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**THE ADAPTIVE FUNCTIONS OF MUSIC LISTENING: STRUCTURE,
CORRELATES, & CONSEQUENCES**

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B. A., H. Dip Psychology (conversion)**

Thesis submitted to the National University of Ireland, Galway in fulfillment of the
requirements for the Degree of Doctor of Philosophy (Psychology)

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Supervised by:
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January, 2017

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I hereby certify that this thesis is my own work, and I have not obtained a degree in this University, or elsewhere, on the basis of this work.

In memory of my Grandfather
Gentleman and Jazz-man, Jimmie Dooley

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Publications & Conference Presentations

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Publications

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ABSTRACT

The current thesis involves three studies employing qualitative, quantitative and experimental methods to examine the relationship between music listening and wellbeing.

Study 1 used the collective intelligence methodology, Interactive Management (IM), to identify the functions of music listening (FML). Four IM sessions were conducted, two with younger adults ($N = 24$, 18-29 years, $M = 22.49$, $SD = 2.25$, 8 males) and two with older adults ($N = 19$, 60-75 years, $M = 65.86$, $SD = 4.47$, 10 males). Participants generated, clarified, and structured FML they believed were most significant for enhancing wellbeing. Four structural models were generated highlighting potential interdependencies between FML in the context of wellbeing enhancement. Age differences emerged in the FML considered adaptive, with younger adults highlighting social connection and affect regulation and older adults highlighting more eudaimonic functions of music (e.g., transcendence and personal growth).

Study 2 reports on the development of a new measure of music listening functions: *The Adaptive Functions of Music Listening Scale*. In a sample of 1191 participants (17-66 years, $M = 22.04$, $SD = 6.23$, 326 males) tests of dimensionality revealed a 46-item scale with 11 factors. Namely, *Stress Regulation*, *Anxiety Regulation*, *Anger Regulation*, *Loneliness Regulation*, *Rumination*, *Reminiscence*, *Strong Emotional Experiences*, *Awe and Appreciation*, *Cognitive Regulation*, *Identity*, and *Sleep FML*. Reliability of the scale and its subscales was high. Consistent with the view that adaptive FML are positively related to wellbeing, a number of factors were significantly positively correlated with subjective, psychological, and social wellbeing measures.

Study 3 evaluated the efficacy of self-chosen music listening for the function of affect regulation with a sample of both younger and older adults. Forty younger (18-

30 years, $M = 19.75$, $SD = 2.57$, 14 males) and forty older (60-81 years, $M = 68.48$, $SD = 6.07$, 21 males) adults visited the laboratory and were randomised to either the intervention (10 minutes of listening to self-chosen music) or the active control condition (10 minutes of listening to a radio documentary). Negative affect (NA) was induced in all participants using the Trier Social Stress Test, followed by the intervention/control condition. Measures of self-reported affect were taken at baseline, post-induction and post-intervention. Examining reduction in induced NA as the dependent variable: a 2 (group: control, intervention) x 2 (age: younger, older adult) ANCOVA controlling for baseline affect and reactivity to the NA induction found significant main effects of group, with the music listening group experiencing greater reductions in NA across a range of discrete measures including *Stress Regulation*, *Nervous Regulation*, *Upset Regulation*, *Sadness Regulation* and *Depressed Affect Regulation*. Analyses also found significant main effects for age, with older adults experiencing greater reductions of NA than younger adults, regardless of condition.

Together these studies suggest a positive role for music listening in wellbeing enhancement, particularly with regard to the regulation of affective experiences.

PREFACE

Music is a complex stimulus with wide-ranging reported effects making it a popular research topic for scholars of music, psychology, sociology, psychiatry, and medicine. The inter-disciplinary nature of music studies has resulted in a great deal of empirical research and a vast array of insights into the nature of different musical experiences, including music listening. On the whole, research suggests positive effects of music listening that have the potential for enhancing and supporting wellbeing across the lifespan. However, drawing conclusions from this body of evidence is challenging because of heterogeneity in the methodologies, study design, analytical approach, and research aims of investigators working across different disciplines.

Historically, research in music psychology has predominantly focused on music perception and cognition. This includes a focus, for example, on the auditory processing and cognitive representation of rhythm, the mechanisms underlying pitch and tonal discrimination, and links between music and language perception (See Deutsch, 2013 for review). More recently there has been growing interest in the link between music listening and wellbeing. At the core of wellbeing research is a focus on positive and negative affective experience. Moods, emotions, stress, and feelings are broadly included in this focus on positive and negative affective experience (Scherer, 1984). Positive and negative affect are central to hedonic definitions of wellbeing (Diener, Eunkook, Lucas, & Smith, 1999). A variety of studies suggest beneficial effects of music listening in optimising affective experience, increasing positive affect and reducing negative affect (see Sections 1.2.1 and 1.2.2).

There are two main approaches to understanding the effects of music on wellbeing that have been adopted in the research literature. One is to focus on micro-level responses to music listening in the context of controlled laboratory studies. A second approach involves a macro-level analysis of the broader wellbeing outcomes of music listening in everyday music listening contexts. In relation to the first approach,

well-designed experimental work provides important evidence in relation to causal mechanisms underlying the relationship between music listening and wellbeing. The majority of experimental work in this context has focused on music and affective experience including the ongoing experience of positive and negative affect during music listening. Early discourse in this field centered on the debate between cognitivists and emotivists. The cognitivist position argued that listeners perceive, but do not experience the emotion being expressed by the music (Meyer, 1956; Kivy, 1990), while emotivists countered that affective experiences are induced by music. This disagreement inspired a tradition of laboratory research that was consistent with the emotivist perspective, demonstrating affective responses to music on a range of objective parameters - such as measures of physiological, neurochemical, and neuroendocrine reactivity (for reviews see Juslin & Sloboda, 2010; Chanda & Levitin, 2013; Koelsch, 2010, 2011).

Much of this research, however, has focused on the stimulus (music) and discrete affective responses to specific features of musical stimuli (e.g., tempo, mode, dynamics) rather than the experience of the responder (listener) in general, including the wellbeing of the listener, and the link between the music listening goals they pursue and their level of general wellbeing. Composers manipulate structural features of music, such as the tempo, mode, pitch, and dynamics (i.e., loudness) to express and convey different affective states in musical form. For example, music expressing happiness would commonly be of faster tempo, in a major key, have higher pitch and greater dynamic range. These musical features are perceived by the listener as salient emotional information, and a large body of research has demonstrated that listeners can correctly identify and subsequently experience the emotion being expressed by the music (see Sloboda, 1991; Juslin, 2001 for review). Following composers, researchers have often examined these features of musical stimuli as independent variables by manipulating them in the form of experimental controls (e.g., fast versus slow tempo, major versus minor mode) and testing their influence on the dependent variable (i.e., the listener's affective response).

Experimental research could be criticised for being somewhat reductionist, yet a great deal of knowledge now exists regarding the effect of specific features of musical stimuli on the listener's subjective and physiological affective response. At

the same time, everyday music listening is unique. An emphasis on specific features of musical stimuli has limited ecological validity when it comes to understanding the unique and variable everyday music listening experiences that people have across different contexts and situations. Music listening is a very common behaviour that is highly individualistic in the sense that different people listen to different music and have different musical preferences in different situations. Outside of the laboratory people select and listen to music that varies across many different musical features (e.g., tempo, mode, pitch, dynamics). These features can fluctuate within individual pieces of music and over more extended periods of music listening. It is suggested in this thesis, therefore, that in order for laboratory experimental work to provide a better representation of everyday music listening experiences and outcomes, studies should employ participant-selected music where possible.

The other main approach to the question of music listening and wellbeing has focused on the range of effects of autonomous music listening experiences in everyday contexts over time - outside of the laboratory. This macro-level analysis has employed qualitative and self-report methods primarily, but also day reconstruction, diary keeping, and naturalistic data collection techniques such as the experience sampling methodology (ESM). Contrary to expectations, findings emerging from these investigations highlight some negative effects of music listening experiences on measures of wellbeing (see Section 1.3.1). Synthesis of this research is challenging as a result of the different research methods used, and it is also difficult due to the varied research questions and conceptual definitions of constructs used across studies (i.e., outcomes, effects, responses, goals, reasons, rewards, reactions, experiences, uses, motives, and functions of music listening). There is an important distinction between the outcome or effect a listener is pursuing (i.e., the goal, motive, reason) and the outcome they actually experience listening to music (i.e., the effect, response, reaction). Relationships with various outcomes, including wellbeing, would be expected to differ based on this distinction. In an effort to support greater synthesis, this thesis will introduce a long-standing theory of learning and behaviour, Social Cognitive Theory (Bandura, 1989; 2001), as a framework for understanding outcomes and effects of musical experiences as goals that motivate the behaviour of listening to music. When such goal-directed behaviour is effective, outcomes of musical experiences become functions that music listening

serves in an individual's life, and enhance their level of wellbeing. This theoretical approach will underlie the development of scale items for a new measure of music listening functions, *The Adaptive Functions of Music Listening Scale*, which is suitable for use in direct investigations of the relationship between self-reported functions of music listening and wellbeing outcomes.

There is a good deal of qualitative and quantitative research relevant to understanding the functions of music listening (FML). Questionnaire and survey studies have been generative in providing lists of common FML. A number of these studies have also uncovered a latent factor structure of the FML using cluster or factor analysis - but further scale development and validation efforts to create instruments to measure the FML have been slower to emerge. The existing instruments are limited in a number of ways by reference to normative standards of psychometric practice. First, in efforts to identify specific FML in the response profile of participants there is an over-reliance on the application of principal components analysis (PCA) when exploratory factor analysis (EFA) would be more appropriate. Second, there has been widespread failure to replicate the dimensionality of measurement instruments using confirmatory factor analysis (CFA). In addition, there are a number of scales that do not distinguish between measurement of the functions of music listening and the functions of music making. For those conducting research on the relationship between FML and wellbeing there are other specific problems associated with the use of existing FML scales. For example, scale items measuring affective FML have typically not differentiated between emotional experiences at a valence level (i.e., distinguishing positive from negative affective experiences) such that directional hypotheses can be made regarding relationships with wellbeing outcomes. Differences in the wording of scale items (e.g., outcome sought versus outcome achieved) and the response format (e.g., frequency of use versus frequency of success in achieving desired outcome) further restrict the predictions that can be made and the convergence of evidence across studies using different FML scales. Finally, the scales that have been developed have been somewhat limited in their scope, that is, in the number of functions of music listening included in the scale. This limitation may result from another problem identified with psychometric practice in the area of FML research, specifically the

lack of qualitative work informing scale development in the field, which can support a deeper understanding of the full range of adaptive functions of music listening.

The three studies in this thesis build upon a hierarchy of evidence in an effort to advance our understanding of the relationship between music listening and wellbeing outcomes. The first level of this hierarchy involves the use of qualitative research methods and engaging participants directly to support understanding of FML and their significance for wellbeing outcomes. Engaging participants directly provides a window into the private world of listeners and highlights a range of FML that researchers, and scale developers in particular, have not yet focused on. These include effects of music such as increased transcendence, meaning, and engagement. Using an innovative qualitative approach to data collection (Interactive Management; Warfield & Cárdenas, 1994), Study 1 will draw upon the collective intelligence of music listeners to identify the broad range of adaptive FML endorsed by both younger and older adults. This collective intelligence data is used to develop a participant-generated model of FML, which in turn is used to inform FML scale constructs. Applying the framework of SCT for the wording of items, and following best practice guidelines for scale development and psychometric analysis, Study 2 in this thesis will introduce *The Adaptive Functions of Music Listening Scale*. It is hoped this scale will meet the need for a psychometrically robust instrument to measure a broad range of FML that is suitable for outcomes-based research examining the relationship between music listening and wellbeing. As such, the second level in the hierarchy of evidence in Study 2 builds upon qualitative reports on the relationship between music listening and wellbeing from Study 1 and seeks to investigate quantitative relationships between FML and wellbeing outcomes using a psychometrically robust measure of the FML.

