding of the functionality of mixed emotions and other functional approaches to emotion is the view that affect (in the form of transient emotions or moods) directly or indirectly influences judgments and actions (e.g., Forgas, 1995; Frijda, 1988; Lerner, Li, Valdesolo, & Kassam, 2015; Loewenstein & Lerner, 2003; Schwarz & Clore, 1983, 2003; Zeelenberg, Nelissen, Breugelmans, & Pieters, 2008). Frijda (1988, 2004) asserted that emotions elicit changes in action readiness: they prepare individuals to take certain actions in the environment. Emotions motivate people to act, but only to the extent that (a) events affect one or more important goals, and (b) if a feasible repertoire of behaviours is available (Frijda, 2004). Similarly, Zeelenberg and colleagues (2008) asserted that emotions have the primary function to drive goal-directed behaviour. Different emotions serve different motivational functions that guide people's behaviour when implementing decisions (Zeelenber et al., 2008). In this theory, as well as in Frijda's approach, rather than dictating specific behaviours, emotions constrain the number of possible actions that could be performed in a situation.

Emotions can also influence behaviour by shaping the contents of individuals' judgments. Schwarz & Clore (1983, 2003) proposed the mood-as-information theory according to which mood conveys information which people use heuristically to make judgements about their current situation. For example, in one study Schwarz and Clore (1983, Study 2) interviewed a sample of participants either on a sunny day or a rainy day, expecting that people would be in a correspondingly good or a bad mood. Results showed that people in a good mood (i.e., those interviewed on a sunny day) were more satisfied with their lives compared to participants in a bad mood (i.e., those interviewed on a rainy day). These findings demonstrate that mood can have a misleading effect on judgments. However, current elaborations of the theory have considered that more transient forms of affect (i.e., emotions) also provide information, which is less likely to be misattributed, because emotions generally

inform individuals' about the meaning of specific objects in the environment (Schwarz & Clore, 2003).

Forgas (1995) further proposed the Affect Infusion Model (AIM) to explain the circumstances that promote or inhibit the influence of affect on judgment. This model states that affect influences cognitive processing only when active elaboration of the available stimuli is required. In contrast, the impact of affect on judgments is unlikely to occur when people are dealing with highly familiar information (i.e., direct access strategy) or intending to accomplish a specific, single goal (i.e., motivated processing strategy). Affect will impinge on cognitive processing when more elaborate processing is needed (i.e., substantive processing). Importantly, for the purpose of this chapter, Forgas (1995) argues that when there are multiple goals to achieve (and as a result, cognitive processing is demanding) affect will permeate cognition and decision-making.

In summary, affect likely drives goal-directed behaviours by assisting the decision-making process (Frijda, 1988; Zeelenber et al., 2008). Affect motivates individuals to follow courses of actions that will attain desired ends. One way in which affect impacts behaviour is through directly influencing people's judgments (Lerner, Li, Valdesolo, & Kassam, 2015; Loewenstein & Lerner, 2003). Moods and emotions provide relevant informational cues that guide people's judgments and decision-making (Schwarz & Clore, 2003). People often consult their emotions when deciding about courses of action (Schwarz & Clore, 2003). Importantly, the impact of affective experiences on judgment seems to largely depend on the characteristics of the situation. People facing complex events, demanding high levels of cognitive processing, are more likely to be influenced by their affect when making a decision (Forgas, 1995). Thus, emotions and moods guide peoples' thoughts and decisions as they navigate the ebb and flow of everyday life, especially when life turns more complicated.

Conflicting goals are clearly the kind of events which demand greater elaboration of multiple stimuli at once.

The remainder of this section briefly outlines the two psychological processes intended to explain how mixed emotions impact eudaimonic well-being (i.e., the restorative mechanism and the balancing mechanism). Several elements of these mechanisms were explained in chapter 1, when justifying **Hypotheses 3, 4, and 5**. Therefore, the following two sub-sections are intended to refresh the main ideas behind these mechanisms.

### **5.1.1. The restorative mechanism**

The idea that individual differences in emotional experiences influence well-being is not new. For example, previous research has shown that extraverts have a greater tendency to experience positive emotions, whereas neurotics have a greater tendency to experience negative emotions (Larsen & Ketelaar, 1989). This has been thought to reflect two orthogonal dimensions of personality (extraversion and neuroticism) which are closely related to positive and negative affect, respectively (Rusting & Larsen, 1997). Likewise, scholars have found that the personality traits of extraversion and neuroticism consistently predict better and worse subjective well-being, respectively (Costa & McCrae, 1980).

Similar to previous accounts, the restorative mechanism anticipates that individual differences in mixed emotions may also play a role in determining psychological well-being. Rafaeli et al. (2007) found that a significant portion of the variance in individuals' reports of mixed emotions were explained by individual differences. Some people consistently reported more positive and negative emotions concurrently, in a manner that was stable over time (Rafaeli et al., 2007). Further research has shown that individuals that more commonly experience concurrent opposite emotions, are better able to perceive the rewarding aspects of negative situations (Wilt et al., 2011). These findings have been interpreted as suggesting that

mixed emotions provide a buffer against the negative consequences of difficult situations (Wilt et al., 2011). Thus, individuals that experience more mixed emotions will be better able to perceive the benefits of experiencing goal conflict, which may help them to maintain positive levels of eudaimonic well-being.

This approach can be defined as a situated account, in which the context in which individual differences are displayed is essential to determining the effects on well-being. Zautra and colleagues (Reich et al., 2003; Zautra, 2003) emphasised that experiencing positive and negative emotions concurrently is beneficial for individuals' well-being in the context of stressful events. The restorative mechanism is consistent with theories suggesting that adverse events, such as the presence of goal conflict, impair well-being (Headey & Wearing, 1989). However, the restorative mechanism suggests that those individuals who tend to experience greater levels of mixed emotions will restore the negative impact of conflicting goals on eudaimonic well-being.

### **5.1.2. The balancing mechanism**

The balancing mechanism postulates that the presence of immediate desires, in conjunction with the pursuit of relevant goals, makes people aware of the presence of goal conflict, which in turn, helps individuals to deploy regulatory resources to resist temptations. The balancing mechanism further postulates that it is the experience of mixed emotions that ultimately mobilises efforts to resist temptations. In other words, the presence of a conflict between an immediate desire and a relevant goal signals the presence of a temptation, but it is the elicitation of mixed emotions that helps people to deploy regulatory resources, facilitating intentions to resist temptations. As previously reviewed, emotions influence further courses of action when complex information processing is required (Forgas 1995). Furthermore, taking inspiration from Parkinson's ideas (2009), it is proposed that mixed emotions allow

the integration of complex information at a given moment. This enhances the meaning making process that permits people to engage in relevant, meaningful, goal pursuit and maintain a balance between multiple courses of action at any given moment. This means that the balancing mechanism is related to eudaimonic well-being in terms of assisting the pursuit of meaningful goals in spite of immediate desires. As indicated in chapter 4, meaning-based theories of eudaimonic well-being emphasise the relevance of pursuing, and making efforts to achieve meaningful goals as an indicator of eudaimonic well-being (e.g., Ryan et al., 2008).

This mechanism may help to resolve conflicting evidence concerning the influence of emotions on self-control. Some findings have shown that positive affect undermines self-control (e.g., Wegener & Petty, 1994, 2001), whereas others studies have demonstrated that positive affect improves self-control (e.g., Aspinwall, 1998; Raghunathan & Trope, 2002), and previous theories, including PCT, have suggested that negative affect is a critical affective cue that facilitates self-control (Inzlicht & Legault, 2014; Powers, 1973, 2014). Based on the balancing mechanism hypothesis, I suggest that the previous disparate findings are a result of not considering mixed emotions as the more parsimonious explanation for the relationship between emotional experiences and self-control. Mixed emotions simultaneously signal the rewarding features of a desire, the negative consequences of yielding to temptations, and the long-term benefits of persistence. It is presumed that all of these features are accessible and integrated at a given moment when feeling mixed emotions, offering substantial benefits compared to feeling only positive or negative emotions. The relationship between emotion and self-control may be obscured when only single affects are considered, which may explain previous inconsistencies.

One final aspect derived from the functionality of mixed emotions is that mixed emotions in the face of a self-control dilemma will help people to replenish vitality after making an effort to resist temptations. Vitality is defined as the feeling of possessing energy

available to the self, and includes both subjective feelings of being alive and physical energy (Ryan & Frederick, 1999). Vitality is considered a component of eudaimonic well-being that promotes engagement with current activities (i.e., personal expressiveness; Waterman, 1990, 1993). The strength model of self-control (Baumeister et al., 2007; Muraven & Baumeister, 2000) predicts that people will be less likely to exert self-control after previous regulatory efforts. Although this theory has been recently questioned (e.g., Inzlicht & Schmeichel, 2012), an interesting derivative of the strength model is that efforts to resist temptations reduce people's mental vitality (Muraven, Gagné, & Rosman, 2008). Vitality presumably enhances the perception of regulatory resources leading to better subsequent self-control performance (Muraven et al., 2008). The current chapter hypothesised that efforts to resist temptations have a negative impact on vitality, but that the interaction between efforts to resist temptations and the experience of mixed emotions replenishes vitality.

## **5.2. Overview of Study 5**

The aim of Study 5 is to examine the two psychological processes that might explain how mixed emotions positively impact eudaimonic well-being in the context of experiencing conflicting goals. These two mechanisms are assessed in the Study 5 using an intensive longitudinal methodology, in which people report on relevant variables (e.g., desires, conflict, mixed emotions) several times every day for 10 consecutive days (i.e., an experience sampling method).

It is hypothesised that conflicting goals will negatively predict psychological well-being (*hypothesis 3.1*). Secondly, it is hypothesised that individual differences in mixed emotions will moderate the association between conflicting goals and eudaimonic well-being (*hypothesis 3.2*). Thirdly, it is anticipated that the presence of conflicting goals involving immediate desires and relevant goals will positively predict efforts to resist temptations

(*hypothesis 4.1*), although this effect will be mediated by the elicitation of mixed emotions (*hypothesis 4.2*), which in turn will positively predict efforts to resist temptations (*hypothesis 4.3*). Finally, it is anticipated that efforts to resist temptations will negatively predict the experience of vitality (*hypothesis 5.1*), but that this effect will be compensated for (moderated by) the experience of mixed emotions (*hypothesis 5.2*).

### 5.3. Study 5

#### 5.3.1. Method

**Participants.** Seventy three undergraduate and postgraduate students (58 female,  $M_{\text{age}} = 20.5$  years;  $SD = 3.6$  years), participated in the study in exchange for course credits or £10 in cash. For reasons related to the accessibility of the sample, participants were recruited from a list of student volunteers and an online research participation system facilitated by the Department of Psychology. Participants completed the experiencing sampling protocol using a web-link sent to their mobile phones. Participants were informed that the study aimed to understand how people manage their desires and personal goals, and how these influence their emotions and daily activities. No participants dropped out of the study before completing the experiencing sampling. The study received ethical approval from the DESC, prior to beginning the data collection process.

**Measures.** Participants completed a set of questionnaires during an orientation meeting. These questionnaires were aimed to provide a baseline level for some relevant variables for the present study. In particular, participants completed the following validated scales, as baseline measures:

*The psychological well-being scale (PWB; Ryff, 1989).* This scale measures the extent to which individuals perceive their lives to be meaningful, worthwhile, in balance with their needs, and as having positive relations with other people. The PWB operationalizes



psychological well-being along six dimensions: autonomy (e.g., “*Being happy with myself is more important to me than having others approve of me*”), environmental mastery (e.g., “*In general, I feel I am in charge of the situation in which I live*”), personal growth (e.g., “*In my view, people of every age are able to continue growing and developing*”), positive relations with others (e.g., “*I feel like I get a lot out of my friendships*”), purpose in life (e.g., “*I have a sense of direction and purpose in life*”), and self-acceptance (e.g., “*In general, I feel confident and positive about myself*”). Each dimension was assessed using 9-items. All of the items were measured on a 6-point Likert-format scale ranging from *strongly disagree* (1) to *strongly agree* (6). Overall, the subscales had good internal reliability indices (autonomy:  $M = 3.92$ ;  $SD = 0.70$ ;  $\alpha = 0.77$ ; environmental mastery:  $M = 4.20$ ;  $SD = 0.75$ ;  $\alpha = 0.83$ ; personal growth:  $M = 4.89$ ;  $SD = 0.58$ ;  $\alpha = 0.77$ ; positive relations:  $M = 4.56$ ;  $SD = 0.79$ ;  $\alpha = 0.82$ ; purpose in life:  $M = 4.59$ ;  $SD = 0.73$ ;  $\alpha = 0.79$ ; self-acceptance:  $M = 4.19$ ;  $SD = 0.90$ ;  $\alpha = 0.86$ ), as did the psychological well-being construct including all of the items ( $M = 4.39$ ;  $SD = 0.55$ ;  $\alpha = 0.93$ ).

*The brief self-control scale* (SC; Tangney, Baumeister, & Boone, 2004). This scale measures individuals’ tendency to exert control over their own behaviour when facing a broad range of self-control dilemmas (e.g., impulse control, control over thoughts). Participants evaluated the extent to which each of the 13-items reflected how they typically are (e.g., “*I wish I had more self-discipline*”;  $M = 3.12$ ;  $SD = 0.53$ ;  $\alpha = 0.82$ ). All of the items were measured on a 5-point Likert-format scale ranging from *not at all* (1) to *very much* (5).

During the experiencing sampling period, participants completed a number of scales on each occasion:

*The conflicting goals scale*. This scale was similar to the one used in Study 3, which was based on Emmons and King (1988). The scale comprised three items which evaluated

the extent to which recent activity/activities (or desire/s) over the last 30-minutes had been in conflict with an important goal (e.g., “[this/these desire/s (activity/ies)] had harmful effects over a goal you've been trying to achieve”;  $M = 2.22$ ;  $SD = 1.08$ ). The longitudinal reliability of this scale (using the coefficient omega; Shrout & Lane, 2012) was very good ( $\omega = 0.83$ ). All of the items were measured on a 5-point Likert-format scale ranging from *not at all* (1) to *very much* (5).

*The subjective measure of mixed emotions*<sup>2</sup>. On each occasion they were signalled, participants completed the same version of the subjective measure of mixed emotions used in Study 2. This measure included four items designed to measure the extent to which participants experienced mixed emotions over the last 30-minutes (e.g., “...*contrasting emotions (positive and negative emotions)*”;  $M = 2.59$ ;  $SD = 0.98$ ). The longitudinal reliability was very good ( $\omega = 0.81$ ). All of the items were measured on a 5-point Likert-format scale ranging from *not at all* (1) to *very much* (5).

Additionally, participants completed 4 items from the *psychological well-being scale* (Ryff, 1989) corresponding to the dimension of life-purpose (e.g., “*active in carrying out the plans I set for myself*”). This scale was included to evaluate the extent to which participants experienced life-purpose on each particular occasion ( $M = 3.99$ ;  $SD = 1.02$ ). The longitudinal reliability of this dimension was good ( $\omega = 0.71$ ). All of the items were measured on a 6-point Likert-format scale ranging from *not at all* (1) to *extremely* (6).

Participants also completed two items from the *Maslach Burnout Inventory* (Maslach & Jackson, 1981) measuring *emotional exhaustion* (e.g., “*I’m feeling emotionally drained*”),

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<sup>2</sup> See Appendix-1 for a detailed explanation of the advantages of using the subjective measure of mixed emotions compared to using within-person correlations (the most common measure of mixed emotions in intensive longitudinal methods).

plus two items from the *vitality scale* (e.g., “*I’m feeling alive and vital*”; Ryan & Frederick, 1997). The items measuring emotional exhaustion were reversed to create a single dimension of vitality. This scale measures the degree to which the participants felt each of the items at the moment that they were completing each questionnaire ( $M = 3.54$ ;  $SD = 0.91$ ) using a Likert-format scale ranging from *not at all* (1) to *extremely* (6). The longitudinal reliability of this dimension was good ( $\omega = 0.75$ ).

Finally, participants completed a short measure of state positive and negative affect (Larsen & Diener, 1985). Participants were requested to report the extent to which they were experiencing four positive affect adjectives (PA; i.e., happy, joyful, pleased, enjoyment;  $M = 2.76$ ;  $SD = 1.15$ ) and five negative affect adjectives (NA; i.e., depressed, unhappy, frustrated, angry, and worried;  $M = 1.77$ ;  $SD = .89$ ) at the very moment that they were completing the scale. Each dimension showed good longitudinal reliability (PA:  $\omega = 0.87$ ; NA:  $\omega = 0.79$ ). All of the items were measured on a 6-point Likert-format scale ranging from *not at all* (1) to *extremely* (6).

**Procedure.** Participants attended an orientation meeting where they were informed about the aims of the study. At the beginning of the meeting participants firstly read and signed the informed consent form. The informed consent specified the general purpose of the study, the procedures that participants would follow during the study, and the need for their mobile numbers. It was explained that all personal information (including their mobile number) would be saved in a separate file to their data. All participants agreed to participate in the study and completed the set of baseline questionnaires previously described.

Participants also received oral and written instructions about the specific details of the study in the orientation meeting, including the procedures that they would need to follow during the study, and what to do in case of problems or queries. Importantly, participants

received a unique identification number, which they were asked to memorise or keep in a safe place because they would need to provide it every time they completed a questionnaire.

Furthermore, the meaning of desires and goals was explained (see Appendix-2) to prevent potential misunderstandings derived from idiosyncratic interpretations of these concepts for each participant. These explanations were accompanied by some examples to ensure understanding of the concepts. Participants were asked to start the experience sampling period on the first Monday following the day that the meeting took place.

*Experience sampling protocol.* Participants used their own mobile phones during the experience sampling period of ten consecutive days. Every day, they received four text messages during a time interval of ten waking hours. This is consistent with recent experience sampling studies investigating goal conflict in the context of self-control (Hofmann et al., 2012) and provided enough data to prevent type-II error. Following the recommendations of Hektner et al. (2007), this time interval was divided into four blocks. Thus, using an online application, messages were set to be delivered at a random time between 10:00 and 12:29, another text at a random time between 12:30 and 14:59, another text at a random time between 15:00 and 17:29, and finally a text at a random time between 17:30 and 20:00, with the added criterion that there had to be at least one-hour in-between texts. Each text message contained a web-link which took participants to an online questionnaire.

When participants accessed the online questionnaire, they were asked to enter their unique identification number. Participants were then asked to indicate whether they had experienced a desire over the last 30 minutes. A desire was defined as an immediate need or impulse that emerges suddenly in the mind and is not related to current activities. If participants indicated having experienced a desire they next defined the content and strength of this desire. They were provided with a list including 10 desire domains, following the

recommendations of Hofmann et al. (2012): eating, taking substances – such as coffee, sexual desire, use of media – such as Facebook, spending, social contact, leisure, hygiene/maintenance – such as sports, study/work, and sleep. Participants could choose up to three desires on every occasion (using a *Yes/No* format) and then had to rate the strength of the chosen desires on a scale ranging from *not at all* (1) to *irresistible* (5). If they indicated that they had experienced no desires over the last 30-minutes, they evaluated the degree of importance of the activities that they had performed over the last 30-minutes using three items (e.g., “...something that benefits you or others in the long run”), in a scale ranging from *not at all* (1) to *very much* (6). This was done to equate the length of the questionnaire regardless participants reported or not a desire.

Participants then completed the conflicting goals scale. If they had reported a desire, the scale was phrased to ask about conflict between their immediate desires and a relevant goal; whereas if they did not report a desire the scale was phrased to ask about conflict between their current activities. Next, participants completed the subjective measure of mixed emotions. At this point, those participants who had reported experiencing a desire over the last 30 minutes indicated the extent to which they tried to resist this/these desire/s, using a single item (“*How much have you tried to resist this/these desire/s?*”) on a scale ranging from *not at all* (1) to *very much* (6).

If participants reported a degree of goal conflict greater than 1 in the goal conflict scale, they indicated the type of goal or goals (if more than one) that were in conflict with the desire/s (or activity/activities, if no desire was reported). They chose up to three goals (in a *Yes/No* format) from a list of goal categories, following the recommendations of Hofmann et al. (2012): health – such as healthy eating, abstinence/restraint – such as not drinking, achievement – such as academic achievements, social – such as moral integrity, time use – such as reducing procrastination, relaxation – such as reducing stress, and energizing – such

as trying to wake yourself up. After they chose the relevant goal/s from the list, participants rated the importance of the chosen goal/s using a scale ranging from *not at all important* (1) to *very important* (5). Finally, participants completed the vitality scale, the items extracted from the psychological well-being scale, and the state affect measure. On average, participants took 7 minutes to complete each experience sampling questionnaire.