Arguably, at the pinnacle of this hierarchy are well-controlled studies that provide evidence of effects of music listening in everyday contexts. This is a growing research area employing a variety of different data collection techniques. For example, a small number of ESM studies have examined self-reported affect experienced in episodes of music listening compared with effects reported during non-musical episodes in everyday life. Experimental laboratory work can adopt a similar approach to ESM studies, for example by allowing for a comparison of music

listening effects with effects of ecologically valid and reasonably well-matched active control conditions (i.e., watching TV/reading). Experimental work can be used to evaluate any positive effects of music listening which have been documented in naturalistic observation studies, specifically, by replicating effects of music listening in laboratory settings in randomised controlled studies. Experimental laboratory work can also provide support for participants' reports of positive effects of music listening observed in previous qualitative and quantitative survey studies.

In this context, there are a wide range of wellbeing experiences that music may influence that have been the subject of less empirical investigation. Affective experience is only one aspect of wellbeing as it is broadly defined in the literature. In addition to affective experience, many models of wellbeing focus on psychological wellbeing and social wellbeing. There has been less research on the relationship between music listening and these other facets of wellbeing.

There is also a dearth of research involving samples of healthy older adults, particularly experimental research. The effects of music are potentially wide-ranging and can include social and cognitive functioning. These are dimensions of human functioning that can change as people age. For instance, declines in cognitive functioning in advanced old age are well documented (Salthouse, 2010). Research also documents positive developments in social and affective functioning in older adulthood. For example, although the quantity of social interactions may decrease, research suggests that the quality of social relationships often improves in older adulthood. This is accompanied by improvements in affective functioning (i.e., reduced experience of negative affect, increased ability to regulate negative affect, and greater emotional intelligence) (Carstensen, 1995). These developmental changes may influence the requirement or the desire for different music listening effects in everyday life, influencing the FML reported by older adults. Studies 1 and 3 in this thesis will engage samples of healthy older adults. Self-reported FML in everyday life, as reported by older and younger adults in Study 1 will be compared, as well as, age group differences in the FML that are identified by participants as adaptive for wellbeing enhancement. Study 3 will compare younger and older adult responses to a music listening intervention for the function of affect regulation. Although there have been limited investigations with older adults, applying

frameworks of socio-emotional development, along with lifespan theories of self-regulation (Baltes & Baltes, 1990; Heckhausen, 1995) may guide predictions and provide insight into potential fluctuations in the functions of music across the lifespan, and the links between music listening and wellbeing. Including older participants therefore may broaden our knowledge of the effect of music on wellbeing, and strengthen our understanding of the adaptive functions of music listening. Comparing younger and older adults in this way is illustrative because FML that are common at these contrasting developmental stages may therefore be key, adaptive, and stable across the lifespan. In addition, contrasts in adaptive FML may provide theoretical insight into the distinct ways individuals manage their wellbeing at different stages of life.

In sum, Study 1 will employ Interactive Management (IM) to compare, for the first time, age differences in younger and older adults' FML, and will also advance our understanding of which FML listeners consider most adaptive for wellbeing enhancement. IM is a novel, systematic, and rigorous approach to conceptualising a comprehensive set of FML. IM is useful for scoping out the full range of FML described by listeners, and developing a thorough understanding of constructs that emerge. Moving forward, consulting with music listeners using IM as a starting point allows for the construction of a new measure of the FML in Study 2 - *The Adaptive Functions of Music Listening Scale*. By adhering to all eight steps in DeVellis' (2012) rigorous approach to scale development, Study 2 represents an important methodological advance in the creation of psychometric instruments for the field of music psychology. The conceptual framework underlying item construction for this scale ensures the measure will be useful for research on the outcomes of FML, and to validate constructs of this newly developed scale correlation analyses in Study 2 will examine relationships between FML factor scores and a number of wellbeing outcomes. Finally, Study 3 will involve an RCT evaluating the efficacy of music listening for the function of affect regulation. It is expected that in Studies 1 and 2, as in the literature, participants will report positive beliefs about music's effect on affect regulation. However, more evidence from controlled studies is required to confirm listeners' perceived efficacy of music for different functions, including affect regulation.

1 CHAPTER 1

Introducing The Adaptive Functions Of Music Listening

Introduction

There is an extensive and fascinating history of human music-making. Musical instruments dating back 40,000 years have been discovered (Conard, Malina, Munzel, & Seeberger, 2004). There are multiple theories as to the many functions of music in relation to psychological, social, and cultural development. One ancient theory stems from Chinese philosopher Confucius, who argued that, "Music produces pleasure which human nature cannot be without", (Li Ki, bk. xvii., sect. iii.). Confucius thus highlighted the emotional effects of music, a prominent theme in modern research on the psychology of music listening. Indeed, music has been a common feature of celebrations and lamentations throughout human history. Confucius goes further to say that, "music is the blossoming of virtue", (Li Ki, bk. xvii., sect. ii., 21.), thus highlighting a role for music in pursuit of the 'good life' and higher states of wellbeing.

Historically, music has also been used for healing and promoting wellness (Gouk, 2000; Horden, 2000). Music's healing properties were celebrated as far back as the sixth Century BC. The mathematician and philosopher Pythagoras prescribed music as medicine, claiming that the laws of harmony inherent in music could be harnessed to restore harmony to the human mind, body, and soul. Today, the practice of music therapy and music medicine apply this idea, using music in the treatment of various conditions and ailments (Thaut, 2005).

Music has also been part of shamanic, sacred, and religious ceremonies and rituals for centuries (Morley, 2009), thus indicating a religious, spiritual, or transcendent function of music. According to Dissanayake (2009) music facilitates meaning-making in these contexts. It is argued that music is at the heart of ritual because of the strong emotions it elicits, which reinforce the beliefs, or social identity of the

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group engaged in the ritual, and the individual's feelings of identity and belonging to that group.

More generally, music is thought to have been important for group bonding throughout human evolution (Huron, 2001). From birth, some of our earliest social interactions are musical in nature. Infant-directed speech is a prosodic (melodic) and emotionally expressive form of infant-directed communication that is important for parent-child attachment, but also for later language and social development (Saint-Georges et al., 2013; Trainor, 2002; Trainor, Austin, & Desjardins, 2000).

The role of music in work contexts throughout history is also well documented: songs of workers in cotton fields became the foundations of musical traditions like Spirituals and The Blues. Sea Shanties too arose out of the work songs of fishermen. However, it has been argued that the function of music listening (FML) in this context was not only for workers to be more synchronised and therefore more efficient, but also to make work more enjoyable (Gioia, 2006).

History highlights many applications and functions of music that retain their significance in modern times and are worthy of in-depth scientific investigation. Music listening today remains a common and valued behaviour that people of all ages invest a large amount of time in. A series of survey studies including a variety of younger and older adult samples highlight the popularity of music listening. For example, studies have reported that 78% of adults listen to music daily (Juslin, Liljestrom, Laukka, Vastfjall, & Lundqvist, 2011), 64% of older adults (65-75 years of age) reported listening once or several times a day (Laukka, 2007), and university students spend an average of 3.66 hours per day listening to music (Lonsdale & North, 2011). Studies sampling episodes in people's daily lives have found that music is present in about one third to one half of episodes sampled (Juslin, Liljeström, Vastfjall, Barradas, & Silva, 2008; Krause, North, & Hewitt, 2015; North, Hargreaves, & Hargreaves, 2004). Music listening then makes up a large part of many people's everyday lives. Understanding its effect on psychological functioning, and its potential benefit for the wellbeing of listeners across the lifespan is thus worthy of empirical investigation.

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Using a combination of qualitative collective intelligence, cross-sectional quantitative, and experimental methods, this thesis focuses on the listener's subjective experience of music, and aims to understand how listeners use and respond to music in their everyday lives and how that may relate to their wellbeing.

In order to establish a foundation for this work, we focus first on models of affect, affect regulation, and wellbeing that are relevant for understanding the effect of music listening on wellbeing, broadly defined. Secondly, we review evidence supporting claims that music listening influences wellbeing in the following domains (i) affective experience (ii) regulation (iii) social functioning, and (iv) eudaimonic experience. Next, we provide theoretical grounds for considering these effects of music as adaptive functions of music listening that are sought out by listeners in everyday contexts, and review studies linking functions of music with wellbeing. This provides a basis for the research rationale presented at the end of this chapter, which describes how the three studies presented in this thesis fill a number of key gaps in the literature on the relationship between music listening and wellbeing.

1.1 Theoretical Perspectives on Wellbeing

The positive psychology movement has aimed to alter the course of research in psychology from a primary focus on psychological illness towards a greater understanding of human wellness and positive functioning. There are two main theoretical approaches to understanding wellbeing that are often distinguished in this area of research: the hedonic perspective and the eudaimonic perspective. The distinction between hedonia and eudaimonia was first put forward by Aristotle (Brown, 2009). Happiness derived from pleasure was considered hedonic, whereas happiness derived from leading a good life and following one's 'daimon', or true self, was deemed eudaimonic. The Aristotelian view emphasises that achieving wellbeing involves more than the pursuit of pleasure and the avoidance of pain (hedonia), rather, eudaimonic wellbeing is the process of living well. To live in accordance with one's 'true self' implies the development of identity (Erikson, 1959), and a movement towards self-acceptance (Ryff & Keyes, 1995). Eudaimonic wellbeing also involves personal growth towards the realisation of one's potential; or

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eventual self-actualisation (Maslow, 1999; Ryff & Singer, 2008). Furthermore, fulfilling one's 'daimon' also depends on other eudaimonic processes, including finding meaning and purpose in life (Frankl, 1985; Steger, Oishi, & Kashdan, 2009). Finally, experiencing engagement or flow in personally meaningful and intrinsically-motivated activities is another important element of eudaimonic living (Csikszentmihalyi, 2002).

More fundamentally, leading a good life, according to Aristotle meant living a life of strength and virtue. These virtues he regarded as intellectual, emotional, and social in nature. The eudaimonic life was not a solitary one, and Aristotle wrote at length about friendships - they are formed, according to Aristotle, when people spend time together engaged in activities that exercise their virtues. In developing their classification of human character strengths and virtues, which includes 6 higher-order virtues and 24 character strengths, Peterson and Seligman (2004) drew upon the work of Aristotle and other thinkers. Half of the higher-order virtues in their classification (i.e. *Humanity*, *Justice*, and *Temperance*) highlight strengths that foster quality relationships (e.g. social intelligence, kindness, teamwork). The remaining virtues and strengths, which include *Transcendence* (e.g. appreciation of beauty, spirituality), *Wisdom* (e.g. creativity, curiosity) and *Courage* (e.g. perseverance, zest) emphasise additional psychological and social processes central to wellbeing broadly defined. More generally, positive psychology has conceptualised authentic happiness as a combination of hedonic and eudaimonic wellbeing (Seligman & Csikszentmihalyi, 2000).

Traditionally, much of the research on wellbeing in psychology has adopted the hedonic view of happiness and wellbeing, but a broader scope of empirical work has emerged in recent years. Recent models also highlight the link between pleasure, positive affect, and broader psychological, social, and eudaimonic well-being outcomes. For example, Fredrickson's (2004) *Broaden and Build Theory* proposes that positive emotions signal safety and thus engender a more open mindset and creative exploration of the environment. This broadened perspective provides opportunities for discovery and learning, as well as forming new social bonds and strengthening existing ones. As such, positive emotions may support the building of lasting resources through acquired knowledge, skills, and quality relationships.

Similarly, Seligman's (2012) approach to wellbeing builds upon the more traditional hedonic focus. As well as *Positive Emotions* (P), his PERMA model includes *Engagement* (E), *Relationships* (R), *Meaning* (M), and *Accomplishment* (A). *Engagement* refers to a state of absorption and focus, and at the higher level, a state of flow or complete immersion in what one is doing (Csikszentmihalyi, 2002). The PERMA model also highlights the importance of social *Relationships* that are rewarding and supportive. Social support is considered an important contributor to wellbeing (Reis & Gable, 2003; Froh, et al., 2007), in part because of its value as a coping resource (Cohen & Wills, 1985). *Meaning* refers to living a life one believes is of value and serving something larger than the self. Interestingly, early humanist work on meaning highlighted relationships, intimacy, achievement, acceptance, religion, and self-transcendence as the main sources of meaning in life (Frankl, 1985). Finally, *Accomplishment* involves feeling capable and progressing towards or achieving goals. Our perceived rate of progress towards intrinsically motivated goals generates positive emotions (Carver & Scheier, 1990). According to Seligman, the five elements in the PERMA model contribute to wellbeing, are related, but can be defined and measured independently. A related line of more established research draws a distinction between subjective, psychological, and social wellbeing, and some of the most well-established and widely-used measures of wellbeing emerge from this line of research. The key distinctions are outlined below.

Subjective Wellbeing. Building upon a hedonic view of wellbeing, the components of subjective wellbeing (SWB) are both affective and cognitive. More specifically, SWB is defined as high positive affect, low negative affect, and a cognitive evaluation of high satisfaction with one's life (Diener et al., 1999). A series of studies by Diener, Larsen, Levine and Emmons (1985) found that the frequency and the intensity of positive and negative affect were independent factors underlying affective experience. Diener, Sandvik and Pavot (2009), later concluded that frequency of positive affect is more important for happiness than the intensity of positive affect felt and that SWB is best explained by the amount of time spent feeling positive relative to time feeling negative.

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The experience of both positive and negative affective states are important because these feelings provide essential information about our inner and outer environments that guide adaptive responding (Gross, 1998; Larsen, 2000). Affective experiences can persist and thus an ability to regulate affect is also necessary for optimum psychological functioning (Larsen, 2000). There are a number of theories, models, and taxonomies describing affect regulation strategies people use to regulate affective states (Folkman & Lazarus, 1988; Gross, 1998; Larsen, 2000). Theories often focus on stress or negative affect (NA) regulation and typically distinguish between behavioural strategies and cognitive strategies, and between strategies that are either emotion-focused (reducing the NA aroused by the stressor/stimulus) or problem-focused (aimed at the source of stress and NA) (Carver, 1997; Lazarus & Folkman, 1984; Gross, 1998; Larsen, 2000). In the theoretical model put forth by Larsen (2000) behavioural strategies involve changing what one is doing to regulate NA. Cognitive strategies by contrast involve changing one's way of thinking or state of mind, and like behavioural strategies can be problem or emotion oriented. This model implies at least four different ways of regulating negative affect, including:

1. Behavioural & problem-focused (e.g., taking action to solve the problem, or disengaging behaviourally by withdrawing from or avoiding the problem).
2. Behavioural & emotion-focused (e.g., seeking pleasure through enjoyable activities, expressing or venting one's negative feelings, or avoiding rumination by staying busy/distraction).
3. Cognitive & problem-focused (e.g., reappraisal, or reframing of the stressful situation to think about it in a more positive way).
4. Cognitive & emotion-focused (e.g., practicing meditation to relax the mind, or engaging in fantasy or daydreaming).

Affect regulation and SWB are closely related, as SWB can be regulated by increasing positive affect or reducing negative affect (Larsen, 2009). Higher levels of SWB in turn have been associated with other adaptive outcomes such as increased creativity, greater sociability and pro-sociality, and improved task-persistence and multi-tasking (Diener, 2000).

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Psychological Wellbeing. Carol Ryff (1989) argues that subjective theories of wellbeing omit important aspects of positive psychological functioning. Ryff developed her Psychological Well-Being (PWB) model and psychometric measure over the course of a decade of research focused on positive psychological health. Ryff identified a high degree of convergence in the works of Aristotle's 'Daimon', Erikson's psychosocial stage theory (1959), Maslow's work on self-actualisation (1950), Allport's work on maturity (1961), and others, and suggested that the dominant accounts of wellbeing were limited by excluding these works.

Ryff's model of Psychological Wellbeing (PWB) includes six factors. An individual with high PWB has *Autonomy* and freedom, they are independent and resistant to pressures to conform. They report high levels of *Environmental Mastery* or an ability to regulate the outside world, providing a sense of agency and competence. They also have a positive attitude towards themselves and their past, or *Self-Acceptance*. They are empathetic and have *Positive Relations with Others* that are warm, trusting, and reciprocal. Another PWB factor Ryff highlights is *Purpose in Life*, a sense of direction, or goals and aims that give life a feeling of meaningfulness. The final factor, *Personal Growth*, involves being open to new experiences and working to realise one's potential through a process of continuous development. Rather than viewing these six factors as antecedents of wellbeing narrowly defined (i.e., SWB), Ryff suggests that they are better viewed as related but distinct indicators of positive psychological functioning.

Social Wellbeing. Keyes's (1998) model builds upon the work of Diener, Ryff, and others by highlighting a distinction between subjective, psychological, and social wellbeing dimensions. Predominant conceptions of wellbeing focus on the inner experience or characteristics of the individual, yet we exist in social groups and structures and our wellbeing, broadly defined, is a function of our social experiences. As such, how well we function within these social structures is an important element of adaptive functioning and wellbeing. Drawing on sociological and social psychology perspectives, Keyes's account of social wellbeing includes five factors, which people can rate themselves on by answering a series of questions: *Social Integration* reflects one's feeling of belonging to society. *Social Acceptance* reflects positive beliefs about human nature and about society as a whole. *Social*

Contribution is the extent to which people feel they have value in society. *Social*

Actualisation is the belief that society is progressing towards its best potential.

Finally, *Social Coherence* captures one's understanding of and desire to understand how the social world works. Social wellbeing therefore involves a person's appraisal of their circumstance and functioning in society.

Rather than representing competing conceptions of wellbeing, the different components of wellbeing - subjective, psychological, social, and eudaimonic wellbeing - are closely related, and potentially interactive components of wellbeing (Diener & Tov, 2012). Thus, this thesis adopts a broad framework including these various components of wellbeing to gain a greater understanding of the complex ways that music listening might enhance wellbeing.

1.2 Music Listening and Wellbeing

1.2.1 Music Listening and Affective Experience

Affective experiences are fundamental building blocks of wellbeing (Diener et al., 1999), and affective experiences are perhaps the most studied effects of music listening (Juslin & Sloboda, 2010). At the same time, understanding the relationship between affective experiences in response to music listening and an individual's wellbeing, more broadly defined, in everyday contexts, is much more challenging. As noted, the majority of younger and older adults listen to music daily (Juslin et al., 2011; Laukka, 2007), with university students spending close to four hours a day listening to music (Lonsdale & North, 2011), and with music being present in up to half of daily episodes sampled in experience sampling studies (Juslin et al., 2008; Krause et al., 2015; North et al., 2004). Although the frequency and intensity of ongoing affective experiences are important in shaping the experience of subjective wellbeing (SWB) (Diener et al., 1999), less is known about the role of everyday music listening in shaping SWB. There are a number of challenges in extrapolating from experimental laboratory-based music listening research to understanding the effects of music listening in everyday contexts, including:

- 1 A predominant focus on discrete features of musical stimuli (e.g., tempo, mode, genre) and comparing affective responses to these different features of the

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musical stimuli, as opposed to a focus on the music listening experience overall and its relationship to affective responding and SWB of listeners.

- 2 Laboratory research has revealed complex and often conflicting findings highlighting divergent physiological and subjective responses to different features of musical stimuli.
- 3 There has been a lack of experimental control in many studies, with no non-music control conditions to compare the unique effects of music listening on affective outcomes in comparison with the effects observed in active or passive control conditions.

In everyday contexts people choose music to listen to that varies dynamically by the very properties that are often controlled for and compared in experimental studies (e.g., tempo, mode, genre) and music is selected that varies both within and between listeners, and across individual listening experiences.

At the same time, laboratory research has shed light on the effects of music listening on basic components of affective experience, and much of this research has been conducted with a focus on outcome measures that are fundamental to mainstream theories of affective experience. Predominant models of affect describe the affective experience across two bipolar dimensions (Russell, 1980; Watson & Tellegen, 1985), specifically, arousal (high to low), and valence (positive to negative). A diverse range of affective experiences can be understood by their position within this two-dimensional circumplex. For example, excitement is a high-arousal and positively-valenced affective state, in contrast to sadness which is a low-arousal and negatively-valenced state.

Notably, musical stimuli (songs, movements, excerpts) can also be distinguished by their valence and arousal ratings. Musical features provide the listener with cues as to the valence and arousal of the affect expressed by the music. Some of the most consistent findings across studies are that positively-valenced states are conveyed in music by major modes and high pitch, whereas minor modes and low pitch denote negatively-valenced states. High arousal states are expressed by faster tempo, and low arousal states by slower tempo (Dalla Bella, Peretz, Rousseau, & Gosselin, 2001; Gagnon & Peretz, 2003; Sloboda, 1991; Clarke, 1983; Gabrielsson &

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Lindström, 2001). For example, sadness - a negatively-valenced and low arousal emotion - would be expressed by music in a minor mode, with lower pitch and slower tempo. Further, these musical features influence the affect induced, in the sense that music in a minor mode, with lower pitch and slower tempo can induce sadness in listeners (Gabrielsson & Juslin, 2003; Juslin, 2001).

Much experimental research has concerned itself with demonstrating how these features of music influence the affective experience of listeners. Many studies have compared affective responses to musical stimuli with differing valence and arousal properties: such as pleasant versus unpleasant, or stimulating versus sedating music. Studies have also sought to compare responses to music stimuli that express discrete emotions (e.g., happy versus sad music), and music of different genre (e.g., classical versus heavy metal). In this context, musical stimuli with different properties influence both reported affective experience and physiological indicators of affective experiences.

A number of key findings highlight these effects. For instance, comparing effects of music of different arousal level, participants in a within-subjects experiment by Iwanaga and Moroki (1999) reported greater relaxation and less tension following sedative music listening, and more vigour after they listened to stimulating music. Further, heart rate (HR) and systolic blood pressure (SBP) were significantly higher during excitative music listening than sedative music listening. Other studies have examined responses to music expressing different affective states. For example, Lundqvist, Carlsson, Hilmersson, and Juslin (2009) compared subjective and physiological responses to happy and sad musical pieces (140 seconds each). The musical pieces had been composed in a pop style specifically for the study in line with the musical features described above (i.e., happy music had a fast tempo and major mode, and sad music had a slow tempo and minor mode). Predictably, happy music induced more self-rated happiness than sad music, and sad music induced more self-rated sadness than happy music. No differences in participants' HR were found between music types, but happy music resulted in higher skin conductance levels than sad music. Finger temperature was lower in happy compared with sad music listening, contrasting with the influential study by Krumhansl (1997) reporting

lower finger temperature in response to sad music compared with happy or fearful music.