*Response details.* If a participant left a questionnaire unanswered until the next text was sent, the response was marked as missing. Similarly, if the participant started the questionnaire (entered his/her unique number) but did not complete any question until the next text was sent, the response was marked as missing, too. Responses were coded as valid if the participant completed the majority of the questionnaire within the corresponding time block and when the next questionnaire was separated from the current one by at least one hour. However, to ensure that a sufficient number of questionnaires were completed per participant, the participant was invited to extend his/her participation for up to one day if s/he completed less than 30% of the questionnaires throughout the study. In order to obtain a satisfactory response rate throughout the study, the participants received text messages every day after the last block ended (between 20:00 and 21:00 hours) to remind them to keep completing the questionnaires.

On average, participants completed 90% of the questionnaires embedded in the text messages sent every day. The remaining 10% of the questionnaires were either not responded to at all or remained uncompleted. Response rates for individual participants varied between 60% and 100% of the total number of questionnaires expected for each day. Overall, participants provided a total of 2,619 observations.

When participants finished their final experience sampling day, they were thanked for participating in the study and a personalised report was sent a few days later in appreciation

for their collaboration in the study. The personalised report included statistics and charts about their responses throughout the study, as well as some general advice on implementation intentions (i.e., a self-regulatory strategy in the form of an *if-then* plans; Gollwitzer & Sheeran, 2006).

### **5.3.2. Data analysis**

As in the previous chapter, the data analysis segment is presented in a separate sub-section to aid comprehension of the results. This sub-section briefly outlines the principles of multilevel modelling and then explains the stages conducted to analyse the data from Study 5.

It is important to consider in evaluating the hypotheses of the present chapter that most of the predictors included in the analyses are time-varying, that is, the variables included in the respective models were measured on the same occasions as the outcome(s) variables, and repeatedly so over time. As such, the correct interpretation of the predictions from the aforementioned hypotheses is that the dependent variable is predicted to be higher (or lower) than usual when people report more (or less) on a given independent variable. An exception to this reading is *hypothesis 3.2* in which experiencing more mixed emotions in general (not on a specific occasion, but at mean level of the person) is proposed to interact with occasions when people experience conflicting goals to predict greater psychological well-being. Evidence for this effect would be shown by a cross-level interaction in which a between-person effect (individual differences in mixed emotions) interacts with a time-varying independent variable (conflicting goals) to predict a time-varying outcome (psychological well-being).

Longitudinal designs are characterised by two or more hierarchical levels of analysis. When data are organized in one or more hierarchical levels it is said that the lower level is nested within the higher level. For example, employees nested within organizations or

citizens nested within countries. In particular, experience sampling methods are described by repeated measures nested within individuals. Each individual provides multiple responses over time, and as such, the individual represents the higher level in the data structure (level-2) whereas time is the lower level in the data structure (level-1).

Multilevel modelling (MLM) techniques provide a useful tool to explore hypotheses concerning fluctuations of responses from individuals over time. Thus, MLM was preferred over alternative techniques (e.g., repeated measures ANOVA) for two reasons. Firstly, alternative techniques assume that the total variance and covariances are constant across occasions. This implies that a variable will fluctuate at the same rate for all of the individuals in the sample, which is highly unlikely in a repeated measures design (Hox, 2010). Secondly, ANOVA techniques estimate the results based on least square estimation, which needs complete data; therefore, participants who miss a signal would be entirely dropped from the analysis because this estimation uses listwise deletion (Hox, 2010).

Multilevel modelling addresses these limitations. Firstly, MLM distinguishes between variations in a dependent variable that is between-person (BP) from variation that is within-person (WP) over time (Hox, 2010). Consider the linear model shown in equation 5.1. In this equation the outcome  $y$  for person  $i$  at time  $j$  is estimated based on the average intercept plus the predictor  $x$  for the same person and occasion, adding two residuals. Thus, the variance is partitioned by adding one residual term to account for the differences between the conditional mean of the predictor(s) and the individual's mean across time; this is normally called a random intercept (Hox, 2010). Partitioning the variance of a dependent variable results in standard errors for the fixed effects that are less biased, and as a consequence, type-I error is reduced. The second residual shown in equation 5.1 shows that the slope of the corresponding fixed effect can be also treated as random ( $u_{1j}x_{ij}$ ). Incorporating random intercepts and



slopes distinguishes between variances at Level-2 (between-person variance) and at Level-1 (within-person variance) reducing conflation of fixed effects estimated at each level.

$$Y_{ij} = \beta_{00} + \beta_{10}x_{ij} + u_{0j} + u_{1j}x_{ij} + \varepsilon_{ij} \quad (5.1)$$

In the present chapter, MLM was used to conduct the analyses across three different stages. In the first stage, MLM was used to estimate the impact of the type of goals and desires on the experience of conflicting goals. These models incorporate an autoregressive covariance structure with a lag-1. This is simply a statistical computation that estimates a constant variance across occasions, and predicts that the correlation of residuals over time is determined by the distance from the immediate following occasion. This is called an autocorrelation and is normally estimated using one time point of distance (i.e., lag-1).

The second stage corresponds with the testing of a cross-level interaction for **Hypothesis 3**. This required some variable transformations. Following Curran and Bauer's recommendations (2011), a set of between-person centred variables were created by averaging the raw scores of each individual for each relevant variable. This created variables that had the same score across occasions but a different value across individuals. Then, a set of within-person variables were created by subtracting the individual's average score for each variable from the raw scores. This created variables that had a unique value for each time point which was orthogonal to the corresponding between-person centred variable. Thus, to test the influence of individual differences in mixed emotions on the association between goal conflict and life-purpose, the between-person variable of mixed emotions was used to predict variations in the slope of the effect of the within-person variable of goal conflict on life-purpose. This interaction was also tested by plotting the corresponding cross-level interaction following the guidelines of Bauer and Curran (2005), and Preacher, Curran, and Bauer (2006) for probing multi-level interaction.

Finally, **Hypotheses 4** and **5** were tested using Multilevel Structural Equation Modelling (MSEM; Preacher, Zhang, & Zyphur, 2011; Preacher, Zyphur & Zhang, 2010). MSEM was preferred because it allows unbiased estimation of indirect effects, preventing conflation resulting from using hierarchical data where both level-1 and level-2 effects are present. In this model, separate level-2 and level-1 models of the hypothesised model were estimated as latent variables to account for measurement errors, preventing conflation between level-2 and level-1 components of the main effects. Separating and estimating direct and indirect effects for each level, reduces biases that result when alternative approaches are used (i.e., MLM using raw data or centred versions of the variables). This decreases the probability of committing type-II errors and provides more accurate confidence intervals. These analyses were conducted using *Mplus 7.3* (Muthén & Muthén, 2012). Further details are provided in the corresponding results sub-section.

### 5.3.3. Results

The results are separated into five sub-sections. The first sub-section provides general descriptive statistics concerning the frequency and strength of desires and goals across individuals and across time. Additionally, the first sub-section of results estimates the main effect of the presence of each type of desire on goal conflict, as well as the effect of each type of goal, partitioned by presence and absence of desires, on goal conflict. Finally, this section estimates the conditional effect of goals and desires on goal conflict. The second sub-section examines the set of hypotheses derived from the main **Hypothesis 3**. In particular, it evaluates whether conflicting goals negatively predict life purpose (*hypothesis 3.1*), and whether this association is moderated by individual differences in mixed emotions (*hypothesis 3.2*). This sub-section incorporates several control variables (PA, NA, and PWB) to determine the strength of *hypothesis 3.2* when other predictors are included in the model.

The third sub-section is dedicated to evaluating **Hypothesis 4**. This sub-section firstly assesses the effects of goal conflict on efforts to resist temptations (*hypothesis 4.1*), and then assesses the mediating effect of mixed emotions in the association between goal conflict and efforts to resist temptations (*hypothesis 4.2*). This sub-section also assesses the impact of mixed emotions on efforts to resist temptations (*hypothesis 4.3*). General levels of self-control (SC scale), and PA and NA were used as control variables in the mediational model. The fourth sub-section examined **Hypothesis 5**. In detail, this sub-section firstly tests the effects of efforts to resist temptations on vitality (*hypothesis 5.1*) and then whether mixed emotions moderate this association (*hypothesis 5.2*).

Finally, the last sub-section provides some ancillary analyses that parallel the analyses conducted in Study 4 concerning the curvilinear effect of mixed emotions on eudaimonic well-being at the between-person level of analysis.

**The nature of goal conflict.** Participants reported experiencing a desire on 65% of the occasions ( $N = 1698$ ). As shown in *Figure 11*, the most common desires were “eating” and “leisure”, whereas in term of the strength to the desires, the desires of “media (e.g., facebook)”, “study or work”, “social contact”, “sleep”, “leisure” and “eating” were usually experienced at a moderate to high intensity (on a scale from 1 to 5), whereas “sexual desire”, “spending”, “substances”, and “hygiene or maintenance (e.g., sports)” were experienced at low to moderate intensity (in a scale from 1 to 5). Also interesting was the number of mentions received for each type of desire, represented by the size of each bubble. Bigger bubbles indicate that more people mentioned the corresponding desire on more than one occasion. Thus, the most widespread desires across participants were the desire of “eating”, followed by the desire of “leisure” and “media”, whereas “sexual desire” and “substances” were mentioned only by a few participants on more than one occasion.

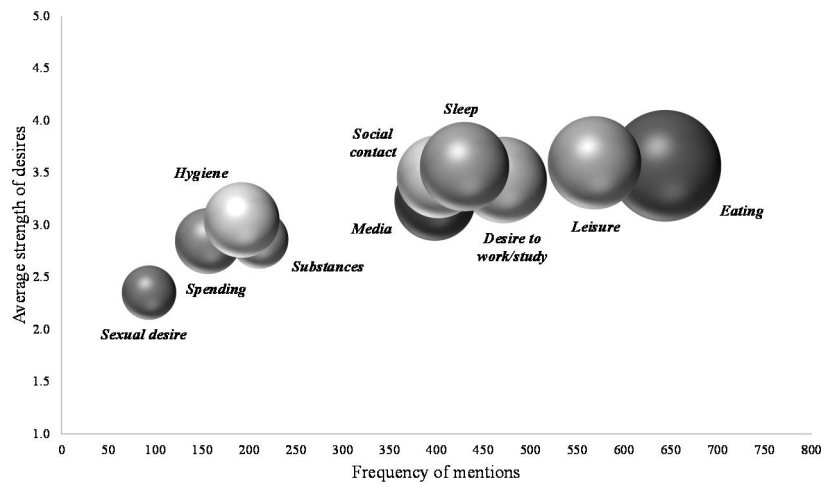


Figure 11. Frequency of mentions of desires and their strength across participants and occasions.

Another aspect examined across individuals and occasions was the type of goals activated during the presence or absence of desires. Figure 12 shows that when desires were not present, people mentioned a large variety of goals, as deduced from the absolute number of mentions of each goal. In contrast, the presence of desires was clearly most common when achievement-related goals and time use-related goals were active. Goal importance was similar among the different type goals, regardless of whether desires were present or not.

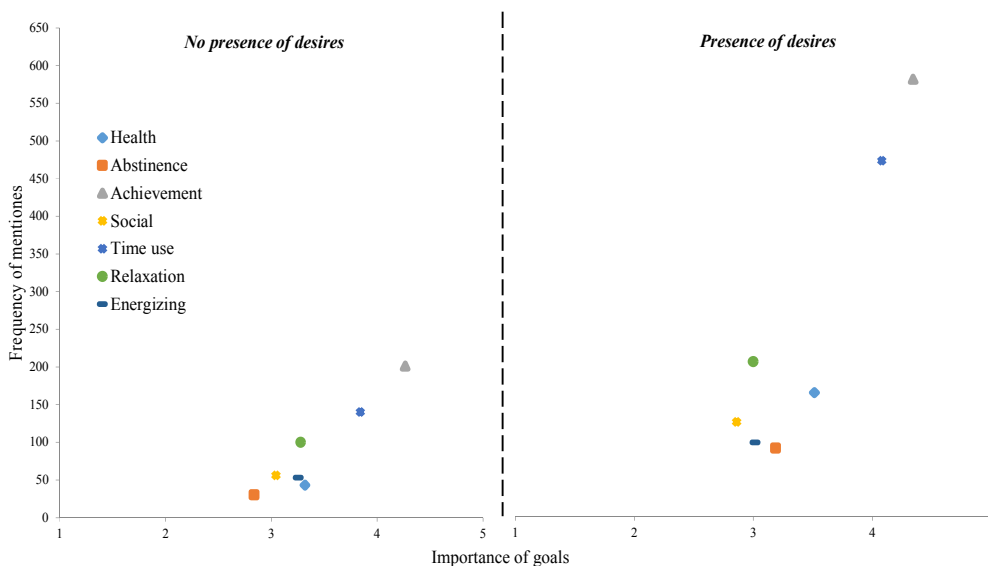


Figure 12. Types of goals, their frequency of mentions and goal importance across participants and occasions, comparing between presence and no presence of desires.

One conclusion that can be drawn from the descriptive plots is that the strength of desires and the importance of goals are similar across types of desires and types of goals, respectively. In order to statistically evaluate the effect of the importance of the goals and the strength of the desires on goal conflict, goal conflict was regressed on the strength of each desire and the importance of each type of goal; these independent variables were non-centred. The model also incorporated the variable of time (centred) to control for potential linear effects of time on goal conflict. The model specified random intercepts and fixed slopes for each individual, the first-order autoregressive covariance structure was included, and maximum likelihood was the estimator.

Results did not reveal an effect of the importance of goals on the intensity of goal conflict ( $p > 0.10$ ). However, on occasions where the strength of certain desires was higher, people tended to experience more intense goal conflict. In particular, the strength of desire to use media,  $\beta = 0.08$ ,  $t(2,550) = 4.97$ ,  $p < 0.01$  [95%CI: 0.05 / 0.11]; spend,  $\beta = 0.05$ ,  $t(2,527) = 2.66$ ,  $p < 0.01$  [95%CI: 0.01 / 0.09]; engage in leisure activities,  $\beta = 0.09$ ,  $t(2,442) = 7.56$ ,  $p < 0.01$  [95%CI: 0.06 / 0.11]; and sleep,  $\beta = 0.10$ ,  $t(2,459) = 7.92$ ,  $p < 0.01$  [95%CI: 0.07 / 0.12], were significantly associated with higher levels of goal conflict on a given occasion.

The previous multilevel model was repeated but this time including the presence of each type of desire and type of goals (categorical variables as predictors) when desires were present or absent, resulting in 3-new multilevel models. *Table 12* (column A) shows that conflicting goals were more intense on occasions where the desire to use media,  $\beta = 0.25$ ,  $t(2,540) = 4.79$ ,  $p < 0.01$  [95%CI: 0.15 / 0.35]; spend,  $\beta = 0.20$ ,  $t(2,499) = 2.67$ ,  $p < 0.01$  [95%CI: 0.05 / 0.34]; engage in leisure activities,  $\beta = 0.34$ ,  $t(2,451) = 7.91$ ,  $p < 0.01$  [95%CI: 0.25 / 0.42]; and sleep,  $\beta = 0.37$ ,  $t(2,481) = 7.70$ ,  $p < 0.01$  [95%CI: 0.27 / 0.46], were active.

Table 12. The effect of type of desires and type of goals (including when desires were active and not) on goal conflict.

Model Parameters	Column A			Column B (present)			Column C (absent)		
	Estimate	SE	p <	Estimate	SE	p <	Estimate	SE	p <
<u>Fixed effects</u>									
Intercept	2.02	0.07	0.01	1.95	0.05	0.01	2.13	0.07	0.01
Time effect	-0.01	0.02	0.59	0.01	0.02	0.72	-0.03	0.02	0.10
Desire of eating	0.03	0.04	0.46						
Substances desire	-0.11	0.07	0.11						
Sexual desire	0.12	0.09	0.21						
Desire of media	0.25	0.05	0.01						
Desire of spending	0.20	0.07	0.01						
Desire of social contact	0.08	0.05	0.12						
Desire of leisure	0.34	0.04	0.01						
Desire of hygiene	0.04	0.07	0.56						
Desire of study or work	0.03	0.05	0.54						
Desire of sleep	0.37	0.05	0.01						
Health goals				0.31	0.07	0.01	-0.48	0.20	0.05
Abstinence goals				0.56	0.09	0.01	-0.37	0.20	0.06
Achievement goals				0.92	0.05	0.01	0.27	0.15	0.07
Social goals				0.18	0.08	0.05	-0.17	0.17	0.33
Time use goals				0.50	0.05	0.01	-0.02	0.16	0.92
Relaxation goals				0.33	0.07	0.01	-0.15	0.16	0.39
Energizing goals				0.22	0.08	0.01	0.17	0.17	0.33
Percent of desires				-0.52	0.16	0.01			
Percent of goals							2.68	0.86	0.01
ICC	0.30			0.23			0.32		
Deviance -2ΔLL(Δdf)	171.2 (11)		0.01	883.3 (9)		0.01	199.4 (8)		0.01
R <sup>2</sup>	0.06			0.29			0.09		

Note: N = 73, 10 days, 4 observations per day, 2,619 observations. SE: standard error. ICC: intra-class correlation.

In relation to the effect of type of goals on goal conflict when desires were mentioned (*Table 12*, column B), results shows that conflicting goals were more intense on occasions where a desire was present and people were pursuing any goal. This indicates that the confluence of a desire and a goal produced conditions in which people were likely to experience greater levels of goal conflict. The corresponding estimates for each effect (*Table 12*, column B) indicate that strongest effects were observed on occasions where one or more desires were present and abstinence-related goals,  $\beta = 0.56$ ,  $t(2,526) = 6.22$ ,  $p < 0.01$  [95%CI: 0.38 / 0.73], achievement-related goals,  $\beta = 0.92$ ,  $t(2,569) = 19.01$ ,  $p < 0.01$  [95%CI: 0.83 / 1.01], and time use-related goals,  $\beta = 0.50$ ,  $t(2,556) = 9.66$ ,  $p < 0.01$  [95%CI: 0.40 / 0.60], were mentioned.

Planned comparisons (not shown in *Table 12*) including conditional terms between type of desires and type of goals found that goal conflict was higher on occasions where individuals had the desire to spend money and the goal of abstinence was active,  $\beta = 0.48$ ,  $t(2,483) = 2.44$ ,  $p < 0.05$  [95%CI: 0.09 / 0.84]. Similarly, goal conflict was higher on occasions where individual had the desire to engage in leisure activities and achievement-related goals were active,  $\beta = 0.31$ ,  $t(2,495) = 3.29$ ,  $p < 0.01$  [95%CI: 0.13 / 0.50].

The last model estimated the impact of the number of desires present on a given occasion on the intensity of goal conflict. To do this a new variable was created based on the average score across all types of desires. As the presence and absence of desires was coded using 1 and 0, respectively, this variable reflected the percentage of active desires on each occasion. Results showed that the activation of more desires on a given occasion predicted less goal conflict,  $\beta = -0.52$ ,  $t(2,545) = -3.34$ ,  $p < 0.01$  [95%CI: -0.83 / -0.21]. Therefore, the more desires that people experienced at a given moment, the less conflict they reported.

A similar variable was created to estimate the impact of the amount of goals present on a given occasion on goal conflict when desires were absent. In contrast to the previous finding, the percentage of active goals significantly predicted greater goal conflict,  $\beta = 2.68$ ,  $t(2,429) = 3.12$ ,  $p < 0.01$  [95%CI: 0.99/ 4.36]. This finding provided evidence that the simultaneous pursuit of multiple goals led people to experience greater goal conflict.