Other studies have compared affective responses to music of different genres. In the within-subjects experiment carried out by Gerra et al (1998), thirty minutes of listening to techno music significantly increased HR, SBP, as well as hormones mediating the stress response, namely, adrenocorticotrophic hormone, norepinephrine, and cortisol. Techno music also increased self-rated depressed affect. In contrast, listening to thirty minutes of classical music resulted in self-reported decreases in depressed affect, but no change in neuroendocrine or cardiac measures. Self-reported relaxation, calm, and serenity were significantly higher in classical music listening than during techno. In contrast, the study by Nater, Abbruzzese, Krebs and Ehlert (2006) — comparing low arousal positively-valenced classical music and high arousal negatively-valenced heavy metal music — found no differences in participants' cortisol level across music types but did report greater physiological arousal when participants were listening to heavy metal than when listening to classical music (i.e., HR and skin conductance level were significantly higher and finger temperature significantly lower). Listening to heavy metal music led to a reduction in self-rated positive mood and calmness, whereas mood improved and calmness increased following low arousal positively-valenced classical music.

A major drawback of the studies described is that they have failed to compare the effects of music against a non-musical control condition. Instead, affective responses to music have been compared across music stimuli of different valence, arousal level, and genre. In general, high arousal music and negatively-valenced music was associated with a characteristic pattern of physiological responses and subjective reports suggestive of negative affective experience (e.g. increased HR, BP, cortisol, self-reported tension and depressed affect). However, participants' everyday experience of music may be more complex. For example, genres of music that sometimes produce negative affective responses in lab settings, including techno and heavy metal music, are popular with many listeners and in everyday contexts people select this type of music (Schäfer & Sedlmeier, 2009). A consideration of the goals people are pursuing in context may be important for understanding the effect of music listening on affective experience in more dynamic everyday contexts.

For example, in relation to arousal, there is a need to consider the level of arousal listeners prefer in musical experiences in the laboratory, in everyday contexts, and for different everyday adaptive functions they might be pursuing in different situations. Early theories proposed an inverted U function for preference and arousal, suggesting in particular that music that evokes moderate arousal has greater hedonic value than music of high or low arousal (Berlyne, 1971; Konecni, 1982). However, other investigations found that listeners do not consistently seek moderate arousal or homeostasis of arousal level — in certain contexts they seek out more extreme experiences and seek to further polarise their current level of arousal (DeNora, 1999; North & Hargreaves, 1996a; 2000). The experiment by North and Hargreaves (2000) asked participants who were assigned to either an aerobic exercise class or relaxation group to select between high or low arousal music. The context was important in shaping their preferences. Participants preferred high arousal music for exercising, and low arousal music to accompany a relaxation practice. However, in a follow-up study, it was found that, after exercise participants preferred to moderate and thus reduce their higher level of arousal with low arousal music. Music listening behaviours in everyday life are thus influenced by the function of music listening being pursued and the context of music listening (North & Hargreaves, 1996b). People may desire different music listening experiences in different situations, and the match between their goals, music choices, and the situation may influence their overall wellbeing experience in context. This should be reflected in music selection for experimental research also, in the sense that different music listening experiences may induce different responses from study participants depending on their goals, and the context in which music listening occurs. However, the majority of studies focusing on affective experiences induced by music listening have not been designed with these considerations in mind.

At the same time, laboratory research clearly demonstrates that a range of affective experiences can be induced by music listening. This is supported by Västfjäll's (2002) review of studies involving musical mood induction procedures, where it is concluded that music is an effective intervention for inducing positive, negative, and neutral moods, of both high and low arousal. Building upon and extrapolating from

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this experimental work, new models are emerging which seek to specify the possible routes through which music listening impacts on affective experience.

Notably, the BRECVEMA framework is a recent attempt to provide a comprehensive account of how emotional reactions take place during music listening (Juslin, Barradas, & Eerola, 2015; Juslin, 2013; Juslin et al., 2008; Juslin, Harnat, & Eerola, 2014). The framework contains 8 mechanisms underlying affect induction in music, one corresponding to each letter in the framework:

- *Brain stem reflex* is the process by which emotion is induced because of musical features that outside of musical contexts signal important or urgent information - such as sudden, loud, or dissonant patterns of sound.
- *Rhythmic entrainment* refers to the process of synchrony which occurs between internal body rhythms (e.g. HR, BP, respiration rate) and the external rhythm of the music heard.
- *Evaluative conditioning* refers to the emotional response aroused by a piece of music alone because of its previous and repeated association with other stimuli arousing that same response.
- *Contagion* occurs when the listener feels, or ‘catches’ the emotions being expressed by the music.
- *Visual Imagery* refers to the inner representations of musical structure and meaning formed by the listener.
- *Episodic Memory* is the conscious retrieval of a particular life event triggered by the music, and this can result in the affective experience of nostalgia as well as other more specific emotions associated with that memory.
- Affective states, such as anxiety, tension, and surprise can be aroused when the listener’s *Musical expectancy* is violated or delayed. It is satisfying for the listener when music conforms to their expectations for that musical piece or genre. The interplay between the expected and unexpected in musical features is considered important in emotional responses to music.
- *Aesthetic judgement* is the subjective evaluation of artistic value that the listener grants to the music heard.

The BRECVEMA framework provides a broad lens through which to understand the potential mechanisms of musical affect induction, and highlights some gaps in the

existing literature. For example, it has been suggested that physiological indicators, especially those mediated by brainstem responses (e.g. HR, pulse, BP, skin conductance) are particularly sensitive to psychoacoustic cues in music (i.e. tempo, loudness, pitch) (Chanda & Levitin, 2013). Given the predominant focus in experimental research on musical features, particularly those linked to arousal level and associated physiological measures of affect, this suggests that many studies have centred on the proposed BRECVEMA induction mechanisms of *Brain stem reflex* and *Rhythmic entrainment*. However, as noted, there is a challenge in applying these experimental findings to music listening experiences in everyday contexts, as listeners are likely to select music that varies dynamically across key stimulus features of music within and across music listening sessions. People may also select music with different musical features for different reasons, depending on the context of listening. More generally, in many everyday contexts, where people choose the music pieces they listen to, the experience is often appraised positively by the listener (Huron, 2006; Juslin et al., 2008; Krause, North, & Hewitt, 2014). As such, choice and control over music selection may be important in shaping affective experience. Furthermore, considering the BRECVEMA model, key aspects of the music listening response (e.g., linked to *Episodic Memory*, *Evaluative Conditioning*, and *Aesthetic Judgement*) may be important over both the short-term and longer-term in shaping more sustained aspects of subjective, psychological, or social wellbeing.

At the macro-level of analysis, questionnaire and ESM studies of everyday music listening have shown that, in everyday life, listeners report experiencing affect when listening to music, and these affective experiences are frequently positive. Questionnaire studies have confirmed that listeners' most commonly reported emotional responses to music are positive. Specifically, happiness, enjoyment, calmness, feeling moved, and nostalgia are commonly reported responses to music listening in general (Juslin & Laukka, 2004; Laukka, 2007). Studies employing naturalistic data collection techniques such as the experience sampling method (ESM) have found similar results (Greasley & Lamont, 2011; Sloboda, O'Neill, & Ivaldi, 2001). For example, an ESM study by Juslin et al (2008) found that positive emotions were more common, and negative emotions less common in emotional musical episodes when compared with emotional episodes not involving music.

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Further research is needed to determine what affective experiences listeners seek and experience in everyday music listening contexts. Research is also needed to determine what are the consequences of these experiences for listeners' overall affective experience (valence and arousal), as well as their wellbeing more generally.

1.2.2 Music Listening and Regulation

Research outlined in the preceding section demonstrates that music listening can influence affective experience. For example, listening to music can induce positive affective experiences, and reduce negative affective experiences. As a core component of subjective wellbeing is hedonic balance – higher levels of PA and lower levels of NA - findings linking music listening to the induction of PA and the regulation of negative affective states have potentially important implications for increasing wellbeing (Larsen, 2000).

The studies described in Section 1.2.1 demonstrate that listening to music can influence activity on a range of parameters relevant to the human stress response (e.g., cortisol, cardiovascular and electrodermal activity, self-reported increases in relaxation and calm, and reductions in anxiety, stress and tension). The experiments described above examine affective experience or induction, in that they are reporting changes from baseline in positive and negative affect after listening to music, as opposed to the regulation of ongoing stress or negative affect by listening to music.

Focusing on the regulation of affective experience in particular, a number of naturalistic studies have found benefits of music listening for regulating negative affect in stressful situations. One review of 12 studies examining the impact of music on anxiety levels while awaiting medical procedures found a significant effect of music listening in reducing anxiety in 11 of the studies (Cooke, Chaboyer, & Hiratos, 2005). The systematic review of randomised controlled trials by Evans (2002) concluded that music played via headphones reduced patient anxiety during routine care, but had no significant effect during more aversive medical procedures such as bronchoscopy or epidural. More generally, a meta analysis of 22 quantitative studies involving music-assisted relaxation techniques in people experiencing stress (laboratory induced or during medical/clinical procedures) concluded that music

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alone, and in combination with other techniques, is an effective method to reduce stress-induced arousal (self-reported, physiological, and behavioural) (Pelletier, 2004).

Studies employing the experience sampling methodology (ESM) confirm that listening to music can also regulate affect in everyday situations. An ESM study by Juslin et al. (2008) found that in 64% of musical episodes participants experienced a change in their affective state. A later ESM study found a small but significant increase in positive affect during music listening episodes, and this increase was greatest when the listener was in a negatively-valenced affective state prior to music listening (Randall, Rickard, & Vella-Brodrick, 2014).

There are also a number of studies that have experimentally induced stress or negative affect to address the question of musical affect regulation in the laboratory more directly. These studies have also demonstrated benefits of music for the regulation of ongoing NA (e.g. (Chafin, Roy, Gerin, & Christenfeld, 2004; Khalfa, Dalla Bella, Roy, Peretz, & Lupien, 2003; Knight & Rickard, 2001; Sandstrom & Russo, 2010; Yamamoto, Naga, & Shimizu, 2007).

There are some issues with this body of research that limit the conclusions that can be drawn regarding music's efficacy for regulating negative affect - and its subsequent impact on wellbeing:

1. A continued focus in this line of research on comparing the effects of musical stimuli with contrasting features (e.g., tempo, mode, pitch - musical features that are linked to arousal and valence; and genre of music).
2. A predominance of studies examining effects of researcher-chosen music, as opposed to participant-chosen music.
3. An over reliance on silent control conditions, which do not provide a very ecologically valid comparison to music listening conditions.

Issues 1 and 2 above are problematic when it comes to generalising results from these laboratory studies to the efficacy of music for affect regulation in everyday contexts. Firstly, as described in Section 1.2.1, everyday music listening may involve dynamic variation in the stimulus experience, and comparing responses to music of contrasting valence and arousal properties (i.e., tempo, mode, pitch) may contribute

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to divergent subjective and physiological effects of music, and divergent effects across studies. This can make it difficult to synthesise research and to generalise subjective and physiological effects from laboratory studies to the overall affective experience of the listener in everyday contexts. Secondly, laboratory research designs may lack ecological validity, because outside of the laboratory listeners select their own music for different functions, including affect regulation. This option to select from a range of music listening experiences is not often granted to participants in the experimental laboratory situation. Importantly, people self-select music for affect regulation that varies along key measurable features of the musical stimulus (i.e., valence, arousal level, genre) (DeNora, 1999; Greasley & Lamont, 2011; Schäfer & Sedlmeier, 2009).