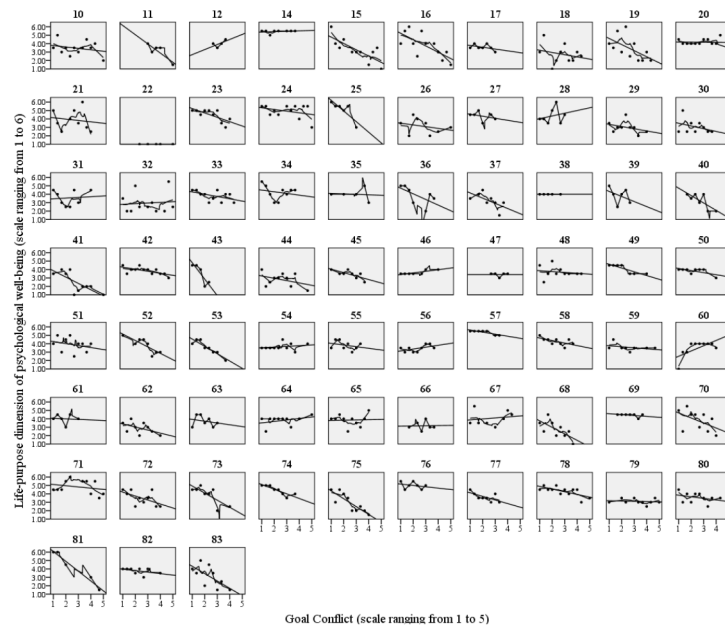
However, when examining the effect of single goals on goal conflict on occasions where desires were not present, the results were markedly different (*Table 12*, column C). The pursuit of health-related goals predicted significantly less goal conflict,  $\beta = -0.48$ ,  $t(2,454) = -2.44$ ,  $p < 0.05$  [95%CI: -0.86 / -0.09], while the pursuit of the most other goals resulted in a negative trend, indicating that goal conflict was not produced by pursuing single goals. To sum up, goal conflict was most likely to be experienced when one or more desires were activated in conjunction with relevant goals or multiple goals were activated on a given occasion.

**The moderating role of individual differences in mixed emotions.** In order to determine whether individual differences in mixed emotions moderate the relationship between goal conflict and eudaimonic well-being, it was first necessary to evaluate whether goal conflict predicted eudaimonic well-being. *Figure 13* shows the regression fitted lines for each participant for the association between goal conflict and the life-purpose dimension of psychological well-being. Visual inspection suggests a negative trend, such that greater levels of goal conflict were associated with lower levels of life-purpose.

In order to statistically determine whether individual differences in mixed emotions moderated the association between goal conflict and life-purpose, a multilevel model was firstly specified incorporating the raw data on goal conflict as a predictor of life-purpose (Model-1). The model also incorporated time to control for potential linear effects of time on



life-purpose. Random intercepts and random slopes were specified for each individual. Serial autocorrelations between residuals were accounted for using the first-order autoregressive covariance structure. The estimator was maximum likelihood.



*Figure 13.* Life-purpose as a function of goal conflict. Raw data and fitted regression lines for each participant over time. The number above each square represents the actual ID number given to each participant at the beginning of the study.

As shown in *Table 13*, goal conflict negatively predicted life-purpose across occasions,  $\beta_2 = -0.27$ ,  $t(67) = -8.80$ ,  $p < 0.01$  [95%CI: -0.33 / -0.21]. This provides support for *hypothesis 3.1* which stated that conflicting goals will negatively predict life-purpose, and confirmed the interpretation of *Figure 13*. Importantly, there was significant variance in the slopes of goal conflict,  $\sigma^2 = 0.04$ ,  $Wald-z = 3.79$ ,  $p < 0.01$ , which suggest that variables at the between-level may account for this variation. The proportion of variance was small,  $R^2 = 0.08$ , although the deviance showed that Model-1 fitted the data significantly better than the model without predictors. The inclusion of gender and age did not modify the main effect of goal conflict on life-purpose.

Prior to estimating a new model, an empty model including raw scores of mixed emotions as a dependent variable was analysed to determine the amount of between-subject variance in the sample, as a proxy of the presence of significant individual differences in mixed emotions. The results from this model revealed that a significant amount of variance was due to individual differences in mixed emotions,  $\sigma^2 = 0.26$ ,  $Wald-z = 5.46$ ,  $p < 0.01$  [95%CI: 0.18 / 0.37]. Thus, it is possible that some amount of the variability in mixed emotions was explained by significant differences across individuals. With the confidence of these results, in a second step, a new model was estimated adding a between-person centred version of mixed emotions and an interaction term combining goal conflict and the between-person centred mixed emotions variable (Model-2). The estimator was again maximum likelihood.

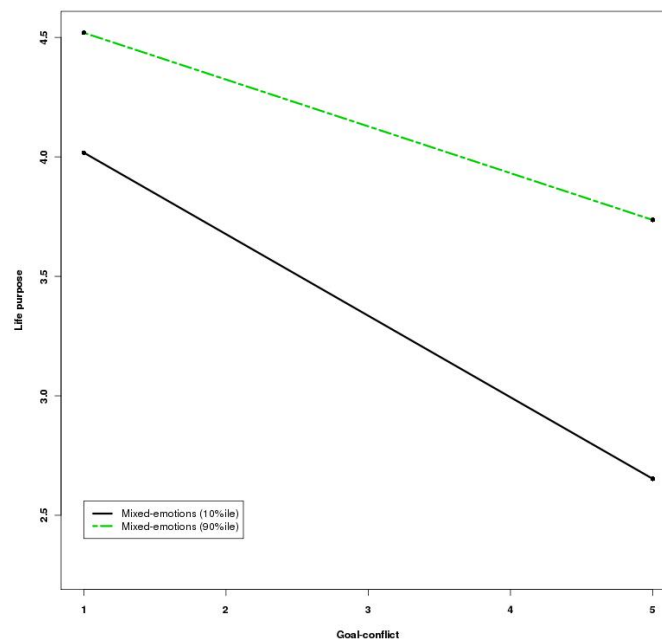
The additional interactive term incorporates a new parameter at level-2, which estimates the slope of goal conflict on life-purpose from variations in between-subject scores of mixed emotions. As shown in *Table 13*, individual differences in mixed emotions did not predict fluctuations in life-purpose. However, a significant cross-level interaction was found between goal conflict (level-1) and between-person mixed emotion scores (level-2). The effect of fluctuations in the levels of goal conflict on life-purpose depended on individual differences in mixed emotions,  $\beta_2 * \beta_3 = 0.11$ ,  $t(2,239) = 3.23$ ,  $p < 0.01$  [95%CI: 0.04 / 0.18]. Thus, in accordance with ***hypothesis 3.2***, the negative effect of experiencing goal conflict on life-purpose was attenuated by between-subject variations in mixed emotions. Although the increase in the proportion of variance explained was marginal,  $\Delta R^2 = 0.01$ , the model fitted the data well. The inclusion of gender and age did not modify the conditional effect of goal conflict on life-purpose as a function of individual differences in mixed emotions.

Table 13. The effect of conflicting goals on life-purpose moderated by individual differences in mixed emotions.

Model Parameters	Model-1			Model-2			Model-3		
	Estimate	SE	p <	Estimate	SE	p <	Estimate	SE	p <
<u>Fixed effects</u>									
Intercept ( $\beta_0$ )	4.59	0.08	0.01	4.56	0.07	0.01	2.75	0.55	0.01
Time effect ( $\beta_1$ )	-0.01	0.01	0.52	-0.01	0.02	0.66	0.01	0.01	0.40
Goal conflict ( $\beta_2$ )	-0.27	0.03	0.01	-0.26	0.02	0.01	-0.46	0.13	0.01
Mixed emotions <sub>-between</sub> ( $\beta_3$ )				-0.27	0.20	0.10	-0.18	0.13	0.17
Goal conflict*Mixed emotions-PMC ( $\beta_2*\beta_3$ )				0.11	0.03	0.01	0.09	0.03	0.01
PA <sub>-within</sub> ( $\beta_4$ )							0.29	0.04	0.01
NA <sub>-within</sub> ( $\beta_5$ )							-0.15	0.07	0.05
PWB ( $\beta_6$ )							0.42	0.12	0.01
Goal conflict*PA <sub>-within</sub> ( $\beta_2*\beta_4$ )							-0.01	0.02	0.50
Goal conflict*NA <sub>-within</sub> ( $\beta_2*\beta_5$ )							0.02	0.02	0.36
Goal conflict*PWB ( $\beta_2*\beta_6$ )							0.06	0.03	0.04
<u>Variances</u>									
Residual variance	0.61	0.02	0.01	0.60	0.02	0.01	0.55	0.02	0.01
Random intercept variance	0.29	0.05	0.01	0.26	0.05	0.01	0.18	0.03	0.01
ICC	0.32			0.30			0.25		
Deviance -2 $\Delta$ LL( $\Delta$ df)	200.4 (2)		0.01	202.2 (4)		0.01	466.6 (10)		0.01
R <sup>2</sup>	0.08			0.09			0.17		

Note: N = 73, 10 days, 4 observations per day, 2,619 observations. SE: standard error; *between*: between-person centred variable; ICC: intra-class correlation.

A graphical representation of this moderation is shown in *Figure 14* which depicts the multilevel regression fitted lines for changes in life-purpose as a function of fluctuations in goal conflict and different values of individual differences in mixed emotions (90% percentile and 10% percentile). *Figure 14* revealed that, when people did not experience goal conflict (represented by 1 in *Figure 14*, using the unadjusted scale) or they experienced low levels of goal conflict, they usually experienced higher levels of life-purpose, and individual differences in mixed emotions had no impact. However, at times when people reported moderate to high levels of goal conflict (3, 4, and 5 in *Figure 14*, using the unadjusted scale), they tended to report lower levels of life-purpose, but only when their average level of the experience of mixed emotions was low, because the negative impact of goal conflict on life-purpose was tempered when people tended to experience mixed emotions more frequently.



*Figure 14.* Multilevel model of a two-way interaction between goal conflict (level-1) and mixed emotions using a person mean centred variable (Level-2).

As an illustrative comparison, when people reported a very intense goal conflict (5 on the scale) and did not experience mixed emotions (i.e., scored on the bottom 10% of the sample for mixed emotions), the negative impact of goal conflict led people to report life-purpose scores as low as “2.5” (on a scale ranging from 1 to 6); whereas at the same levels of goal conflict, people who did experience mixed emotions (scored on the top 90% of the sample for mixed emotions), scored about “4” on life-purpose using the same scale.

In the final step (Model-3), the following control variables were added to the previous Model-2: within-person levels of positive affect (PA) and negative affect (NA), and between-person levels of psychological well-being (PWB). The corresponding interaction between these variables and goal conflict were also included. As shown in *Table 13*, the main effect of goal conflict on life-purpose as well as the interaction between goal conflict and between-person mixed emotions scores remained statistically significant. Thus, individual differences in mixed emotions moderated the association between goal conflict and life-purpose, over and above average levels of psychological well-being and state-PA and state-NA.

In addition, it was found that higher PA predicted greater life-purpose,  $\beta_4 = 0.29$ ,  $t(2,494) = 6.69$ ,  $p < 0.01$  [95%CI: 0.21/ 0.38], which confirmed the known benefits of experiencing positive emotions in everyday life for psychological well-being. Similarly, individual differences in psychological well-being (PWB) significantly predicted within-day experiences of life-purpose,  $\beta_5 = 0.42$ ,  $t(158) = 3.40$ ,  $p < 0.05$  [95%CI: 0.18 / 0.66], providing evidence of the convergence between everyday experiences of life-purpose and general PWB scores. The model explained  $R^2 = 0.17$  of the variations in life-purpose, and fitted the data well. Another interaction was found between goal conflict and PWB, such that people who scored higher on the psychological well-being scale had greater life-purpose when experiencing goal conflict.

### **The mediational role of mixed emotions in regulatory efforts to resist**

**temptations.** To assess whether fluctuations in mixed emotions experience mediated the relationship between goal conflict and efforts to resist temptations, a multilevel structural equation model (MSEM) using maximum likelihood was specified including goal conflict and mixed emotions as predictors of efforts to resist temptations.

*Figure 15* provides a graphical representation of this mediation. In this figure the between components are separated from the within components by creating random intercepts and slopes for each association (i.e.,  $GC \rightarrow RT$ ;  $GC \rightarrow ME$ ;  $ME \rightarrow RT$ ) using the observed scores of each variable. The model also involves the estimation of separate residual variances for each component at both levels (expressed as “ $\theta$ ” in *Figure 15*). Not shown in the figure, for the sake of simplicity, are the multiple Level-2 covariances among the slopes and fixed effects. Thus, the estimation of the lower-level mediation parameters is calculated as follows: the path regressing efforts to resist temptations on goal conflict equals the estimate of the mean of the corresponding slope ( $GC \rightarrow RT$ ); the path regressing mixed emotions on goal conflict equals the estimate of the mean of the corresponding slope ( $GC \rightarrow ME$ ); the path regressing efforts to resist temptations on mixed emotions equals the estimate of the mean of the corresponding slope ( $ME \rightarrow RT$ ); the indirect effect equals the multiplicative term between the path  $a_w$  and  $b_w$  plus the covariance between the slopes of  $a_b$  and  $b_b$ . The previous model permits the estimation of precise within-person effects for this mediational model.

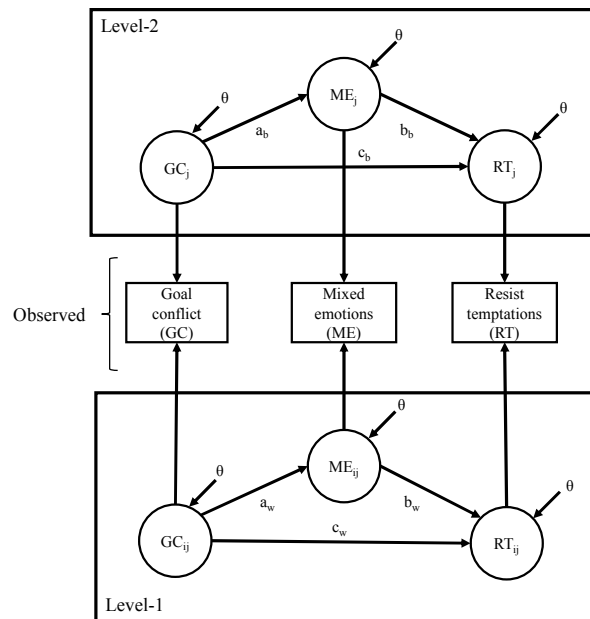


Figure 15. Illustration of 1-1-1 mediation model based on Preacher et al. (2010). *GC*: goal conflict, *ME*: mixed emotions; *RT*: efforts to resist temptations.

Findings using this mediational model firstly demonstrated that occasions where desires conflicted with relevant goals positively and significantly predicted greater efforts to resist temptations during the same event,  $\beta_{c_w} = 0.33$ ,  $SE = 0.05$ ,  $p < 0.01$  [95%CI: 0.26 / 0.41]. This finding supported **hypothesis 4.1**, according to which goal conflict will positively predict efforts to resist temptations. More importantly, the effect of goal conflict on efforts to resist temptation was mediated by the elicitation of mixed emotions during the same event. The indirect effect of goal conflict on efforts to resist temptation via mixed emotions was significant,  $\beta_{c'w} = 0.03$ ,  $SE = 0.01$ ,  $p < 0.01$  [95%CI: 0.01 / 0.05], with an 8% mediated effect, indicating that the elicitation of mixed emotions was a proximal predictor of self-control efforts, supporting **hypothesis 4.2**. The results also demonstrated that stronger experiences of mixed emotions were significantly and positively associated with greater efforts to resist temptations,  $\beta_{b_w} = 0.13$ ,  $SE = 0.04$ ,  $p < 0.01$  [95%CI: 0.07 / 0.20]. This finding supported **hypothesis 4.3**, according to which mixed emotions will positively predict

efforts to resist temptations. The fit of the mediation model was good, with a deviance significantly better than the empty model,  $-2\Delta LL = 112.7 (2), p < 0.01$ .

The findings also showed that occasions where greater goal conflict was reported were positively and significantly associated with greater levels of mixed emotions,  $\beta_{aw} = 0.16, SE = 0.03, p < .01 [95\%CI: 0.12 / 0.20]$ , offering longitudinal support for **Hypothesis 1**. This is also described in *Figure 16*, which shows the fitted regression lines for each participant for the association between goal conflict and mixed emotions. Visual inspection of *Figure 16* confirms that higher goal conflict was followed by the presence of greater mixed emotions. Additional multilevel analyses using mixed emotions as the dependent variable demonstrated that the percentage of active goals predicted greater levels of mixed emotions on a given occasion,  $\beta = 0.82, SE = 0.14, p < 0.01 [95\%CI: 0.54 / 1.09]$ ; whereas the percentage of active desires did not predict levels of mixed emotions ( $p = 0.52$ ). These demonstrate the strong association between conflicting goals and mixed emotions.

In order to examine the influence of additional variables in the previous model, efforts to resist temptations were regressed on the baseline measure of trait self-control (SC). As shown in *Table 14* (column labelled as “RT as DV”), the results revealed a non-significant effect of trait self-control on efforts to resist temptations ( $p = 0.51$ ). This model also incorporated within-person centred versions of positive affect (PA) and negative affect (NA) at level-1 to examine the influence of occasions where people experienced greater PA or NA on efforts to resist temptations.



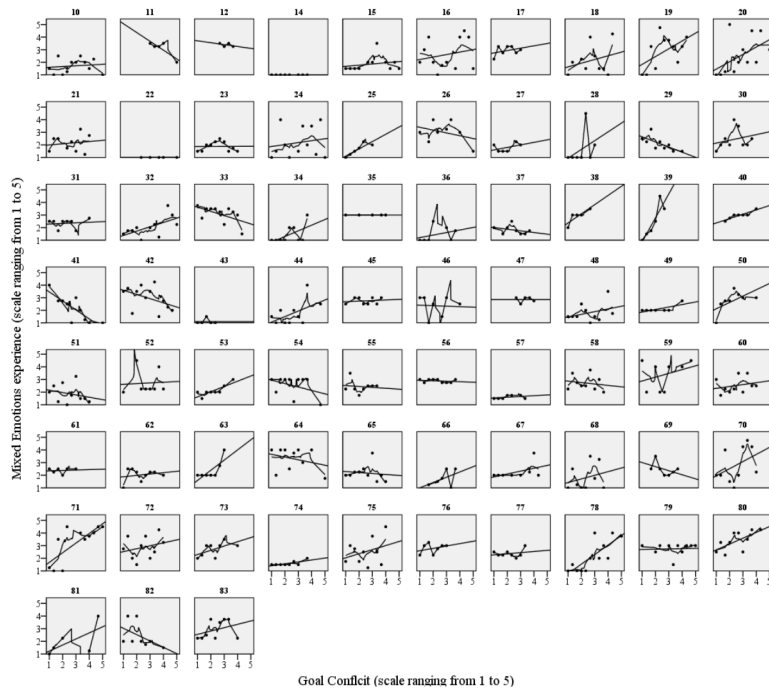
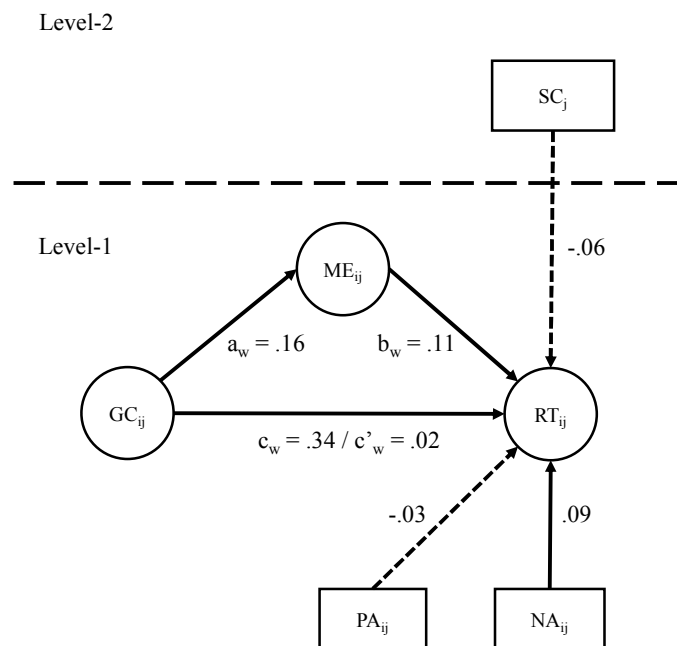


Figure 16. Experience of mixed emotions as a function of goal conflict. Raw data and fitted regression lines for each participant over time. The number above each square represents the actual ID number given to each participant at the beginning of the study.