A third problem is that many laboratory experiments have compared the effect of music listening with silence. Silent control conditions have some disadvantages. In a context where regulating negative affect is an important goal, listening to music may be more beneficial for reducing NA when compared to waiting in silence, but music listening may not be as effective when compared with something else (e.g., a more active control condition). Silent control conditions may lack ecological validity, in the sense that silence is not necessarily a common activity, and everyday life often provides a number of non-musical behaviours and activities individuals can engage in to regulate aversive affective experiences. However, experimental studies typically do not employ control conditions that compare the effects of music listening with other activities that people may use in everyday contexts to regulate NA. The use of ecologically valid active control conditions in laboratory studies may provide better evidence of music's relative efficacy for affect regulation in everyday contexts.

Selecting music for regulation

Research findings emerging from studies employing ESM and mobile data collection techniques demonstrate the centrality of individual choice and control of musical experiences in everyday contexts for the regulation of NA. The ESM study by Greasley and Lamont (2011) found that in episodes where participants reported having listened to music for the function of affect regulation they also reported having high choice over the music they heard in that episode. This study also reported that low levels of choice in music listening episodes were linked to weaker

reported effects as well as increased negative effects such as annoyance. Sloboda, O'Neill and Ivaldi (2001) found complementary results, in particular that in everyday contexts, adaptive affective change was greatest when listeners had control over the music they heard. A recent study of personal music listening in everyday contexts (i.e., using mobile devices) found that when participants were in a negative affective state, they most frequently reported listening to music for emotional reasons (e.g., to reflect, to release, to relax), as opposed to social (e.g., to express identity, to entertain), or other reasons (e.g., for entertainment, to reduce boredom) (Randall & Rickard, 2016). Together these findings suggest that when experiencing negative affect individuals use music to regulate that experience, and when doing so they exercise choice over the music they listen to. Thus a greater reflection of musical affect regulation behaviour in everyday life may be gained from the use of participant-selected music in the laboratory. Unfortunately, the majority of experimental studies incorporating negative affect inductions have employed researcher-chosen classical or relaxing music. Musical stimuli have been selected on the basis of their use in prior studies (Knight & Rickard, 2001; Thoma et al., 2013), ratings by prospective participants in pre-trials (Nomura, 2009), slower tempo and relaxation properties as perceived by the researcher (Khalfa et al., 2003).

At the same time, a handful of studies have focused on participant-selected music, for example in experimental studies of intense emotional experiences (Blood & Zatorre, 2001; Rickard, 2004; Salimpoor, Benovoy, Larcher, Dagher, & Zatorre, 2011), affective experience (Burns, Labbé, Williams, & McCall, 1999; Garrido & Schubert, 2015), and affect regulation (Burns et al., 2002; Labbé, Schmidt, Babin, & Pharr, 2007; Radstaak, Geurts, Brosschot, & Kompier, 2014). These studies have shown self-selected music to have some reliability in facilitating positive and adaptive affective experiences. For instance, a series of studies found that self-selected relaxing music was as effective or more effective than experimenter-chosen relaxing music in recovery from a stressor (Burns et al., 2002; Labbé, 2008). However, there are very few of these studies and they have other design flaws, such as restricting the selection of musical stimuli along certain dimensions (e.g. level of arousal or valence) and comparing subsequent regulation effects, which, as stated, has some limitations in terms of its representativeness of everyday music listening.

Results and limitations of these studies will be discussed further in Chapter 4 (Study 3).

Not only does participant-chosen music provide a better representation of real life listening circumstances, some research suggests that participant-chosen music may have greater regulation benefits than music chosen by researchers (Burns et al., 2002; Labbé, 2008). These findings suggest that a sense of agency or control might be an important factor in music listening effects. Agency and control have been highlighted in a number of models of self regulation (Baltes & Baltes, 1990; Heckhausen, 1995) and affect regulation (Carver & Scheier, 1982; Folkman, 1984). Listening to one's own music under stressful or aversive conditions may contribute to an increased sense of agency, which in line with these theories should increase adaptation to stress or environmental challenges. Consistent with this view, studies by Mitchell and MacDonald (2006; Mitchell, McDonald, & Knussen, 2008) found that participants listening to their preferred music reported significantly greater feelings of control and had significantly longer pain tolerance during a cold pressor task, compared to listening to experimenter-chosen relaxing music, or white noise.

Listeners are more likely to select music that is familiar, and positive judgements of and liking for music is said to increase with familiarity (North et al., 2004). Further, personally-chosen familiar music may influence a greater number of the affect induction mechanisms proposed in the BRECVEMA model (Juslin, 2013) like *Episodic Memory* and *Evaluative Conditioning* (Liljestrom, Juslin, & Vastfjall, 2013), which may further facilitate affect regulation benefits of music.

Although classical music is the most commonly used stimulus in music studies, including those focused on affect regulation (Juslin & Laukka, 2003) classical, low-arousal, or relaxing music is not the only type of music that may regulate NA. Fans of many different genres, including fans of high-arousal music, believe their favourite music to have affect regulation benefits (Schäfer & Sedlmeier, 2009). It may also be the case that an individual's *preference* for different types of music may contribute more to their experience of regulation than *properties* of the music itself. This is illustrated by the contradictory findings of two studies incorporating a high arousal music listening intervention and an NA induction. Krahé and Bieneck (2012)

induced anger in participants and assigned them to listen to aversive music (hardcore metal and techno), pleasant music (classical), or silence. Pleasant music resulted in greater increases in positive mood, and less anger following provocation than silence or aversive music. Aversive music was associated with significantly less positive mood. However, Sharman and Dingle's (2015) findings contradict these results, indicating that a personal preference for 'aversive' heavy metal or high arousal music negates these effects. Following an anger induction, they had 39 fans of extreme metal music listen to either self-selected extreme music or silence. The anger-induced increase in HR decreased in the silent condition but not in the extreme music condition. However, participants in the extreme music condition reported no further increase in NA and also reported significantly increased relaxation when compared with those in the silent condition. These results again indicate that self-selection of musical stimuli, as well as individual differences in liking or preference for musical stimuli, play an important role in affect regulation outcomes.

Selecting activities for regulation

Music listening is one activity amongst a range of activities that people might select in real-world situations to regulate negative affect. As noted, studies of music listening have generally not compared music listening with other activities. One exception is the qualitative study by van Goethem and Sloboda (2011), where participants noted that affect regulation attempts by listening to music were as successful as affect regulation through non-musical activities in everyday life (i.e., talking to friends, watching TV/film, exercising). Experimental studies could provide a better understanding of the relative efficacy of music listening for affect regulation by comparing the act of music listening with other behaviours that may be employed in everyday contexts for similar goals or functions, rather than comparing music listening with no activity (i.e. silence). In fact, Chanda and Levitin (2013) make such recommendations and advise that suitable control conditions are those that provide similar benefits to music in terms of distraction, attentional capture, and mood enhancement - they suggest TV watching or reading as appropriate active control conditions in studies that examine the effect of music listening.

A small number of experimental studies of music and affect regulation have adopted this approach (e.g., Matsumoto, 2002; Radstaak et al., 2014; Scheufele, 2000; Sleight

& McElroy, 2014; See Section 4.2 for study details). Two of these studies examined levels of recovery from a stressor in response to music listening, but reported opposing effects. Radstaak et al (2014) found that after a stress induction subjective recovery was greater for participants in a relaxing or happy music condition compared to participants in either a silent or an active control condition (audiobook listening). Physiological recovery (BP and HR) however was delayed in the music listening conditions relative to the control conditions. Scheufele (2000) compared two methods of affect regulation in a study focused on recovery from stress, specifically, progressive muscle relaxation and classical music listening, both of which were compared in turn with both a silent or an active control condition (i.e., an auditory story recall task). In contrast to Radstaak and colleagues, in this study levels of physiological recovery (HR) were greater in the music condition, but only the progressive relaxation group reported subjective recovery from stress. Such studies highlight the relative independence between subjective and physiological affective outcomes.

Notably, these two studies differed in the degree of choice and control that participants had over the music they listened to. Radstaak et al. (2014) employed participant-selected relaxing or happy music, whereas Scheufele (2000) prescribed classical music to facilitate recovery from a stressor. One possible explanation for the contrasting effects observed could be that subjective recovery from NA in the Radstaak study was facilitated by increased feelings of agency/control provided by choosing one's own music to listen to. Another possible explanation, proposed by Liljestrom et al. (2013) could be that by selecting familiar music, participants in the study by Radstaak et al., (2014) activated a greater number of the BRECVEMA affect induction mechanisms, such as *Episodic Memory* and *Evaluative Conditioning* (Juslin, 2013). In contrast then, the greater physiological recovery following music listening relative to progressive muscle relaxation in the study by Scheufele may have been achieved through other induction mechanisms such as *Rhythmic Entrainment*. The classical music selected by Scheufele might have reduced physiological indicators of stress by synchronising internal body rhythms (e.g., HR) to a slower external rhythm. Whereas, entrainment to the faster tempo of the music, particularly the happy music selected by participants in the Radstaak et al., study may have contributed to the delay in physiological recovery.

Experimental findings regarding the effect of music for affect regulation are thus complex and somewhat mixed. To gain a greater understanding of the link between music listening and wellbeing in everyday life there is a need for more ecologically valid and well-controlled experimental studies examining the effects of self-selected music for the function of affect regulation. Further experimental evidence is needed to support listener's reports that music provides successful affect regulation in everyday contexts.

In everyday life, listeners report conscious and active use of music as a method of controlling unwanted moods and emotions. For example, in a survey study comparing a variety of different mood regulation strategies, participants rated listening to music as the second most effective strategy next to exercise (Thayer, Newman, & McClain, 1994). Indeed, the most commonly cited reason for engaging in music listening is affect regulation (Laukka, 2007; Schäfer, Sedlmeier, Stadtler, & Huron, 2013; Tarrant, North, & Hargreaves, 2000). A number of researchers have also claimed affect regulation to be the most frequently cited and thus the most important function of music listening (Juslin & Sloboda, 2010; ter Bogt, Mulder, Raaijmakers, & Nic Gabhainn, 2011; Schäfer et al., 2013).

Music listening may also lead to improved affect regulation over time. Dingle and Fay (2016) found that four sessions of a weekly group music listening intervention with young adults significantly increased self-rated emotional awareness, clarity, recognition, and perceived ability to regulate emotions relative to a wait list control. In one survey-based structural equation modelling study by Chin and Rickard (2014a) listening to music for the function of *cognitive and emotional regulation* was associated with greater use of the affect regulation strategy reappraisal which predicted higher subjective, emotional, social, and psychological wellbeing. Listening to music may reduce NA in a variety of different situations where affect regulation is required, and over time may also facilitate the development of more adaptive affect regulation abilities, potentially contributing to higher overall wellbeing for the listener.

Strategies of regulation

As previously described (Section 1.1), mainstream models of affect regulation highlight a variety of behavioural and cognitive strategies people engage. Though there is less theory on this topic in the area of music psychology, there is considerable overlap between general affect regulation strategies and those that have been associated with music listening. Saarikallio's (2007; 2008) qualitative and survey studies of adolescents illustrate seven strategies used to regulate mood by listening to music. These are:

1. *Entertainment*, or using music to create a positive atmosphere or for maintaining or enhancing current positive feelings.
2. *Revival* is an arousal-regulatory goal aimed at increasing one's energy level.
3. *Strong Sensation* refers to seeking out intense affective experiences in music.
4. *Diversion* is a means of distracting oneself from negative thoughts and feelings.
5. *Discharge* relates to venting or expressing negative emotions.
6. *Mental Work* involves using music to facilitate problem solving and reappraisal, and
7. *Solace* refers to seeking comfort and acceptance in music.

In an adult sample, a diary keeping and interview study asked participants to report on episodes of musical affect regulation (van Goethem & Sloboda, 2011).