Results demonstrated that PA did not predict greater efforts to resist temptations on a given occasion ( $p = 0.47$ ), whereas occasions where people experienced higher levels of NA positively and significantly predicted greater efforts to resist temptations,  $\beta = 0.09$ ,  $SE = 0.04$ ,  $p < 0.05$  [95%CI: 0.01 / 0.16]. Importantly, the indirect effect of the mediational model remained significant,  $\beta_{c'w} = 0.02$ ,  $SE = 0.01$ ,  $p < 0.05$  [95%CI: 0.01 / 0.04], as well as the effect of mixed emotions on efforts to resist temptations,  $\beta_{bw} = 0.11$ ,  $SE = 0.04$ ,  $p < 0.01$  [95%CI: 0.05 / 0.18]. As shown in Table 14, the fit of the mediational model including the three additional variables was good and the entire model explained  $R^2 = 0.19$  of the variance at level-1. In order to facilitate the visualisation of the entire model (i.e., including the mediation and controlling variables), a summary is shown in Figure 17, incorporating all of

the main effects tested, whereas *Table 14* shows the remaining estimates at level-1 and at level-2.



*Figure 17.* Mediation model including trait self-control (SC) at Level-2 and PA and NA at level-1 as competing predictors. Squares indicate an observed variable whereas circles indicate latent constructs. Subscript “j” indicates a variable measured at level-2, whereas subscript “ij” indicates a variable measured at level-1. Dotted lines indicate no-significant effects.

**The influence of the everyday experience of mixed emotions on vitality.** The final set of analyses tested the effect of occasions where people made efforts to resist temptation on vitality, and whether this association was moderated by mixed emotions. The previous mediational model was used as the primary model upon which new parameters were estimated. This provided two advantages. Firstly, this approach added consistency and robustness to the previous hypotheses. If efforts to resist temptations have an effect on relevant variables, then this effect should occur alongside the mediational model just tested. Secondly, this approach helped to build a model that connected the two mechanisms tested in

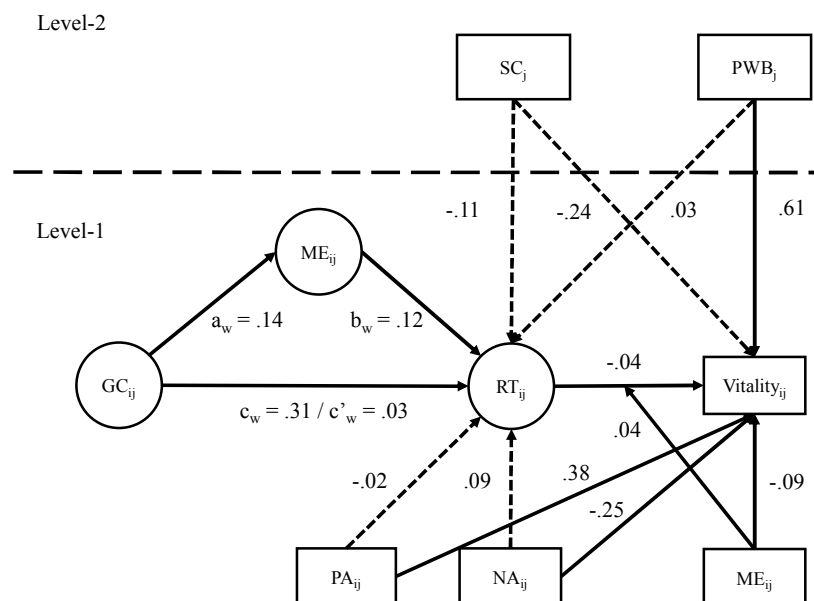
this chapter, providing a more comprehensive model of the functioning of mixed emotions and eudaimonic well-being.

Hence, the previous mediational model incorporated vitality as a dependent variable regressed on efforts to resist temptations. Likewise, vitality was also regressed on mixed emotions. Mixed emotions were entered into the model as a within-person centred variable. This was necessary to create a new level-1 predictor which was orthogonal to the latent level-2 parameter defined in the mediational model. Although the level-2 parameter was not hypothesised in the mediational model, this procedure reduced conflation between the level-1 and level-2 estimates of mixed emotions. Additionally, a conditional effect was created including an interaction between efforts to resist temptation at level-1 and mixed emotions at level-1. This additional term estimated the moderating effect of mixed emotions on the association between efforts to resist temptation and vitality. Vitality was also regressed on PWB and trait self-control at level-2, and finally, vitality was regressed on PA and NA measured at level-1 using their within-person centred versions. The rest of the parameters tested in the mediational model were the same.

The second column of *Table 14* shows the same mediational model tested in the previous sub-section, but including vitality as the dependent variable. The results revealed that mixed emotions still mediated the relationship between goal conflict and efforts to resist temptations at level-1. Furthermore, occasions where people made greater efforts to resist temptations were associated with significantly less vitality,  $\beta = -0.08$ ,  $SE = 0.03$ ,  $p < 0.01$  [95%CI: -0.12 / -0.04]. This finding supported *hypothesis 5.1* which anticipated that efforts to resist temptations would negatively predict vitality. Likewise, mixed emotions predicted significantly less vitality. However, if occasions where people made greater efforts to resist temptations were accompanied by higher levels of mixed emotions, then people reported higher levels of vitality,  $\beta = 0.07$ ,  $SE = 0.02$ ,  $p < 0.01$  [95%CI: 0.03 / 0.11]. This result

provides support for *hypothesis 5.2*, which anticipated that efforts to resist temptations will interact with the experience of mixed emotions to enhance vitality.

The inclusion of variables at level-2 (namely, PWB and trait-SC) did not change the interaction effect of mixed emotions and efforts to resist temptations on vitality, although people who scored higher on the PWB scale had higher levels of vitality across occasions. Similarly, occasions where people experienced higher PA positively predicted vitality, whereas occasions where people experienced higher NA negatively predicted vitality. The inclusion of age and gender did not showed a significant effect on vitality. Finally, it is interesting to note that the amount of variance explained was higher after the inclusion of PWB and PA in the model, demonstrating the strong interrelations between vitality and other well-being related constructs. A graphical representation including the main effects and interaction is shown in *Figure 18*.



*Figure 18.* Full-model testing Hypothesis 4 and Hypothesis 5. Squares indicate an observed variable whereas circles indicate latent constructs. Mixed emotions experience appears twice in the scheme to reflect that the effect found is at level-1, but this is the same variable showed encircled as *ME*.

Table 14. Full-model including the mediating effect of mixed emotions in the relationship between conflicting goals and efforts to resist temptations, and the moderating effect of mixed emotions on the relationship between efforts to resist temptations and vitality with covariates.

Model Parameters	RT as DV			Vitality as DV			Vitality as DV plus covariates		
	Estimate	SE	p <	Estimate	SE	p <	Estimate	SE	p <
<u>Level-1</u>									
Intercept	0.01	0.61	0.99	1.82	0.74	0.02	1.82	0.74	0.02
<i>GC</i> → <i>RT</i>	0.34	0.05	0.01	0.31	0.05	0.01	0.31	0.05	0.01
<i>GC</i> → <i>ME</i>	0.16	0.03	0.01	0.15	0.03	0.01	0.14	0.03	0.01
<i>ME</i> → <i>RT</i>	0.11	0.04	0.01	0.12	0.04	0.01	0.12	0.04	0.01
Indirect effect	0.02	0.01	0.02	0.03	0.01	0.02	0.03	0.01	0.01
<i>RT</i>				-0.08	0.03	0.01	-0.04	0.02	0.05
Mixed emotions <sub>-within</sub>				-0.22	0.03	0.01	-0.09	0.04	0.02
RT*Mixed emotions <sub>-within</sub>				0.07	0.02	0.01	0.04	0.02	0.03
PA <sub>-within</sub>	-0.03	0.04	0.47				0.38	0.05	0.01
NA <sub>-within</sub>	0.09	0.04	0.05				-0.25	0.06	0.01
<u>Level-2</u>									
<i>GC</i> → <i>RT</i>	0.34	0.05	0.01	0.34	0.05	0.01	0.39	0.05	0.01
<i>GC</i> → <i>ME</i>	0.64	0.18	0.01	0.67	0.19	0.01	0.68	0.19	0.01
<i>ME</i> → <i>RT</i>	0.37	0.25	0.13	0.41	0.23	0.09	0.45	0.22	0.06
Indirect effect	0.24	0.15	0.11	0.27	0.14	0.06	0.31	0.14	0.04
Trait Self-control	-0.06	0.09	0.51				-0.24	0.12	0.06
PWB							0.61	0.18	0.01
Deviance -2ΔLL(Δdf)	172.9 (9)		0.01	NC			NC		
R <sup>2</sup> at Level-1	0.19			0.05			0.34		

Note: *N* = 73, 10 days, 4 observations per day, 2,619 observations. *DV*: dependent variable; *SE*: standard error; *GC*: goal conflict; *ME*: mixed emotions; *RT*: efforts to resist temptations; *within*: within-person centred variable; *NC*: the model did not converge to estimate the likelihood estimator.

#### **5.3.4. Ancillary analysis**

In order to provide parallel evidence of the curvilinear effect of mixed emotions on eudaimonic well-being as shown in chapter 4, mixed emotions at the between-person level of analysis were used as a predictor of the global measure of psychological well-being (PWB). This is similar to the analysis conducted in Study 4 where a global measure of eudaimonic well-being was predicted by mixed emotions elicited following a manipulation procedure.

Hierarchical regressions based on 10,000 bootstrapped samples were used to test the effect of between-person centred mixed emotions on PWB at step 1. Next, the squared term of between-person centred mixed emotions was entered at step 2, in order to test the curvilinear effect of mixed emotions on PWB.

Consistent with Study 4, the squared term for between-person centred mixed emotions explained a significant amount of the variance in PWB,  $R^2 = 0.07$ ,  $F(2, 71) = 6.74$ ,  $p < .01$ , whereas the variability explained by between-person centred mixed emotions was not significant. Furthermore, the squared term mixed emotions was significantly associated with PWB,  $\beta = -0.04$ ,  $p < 0.01$  [95%CI: -.02 / -.06], which indicated a concave curvilinear effect.

#### **5.4. Discussion**

Study 5 used an experience sampling method to examine the influence of mixed emotions on eudaimonic well-being via two proposed mechanisms: the restorative mechanism and the balancing mechanism. Additionally, Study 5 also assessed the nature of goal conflict, and its relationship with the presence of desires and goals in everyday life. The discussion of the findings is organised following the four sub-sections presented in the results section. Thus, the first sub-section discusses the nature of goal conflict, giving special attention to the theoretical consequences of the evidence concerning the elicitation of goal conflict. The second sub-section discusses the restorative mechanism. The third sub-section

discusses the mediational role of mixed emotions in the relationship between goal conflict and efforts to resist temptations. Finally, the fourth sub-section discusses the implication of the conditional relationship between mixed emotions and vitality. The discussion section ends by emphasising the limitations and main contributions of Study 5 in understanding the impact of mixed emotions on eudaimonic well-being.

**Goals, desires, and goal conflict.** The findings of Study 5 firstly demonstrated that goal conflict can result from the activation of desires that interfere with current goals. Occasions where people reported having a desire and a relevant goal was active, were associated with higher levels of goal conflict. In particular, goal conflict was commonly characterised by situations where there was a desire for leisure and achievement-related goals were present. Likewise, situations characterised by a desire to spend money when an abstinence goal (e.g., saving money) was present, produced greater levels of goal conflict. Considering the pervasiveness of achievement-related goals and the desire for leisure in the present study, it is legitimate to speculate that (a) these situations qualify as a common self-control dilemma in everyday life, and (b) people consistently identify these situations as conflicting, and as a consequence, they qualify as one of the most common self-control dilemmas in the sample studied.

Powers (1973) pointed out that conflict is likely to occur between systems at the same level of the hierarchy. This is to say that a temptation, usually defined as a lower-priority goal (e.g., Fishbach, Friedman, & Kruglanski, 2003), should not enter into conflict with a long-term goal. Therefore, the current evidence showing that the presence of a desire and a relevant goal predicted greater goal conflict challenges Power's original idea. However the present study construes desires as a motivational force that differs from formal goals only in respect of its urgency and its irrelevance with respect to the current activity (Hofmann & Van Dillen, 2012). Desires emerge automatically as a reward-processing system in regard of

internal need states (e.g., hunger, thirst, deprivation) (Hofmann & Van Dillen, 2012). A desire turns into temptation only when it hampers the realisation of a current, relevant task or goal (Hofmann et al., 2012). Hofmann and colleagues added that desires influence actual behaviours either through the conscious pursuit of desire, in which case the feeling of wanting is present, or via impulsive, habitual responses, which are presumably unconscious (Hofmann, Friese, & Strack, 2009; Hofmann & Van Dillen, 2012).

The present findings suggest that desires are not necessarily lower in the hierarchy. Even the most important goals can emerge in the form of a desire, and they can be as intruding as the most basic of the temptations. Consider an academic dining with her partner, while she tries to put out of mind the grant application that she has been working on in the last weeks. In this example, a central goal, such as achievement is acting as a trivial desire because it emerges in a situation where it is not appropriate. Goals (Austin & Vancouver, 1996) and desires (Hofmann & Van Dillen, 2012) are characterised as internal desired states with a given motivational force. In accordance with this proposition, Fujita (2011) defined a dual-motive conceptualisation of self-control. In this theory, self-control is not seen as the effortful inhibition of impulses but rather as the prioritization of long-term goals over proximal competing motivations. According to Fujita (2011), the effortful inhibition of desires is one among several other mechanisms through which people prioritise distal goals over short-term goals. Therefore, a desire could be characterised as an unforeseen goal, an unexpected guest at a table that is already full.

In support of the idea that both the activation of multiple long-term goals, as well as goals interacting with proximal goals (desires), produced conflict the present findings demonstrated that any goal pursuit predicted greater goal conflict when desires were present. Even those goals that may be considered temptations on some occasions, such as relaxation, predicted greater goal conflict when a desire was active. Furthermore, higher levels of



conflict occurred on occasions where desires were absent but people tried to achieve multiple goals simultaneously. The percentage of active goals at a given moment significantly predicted greater goal conflict.

In contrast, the percentage of active desires predicted less goal conflict. Previous research has shown that the intensity of desires positively predicts self-indulgence (Hofmann et al., 2012). This effect is presumed to occur because conscious desires gain access to working memory increasing cognitive load and influencing desire-related behaviours (Baumeister, Masicampo, & Vohs, 2011; Hofmann & Van Dillen, 2012). Engaging in demanding tasks reduces the likelihood of self-indulgence, whereas low cognitive load leads people to display greater attention to tempting stimuli and activate hedonic thoughts (Van Dillen, Papiés, & Hofman, 2013, Study 2). The present findings suggest that a greater number of desires negatively predicted goal conflict. A potential explanation for this finding is that a greater number of desires activated at a given moment reduced the likelihood of detecting a goal conflict. Desires may reduce the probability of identifying the presence of conflict; people may self-indulge without even noticing they were hampering a goal. Another possibility could be that in the absence of conscious goal-pursuit, people fill out their minds with alluring gratifications, which are not considered goals at this point.

Overall, these findings suggest that what is crucial to understanding goal conflict is the nature of the focal goal. If someone is planning to rest at the weekend, then another goal (e.g., finishing a thesis chapter), or a desire (e.g., going running or seeing friends), may collide with the plan for rest. In Powers' (1973) terminology, the goal and the desire are at the same level: programs. They involve conscious decisions at several points in a sequence of actions. The desire to go running seems to be lower than the planned goal of finishing the chapter only because the desire was unexpected and irrelevant regarding the conscious action plan. Although previous research has suggested that temptations activate long-term goals

(Fedorikhin & Patrick, 2010), the evidence presented here indicates that the goal at the forefront of attention may determine the type of desire or alternative goals that can potentially create conflict.

**Individual differences in mixed emotions moderated the negative impact of goal conflict on life-purpose.** The restorative mechanisms imply that goal conflict can predict lower levels of life-purpose, but that this effect will be attenuated to the extent that people report, on average, greater levels of mixed emotions. Findings confirmed this hypothesis (**Hypothesis 3**). Firstly, it was found that those occasions where higher goal conflict was experienced predicted lower levels of life-purpose. In accordance with a large amount of literature (see Kelly, Mansell, & Wood, 2015, for a review), conflicting goals were found to hinder well-being. However, goal conflict interacted with the propensity to experience mixed emotions to predict greater life-purpose. Thus, those people who experienced higher levels of mixed emotions did not suffer the negative impact of conflicting goals on eudaimonic well-being. Findings also demonstrated that this effect was significant over and above the amount of positive or negative affect felt on a given occasion, and also controlling for trait levels of psychological well-being. Interestingly, the trait levels of psychological well-being significantly predicted variations in life-purpose, indicating that the dimension of life-purpose measured appropriately levels of eudaimonic well-being. Finally, it was found that PWB interacted with goal conflict to predict greater life-purpose. Higher levels of psychological well-being buffered the negative impact of goal conflict on life-purpose.

These results are in accordance with the DMA (Reich et al., 2003; Zautra, 2003). The DMA asserts that on occasions where people experience higher levels of stress, positive affect and negative affect follow a bipolar structure, meaning that there are strong negative correlations between these oppositely valenced affects. The bipolarity of affect in times of

stress can facilitate quick elaboration and rapid responses. In contrast, on occasions where people do not suffer stress, positive and negative affect follow a bivariate structure, leading to near zero correlations between positive and negative affect. The independence of PA and NA can permit greater emotional flexibility. However, the theory also sustains that individual differences in the experience of positive and negative affect in times of stress can ameliorate the negative consequences of stress on health-related issues. People who can maintain independence of positive and negative affect in times of stress (i.e., reflected by correlations near zero) are predicted to be better able to cope with stress (Reich et al., 2003; Zautra, 2003).

The interaction between mixed emotions and goal conflict as a predictor of eudaimonic well-being is also consistent with other research. For example, Kelly and colleagues (2011) demonstrated that feelings of ambivalence predicted depression only when experienced in the absence of conflict, whereas feelings of ambivalence interacted with goal conflict to predict lower levels of depression. Although the concept of ambivalence is different from the concept of mixed emotions considered in the present research project, it is informative that the interaction between goal conflict and ambivalence predicted lower levels of depression.

Other studies (e.g., Segerstrom & Nes, 2006) have found that individual differences in optimism interact with goal conflict to predict well-being, but in the opposite direction. Specifically, optimism has been found to predict greater conflict (Segerstrom 2001; Segerstrom & Nes, 2006), and evidence seems to indicate that optimism is also associated with better psychological health (Segerstrom & Nes, 2006). However, research investigating the interaction between goal conflict and optimism has found that life events involving high levels of goal conflict predicted worse immune response when optimism was high, indicating poorer well-being because immune response is associated with the propensity to get sick

(Segerstrom 2001). In contrast to the evidence concerning individual differences in optimism, individual differences in mixed emotions buffered the negative effect of goal conflict on well-being, even after controlling for state-positive affect and state-negative affect.

**The experience of mixed emotions was a proximal predictor of efforts to resist temptations.** The balancing mechanism implies that the relationship between goal conflict and efforts to resist temptations is mediated by the experience of mixed emotions during the same event. Theoretically, the integration of incompatible strands of information allows people to balance the benefits and drawbacks of multiple courses of actions. This, presumably, helps to prioritise meaningful goals, which in turn, motivates attempts to resist temptations. The pursuit of meaningful goals is an important feature of several eudaimonic well-being, which helps to connect the findings of Study 5 with the evidence presented in Chapter 4.

The findings supported the hypotheses. Firstly, it was found that goal conflict predicted efforts to resist temptations. This is consistent with recent theory and research indicating that the identification of goal conflict is a necessary step to exerting self-control (Fishbach et al., 2003; Hofmann et al., 2012; Mysreth & Fishbach, 2009). Conflict is a signal that triggers efforts to resist temptations (Carver & Scheier, 1982; Hofmann et al., 2012). People “know” that it is time to make efforts to continue pursuing a long-term goal partly because they have detected a conflict. Although some authors (e.g., Baumeister, 2002) have suggested that goal-conflict leads to self-control failure, the bulk of the evidence seems to indicate that the perception of goal conflict is positively associated with efforts to resist temptations.

Counter-active self-control theory (Fishbach & Trope, 2005; Mysreth, Fishbach, & Trope, 2009; Trope & Fishbach, 2000) suggests that the simultaneous presence of a long-

term goal and a temptation assists self-control because continuous asymmetrical valuations of the goal and the desire take place. People allocate more importance to the goal and less importance to the temptation, reducing the likelihood of succumbing to temptation.

Occasions where a desire becomes stronger in the face of a long-term goal results in greater devaluation of the temptation, augmenting valuation of the long-term goal.

Contrasting with the aforementioned approach, other theories have given greater importance to the affective processes underlying self-control (Hofmann & Fisher, 2012; Inzlicht & Legault, 2014; Fishbach & Labroo, 2007). For example, Fishbach and Labroo (2007) showed that positive mood facilitates self-control when a self-improvement goal (e.g., get better grades) was accessible, but positive mood undermines self-control when a goal related to mood management (e.g., feeling better) was accessible. In contrast, other theories (Inzlicht & Legault, 2014; Powers, 1973, 2014) postulated that negative affect facilitates self-control because it signals deficiencies in goal progress and heightens the need for greater effort to resist temptations. The findings of the present chapter showed that mixed emotions predicted greater efforts to resist temptations. Furthermore, mixed emotions mediated the relationship between goal conflict and efforts to resist temptations. This is one of the key contributions of this chapter.

In accordance with theories suggesting that self-control is driven by affective (Hofmann & Fisher, 2012; Inzlicht & Legault, 2014; Fishbach & Labroo, 2007), Study 5 demonstrated that perceptions of goal conflict are not the proximal predictor of efforts to resist temptations. Rather, the proximal predictor of efforts to resist temptations was the experience of mixed emotions after experiencing goal conflict. These results seem to indicate that weighting the informational characteristics of the stimuli is only a preliminary step, and that the experience of mixed emotions signals the need to integrate complex, incompatible stimuli which ultimately triggers self-control efforts. This approach represents a new

approach in the investigation of the affective experiences involved in self-control and signifies a relevant, innovative contribution of this research project in the field of self-control.

Finally, the findings demonstrated that the mediating effect of mixed emotions on the relationship between goals conflict and efforts to resist temptations remained significant even after including state-positive affect, state-negative affect, and trait-levels of self-control. Interestingly, trait self-control was not related to efforts to resist temptations. This differs from the accrued evidence relating trait self-control and different self-control behaviours (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012), although it is interesting to note that a recent meta-analysis found a large amount of heterogeneity in the effect sizes for trait self-control when related to well-being and adjustment life-domains (de Ridder et al., 2012), which was precisely the goal of the present study.

Thus, people used mixed emotions as the proximal source for choosing to exert regulatory efforts, over and above the levels of positive affect and negative affect experienced during the same occasion, and also over and above the average levels of self-control. One final finding of note was that occasions where people experienced higher levels of negative affect positively predicted efforts to resist temptations, providing, for the first time, support for the affect alarm model of self-control (Inzlicht & Legault, 2014), which postulates that negative emotions drive self-control efforts.

**Mixed emotions interact with efforts to resist temptations to enhance vitality.** It was finally hypothesised that mixed emotions not only assist the prioritisation of meaningful goals, but also replenish a sense of vitality when making efforts to resist temptations. It was presumed that mixed emotions interact with efforts to resist temptations to predict greater vitality.

Efforts to resist temptations and the experience of mixed emotions led people to experience less vitality, when considered independently. Nevertheless, the interaction between efforts to resist temptations and mixed emotions seemingly replenished feelings of vitality. It is important to emphasise that this finding means that if people felt more mixed when exerting self-control efforts they did not experience exhaustion, instead they managed to maintain the sense of vitality. Furthermore, these results were observed over and above levels of state-positive affect and state-negative affect. Finally, state positive-affect positively predicted greater vitality, and trait levels of psychological well-being also predicted greater vitality.

These findings indicate that feelings of vitality appear to be a meaningful component of eudaimonic well-being. This is consistent with previous findings which have also shown that eudaimonic well-being is closely related to vitality (e.g., Huta & Ryan, 2010; Reis, Sheldon, Gable, Roscoe, & Ryan, 2000). Likewise, some meaning-based theories of eudaimonic well-being have included the inner sense of vitality as a relevant component of eudaimonic well-being (Kashdan et al., 2008; Ryan & Deci, 2001). For example, self-determination theory posits that fulfilment of the basic needs of autonomy, relatedness and competence is essential for psychological growth, self-congruence, and vitality (Ryan & Deci, 2001).

Integrating the different sources of evidence presented in this sub-section, the findings are consistent with the notion that mixed emotions promote the integration of complex information at a given moment. Processing in parallel both the rewarding and the troubling consequences of multiple, incompatible courses of action presumably may help individuals prioritise meaningful goals in the face of self-control dilemmas. This is demonstrated by the positive relationship between the experience of mixed emotions and efforts to resist temptations. Finally, although exerting self-control can be draining, experiencing mixed

emotions when attempting to resist temptations appears to be capable of replenishing feelings of vitality.

It is possible to speculate that mixed emotions in combination with self-control efforts are perceived as a meaningful response to self-control dilemma, giving individuals a sense of progress towards long-term goals, relevant to the self, which ultimately enhances the subjective experience of feeling alive. Mixed emotions may help people to realise what is meaningful and worthy of their efforts. Regardless of whether people's choices succeed, the composite affective experience has the potential to encourage and reinvigorate people to balance the multiple opportunities that life commonly holds.

**Limitations.** The findings of this chapter integrate several pieces of the theoretical model proposed in chapter 1, and separately examined in chapters 3 and 4, but some limitations need to be mentioned. Firstly, Study 5 did not investigate whether efforts to resist temptations actually resulted in improved self-control performance. That is, this chapter did not explore whether mixed emotions influence actual restraint or self-indulgence. The evidence was limited to efforts to resist temptations. One possibility is that mixed emotions do not directly influence self-control success or failure but rather they determine the degree of goal-commitment and goal-progress when conflict is detected. This aspect is explored in greater detail in chapter 6.

Secondly, testing a mediational model using an experienced sampling method required some assumptions concerning causality. In particular, this chapter tested the effects of goal conflict on mixed emotions, which in turn, predicted efforts to resist temptations. Three conditions are mentioned in the literature as fundamental to sustain causal inference when testing mediation (Baron & Kenny, 1986; Stone-Romero & Roposo, 2008). Firstly, it is necessary to have temporal precedence, that is, the cause ( $X$ ) precedes the mediator ( $M$ ), and



*M* precedes the effect (*Y*) in time. Second, cause and effect need to be related. And finally, potential confounders need to be appropriately addressed in the model. Two of the three aforementioned assumptions are correctly addressed in the present study, whereas the first one was partially satisfied.

The present study established the associations between *X* and *M*, *X* and *Y*, and *M* and *Y*. Likewise, potential confounders were satisfactorily incorporated in the model, and the proposed mediation remained intact. Potential confounders, such as positive affect or negative affect, did not destabilise the mediation, suggesting that the proposed paths were correctly estimated. However, temporal precedence was not supported because all the variables in the mediation analysis were measured at the same time. In order to partially correct this problem, instructions to complete questions concerning *X* and *M* considered experiences that occurred within the last 30-minutes, whereas *Y* was instructed to be completed as perceived in the very moment the questions were read. Furthermore, the model tested mediation over time, meaning that stability of measures over time was observed (MacKinnon & Fairchild, 2009), which adds support for the causal chain suggested.

Finally, the characteristics of the sample, as well as the limited number of categories of goal and desires, constrain the extent to which this findings can be generalised. The sample mainly consisted of undergraduate and postgraduate students, whose goals and desires reflect the academic nature of their activities. This was clear when observing that the most common self-control dilemma was the conflict between achievement-related goals and leisure. Furthermore, the limitations of time when completing the questionnaires during the experience sampling section of Study 5 limited the number of goals and desires that it was possible to survey on each occasion. It is possible that examining a larger set of goals or desires may have resulted in different findings concerning the nature of goal conflict.

**Conclusion.** To conclude, chapter 5 has integrated the findings presented in chapter 3 and 4. Using an intensive longitudinal design, goal conflict predicted mixed emotions as they did in chapter 3. Furthermore, two more precise mechanisms explaining the influence of mixed emotions on eudaimonic well-being were tested. The proposed restorative mechanism demonstrated that individual differences in mixed emotions interact with occasions where people perceived greater goal conflict to predict life-purpose. The proposed balancing mechanism showed that mixed emotions help people to display greater self-control efforts in response to self-control dilemmas, which may explain continuous people's effort to attain meaningful goals, which in turn, enhances eudaimonic well-being. Finally, mixed emotions and efforts to resist temptations combined to replenish feelings of vitality, suggesting that mixed emotions may help to maintain or to find what is meaningful in the face of a self-control dilemma.

## 6. CHAPTER SIX: GENERAL DISCUSSION

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*“The essence of neurosis is conflict [and] the essence of life is conflict – from which one might (incautiously) conclude that life is essentially neurotic”*

*David Carr (2009)*

The present chapter organises the main contributions of this research project. It suggests future research avenues in the investigation of mixed emotions and well-being, directions for research linking mixed emotions to goals, and finally an integrative theory of complex emotions. Separate sections are devoted to each of these aspects. The first section summarises the main hypotheses and findings of the previous chapters, highlighting the main contributions, and also main limitations. The second section explores future implications by proposing future research to explore the effects of mixed emotions on health-related outcomes. Implications of the findings for clinical populations are also described. The second section finishes by describing hypotheses to further investigate the relationship between mixed emotions and goal shifting. Finally, the third section outlines an integrative model of complex emotions, using the conclusions and evidence from previous chapters. This section represents a speculative effort which is a summary of the reflections aroused while investigating in a research field where no clear theoretical framework has been developed.

### **6.1. Findings and contributions**

This research project examined the conditions that elicit the experience of mixed emotions and evaluated the consequences of experiencing mixed emotions on eudaimonic well-being. Mixed emotions are affective experiences characterised by the co-activation of oppositely valenced emotions, such as feeling happy and sad. A broad model was proposed, in which 5 main hypotheses were anchored. It was firstly hypothesised that (**H1**) conflicting

goals will predict mixed emotions. The second main hypothesis was that **(H2)** experiencing mixed emotions, in the context of goal conflict, would positively predict eudaimonic well-being. The third main hypothesis postulated that **(H3)** individual differences in mixed emotions would moderate the relationship between goal-conflict and eudaimonic well-being. The fourth hypothesis suggested that **(H4)** mixed emotions would mediate the relationship between goal conflict and efforts to resist temptations. Finally, the fifth main hypothesis was that **(H5)** mixed emotions would interact with efforts to resist temptations to enhance feelings of vitality.

Prior to testing the hypotheses, a meta-analysis was conducted to evaluate whether mixed emotions are a robust and a non-artifactual affective experience (see chapter 2). The meta-analysis (of 63 independent experiments), showed that mixed emotions are consistent regardless of the type of emotional adjectives or model of affect used. This finding was resilient to publication biases and the meta-analysis applied rigorous methods to control for measurement error and also biases resulting from combining studies using different designs (between-person, within-person, and mixed). Furthermore, the meta-analysis also found that the percentage of women in the sample was associated with higher effect sizes, which provides an alternative hypothesis to explain why women tend to feel more frequent negative emotions, but report similar levels of subjective well-being (Fujita et al., 1991). It is possible that women experience more frequent mixed emotions or they are more aware of complex emotional experiences, such as mixed emotions. Finally, the meta-analysis found that subjective measures of mixed emotions were associated with higher effect sizes, whereas the minimum index was associated with lower effect sizes.

The five empirical studies demonstrated support for the hypotheses mentioned above. Specifically, it was found that **(H1)** conflicting goals consistently elicited the experience of mixed emotions. This was confirmed using experimental (Studies 1 and 2), cross-sectional

(Study 3), and intensive longitudinal methods (Study 5). In Study 1 (see chapter 3) the experimental condition activated two incompatible goals, whereas in the control condition the same goals did not conflict. Results confirmed that the conflicting goals condition elicited more mixed emotions compared to the control condition where the same goals were not in conflict. Furthermore, Study 2 (see chapter 3) found that recalling recent personal experiences involving conflicting goals predicted higher levels of mixed emotions compared to other intergoal dynamics (i.e., facilitating goals). Study 3 (see chapter 4) also found that greater levels of goal conflict were associated with more mixed emotions. Finally, a longitudinal study that measured goal-conflict and mixed emotions over time found the same association, supporting the ecological validity of the relationship between goal conflict and mixed emotions (see chapter 5). Hence, mixed emotions can be elicited following the activation of simultaneous multiple incompatible goals.

Findings also showed that (**H2**) the experience of mixed emotions was associated with greater eudaimonic well-being, using different measures of eudaimonic well-being and different designs (i.e., cross-sectional design – Study 3 - and a quasi-experiment – Study 4). Study 3 (see chapter 4) found that people who reported, on average, feeling more mixed emotions had greater levels of eudaimonic well-being. Likewise, Study 4 (see chapter 4) found that the experience of mixed emotions was greater after watching a video-clip (versus before having watched the video-clip) intended to elicit mixed emotions, and in turn, higher levels of mixed emotions after the video-clip were associated with greater levels of eudaimonic well-being.

The findings of Study 5 (see chapter 5) supported the hypothesis that (**H3**) individual differences in mixed emotions interact with goal conflict to predict greater levels of life-purpose. Importantly, this association remained consistent over and above state-positive and state-negative affect, as well as controlling for trait levels of psychological well-being.

Similarly, it was found that **(H4)** mixed emotions mediated the relationship between goal conflict and efforts to resist temptations, over and above state-positive and state-negative affect, even when controlling for trait levels of self-control. Finally, Study 5 found that **(H5)** mixed emotions interacted with efforts to resist temptations to predict greater levels of vitality. This interaction effect was tested upon the previous mediational model, and including all the previous controlling variables. Importantly, the mediational model tolerated these stringent conditions, and all the main effects were retained.

Overall, it is possible to summarise the aforementioned findings into three main contributions of the present research project.

**Mixed emotions and the resolution conflict between goals.** Firstly, the emotional consequences of experiencing conflicting goals exceeds the common distinction between positive and negative affect, and situates the experience of mixed emotions as a critical affective variable that assists people in the process of resolution of conflicting goals. Several theories have suggested that goal multiplicity is an inevitable consequence of rich complex social environments (e.g., Fishbach & Ferguson, 2007; Köpetz et al., 2011; Kruglanski, Shah, Fishbach, Friedman, Chun, & Sleeth-Keiper, 2002). Likewise, perceptual control theory suggested that goal conflict is a state that individuals are compelled to resolve by integrating disparate courses of action at higher levels in the goal hierarchy (Powers, 1973, 2014). Therefore, mixed emotions may be a relevant component of the control process that enables people to correct error signals by prioritising long-term goals.

Evidence presented in chapter 3 demonstrated that mixed emotions are consistently experienced in situations of goal conflict, which was not the case when single goals (Study 1) or other intergoal dynamics were present (i.e., facilitating goals, Study 2). Moreover, evidence derived from Study 5 showed that the experience of mixed emotions following goal

conflict is not merely a residual component of the control process; rather mixed emotions facilitate regulatory efforts in the face of conflicts involving desires and long-term goals. This means that the experience of mixed emotions may assist the integration of complex, incompatible strands of information.

Both the ESM (Cacioppo et al., 1999; Cacioppo et al., 2004) and the communicative model of emotion (Oatley & Johnson-Laird, 1996) anticipate that one consequence of experiencing mixed emotions is that they enable disparate courses of action to be followed. Thus, it is possible to suggest that the process through which mixed emotions facilitate the resolution of conflicting goals is via providing behavioural equilibration and sense-making processes in the face of goal conflict. Following Piaget's conceptualizations, Bless and Fiedler (2006) have suggested that positive affect is related to *assimilative*, heuristic processing styles; whereas negative affect has been linked to *accommodative*, analytical processing styles. Using the same Piagetian analogy, the current findings suggest that mixed emotions are more likely to be associated with *equilibration* which is the process through which complex information is incorporated to restore behavioural control.

**Mixed emotions and eudaimonic well-being.** Secondly, the evidence presented across multiple studies suggests that mixed emotions may be adaptive and positively influence eudaimonic well-being, although this effect may be more complex than suggested by a simple linear association. Evidence presented in chapter 4 showed that higher levels of mixed emotions were related to greater levels of eudaimonic well-being and the search for meaning in life; and that the experience of mixed emotions was different from emotional conflict (Study 3). Furthermore, artificially eliciting mixed emotions in a sample of students about to graduate was also associated with greater eudaimonic well-being. In particular, moderate levels of mixed emotions predicted greater eudaimonic well-being; as evidenced by a curvilinear association between mixed emotions and eudaimonic well-being. However, no

association was found between individual differences in mixed emotions and life-purpose in Study 5. Instead, individual differences in mixed emotions moderated the association between goal conflict and life-purpose.

One explanation of this discrepancy could be that eudaimonic well-being was assessed differently in chapters 4 and 5. In Study 5 (chapter 5), life-purpose was measured repeatedly over time (within-person level), whereas in Study 3 and Study 4 (chapter 4), eudaimonic well-being was measured on one occasion (between-person level). Global levels of mixed emotions and eudaimonic well-being might be closely related, but when examining the association between fluctuations in one of these variables with stable dispositions of the other, the effects might be absent.

It is noteworthy that the experience of mixed emotions at between-person level had a curvilinear effect on eudaimonic well-being. A concave, curvilinear effect on eudaimonic well-being was found both in Study 4 and the ancillary analysis presented in Study 5. This suggests that mixed emotions can directly benefit eudaimonic well-being but only when people experience a moderate amount of mixed emotions. Too little or too much mixed emotion may have detrimental effects on eudaimonic well-being. This may not be the case when examining the effect of mixed emotions on eudaimonic well-being over time, where the interaction between goal conflict and mixed emotions is critical to produce beneficial effects on eudaimonic well-being.

Theoretically, mixed emotions may not only facilitate the resolution of conflicting goals but also promote balance among multiple possibilities by prioritising meaningful goals. Perceptual control theory asserts that the resolution of goal conflict can be achieved by the integration of goals at higher levels in the hierarchy (Powers, 1973). Powers (1973) characterised high level goals as principles and values. Interestingly, several theories of



eudaimonic well-being claim that eudaimonic well-being is characterised by engagement in activities that fulfil meaningful goals (e.g., Ryan & Deci, 2001; Ryan et al., 2008, Waterman, 1990) and promote balance between relevant facets of individual experience (e.g., Ryff, 1989, 1995; Ryff & Singer, 1998), which is easily translated as goals in the form of principles (e.g., finding purpose in life, maintaining healthy relationships).

Hence, if mixed emotions are primarily elicited following goal conflict, then the effect of mixed emotions on eudaimonic well-being should not be interpreted without considering the specific situational characteristics under which mixed emotions were elicited. When mixed emotions are elicited in the presence of conflicting goals, it is possible to anticipate that people will perceive greater levels of eudaimonic well-being. Evidence presented in Study 5 (chapter 5) showed that both at the between-person level and at the within-person level, mixed emotions interacted with goal conflict features (including efforts to resist temptation as a common consequence of goal conflict) to predict greater levels of life-purpose and vitality, two common constructs in the literature on eudaimonic well-being (e.g., Ryan & Deci, 2001; Ryan et al., 2008; Ryff, 1989, 1995; Ryff & Singer, 1998).

**The relevance of the subjective experience of mixed emotions.** Finally, the present findings suggest that the subjective measure of mixed emotions (developed for the purpose of this research project) is a reliable and valid measure of mixed emotions. In contrast to common measures of emotions, the subjective measure of mixed emotions relies on the assumption that mixed emotions are an integral emotional experience (as explained in chapter 2). This is identifiable by people as a genuine emotional experience characterised by the co-activation or the rapid succession of two emotions usually understood as opposite in valence.

Study 2 (chapter 3) and Study 4 (chapter 4) found that the subjective measure of mixed emotions was strongly and positively correlated with the minimum index, one of the

most common measures of mixed emotions, indicating that these two measures of mixed emotions assessed a similar construct. The research also produced further evidence about the minimum index. Importantly, the minimum index used in Study 4 was not based on average scores of positive and negative affect. The minimum index used in Study 4 reflected the emotions that the literature has mentioned to be coupled when experiencing a limited-time experience (i.e., poignancy, a combination of happiness or enthusiasm and sadness). Furthermore, Study 3 and Study 4 (chapter 4) revealed that the minimum index was positively and significantly related to the corresponding positive and negative emotion, suggesting that the minimum index does not just reflect the amount of negative emotions, as could be thought considering that it is estimated using the intensity of the weaker affect.