Participants also reported on their use of a range of regulation strategies that the researchers had drawn from general models of affect regulation. It was found that music listening assists affect regulation primarily through the strategies of relaxation, distraction, active coping, introspection, venting, and rational thinking. This study also compared participant's ratings of the efficacy of music listening when compared with other tactics (e.g., exercising, reading, watching TV/movies, talking with friends), and found music was rated as similarly effective as other affect regulation tactics. Further, participants' reports of the relative success of discrete affect regulation strategies — relaxation, distraction, active coping, introspection, venting, and rational thinking — did not significantly differ when music listening was compared with other activities.

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The variety of strategies of affect regulation that can be used in the context of music listening highlight the power of music to alter and modify affective experience.

Outside of music listening, reappraisal and distraction, which studies suggest music listening may provide, have been found to be among the most effective strategies for the regulation of affect (Augustine & Hemenover, 2009; Gross & John, 2003).

Indeed, music listening may support a variety of strategies of regulation that extend beyond narrow measures of affect regulation (e.g., stress reduction) and point to a variety of other adaptive functions of music listening that support the regulation of wellbeing more broadly defined. For example, in an interview study by DeNora (1999) strategies of emotional self-management described by women included the production of mental concentration by listening to music. Participants in this study discussed a variety of effects of music listening such as blocking out background noise and ways in which mental concentration could be harnessed for different ends, including affect regulation and enhanced focus and attention that was conducive to work or study. In another qualitative study, this time with adolescents, ‘modifying cognitions’ emerged as a significant theme in analysis of focus group discussion on the uses of music for wellbeing. Young people talked about using music to assist problem solving, to evoke memories, and to enhance concentration, inspiration, and creativity (Papinczak, Dingle, Stoyanov, Hides, & Zelenko, 2015). Another qualitative study on the role of musical activities in older adulthood reported that music was used to maintain wellbeing through the regulation of cognitive states. One older man talked about listening to music for its “*intellectual content*”, and to “*keep the mind active*”, (Hays, 2005). These studies suggest that cognitive regulation in the context of music listening may facilitate affect regulation. Cognitive regulation may also facilitate other adaptive outcomes that may be associated with enhanced wellbeing. For example, cognitive effects of music, such as increased focus and concentration may facilitate improved performance and functioning, enhancing feelings of achievement, agency, mastery, and competence. Such constructs have been associated quantitatively with emotional wellbeing (Schultheiss, Jones, Davis, & Kley, 2008), and are also included in a number of models of wellbeing (Seligman, 2012; Ryff, 1989).

To facilitate theory building in this area, more qualitative research and listener’s self-reports of the functions of music listening are needed to understand the full range of

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music listening goals or functions people pursue in efforts to regulate affective experiences and enhance their wellbeing more generally. In this broader context, there is a need to consider the role of self-selected music in particular, as people in everyday contexts self-select music to achieve a broad variety of regulatory functions. In addition to grounding broader models of the adaptive functions of music listening in qualitative reports of listeners, experimental laboratory work needs to examine more closely how self-selected music listening serves to regulate NA. Much of the laboratory research, although valuable, has not involved self-selected music listening, but rather musical pieces selected by the research team.

1.2.3 Music Listening and Social Functioning

Social connection and relationships are included in a number of wellbeing models outlined above (Keyes, 1998; Ryff, 1989; Seligman, 2012). Koelsch (2010) theorises that music may be rewarding because it satisfies our basic social needs. Music listening engages social cognition by activating the Theory of Mind network during music perception (Steinbeis & Koelsch, 2009). Listeners' emotions can be altered by the perception of another's affective state, referred to by Koelsch as co-pathy. This is frequently manipulated by composers and performers in diverse contexts like funerals and celebrations, or to rally religious, political, or patriotic zeal. Communally the affective experience linked to music listening becomes increasingly cognate, promoting group cohesion and bonding (Huron, 2001; Cross & Morley, 2008). Evolutionary theories of music also highlight the social bonding and emotional communication functions of music (Cross, 2001; Freeman, 2000; Panksepp & Bernatsky, 2002).

Carstensen's (1995) *socio-emotional selectivity theory* proposes that individuals have three motivations that influence social interaction. These are emotion regulation, identity development, and information seeking through the development of new social networks. The role of music listening in emotion regulation has been detailed above. Research suggests that listening to music in social contexts may further increase the emotional effects of music. For example, the ESM study by Juslin et al. (2008) found that participants experienced greater pleasure when listening to music with a close friend or significant other. Similarly, an experimental study by

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Liljestrom et al. (2013) found that participants experienced emotions more intensely when they listened to music with a close friend or partner than when they had listened to music alone. Listeners also experienced significantly more positive emotions in the co-listening condition, specifically, higher happiness-elation, enjoyment-pleasure and admiration-awe.

In relation to identity and the formation and maintenance of social networks, a number of research findings are relevant. For example, music listening may provide opportunities for the development of individual identity and self-concept in adolescence (North & Hargreaves, 2006) and in older adulthood (Hays & Minichiello, 2005). A series of questionnaire studies by North and Hargreaves (2006) with 10-11 year olds, 13-14 year olds, and 18-19 year olds found that children and adolescents hold normative beliefs about fans of different styles of music. These beliefs inform perceptions regarding the social consequences of having certain musical tastes, and the positive or negative characteristics attributed to listeners of that music type. This suggests that in adolescence music acts as a badge of identity, and guides social inferences. These social cognitions inform the adoption of musical styles that match an individual's self-concept. They also found that participants with higher self-esteem had a greater degree of identification with fans of their preferred music style than participants with low self-esteem. Similarly, a survey study by Laukka (2007) found that older adults (65-75 years) reported listening to music for *identity and agency* functions (e.g., 'it strengthens my self image'). After controlling for personality and health status, more frequent use of music for *identity and agency* predicted higher scores on the self-acceptance subscale of Ryff's (1989) psychological wellbeing scale. It has been argued that a strong sense of identity generates positive affect by increasing feelings of agency (Baumgardner, 1990). A strong sense of identity has also been associated with increased happiness and life satisfaction (Kahn, Zimmerman, Csikszentmihalyi, & Getzels, 1985). Such findings suggest a potential positive link between music listening for social functions, such as identity development and expression, and subjective and psychological wellbeing.

Music may also play a role in the development and maintenance of social networks (Hargreaves & North, 1999) and peer affiliation (Miranda & Claes, 2009). One interesting study found that the presence of music significantly reduced listener's

personal space requirements, such that they allowed another person (i.e., the experimenter) to approach them closer (Tajadura-Jiménez, Pantelidou, Rebacz, Vastfjall, & Tsakiris, 2011). Papinczak and colleagues (2015), based on a focus group with eleven 16-25 year olds, reported that music facilitates relationship building as a result of specific effects of music: feeling more connected, having more positive interactions, and promoting healthier social relationships. Specific behaviours were described as instrumental including sharing recorded music with others, and attending group musical events. These pro-social effects of music were also reported by young people to be important determinants of their wellbeing. A follow-up survey study with a larger sample of 107 younger adults did not find any significant associations between participants' endorsement of the relationship-building effects of music and scores on a measure of emotional, psychological, and social wellbeing. Frequency of music listening did not directly predict any wellbeing outcomes. However, frequency of listening did predict higher social wellbeing via the collective indirect effect of four key effects of music listening: relationship building, modifying cognitions, immersing in emotions, and modifying emotions. Another noteworthy finding from this study is that endorsement of the relationship building function of music listening did not relate to social wellbeing directly, whereas, listening to music for modifying emotions did have a significant and positive direct effect on social wellbeing. Carstensen's (1995) *socio-emotional selectivity theory* proposes that an important function of social interaction is emotion regulation. The relationship could be bidirectional in that regulating negative emotions, by listening to music for example, may facilitate more positive social interactions, or enhance social functioning, which in turn may relate to higher levels of social wellbeing.

A qualitative study with older people reported that a shared interest in music was an important determinant in forming a connection with others, and that feelings of acceptance and belonging were derived from these musical networks (Hays & Minichiello, 2005). In adolescence and young adulthood the friendship forming effects of music centre around having shared musical tastes (Rentfrow & Gosling, 2006; Selfhout, Branje, Bogt, & Meeus, 2009). In the studies by North and Hargreaves (2006) adolescents assigned more positive attributes to fans of the same type of music as themselves. Another survey study with adolescents found that

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having the same taste in music and having less conflict over musical differences (defined as social congruence in music tastes) with both friends and parents was related to higher levels of subjective wellbeing (Miranda & Gaudreau, 2011). Thus, music may support forming and sustaining social relationships, a component of psychological wellbeing (Ryff & Keyes, 1995).

The music one listens to may also facilitate expressing one's identity as part of a group (North, Hargreaves, & O'Neill, 2000). Further, musical taste is an important dimension of young people's social identity (Tarrant et al., 2000), and social identity and belonging are important predictors of wellbeing (Haslam, Jetten, Postmes, & Haslam, 2009). Experimental evidence supports this showing that social identity may also dampen the stress response. Being in a group setting buffered cortisol reactivity to a social-stress induction, but only when the social identity of the group was invoked (Häusser, Kattenstroth, van Dick, & Mojzisch, 2012). A cross-cultural survey-based modelling study by Boer and Abubakar (2014) found that music rituals in peer groups, such as listening to and talking about music, as well as sharing musical preferences, had a direct and positive effect on emotional wellbeing, measured by level of positive affect. This effect was found for young people from New Zealand and Germany, but not for those from the Philippines or Kenya. Music rituals within families had a significant positive effect on family cohesion, but this did not predict higher positive affect except for Kenyan youths. These findings further suggest a potential positive link between the social effects of music listening and subjective wellbeing.

Research evidence is heavily weighted on the affective benefits of music listening. Yet, research on the social psychology of music suggests that music's emotional effects may be potentiated by listening in social contexts, and that modifying emotions through music may enhance social wellbeing. Further, listening to music for social reasons like identity development, connection, and in-group formation may be related to enhanced subjective and psychological wellbeing. However, more research is needed to determine the range of social functions of music listening in everyday contexts, and the benefits of music for social functioning as reported and experienced by music listeners.

1.2.4 Music Listening and Eudaimonic Experience

When considering music listening effects that could be defined as eudaimonic in nature, a good starting point may be Maslow's pioneering work on the peak experience. Maslow (1999) asked participants to describe "the most wonderful experience of your life". Music and sex were the two most reliable ways to induce these experiences. Based on the participant's reports, Maslow described these experiences as peak experiences. Maslow's description of peak experiences includes a combination of intense positive affectivity, with flow-type states of consciousness, and increased self-realisation. Peak experiences are considered by Maslow as transient episodes of self-actualisation. Self-actualisation is at the peak of Maslow's Hierarchy of Needs (1943) - signifying its centrality to his view of optimum psychological functioning.

Panzarella (1980) listed 7 benefits of the peak experience in art, including greater self-appreciation, improved relationships with others, a shift in attitudes toward life or the world, and long-lasting positive mood effects. Although the peak experience is short lived, it can lead to long-lasting, even permanent changes and benefits to the self (Maslow, 1999). These benefits of the peak experience align with components of various definitions of subjective and eudaimonic wellbeing outlined in Section 1.1. Peak experiences in music may enhance elements of wellbeing, such as positive affect (Diener et al., 1999; Fredrickson, 2001), engagement/flow (Seligman, 2012; Csikszentmihalyi, 2002), self-acceptance (Ryff, 1989), social relationships (Seligman, 2012; Ryff, 1989), and positive appraisal of the society in which one lives (Keyes, 1998).