That said, the subjective measure of mixed emotions and the minimum index (and probably most of the self-report measures of affect) may suffer from memory biases (Kihlstrom, Eich, Sandbrand, & Tobias, 1999). That is, people may confuse the actual emotional experience when asked to report their emotions after a certain period of time. For example, in Study 5 (chapter 5) participants reported their experience of mixed emotions within the last 30-minutes. This information may be distorted compared to actual feelings in the very moment that an event happened.

The research also found evidence of differences between the measures of mixed emotion. The evidence presented in Appendix-1 suggests that within-person correlations, the most common measure of mixed emotions in intensive longitudinal designs (e.g., Brose et al., 2014; Coifman et al., 2007; Grühn et al., 2013; Hershfield et al., 2013; Ong & Bergeman, 2004), were negatively related to the minimum index and the subjective measure of mixed emotions, whereas the minimum index and the subjective measure of mixed emotions were positively related. This may imply that future studies should prioritise use of the minimum

index or subjective measures of mixed emotions over within-person correlations as an indicator of mixed emotions.

By demonstrating the utility of using the subjective measure of mixed emotions, the assumption of mixed emotions as an integral experience is better grounded. The assumption of the integral experience of mixed emotions, postulated in chapter 2, suggests that mixed emotions are not merely the aggregation of independent emotions. When feeling mixed, people genuinely identify specific affective features that exceed the feelings associated with single emotions. Some authors (e.g. Greenspan, 2003; Russell, 2003) have suggested that mixed emotions are emotional episodes concerning two independent events that people confuse as mixed emotions. In contrast to these approaches, the evidence reviewed here has shown that people listening to single pieces of music in which there is a conflict between tempo and mode (e.g., the piece of music used in the video-clip of Study 4; Hunter et al., 2008) experienced higher levels of mixed emotions compared to people who listened to pieces of music where only a fast tempo or major mode was present. These findings suggest that one indivisible event was capable of reliably eliciting mixed emotions. Likewise, when people reported feeling mixed emotions across the multiple studies conducted in the present research project, they reported a unitary emotional experience that emerged as a result of conflicting features in the environment, which, despite the lack of a lexicon to classify it, was characterised as a combination of opposite emotions.

**Limitations.** Despite the contributions of the present research project, several limitations remain. Each chapter describes the limitations of the different studies conducted, but it would be valuable to recheck some of them. Firstly, the sample of participants that took part in each study mainly consisted of university students. In a recent study, Henrich and colleagues (2010) showed that the majority of studies conducted in Psychology have used undergraduate students, which are mostly characterised by being well-educated, living in

industrialised and democratic countries. They are also richer than average, and have likely grown up in Western cultures. They concluded that samples with this background are one of the least representative populations to be surveyed. Thus, the generalisability of the present findings is an important issue that future studies will need to address by replicating findings in other groups of the population (e.g., workers, middle age people, samples from developing countries).

Secondly, all of the studies used self-report measures. Although recent research has demonstrated that mixed emotions may also be described by using physiological measures (e.g., Henderson & Norris, 2013; Kreibig et al., 2013), demonstrating that, for example, the mixed emotion of *amusement-fear* activates patterns of facial muscles that cannot be simply described as components of each emotion separately (Kreibig et al., 2013), it is possible that self-report measures of mixed emotions may be subject to biases derived from memory, desirability or acquiescence (Kihlstrom, Eich, Sandbrand, & Tobias, 1999). Future studies should evaluate the correspondence between self-report measures of mixed emotions and data obtained from physiological responses. However, this enterprise may be difficult due to the lack of coherence between different emotional responses (e.g., self-report, autonomic responses, facial expressions; Hollenstein & Lanteigne, 2014).

Finally, it was difficult to infer causality with respect to several of the hypotheses tested, due to only a portion of the studies included were experimental designs with a control group. In particular, some of the evidence presented in Study 5 involving causal relationships (e.g., mediation) may produce different findings in the lab. For example, the association between efforts to resist temptations and vitality could be in the opposite direction, such as that people displayed greater efforts to resist temptations as a result of feeling more vitality. Alternative hypotheses derived from the data presented in the studies of this research project

will need closer examination using experimental designs in order to determine the directionality of the hypothesised association found in several of the studies.

## **6.2. Implications of mixed emotions for health-related outcomes and goal theory**

To facilitate the presentation of the different implications of mixed emotions for well-being and goals, this section is separated into three brief sub-sections. The first sub-section outlines some potential implications of mixed emotions for promoting health-related outcomes, such as smoking cessation. The second sub-section considers some implications of mixed emotions for clinical interventions. Finally, the third sub-section outlines future research connecting mixed emotions and goal shifting by integrating the goal dynamics theory (Fishbach, Zhang, & Koo, 2009).

**Mixed emotions and health-related outcomes.** The findings of Studies 3, 4 and 5 suggest that mixed emotions can boost eudaimonic well-being, especially when experienced alongside conflicting goals. These findings suggest that mixed emotions may help people to resolve personal dilemmas and achieve a purposeful life. One common conflict that people face is trying to avoid certain behaviours that are considered pleasant in the short term, but pernicious for health in the long term, such as smoking. Future research should investigate whether mixed emotions may positively impact relevant health-related outcomes, such as smoking cessation.

A recent theoretical contribution (Frijda, Ridderinkhof, & Rietveld, 2014) suggested that impulsive actions can be controlled by the confluence of multiple emotions because each emotion contributes with different action readiness states (motivational forces) which in turn regulate ongoing actions, delaying the display of non-deliberative actions. Consistent, with this approach, Study 5 (chapter 5) showed that mixed emotions promote greater efforts to

resist temptations. Therefore, it is feasible to suggest that mixed emotions may play a role in controlling impulses, such as smoking. For example, it could be possible that mixed emotions assist the control of impulsive behaviours by delaying the decision making process. As mixed emotions are thought to involve greater levels of behavioural flexibility (Cacioppo et al., 2004; Oatley & Johnson-Laird, 1996), people who experience mixed emotions when confronted by smoke-related stimuli may delay nicotine desires, thereby gaining time to reconsider health-related goals.

A preliminary step towards this direction emerges from a recent study conducted by Veilleux and colleagues (2013). They exposed a group of smokers to a series of pictures. The pictures contained pleasant, unpleasant, smoke-related, or neutral cues. Participants reported their perceived cigarette craving after the presentation of each picture, completed a self-reported measure of affect, and undertook a task designed to measure impulsiveness after the trials. Participants reported significantly more craving during the exposure to smoke-related cues compared to pleasant, unpleasant or neutral cues. Furthermore, smoke-related cues elicited greater levels of mixed emotions compared to pleasant, unpleasant or neutral cues, and the experience of mixed emotions was associated with increased craving, controlling for baseline craving and nicotine dependence. They also found that craving was associated with greater levels of impulsivity, although this study did not test the relationship between mixed emotions and impulsivity.

In the previous study, the sample was composed of smokers who were not trying to quit smoking. Therefore, the association between craving and mixed emotions may be indicative of certain amount of conflict between the desire to smoke when seeing smoke-related cues and social desirability (e.g., smokers participating in a lab study consisting of seeing some smoke-related pictures may infer that smoking is not socially desirable), not a conflict between the desire to smoke and the goal of trying to quit smoking. Future research

should explore whether greater levels of mixed emotions among people who are trying to quit smoking are related to greater success in quitting smoking. In the lab, it could be possible to investigate whether the elicitation of mixed emotions produces larger response times to smoke-related pictures compared to other emotional or neutral cues.

Stahl et al. (2014) showed that impulsive actions are characterised by five correlated, although independent behavioural components. *Control of stimulus interference*, which is related to selective attention to goal-related stimuli; *proactive interference*, which is related to attending to goal-related cognitions; *response interference*, which is related to deciding goal-related choices and executing actions that are consistent with the desired goal; *motivational impulsivity*, similar to delay of gratification; and *decisional impulsivity*, which is related to gathering information relevant to the goal before making a decision. Future research may benefit from these findings to determine which of these aspects of impulsive behaviours are affected by the experience of mixed emotions in order to determine whether mixed emotions can help people to reduce unhealthy behaviours. Consistent with the idea that mixed emotions promote greater behavioural flexibility, it is possible that mixed emotions may be particularly beneficial for selecting goal-related choices (response interference) or delaying immediate gratification in order to prioritise long-term goals (motivational impulsivity).

**The utility of mixed emotions in treating mental health problems.** Mixed emotions are primarily elicited by the presence of conflicting goals and conflicting goals were found to be negatively related to eudaimonic well-being. Powers (1973) suggests that goal conflict represents the most serious kind of malfunction for individuals, even amongst people who are not affected by a mental health problem. In a recent review of the literature concerning goal conflict (at different levels) and well-being, Kelly and colleagues (2015) found that high-level conflict (defined as self-discrepancy), mid-level conflict (defined as ambivalence), and low-level conflict (defined by goal conflict in plans or projects), was

generally associated with poor well-being outcomes (e.g., lower levels of subjective well-being and psychological well-being, higher levels of psychological symptoms). Importantly, the results of Study 3 in the present research showed that mixed emotions are different from ambivalence over emotional expression (i.e., emotional conflict), a measure that is commonly associated with mid-level conflict (Kelly et al., 2015), and mixed emotions interacted with goal conflict to boost eudaimonic well-being.

Future research investigating the role of mixed emotions in mental health problems may benefit from these findings. For example, inspired by perceptual control theory (Powers, 1973), Method of Levels (Carey, 2006) is a psychotherapeutic approach that has shown that the reorganisation of personal conflicts, by mobilizing client's awareness of higher level goals (e.g., acceptance, integrity, autonomy), is an effective intervention to reduce individuals' distress (Carey & Mullan, 2008). Given the evidence linking goal conflict and mixed emotions, it is possible that the expression or verbalisation of mixed emotions during therapy may be a useful tool for the therapist. Specifically, mixed emotions may help the therapist to identify signs of conflicts that clients are unaware of or that may deserve further attention via the therapist. It is useful to note that competency measures for psychotherapies (e.g., Cognitive Therapy Scale- revised; Blackburn et al., 2001) tend to encourage the therapist to elicit a range of single emotions. However, little mention is made of eliciting mixed emotions; therefore, the manuals might integrate examples of questions that elicit mixed emotions.

Additionally, understanding mixed emotions may also be useful from the patient's point of view. For example, focusing on the mixed feelings that arise with respect to a conflict may facilitate an awareness of personal issues, and could be a more direct signal of the presence of conflict. However, it is important to consider that, according to the evidence presented in Study 4 and 5, mixed emotions are better for individual well-being when



experienced at a moderate level. Therefore, the therapist may need to guide the process in order to maintain moderate levels of mixed emotions. For example, PCT (Powers, 1973) suggests that when conflict is not integrated at higher levels in the hierarchy of goals, the overall sense of control is destabilised. Similarly, mixed emotions may need to be experienced at moderate levels to produce positive outcomes for individual's well-being and to maintain the sense of control.

Finally, mixed emotions may help to explain the course of serious disorders, such as bipolar disorder. For example, Carolan and Power (2011) found that the emotional profile during *mania* was characterised by the presence of anger and happiness. Although Carolan and Power (2011) did not estimate the presence of mixed emotions as studied in previous chapters (e.g., using the minimum index), two hypothetical implications can be suggested. Firstly, it is possible that the experience of mixed emotions when no conflict is present may be pernicious for individual well-being. Thus, mixed emotions may be an additional component of a disturbed affect system, and as such, may assist the diagnostic process. For example, future studies could evaluate whether mixed emotions are particular to bipolar disorder or present in other forms of depression. The differential diagnosis could benefit from clarifying the role of mixed emotions across multiple types of depression.

Secondly, and perhaps more consistent with the evidence presented so far, mixed emotions during mania might be a sign of patient's resilience. It is possible to suggest that mixed emotions of happiness and anger, reflect the attempts of the affect system to regulate itself, trying to regain balance over emotional expression, and to restore a normal baseline level. Future studies should investigate whether mixed emotions during mania actually reflect remission or attempts to restore balance to his/her affect system.

**Mixed emotions and goal shifting.** The findings of Study 5 revealed that mixed emotions have a direct effect on efforts to resist temptations. However, efforts to resist temptations do not necessarily entail goal attainment. Rather, efforts to resist temptations are an indirect indicator of success. For example, Sheldon and Elliot (1998) demonstrated that goals that are perceived as more personal and autonomously determined led people to display greater efforts, which in turn, were associated with higher levels of goal attainment. However, an alternative hypothesis could be that mixed emotions are not related to goal attainment, but that the critical goal-related process affected by mixed emotions is goal shifting. As suggested in chapter 5, mixed emotions tend to increase behavioural flexibility, which in turn may modulates the probability that people will shift from one goal into another, instead of influencing the attainment of one single, focal goal.

Future studies should investigate the mechanisms through which mixed emotions influence goal shifting. For example, goal dynamics theory (Fishbach & Dhar, 2005; Fishbach, Dhar, & Zhang, 2006; Fishbach et al., 2009), suggests that the simultaneous pursuit of multiple goals produces characteristic dynamics of self-regulation. One dynamic is highlighting in which people prioritise goals that provide long-term benefits. When highlighting, people express commitment towards certain goals. A second dynamic of self-regulation is balancing. When balancing people alternate between different goals in successive choices. Thus, for example, on one occasion a student might choose to revise for an exam, whereas on the following occasion progress towards one of the goals permits the pursuit of alternative goals, such as resting or visiting friends.

Thus, mixed emotions may influence goal shifting by affecting the degree to which people highlight or balance when pursuing multiple, incompatible goals. However, goal dynamics theory has been mainly tested in self-control dilemmas, where one relevant goal is threatened by an immediate temptation, which is seen as a second order impulse (e.g.,

Fishbach & Dhar, 2005; Fishbach et al., 2006). Actually, this theory views goal commitment and goal progress as opposite motivational tendencies (Fishbach et al., 2009). Goal pursuit is enhanced by higher levels of goal commitment and lower levels of goal progress. However, this does not consider situations where multiple long-term goals interact or long- and short-term goals interact. One interesting finding in Study 5 was that the activation of multiple, incompatible goals resulted in greater levels of goal conflict, which means that several relevant goals may be active at a given moment. Different theories also suggest that self-control may involve goal dynamics where the crucial distinction is whether the active goals provide long or short-term benefits, which implies that desires are not impulses of second order necessarily (Fujita, 2011; Hofmann et al., 2012; Hofmann & Van Dillen, 2012).

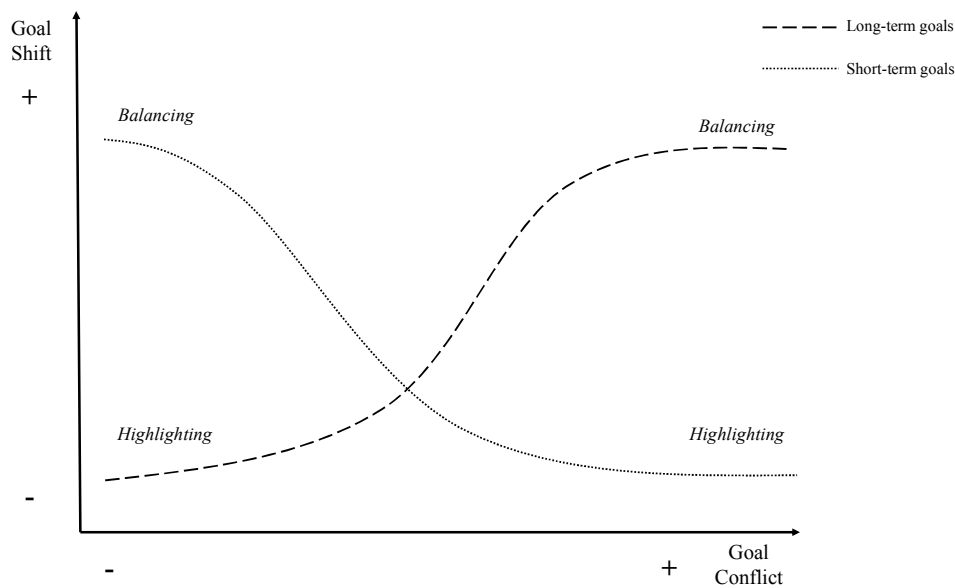
An interesting potential integration of the findings of Study 5 and goal dynamics theory could be that goal shifting is a function of the level of conflict and the timescale of the active goals (or desires) which in turn may produce different patterns of highlighting and balancing. On occasions where long-term goals are active (or a combination of long and short-term goals), the dynamic of highlighting will be more suitable at lower levels of conflict, whereas at higher levels of conflict people will necessarily need to start balancing, evaluating relative progress towards multiple goals. In terms of mixed emotions this implies that when people experience reduced experience of mixed emotions they might tend to commit to single goals, and the probability of goal shifting will reduce. In contrast, as the experience of mixed emotions increases, the need to make progress on simultaneous goals will increase goal shifting and efforts will be redistributed among several goals.

However, opposite results should be obtained when considering the activation of short-term goals. The activation of multiple short-term goals will be associated with lower levels of goal conflict, and reduced experience of mixed emotions consequently. Multiple short-term goals will produce high level of goal shifting, which in turn will be associated with

balancing. On the other hand, as the levels of conflict and mixed emotions increase, people will progressively start to abandon the balancing dynamic and reduce goal shifting, which in turn will increase levels of goal commitment, giving rise to the dynamic of highlighting.

*Figure 19* shows a representation of the expected effects. For example, if a PhD student has the goal to finish a thesis chapter next Monday but the desire to spend more time with his family arises, it is possible that at first he will prioritise the thesis chapter and commit himself to finishing on time. However, as the level of conflict increases, and the urge to go home becomes stronger, mixed emotions will lead to the redistribution of efforts and an attempt to find a middle point between finishing the chapter and spending time with his family. Perhaps, working at night when his family is sleeping will be his solution.

In contrast, if the same PhD student wants some ice-cream, and also wants to watch a movie and chat with his mother, he will probably find a way to progress each of these short-term goals, even juggling the three of them at the same time. However, if his mother starts asking multiple questions, while the movie is reaching its climax, he will start to perceive a certain amount of conflict and mixed emotions. He doesn't want to interrupt his mother, but the movie is really good. As a consequence, at a certain point, he will need to prioritise the movie, the chat with the mother, or even the ice-cream which has been melting while trying to deal with increasing demands in the environment.



*Figure 19.* Goal shift as a function of the degree of goal conflict/mixed emotions and the timescale of the active goals (or desires). Note that the model anticipates that goal shifting reaches an asymptote at high and low levels of balancing or highlighting. This intends to reflect that the probability of goal disengagement is still present, and the degree of goal shifting is limited.

### **6.3. Mixed emotions within an integrated theory of emotional complexity**

The phenomenon of mixed emotions reveals a striking feature of emotional experience, which is that emotions are complex and vary in ways far beyond the typical distinction between positive and negative affect. People report experiencing a vast number of emotional experiences, including simple positive and negative affect (e.g., Russell, 2003; Russell & Carroll, 1999), “blue-ribbon” emotional episodes (e.g., Panksepp, 2005), and mixtures of emotions of varying kinds, ranging from blends of emotion (e.g., Smith & Ellsworth, 1987; Vansteelandt et al., 2005) to mixed emotions (e.g., Larsen & McGraw, 2011; Schimmack, 2001).

Considering the evidence presented across the multiple studies conducted in the present research project, the question arises of how is it possible to report two disparate emotions such as happiness and sadness at the same time. This implies that people not only recognise some feelings as a combination of different affects, but also that people access different sources of affective experience, and that they categorise this experience as a genuine feeling. Research has shown that self-reports of affective experience do not merely represent thoughts about emotions, but emotional words account for the subjective emotional experience itself (Barrett, 2004). Moreover, evidence indicates that language also contributes to the perception of emotions (Gendron, Lindquist, Barsalou, & Barrett, 2012; Lindquist, Barrett, Bliss-Moreau, & Russell, 2006).

Therefore, in order to report two different affects as occurring at the same time, it is necessary to characterise both affective experiences as equally meaningful entities within a particular situation. This means that people are, firstly, capable of distinguishing two opposite affects as separate experiences; and secondly, that these two particular emotions (among a large set of different emotional words) are the best to represent their particular state. In this sense, it is possible to argue that mixed emotions are a complex emotional experience.

Kang and Shaver (2004) defined emotional complexity as a personality construct related to a large range of emotional experiences and a propensity to make thin distinctions within emotional categories. In addition, Lindquist and Barrett (2008) understand emotional complexity as a broad construct containing diverse emotional phenomena, such as emotional granularity or dialecticism. Emotional complexity corresponds to a complex network of emotional concepts that allows individuals to experience refined emotional experiences which cannot be described in broad terms. Rather, emotional complexity demands either making subtle distinctions within emotional concepts (e.g., emotional granularity; Barrett,

2004), or constructing more precise concepts using manifold emotional experiences (e.g., mixed emotions).

However, current definitions of emotional complexity lack a theoretical framework that integrates multiple affective phenomena. It was evident through the present investigation of mixed emotions that future developments need a more comprehensive theory that organises the multiple phenomena related to emotional complexity and makes sense of the relationship between multiple aspects of emotional complexity. Hence, the *Iceberg Model of Emotional Complexity* (IMEC) is proposed as a modest and preliminary contribution to address this issue and to establish basic principles to study emotional complexity in future research. The IMEC takes its name from the shape of the model once all the components are integrated (see *Figure 20*). The model can be decomposed into six major tenets, which are briefly described below in the form of principles.

**Principle 1: *The emotional lexicon corresponds to the overidentified model of affect, which is inaccessible.*** English, as any other language, has a very large number of terms that refer to emotions. Researchers usually simplify the structure of affect in order to explain the largest amount of variability using the smallest number of affective descriptors. Shaver et al. (1987, Study 1) investigated the hierarchical structure of affect using cluster analysis. They determined that the lowest level corresponds to the emotional lexicon that characterises the language of a community of native speakers (213 emotional adjectives surveyed). In the immediate upper level two smaller sets of discrete emotions were described. These correspond to the list of basic emotional adjectives found by theorists of basic emotions. The hierarchical structure described by Shaver and colleagues (1987) also distinguishes two broad characterisations of emotions as positive affect and negative affect at the top of the structure. This is the upper portion of *Figure 20*.

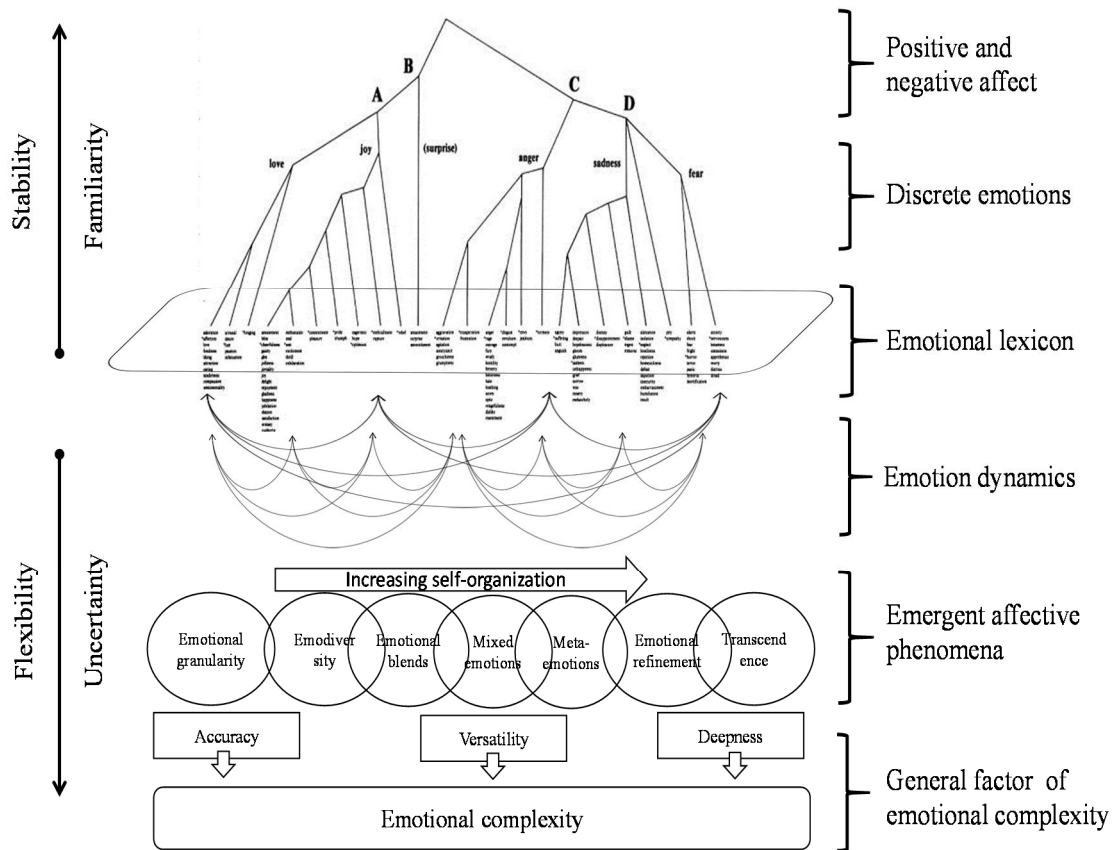


Figure 20. Iceberg model of emotional complexity (IMEC). The upper part of the model was taken from the hierarchical structure found by Shaver et al. (1987), including the emotional lexicon.

The IMEC states that the characterisation of emotional experiences using a limited number of emotional adjectives provides a useful and accurate representation of emotional experiences across the most common situations where emotions are felt. A model is always a simplified version of reality. A model of affect is not a replica of emotions as experienced by individuals; this is only possible to obtain through investigating the emotional lexicon. As the number of variables largely surpasses the parameters that researchers are trying to estimate (e.g., fluctuations of emotions over time), the emotional lexicon is always an overidentified model, impossible to investigate due to practical reasons (e.g., it is unfeasible to conduct research considering a very large amount of emotional adjectives) and statistical reasons (e.g., the probability of committing type-II error is large).



**Principle 2: *The emotional lexicon can produce a number of emotional experiences beyond common characterisations of affect.*** Factorising the emotional lexicon to obtain simpler structures of affect is a deductive process in which multiple emotional adjectives are seen as representing a smaller set of emotional exemplars. This approach, however, ignores that the emotional lexicon can produce a vast number of other emotional experiences beyond classification defined by simplified versions of the affect structure. For example, Larsen and Diener (1992) argued that, despite the strengths of the circumplex model of affect in organising a vast number of emotional adjectives, it has limited utility for generating hypotheses concerning emotional experiences of similar valence and arousal (e.g., anger and fear).

The IMEC proposes that a number of emotional experiences exist beyond common descriptors of affect produced by dimensional or discrete approaches. These descriptions of emotion are derived from the same emotional lexicon that descriptive models employ to characterise the structure of affect. The generation of multiple other emotional experiences is driven by an inductive process, in which simple characteristics governing relationships between multiple emotions (many of them described by the models located in the “surface”) create more complex emotional experiences.

There are four characteristics that are used to “create” emotional complexity: valence of affect, intensity of affect, appraisals, and alignment with goals (e.g., action readiness). Valence has been identified as a fundamental feature of the affective experience (e.g., Barrett & Bliss-Moreau, 2009; Russell, 1980). Almost any word of the affective lexicon can be described in terms of the level of pleasantness or unpleasantness. Although authors disagree on whether valence is better organised as a bipolar dimension (e.g., the circumplex model of affect; Russell & Carroll, 1999) or as a bivariate space (e.g., the evaluative space model; Cacioppo et al., 2004), it is clear that interrelations between emotional words of

different or similar valence signify markedly different subjective experiences. Whereas valence or hedonic tone is described in terms of pleasantness and unpleasantness, intensity has been described as a complex emotional feature containing different parameters such as the level of arousal or activation, the drasticness of action tendency, and influence upon long-term behaviour (Sonnemans & Frijda, 1994).

Appraisals mean that the evaluation of the surrounding circumstances of an affective experience play a relevant role in the elicitation and differentiation of emotions (Arnold, 1960; Ellsworth & Scherer, 2003). This is not to say that appraisals correspond to high evaluative process exclusively, appraisals can be defined as perceptions of external events which are not related to high cognitive processing (Moors, 2013). As stated by Ellsworth and Scherer (2003), the “appraisals process is a link between the organism and the situation that produces the emotion” (pg. 574). Appraisals show that emotions are adaptive responses that motivate individuals to act in particular ways (Ellsworth & Scherer, 2003; Frijda, 2004).

Emotions also align individual behaviours with specific goals that promote adaptive responses. Frijda (2004) argued that the relationship between emotion and motivation relies on the energizing properties of emotions on behaviours, and the intentional properties that align behaviour and desired end states, giving the affect system an increasing range of flexibility and variability to respond to complex environments. The complex experiences that arise from these characteristics are organised through two parameters: time and situations.

**Principle 3: *There are two levels of emotional complexity, the first level of emotional complexity is defined by different fluctuation in emotions over time.*** Emotions fluctuate over time and over situations, and continuous changes in affective experience constitute the essence of how emotions colour people’s daily life. This means that emotions are dynamic (Kuppens, Oravecz, & Tuerlinckx, 2010; Mauro, 1992; Mesquita & Boiger,

2014; Scherer, 2004, 2009). Emotions are not merely the aggregation of isolated and static states, but a collection of changing processes (Mauro, 1992). This implies that emotions do not only shift from one into another, but more importantly, emotions mutually influence each other over the course of an event, altering the intensity of subsequent affects, modifying the hedonic valence of ongoing experiences, coupling multiple emotional experiences as a consequence of similar appraisals, or changing the behaviours to be deployed at a given moment.

Changes in emotion can result in diverse processes defined by the individuals' fluctuations in emotion (Davidson, 1998; Kuppens et al., 2010). Davidson (1998) described four individual differences in affective dynamics characterised by specific features of time. One temporal dynamic is defined by the *threshold for eliciting particular emotions*. Some people will have an emotional response to a stimulus of low intensity, whereas others will need a more intense stimulus for the elicitation of the same emotion. Another dynamic is defined by the *amplitude of the emotional response*. The *time to rise to peak* is a temporal dynamic of affect characterised by more or less quick responses to emotional stimuli. Finally, the last dynamic is *recovery time*, which is related to the amount of time that an individual takes to recover to a baseline level of affect.

More recently, several other emotional dynamics have been defined. Emotional inertia is a recent concept defined by the degree to which emotional responses are resistant to change (Kuppens, Allen, & Sheeber, 2010; Kuppens, Sheeber, Yap, Whittle, Simmons, & Allen, 2012). Emotional inertia has been seen as an unresponsive dynamic of affect, where individuals are insensitive to variations in the environment (Kuppens et al., 2010). Emotional variability or instability could be described as the opposite face of emotional inertia. Emotional variability is defined by the intraindividual variability of emotions over time (Grühn, Lumley, Diehl, Labouvie-Dief, 2013; Röcke, & Smith, 2009).

Emotional inertia and variability seem to be a function of goal alignment. Emotional unresponsiveness from one moment to the next may indicate that people are fixed on the emotional consequences of certain events (e.g., unattained goals and subsequent frustration), whereas high levels of variability may indicate that emotional experiences are highly reactive to changes in the environment (e.g., volatile emotional expression without having reference values or goals associated). Interestingly, high levels of inertia and variability, irrespective of valence, have been shown to be negatively related to well-being and health-related outcomes (e.g., Houben, Van der Noortgate, & Kuppens, 2015; Grouber et al., 2013; Koval, Pe, Meers, & Kuppens, 2013; Kuppens et al., 2012).

Finally, the dynamics of emotions can be also characterised in terms of *augmentation* and *blunting*; that is, current emotions can increase or decrease the experience of subsequent emotions (Pe & Kuppens, 2012). Interestingly, valence and appraisals seem to guide patterns of augmentation and blunting. Emotions tend to increase the occurrence of subsequent emotions of the same valence, whereas emotions of opposite valence showed blunting from one moment to the next (Pe & Kuppens, 2012). Furthermore, evidence has shown that the extent to which appraisals involved in a sequence of emotions over time are similar, can make augmentation or blunting stronger (Pe & Kuppens, 2012).

In sum, it is possible to describe a number of complex emotional experiences mostly characterised by the parameter of time. This level of emotional complexity describes patterns of fluctuation of emotions over time, and constitutes a level of complexity that is generally defined by the interrelations among multiple single emotional experiences.

**Principle 4:** *A second level of emotional complexity is defined by complex situations that increase the levels of self-organisation in emotional processes.* The IMEC proposes that, when time is constrained and the emotion-related event is increasingly complex in terms

of its organisation of information, a new set of complex emotions will emerge. At higher levels of emotional complexity, the emotional lexicon is increasingly integrated, facilitating the emergence of *sui-generis* patterns of affect characterised by self-organization dynamics. Self-organization may result in new verbalisations of emotions, uncommon in the emotional lexicon (e.g., mixed feelings), or the combination of multiple emotional adjectives into one single experience (e.g., *awe*; Keltner & Haidt, 2003).

As the level of emotional complexity increases, self-organization processes may not resemble the common use of the emotional lexicon, although people identify these experiences as genuine feelings. For example, it is remarkable that the English language, among others (e.g., Spanish, Portuguese), does not have specific emotional adjectives to describe mixed emotions. Likewise, *awe* has been defined as a mixture of surprise, pleasure, elevation, and astonishment (Darwin, 1872; Keltner & Haidt, 2003). From the point of view of the IMEC, this is because some emotional complex phenomena result from increasing self-organization processes in emotional experiences.

Self-organization is the process through which a control system reduces a state of chaos (i.e., disorganization) via successive negative feedback loops among multiple control systems (Guastello, 2002). This is to say that mutual interactions between multiple control systems facilitate the emergence of more complex emotions which, in turn, permit the affect system to keep flexible and ensure behavioural viability within certain boundaries. For example, understanding mixed emotions as an emergent phenomenon explains the positive correlations between positive and negative emotion shown in Study 4, evidencing a discontinuity from the typical negative correlations observed between positive and negative emotions. Thus, mixed emotions are represented by a spontaneous reorganization of the rules governing the emotional lexicon, which allow positive associations between emotions of opposite valence when goals conflict.

This is closely related to Powers' (1973) idea of the reorganization of goal conflict at higher levels in the hierarchy of goals. The IMEC adds that complex emotional experiences may be considered an integration process which helps individuals to resolve conflict or reduce uncertainty by mobilizing meaning-making. As suggested by Parkinson (2009) emotions are a fundamental component in the creation of meaning. The IMEC additionally asserts that complex emotional experiences may reduce discrepancies perceived in the environment by assisting the process of creating meaning in life. This may help to explain why mixed emotions are associated with eudaimonic well-being, and particularly, with aspects of eudaimonic well-being related to meaning-making (e.g., life purpose).

Park (2010) defined meaning-making as the process through which individuals attempt to reduce the discrepancy between perceived goals, beliefs or expectations. Park (2010) further suggests that searching for meaning may result in greater acceptance, perceptions of growth, and changes in identity, global beliefs or goals. Study 3 actually found that mixed emotions are closely related to searching for meaning in life, but negatively related to having meaning in life. In short, mixed emotions and other complex emotional experiences may mobilize individuals to engage to reduce discrepancies, but the actual creation of meaning is not necessarily guaranteed.

Table 15. Comparison between different concepts of emotional complexity with mixed emotions.

<i>Concept</i>	<i>Definition</i>	<i>Comparison with Mixed emotions</i>	
		<i>Similarities</i>	<i>Differences</i>
<i>Emotional granularity</i>	Individual difference associated with the ability to make finer distinctions and well-differentiated reports of emotional experience, demonstrated by weak correlations between emotional states of the same valence (Barrett, 2004).	- Both are described as complex emotional experiences	- Complexity is accounted for precision rather than variety of affective experience - Assumes a bipolar structure of affective experience.
<i>Emodiversity</i>	The degree to which people can experience a diverse and abundant set of emotional experiences over a period of time. Emodiversity is a measure of richness of emotional complexity and the proportionality of experiences pertaining to a broad number of emotions (Quoidbach et al., 2014).	- Emotional complexity is constituted by the degree of diversity of emotions that people can experience - Emotions are able to freely interact with each other.	- The concept of emodiversity does not incorporate co-activation patterns of affect.
<i>Meta-emotions</i>	A focal emotion is used as an object for a secondary emotion, such as one emotion promptings a secondary emotion (Mitmansgruber et al., 2008; Norman & Furnes, in press).	- Different emotions can be experienced in a very short period of time - Complexity is about diverse emotional experiences.	- One primary emotion is used as an object to experience a secondary emotion - Meta-emotions are the result of meta-cognitive functions.
<i>Emotional refinement</i>	“Emotional states characterised by detachment, restraint, second-order experiences, and self-reflexive awareness” (Frijda & Sundararajan, 2007, pg. 232).	- May incorporate mixed feelings because this concept is based on similar cultural traditions to dialecticism.	- Incorporates a series of different appraisals into one unique feeling.

In terms of the multiple complex emotional experiences found in the literature that may fit with principle 4, *Table 15* provides a description of several (but not all) the emotional complexity phenomena that can be described at this level of analysis. They are compared with the concept of mixed emotions and displayed in increasing order of self-organization, as previously defined. Emotional granularity can be described as the less self-organized phenomenon because the emotional lexicon is conserved. At the middle level of self-organization is the phenomenon of mixed emotions because the emotional lexicon is shaped in new ways that challenge general characteristics concerning the interrelations between emotions. Finally, emotional refinement and transcendence are described as the clearest examples of self-organization because they combine multiple emotional words and rules to create *sui-generis* emotional experience.

**Principle 5: *It is possible to find individual differences in emotional complexity that result from three key components observed in the emergent affective phenomena.***

Despite the multiple complex emotional phenomena that can be identified as a result of fluctuations over time and chaotic external demands, the IMEC asserts that a common single dimension of emotional complexity could be found.

The model argues that three key dimensions underlie the concept of emotional complexity. The first dimension is *accuracy* which is defined by the degree to which people distinguish between emotional experiences. The dimension of accuracy is similar to the traditional conceptualization of complexity in terms of the ability to make thin distinctions between different emotional experiences (Barrett, 2004; Khan & Shaver, 2004). The second dimension is *versatility* which is defined by the degree to which people experience a wide variety of emotional experiences, incorporating multiple combinations available in the emotional lexicon, beyond common distinctions and interrelations of different emotional experiences. This dimension reflects idiosyncratic



variations in emotional experiences, ranging from emodiversity to mixed emotions. Finally, the third dimension is *deepness* and is defined by the degree to which people experience high levels of personal involvement when experiencing complex emotions. This dimension reflects a fusion between the self and the emotional experience, and is commonly found in artistic inspiration, and personal experiences that are characterised by elevation, self-transcendence, and epiphanic experiences. Hence, the IMEC suggests that greater levels of the aforementioned dimensions better characterise what individuals and researchers imply when they try to describe emotional complexity.

**Principle 6: *The functionality of emotional complexity is determined by the perception of the stimuli.*** Emotional complexity is not useful or beneficial for itself. As demonstrated in Study 5, mixed emotions are beneficial when conflicting goals are present. Likewise, the different emotional complexity phenomena described so far serve adaptive purposes that foster behavioural flexibility on occasions of increasing uncertainty. However, when the context is familiar, experiencing complex emotions may destabilize the affect system, which may turn emotional complexity into a pernicious experience for individuals' well-being. On occasions where the stimuli are familiar, the repertoire available in the emotional lexicon of a given individual is better characterised by discrete and dimensional models of affect, or dynamic models of emotions, resulting in greater adaptability. This does not mean that familiarity necessarily equates to successful progress. In accordance with PCT (Powers, 1973, 2014) emotions are still thought as resulting from error signals. Familiarity implies that the nature of the perceived stimulus is not uncertain.

Individuals continuously try to restore stability and a sense of familiarity with the environment on occasions where conflicting stimuli are perceived (Powers, 1973; Proux & Inzlicht, 2012). Several theories actually suggest that people make efforts to regain a sense of stability when facing uncertainty (Dreisbach & Goschke, 2004; Hirsh, Mar, & Peterson,

2011; Proux & Inzlicht, 2012; Van de Bos, 2001). The IMEC suggests that experiencing emotional complexity is a common response to stimuli that are perceived as uncertain. Uncertainty is one of the most critical adaptive challenges for individuals, and people try to maintain levels of uncertainty at manageable levels (Berlyne, 1957; Hirsh et al., 2011). Importantly, Berlyne (1957) defined uncertainty as indicating the complexity of a conflict. According to Berlyne (1957) conflict is determined by the number of stimuli that are perceived in a given moment and the probability that a certain response associated with a stimulus will occur during one unit of time. This means that conflict is not an absolute measure (i.e., present versus absent), but a relative function of the number of goals that are activated at a given moment and the probability that the respective behaviours will occur. Thus, higher values of this function, mean that greater levels of uncertainty are perceived. This assertion is consistent with evidence found in Study 5, where the number of active goals was associated with higher levels of goal conflict.