In the field of music, studies by Gabrielsson (2010) asked respondents to detail "the most intense experience of music that you have ever had". A rich resource of qualitative data describing the experience and outcomes of these intense experiences provide a descriptive framework for theorising about the ways in which music may impact upon wellbeing. Gabrielsson called these *Strong Experiences of Music*, and explains that they are often life-enhancing, giving rise to intense, frequently positive

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emotional experiences, a change in attitudes and thoughts, spiritual insights and reflections on humanity, momentary loss of self-consciousness, increased hope and self-esteem, and can have therapeutic benefits (Gabrielsson & Lindström Wik, 2003; Gabrielsson & Bradbury, 2011).

Recent qualitative work by Schäfer, Smukalla, and Oelker (2014) proposes a theoretical model of how intense emotional experiences in music listening facilitate wellbeing. The intense musical experience (IME), they say, initiates a shift in consciousness where stressors and negative affect are replaced with strong positive feelings. This adjustment in affect is accompanied by cognitive alterations leading to a greater understanding of the self, culminating in a sense of inner harmony and oneness with the world at large. The IME experience (mood elevation and cognitive restructuring) becomes a resource for the listener. Self-reported long term changes as a result of these IME's applied to the listener's relationships, personal values, meaning, and engagement in life. As with other rewarding stimuli, the experiences afforded by music listening were reinforcing and Schäfer and colleagues note that listeners often endeavour to seek out future IME's and to apply the resources gained through the IME to their everyday life. Given their potential transformative effect, Schäfer and colleagues suggest that the IME is a key function that is sought out in music listening experiences. Studies with young people have found this to be the case. For example, adolescents report using music to generate strong sensations, and seeking intense affective experiences by listening to music (Saarikallio & Erkkila, 2007). Tarrant et al. (2000) similarly found self-actualisation needs to be an important function of music listening for both British and American adolescents.

The features of peak experiences, IME's and *Strong Experiences of Music* described by listeners, specifically, flow-like states of consciousness, and a reduction or negation of self-consciousness, suggest music may increase engagement in valued activities. Engagement is an important aspect of wellbeing and positive psychological functioning (Seligman, 2012; Csikszentmihalyi, 2002). The diary keeping study by Herbert (2012) examined 'effortless engagement' which was labelled more specifically as absorption. Herbert compared twenty participants' descriptions of absorption as experienced in both musical and non-musical activities. Absorption was not more common in musical experiences, but this type of 'effortless

engagement' was very commonly reported as part of music listening experiences. Features of absorption included a reduction in the density of thought, alteration in the experience of self, changes in sensory awareness, and greater imaginative involvement in activities. In another qualitative study carried out by Lamont (2011) university students described *Strong Experiences of Music* listening in free written reports. Thematic analysis of these reports found that musical episodes were not purely hedonic (increased pleasure and positive affect). Participants also described additional paths to wellbeing in these experiences, particularly through increased engagement and meaning (Seligman, 2012). Engagement was described as the occurrence of flow-like states of attention, such as increased focus on the music and reduced attention on surroundings. Descriptions of meaning in *Strong Experiences of Music* were linked with identification with the music and artist, and a sense of connection between the performer and listeners in group musical experiences.

These peak, strong or intense emotional experiences in music listening have also been understood by reference to physiological responses like chills, thrills, and frisson. Such responses have been taken as indicators of 'transcendent psychophysiological experiences in music' (Harrison & Loui, 2014). In contrast to experimental research on music listening and affective experience and regulation, research on the peak experience in music has tended to employ participants' own self-selected music as the stimulus. Salimpoor et al. (2011) found that endogenous dopamine release in the striatum underlies peak emotional responses to self-selected music. In a 2001 study by Blood and Zatorre, participants selected musical stimuli which consistently induce intense positive affective experiences, including chills. Using PET they found activation in brain regions mediating pleasure and reward, namely the nucleus accumbens and the ventral tegmental area. They also found concurrent deactivation in the amygdala, a brain structure associated with the processing of negative emotions. The experiment by Salimpoor, Benovoy, Longo, Cooperstock, and Zatorre (2009) found that the chill experience corresponded with subjective pleasure during music listening. Over 80% of chills reported by participants listening to self-chosen intensely pleasurable music occurred during self-reported periods of peak pleasure.

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Peak experiences may also include experiences of transcendence, which in turn are seen as adaptive functions of music listening. For example, in interviews carried out by van Goethem and Sloboda (2011) participants described transcendent effects of music - such as the feeling of being in another world - and these transcendent experiences were seen as being important mechanisms in the regulation of affect. These descriptions concur with evidence from quantitative studies outside of the field of music research. For instance, Beaumont (2009) in a structural equation modelling study, found that high transcendence was positively predicted by self-actualisation and predicted greater subjective happiness and presence of meaning in life in a sample of university students. Together these findings suggest transcendent effects of music may relate to increased subjective and psychological wellbeing.

Overall, the peak experience in music draws together a number of proposed routes to wellbeing enhancement. At the level of subjective, psychological, and social wellbeing, these include PA induction, NA reduction, improved social functioning and identity development. Music listening may also give rise to a number of other experiences central to eudaimonic wellbeing, such as greater self-actualisation, engagement, meaning, and transcendence - suggesting a potential pathway between music listening experiences and eudaimonic wellbeing enhancement. However there is a gap in our knowledge regarding the effect of these eudaimonic musical experiences on wellbeing outcomes, perhaps because of the difficulty of simulating these intense, transcendent, and meaningful experiences in laboratory settings, and/or the lack of assessment tools for measuring these effects of music listening in everyday contexts.

In conclusion, there is empirical evidence highlighting multiple paths of influence from music listening to wellbeing, broadly defined. Although there is a growing body of research, comprehensive theories linking music listening to wellbeing have not been developed, and this may be explained in part by the predominant focus on affective experience and regulation in music listening research. This is clearly illustrated in the narrative review by Croom (2011) of theoretical, experimental, and animal research linking music engagement to each dimension of Seligman's (2012) PERMA model of wellbeing. A large body of physiological evidence is provided supporting a link between music listening and the experience of *Positive emotions*. A

number of positive effects of music on *Relationships* are noted, as well as, compelling evolutionary theories supporting the adaptivity of group musical activities in facilitating the bonding necessary for the survival of our ancestors. However, no studies linking social effects of music with measures of social wellbeing are cited. In fact, no direct investigation of music engagement and a quantitative measure of wellbeing are mentioned in this comprehensive review. The remaining dimensions of wellbeing, *Engagement*, *Meaning*, and *Accomplishment*, are discussed with reference to music performance and production only - possibly because of the limited number of direct studies relating music listening with broader wellbeing outcomes.

Figure 1.1 below represents an overview synthesis of the theoretical and empirical literature from both music psychology and the broader wellbeing research reviewed in Section 1.2. There are a number of proposed relationships presented in this figure. Notably, there is strong theoretical and empirical support for the prediction that music listening effects relating to affective experience and regulation may have a positive influence on subjective wellbeing, particularly if music is regularly selected in real-world contexts in the service of adaptive regulation and optimisation of ongoing affective experience (see Sections 1.2.1 and 1.2.2).

As described in Section 1.2.3 there is also a rationale for the suggestion that social effects of music, such as identity, relationship formation, increased feelings of connection, and bonding would relate to enhanced social wellbeing. In general, empirical support for this hypothesis is lacking. However, some studies have reported higher levels of social wellbeing associated with affect regulation in music (Papinczak et al., 2015), which suggests that social wellbeing may be enhanced by more general effects of music listening linked to affect regulation (see broken line in Figure 1.1). At the same time, the social effects of music have also been associated with other dimensions of wellbeing. For example, listening to music to express identity was positively associated with subscales of psychological wellbeing (Laukka, 2007), and outside of music listening, a strong sense of identity has been associated with enhanced subjective wellbeing (Kahn et al., 1985). Enhanced positive emotional effects of music when listening in social contexts as opposed to listening alone have been reported (Juslin et al., 2008; Liljestrom et al., 2013),

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suggesting social effects such as group bonding may be associated with increased SWB, specifically by increasing PA.

Finally, Section 1.2.4 outlined a number of theories and frameworks describing how peak and intense emotional experiences afforded by listening to music could give rise to effects that may enhance dimensions of subjective, psychological and social wellbeing. These effects (e.g., self-actualisation, transcendence, engagement, meaning), defined here as eudaimonic experiences, have been the subject of very little empirical investigation in music research and thus it is unclear if these represent discrete and stable effects of music listening that are related to wellbeing outcomes. Transcendence experienced in music was identified as a potential affect regulation mechanism by participants in a qualitative study (van Goethem & Sloboda, 2011), and neuroimaging, neurochemical and experimental evidence demonstrated a pattern of positive affective responding in transcendent, peak experiences in music that suggest further positive associations between transcendence and SWB.

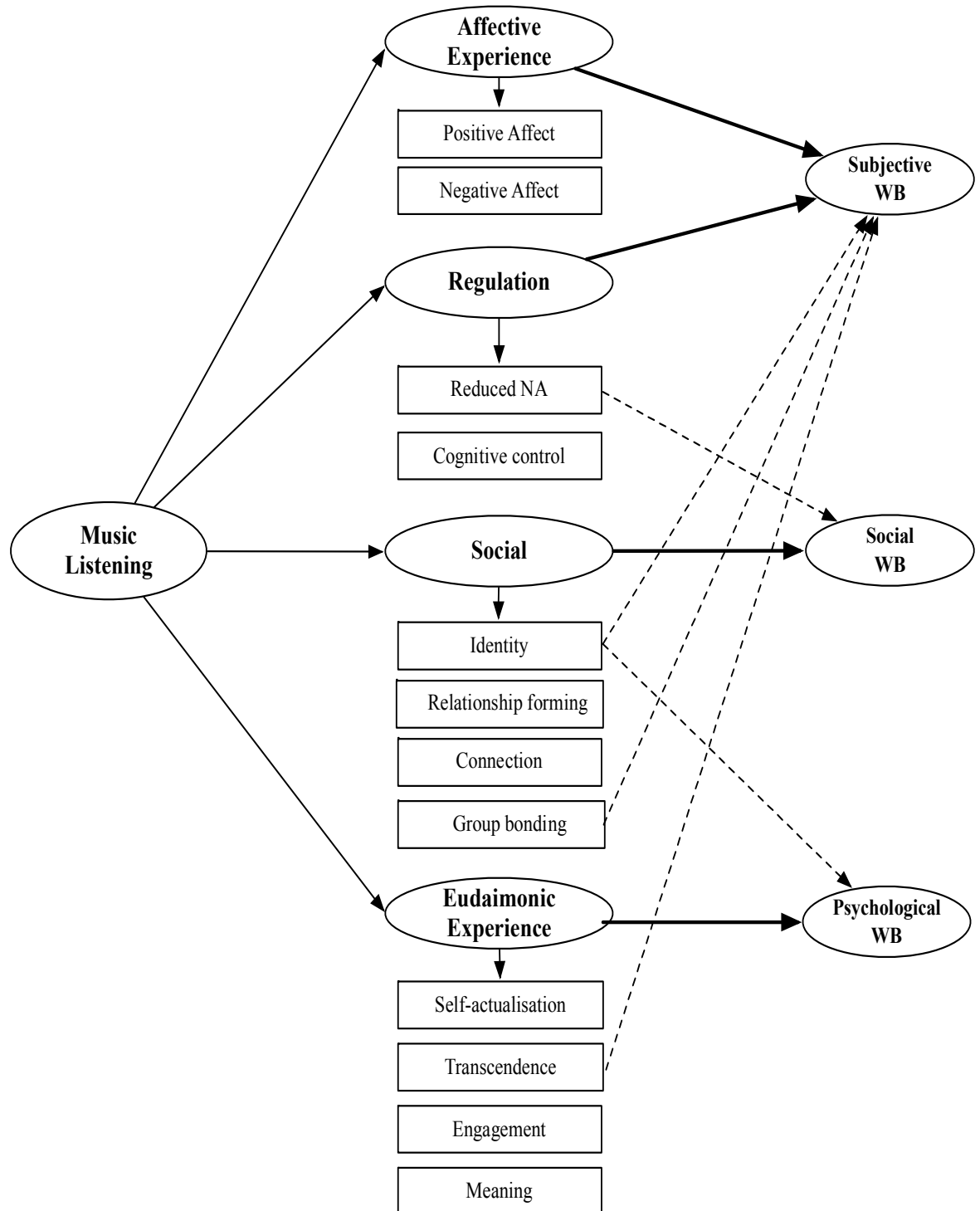


Figure 1.1. Proposed model of adaptive music listening effects and potential relationships with wellbeing outcomes.