The IMEC proposes that increasing levels of uncertainty are responsible for the emergence of increasingly complex emotional experiences. Under uncertain circumstances, the organism gains flexibility to adapt more efficiently to the environment. As mentioned in chapter 5, mixed emotions facilitate the integration of complex information at a given moment, providing greater behavioural flexibility to respond to incompatible cues in the environment. This is consistent with common conceptualisations of mixed emotions (Cacioppo et al., 1999; Cacioppo et al., 2004; Oatley & Johnson-Laird, 1996; Reich et al., 2003; Zautra, 2003). The IMEC further suggests that this function is not peculiar to mixed emotions, but rather represents the common adaptive purpose of emotional complexity, in general.

Unlike recent approaches that have argued that negative emotions are a typical response to higher levels of conflict (Hirsh et al., 2011; Proux & Inzlicht, 2012), Berlyne

(1957, 1960, 1963) suggested that conflict may be rewarding, such as in gambling and aesthetic behaviour. This is not to say that people are wanting to maintain a state of conflict. People continuously look to resolve conflict. However, conflict can instigate exploration and curiosity, especially when conflict involves two potentially attractive outcomes (i.e., gambling) or when conflict is associated with the expectations aroused by the context (i.e., novelty) (Berlyne, 1957, 1960, 1963). Hence, Berlyne's conceptualization of uncertainty leaves enough room to accommodate a large number of phenomena reflecting emotional complexity, even those that result from artistic appreciation.

In sum, the IMEC represents a preliminary attempt to integrate a broad range of complex emotional experiences that have been characterised in the literature, not yet organised into a common theoretical framework. The principles stated in this sub-section represent some elementary aspects that may be useful within a more refined version of this theory, which is still to come. The IMEC can consistently integrate disparate conceptualizations of emotional complexity into a common framework. The IMEC also explains some discontinuities evidenced in several of the previous studies reported (positive correlations between positive and negative emotions), and conceptualises the nature of the association between mixed emotions and eudaimonic well-being in terms of meaning-making mechanisms. Ultimately, the IMEC suggests that emotional complexity is the hallmark of an affect system that is flexible enough to permit a vast number of emotional responses, accurate in signifying relevant stimuli in the environment, and able to initiate searching for meaning from disparate situations such as conflict and spiritual revelation.

**Conclusion.** In conclusion mixed emotions are a relevant component of the emotional repertoire. Mixed emotions have identifiable sources related to goal conflict, they are significantly associated with eudaimonic well-being, and assist the process through which people resolve conflicting goals. Mixed emotions are not merely the result of confusion or

misunderstanding in emotional reports. Different measures of mixed emotions used across the studies conducted in the present research project demonstrate consistent evidence linking conflicting goals, mixed emotions, and eudaimonic well-being. Meta-analytic evidence also supports the claim that mixed emotions are a measurable and non-artifactual experience. Implications of the findings offered in previous chapters point to an inextricable relation between conflicting goals and mixed emotions, which implies that mixed emotions have functional properties that enable individuals to display increasing levels of behavioural flexibility and integrate complex strands of information at a given moment. Functional properties of mixed emotions may offer important research avenues to investigate mixed emotions in clinical settings, improve health-related outcomes, and to better understand the relation between goal multiplicity, mixed emotions, and goal shifting. The lack of theoretical developments in the field of emotional complexity also offers the opportunity to integrate the findings presented in this research project within a broader conceptualisation of emotional complexity. Ultimately, the study of mixed emotions may help to explain why, despite frequent conflict, people maintain efforts to find meaning in their lives and thrive.

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## 8. APPENDIXES

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### **8.1. Appendix-1: Evaluating the correspondence between different measures of mixed emotions.**

Intraindividual correlation between oppositely valenced affects is one of the most common indices of mixed emotions used when conducting longitudinal studies (e.g., Brose, Voelkle, Lövdén, Lindenberger, & Schmiedek, 2014; Gröhn, Lumley, Diehl, Labouvie-Dief, 2013; Hershfield et al., 2013; Ong & Bergeman, 2004; Perunovic, Heller, & Rafaeli, 2007). Consecutive affective reports over time permits us to estimate the strength of the correlation between two or more sets of affective items (e.g., happy, sad, calm, stressed) within each individual. This is known as an intraindividual or *within-person* correlation. For example, it is possible to calculate how strongly correlated happiness and sadness are across all the time points reported for each individual.

Within-person correlations are markedly different from *between-person* correlations. Between-person correlations reflect the strength of the association between two sets of affective items across people at a given point in time (Brose et al., 2014). When emotions are measured over time, an ad-hoc procedure to estimate the between-person correlation is to calculate a simple correlation between, for example, scores of happiness and sadness across all individuals and across all measurement points (Zelenski & Larsen, 2000). Within- and between-person correlations also differ in their association patterns. Between-person correlations among positive and negative affective items are commonly near zero; whereas within-person correlations among positive and negative affective items are usually negative, ranging from -0.58 to -0.13 (Bleidorn & Peters, 2011; Merz & Roesch, 2011; Rush & Hofer, 2014; Vansteelandt et al., 2005).

Yet, the interpretation of a within- or a between-person correlation of a pair of oppositely valenced emotions is similar. A within-person (or between-person) correlation near zero between, for example, happiness and sadness means that positive affect (PA; e.g., happiness) and negative affect (NA; e.g., sadness) were experienced independently (Grühn et al., 2013), suggesting that it is more likely that mixed emotions can occur (or in general, if a between-person correlation was estimated; Brose et al., 2014). In other words, more positive correlations between positive and negative emotions imply that greater mixed emotions are present. In contrast, a within-person (or between-person) correlation closer to minus one indicates that PA and NA were experienced on a single, bipolar dimension (Grühn et al., 2013), and this renders co-activation unlikely.

Evidence is in general consistent in demonstrating that within-person correlations of PA and NA near zero are related to better mental and physical functioning (e.g., Brose et al., 2014; Coifman et al., 2007; Grühn et al., 2013; Hershfield et al., 2013; Ong & Bergeman, 2004). *Table 16* shows a summary of the five identified studies that have investigated the association of a within-person correlation between positive and negative affect with well-being (broadly defined) using a longitudinal design, in its different forms (e.g., experiencing sampling, diary study). It is worth noting that the average within-person correlation was, in general, negative excepting Ong and Bergeman's (2004) study which found a positive within-person correlation. It is possible that this may be due to the fact that Ong & Bergeman's study collected a sample of older adults only. Previous studies have shown that older adults are more prone to experience time as a limited experience and this may result in positive within-person correlations (Carstensen et al., 2000; Ong & Bergeman, 2004). Another notable aspect from *Table 16* is that the range of within-person correlations between PA and NA was large. Figures extracted from these studies showed that the within-person PA-NA correlation range

varied from -0.86 to 0.86, which may be indicative of substantial individual differences in the experience of mixed emotions (e.g., Rafaeli et al., 2007; Wilt et al., 2011).

More importantly, the summary of the studies shown in *Table 16* reveals that, in general, within-person correlations were positively associated with different well-being-related variables. For example, Ong and Bergeman (2004) surveyed the emotional state of a sample of older adults every day during 30 consecutive days. Then they calculated the within-person correlation between the positively valenced emotions and the negatively valenced emotions as an indicator of poignancy. Positive and stronger within-person correlation reflected greater poignancy, whereas negative within-person correlations reflected less degree of poignancy. Results showed that within-person correlations between PA and NA were positively related to indicators of resilience and negatively correlated with neuroticism. They interpreted these findings as demonstrating that co-activation of positive and negative emotions predicts better mental functioning among older adults.

Another study showed that frequency of mixed emotions episodes were strongly associated with better physical health (Hershfield et al., 2013). In this study, 3 waves of data were collected with a 5-years interval. Participants were instructed to complete an emotional adjective questionnaire 5-times a day for over a week in each wave; they also completed a medical health questionnaire. Mixed emotions were estimated as the within-person correlation between positive emotions (e.g., happiness, amusement) and negative emotions (e.g., sadness, fear). Multilevel models were used to demonstrate that mixed emotions were associated with less physical health symptoms, over and above mean levels of positive and negative emotions (Hershfield et al., 2013).



Table 16. Summary of the longitudinal evidence linking within-person correlation of positive and negative affect and well-being.

Study	Sample Size	Average age of the sample / (SD)	Average of the within-person correlation (SD)	Well-being measure	Observed effect
Brose et al., 2014	101	25.6 (2.7)	-.36 (N.R.)	- Trait positive affect - Personal growth	$r = .23^*$ $r = .24^*$
Coifman et al., 2007	54	49.8 (8.2)	-.45 (.54)	- Resilient bereaved compared to symptomatic bereaved - Subjective well-being (e.g., life satisfaction)	$d = .56$ $n.s.$
Grühn et al., 2013	109	55.4 (15.9)	N.R.	- Psychological well-being (6 dimensions)	$n.s.$
Hershfield et al., 2013	312	54.0 (22.5)	-.38 (.43)	- Self-reported physical health symptoms	$\beta = .14^{**}$
Ong & Bergeman, 2004	40	75.5 (6.3)	.19 (.28)	- Global resilience - Daily stress - Neuroticism	$r = .45^{**}$ $r = -.38^*$ $r = -.34^*$

Note: SD = standard deviation; N.R. = not reported; n.s. = no significant association. \*  $p < .05$ , \*\*  $p < .01$ .

Coifman and colleagues (2007) interviewed a sample of bereaved people on four different occasions starting after 4-months of bereavement. The sample was divided into resilient bereaved people and bereaved people experiencing depressive symptoms using a standardised clinical interview based on the diagnostic and statistical manual of mental

disorder. Next, they coded portions of each interview as indicating positive affect or negative affect; participants also completed a measure of perceived health and a standardised measure of health-related symptoms. Findings revealed that resilient bereaved participants tended to experience positive and negative emotions concurrently more frequently during each interview compared to the participants with symptoms, based on within-person correlations (Coifman et al., 2007). Furthermore, resilient bereaved participants exhibited better self-perceived health compared to the other group (Coifman et al., 2007).

The two studies that have investigated the association between within-person correlations and eudaimonic well-being, using the psychological well-being questionnaire (Brose et al., 2014; Gröhn et al., 2013) have produced mixed results. Brose and colleagues (2014) hypothesised that individuals who have a PA-NA within-person correlation more similar to the PA-NA between-person correlation (near zero) should exhibit better well-being. In order to assess this hypothesis, participants firstly completed the psychological well-being scale (Ryff, 1989) and a trait measure of PA and NA (PANAS; Watson, Clark, & Tellegen, 1988). Next, they participated in a diary study completing a state-affect version of PANAS once a day for approximately 100-days. Results revealed a significant effect of trait-PA on the PA-NA within-person correlation. That is, individuals who reported feeling more positive emotions in general in their lives also had PA-NA within-person correlations near zero. Likewise, people who scored higher on the psychological well-being dimension of personal growth had less negative PA-NA within-person correlations.

In comparison, Gröhn and colleagues (2013) carried out an experiencing sampling study where participants completed a brief questionnaire five times a day for a total of seven consecutive days. They used PANAS (Watson et al., 1988) to evaluate the state-affect at each occasion, and they also incorporated the psychological well-being questionnaire (Ryff, 1989) and trait-affect PANAS (Watson et al., 1988) as baseline measures. However, the findings in

this study did not show an effect of psychological well-being or trait-affect on the PA-NA within-person correlations. Actually, an opposite trend was observed with estimates exhibiting a negative, though non-significant association between psychological well-being and PA-NA within-person correlations, excepting the dimension of relation with others which showed a positive trend. A similar negative trend was observed between trait-PA and within-person correlations of PA-NA.

Most of the studies reported in *Table 16* assume that the within-person correlation reflects the co-activation of positively valenced and negatively valenced emotions and some have considered this to be a measure of mixed emotions or a similar construct (Hershfield et al., 2013; Ong & Bergeman, 2007; Perunovic et al., 2007). However, correlation indices may not adequately reflect the experience of mixed emotions. Schimmack (2001) showed that a pair of oppositely valenced emotions (e.g., happy-sad) revealed the elicitation of mixed emotions using the minimum index, but the contrary could be inferred when calculating the correlation between these emotions. In other words, correlation values near zero may not necessarily reflect the elicitation of mixed emotions. According to Schimmack (2001) correlation indices do not appropriately capture the elicitation of mixed emotions because correlations near zero do not accurately inform about the elicitation of mixed emotions as compared to using the intensity of the weaker affect (i.e., minimum index).

To provide additional support for Schimmack's claim, *Figure 21* shows contingency tables for the elicitation of different pairs of oppositely valenced emotions based on state-affect reports of data from Berrios, Totterdell and Niven (2015). This is similar to the contingency tables reported by Schimmack (2001). The mixed emotion experience of happiness and boredom based on the minimum index was equal to 2.9 (considering a scale ranging from 1- *not at all* - to 5 – *very much* -). In contrast, the correlation of the same pair of emotions was equal to -0.42 (Panel 10A).

Panel 10B shows a different pattern. The minimum index between enthusiasm and sadness was equal to 2.8 (similar to the minimum index of happiness-boredom), whereas the correlation between these emotions was equal to -0.09. The lack of correspondence between correlations and the minimum index cast doubts that correlation indices reflect the intensity of mixed emotions. If correlations do reflect the activation of mixed emotions, then it is not clear at what magnitude correlations signal co-activation.

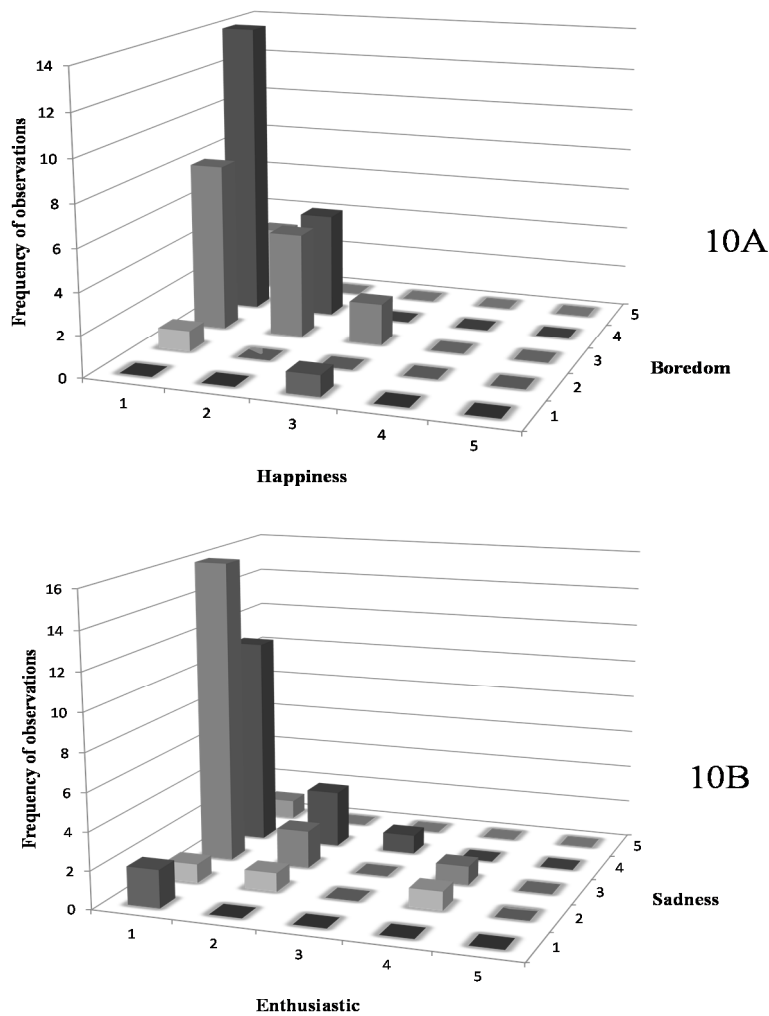


Figure 21. Contingency tables representing the frequency of observations for different pairs of oppositely valenced emotions based on data from Berrios et al. (2015).

An alternative interpretation may suggest that within-person correlations do not correspond with correlation indices estimated from cross-sectional data, which are more precisely between-person correlations. Variations over time reduce measurement error and take into account fluctuations of emotions in daily life, which is not possible to estimate using simple correlations at a single time point. Therefore, a Monte-Carlo simulation was generated using data reported by Study 5 in order to determine the degree of correspondence between different indices of mixed emotions (i.e., within-person correlations, minimum index, and subjective measure of mixed emotions).

Monte-Carlo simulation refers to a computational algorithm that randomly generates artificial data, using a specific data-generating process (Carsey & Harden, 2013). Most types of data-generating process (DGP) are a mix of systematic and stochastic components (Carsey & Harden, 2013). Systematic components are generally defined by the parameters established by the researchers. In the case of the present simulation, this corresponds with the formulations to calculate the associations among the within-person correlations index, the minimum index, and the subjective measure of mixed emotions. The stochastic component is normally an error term defined by a particular distribution (e.g., normal, poisson; Carsey & Harden, 2013).

For the present simulation, 10,000 artificial responses were simulated for three mixed emotions indices: within-person correlations, minimum index, and the subjective measure of mixed emotions. Next, Pearson-correlations were estimated between these indices of mixed emotions. The stochastic component fitted the data automatically according to the actual distribution of these indices in the sample of Study 5; therefore, the error terms of each parameter were estimated separately for each variable.

Results showed that the minimum index was positively and moderately strongly correlated with the subjective measure of mixed emotions (0.48), whereas the within-person correlation index was negatively and weakly correlated with both the minimum index (-0.12) and the subjective measure of mixed emotions (-0.12). Again, this casts some doubts about the appropriateness of using within-person correlation as an indicator of mixed emotions. Certain correspondence should be expected between different measures of mixed emotion, but this simulation showed that only two measures of mixed emotions (the minimum index and the subjective measure of mixed emotions) seem to be tapping a similar construct. As a final separate note, the average within-person correlation between positive affect and negative affect for the present simulation (-0.44) is quite similar to the correlation anticipated by the circumplex model of affect (-0.47; Russell & Carroll, 1999). This correlation is characteristic of the L-shape bivariate response distribution of a bipolar dimension of valence in the circumplex model when measurement error is controlled and response format is strictly unipolar; therefore, the current data-generating process seems to be unbiased for the within-person correlations index.

## 8.2. Appendix-2: Concepts explained to participants in Study 5

**Desires.** A desire is an impulse that usually emerges suddenly in your mind and is not related with your current activities. For example, you can be exercising and suddenly you want to eat some chocolate. Desires can be understood as temptations because sometimes they interfere with your activities. For example, you are revising for an exam and your desires to chat with your friends may interfere with the study. In this example, your desires compete for your time and energy to finish the current activity.

Another feature of desires is that they can be in conflict with an important goal for you. For example, you may have been trying to quit smoking but during the day you crave for a cigarette. Another example could be that you want to sleep or rest, but you are working.

Finally, it is important to mention that you can have more than one desire simultaneously. For example, you may want to drink a glass of wine and this desire accompanies another desire like smoking or chatting with someone.

**Goals.** We use the concept of goal as the purpose that drives the activities or actions you perform in your everyday life. A goal is an objective that you are typically trying to accomplish or attain, for example trying to finish cleaning your room, or trying to complete an assignment.

Goals can be about something that you want to move towards or something that you want to avoid or prevent. For example, trying to quit smoking is something you want to prevent or avoid. On the other, trying to relax yourself is something you want to approach to (e.g., turn on the TV).

Furthermore, a goal is something that may take time to achieve or requires sustained effort, such as when you are preparing an assignment for Uni or when trying to save some

money for your holidays. On the other hand, goals can also be easier to achieve, such as when you want to chat with your friends; you just need to pick up your phone to satisfy this goal.

Finally, multiple goals can be active during a brief period of time. For example, you may have been trying to read but also you may want to eat some chocolate, and you can do both simultaneously. In other times it is more difficult to harmonise your goals, such as when you want to party and you know you need to dedicate more time to revise; in this later case your goals are in conflict.