This model provides a general framework for understanding some of the key adaptive functions of music listening that may be relevant for wellbeing enhancement in everyday life. This model will also be used to guide predictions for construct validation in later scale development work (Study 2, Chapter 3). However, in order to link the idea of music listening functions with wellbeing outcomes

broadly defined, new theoretical frames need to be developed. Below, Social Cognitive Theory (SCT) (Bandura, 1989; 2001) is used to reframe the effects of music listening reported above as functions of music listening (FML) that may be pursued by listeners in part because of the wellbeing outcomes that these FML support. At the same time, in introducing SCT and outlining the range of FML that have already been identified in the literature, the next section also highlights a number of key gaps in the literature and issues that need to be addressed, specifically, (1) the challenge of identifying the full range of FML, which are not yet clarified, (2) moving beyond an understanding of FML based largely on reviews of existing empirical effects, experimenter-driven models, and a limited range of qualitative work, and (3) limited availability of psychometrically-sound instruments to measure FML.

The current thesis seeks to address these research gaps and challenges in substantive ways. Study 1 seeks to fill this gap by using a collective intelligence (CI) methodology (Interactive Management; Warfield & Cárdenas, 1994) to create a comprehensive account of the functions of music listening, use this CI to inform integrative scale development for the measurement of a broad range of FML (see Study 1, Chapter 2), and ground the approach to scale development in SCT, particularly around the wording of scale items (see Study 2, Chapter 3) to ensure its suitability for outcomes-based research questions.

1.3 Functions of Music Listening

The application of Social Cognitive Theory (SCT) (Bandura, 1989; 2001) to music listening behaviour provides a useful frame for approaching theory building, scale development, and empirical research in the area. Consistent with the standard model adopted in cognitive psychology, SCT notes that sensory experiences are transformed in the context of cognitive models - or schemata - which guide our behaviour. More specifically, SCT proposes that ongoing sensory experiences and associated cognitive models related to that experience influence a person's expectations in relation to their psychological experience and future behaviour. SCT also proposes that expectations can be acquired vicariously via modelling and

observation. These expectations can provide incentives to engage in behaviours that are deemed adaptive in achieving desired outcomes or goals. Bandura classifies these incentives as Self-Reactive (e.g., self-regulatory), Social (e.g., communication/insight), Status (e.g., identity), Sensory (e.g., pleasure), and Activity (e.g., entertainment, reduced boredom). The likelihood that people will act on their outcome expectations depends on their self-efficacy beliefs, specifically, that by taking action a desired outcome will be achieved.

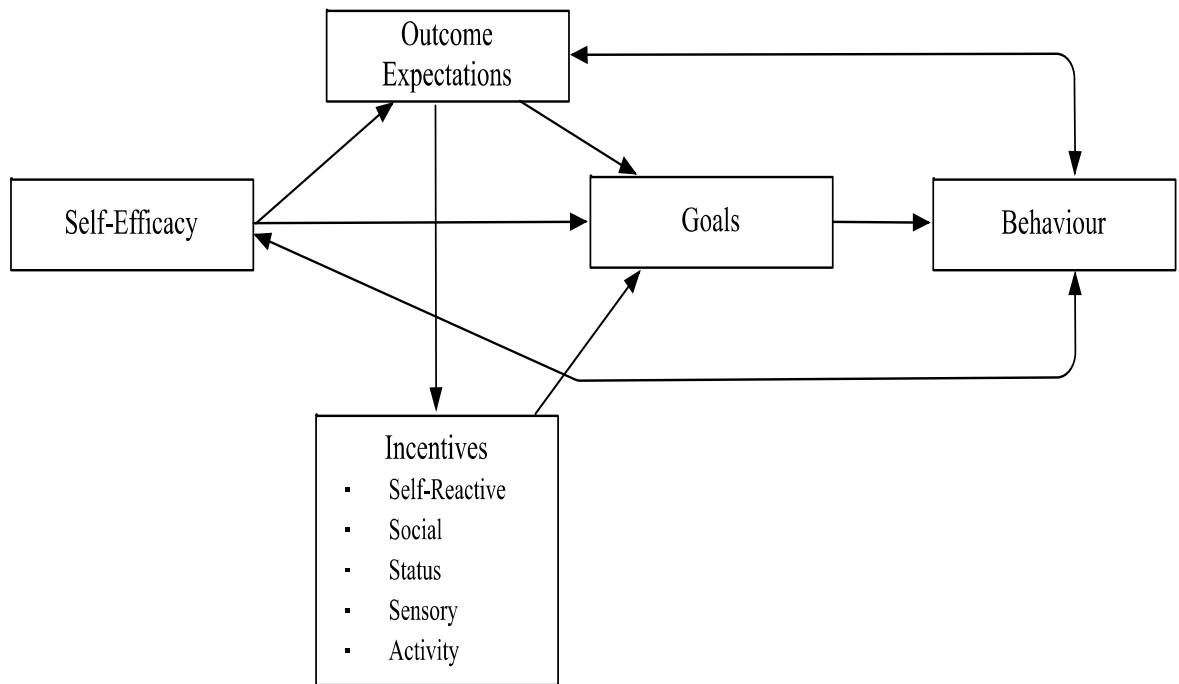


Figure 1.2. Visual representation of Bandura's (1989; 2001) Social Cognitive Theory.

Notably, SCT would predict that music listening behaviour is guided by the listener's beliefs about the effects of music based on their previous listening experiences or through vicarious learning by observing the music listening behaviours of other people and the associated consequences of those behaviours. If an individual listening to music experiences particular effects of music (e.g., increased positive affect, social connection, transcendence) they will come to have expectations of achieving those outcomes again. Specific effects of music listening may become goals that motivate future music listening behaviour. Positive outcomes of music listening experiences also provide incentives (e.g., self-regulation, identity, pleasure) that further drive goal-directed music listening behaviour. The model proposes a reciprocal interdependence in that successfully achieving desired goals through

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music listening increases an individual's efficacy beliefs, and reinforces their expectations of achieving the outcome in future by repeating the behaviour. These outcomes or effects of music become goals that guide behaviour, and with successful experiences become functions that listening to music serves in an individual's life – functions that are a feature of the cognitive models, or beliefs, that people develop over the course of their history of music listening experiences.

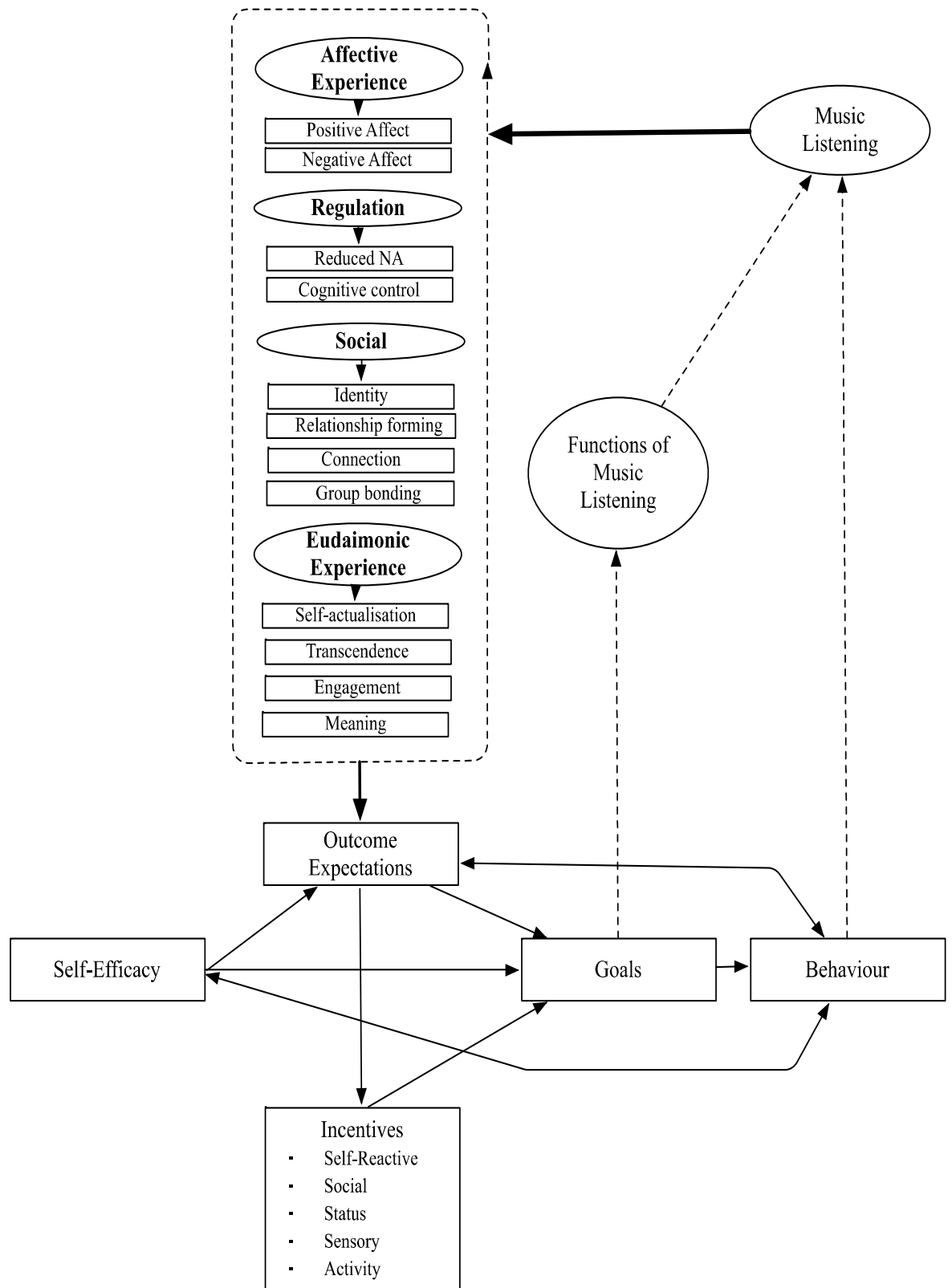


Figure 1.3. Effects of music listening linked with Functions of Music Listening via Social Cognitive Theory.

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Research in the field of FML appears to be moving in this direction. Recent theory building in the area highlights listeners' goals as an important facet of the music listening experience. The GSTM framework by van Goethem and Sloboda (2011) focuses exclusively on affect regulation FML. This framework includes four levels: *Goals, Strategies, Tactics* and *Mechanisms*. Affect regulation *Goals* correspond to the up-regulation, down-regulation, or maintenance of affective states. These regulatory goals can be achieved through various *Strategies*, such as pleasure, distraction, or reappraisal. Within this framework, listening to music is viewed as one possible *Tactic* or tool to achieve affect regulation goals, using different strategies and through a multitude of *Mechanisms* of action (e.g. *Rhythmic Entrainment, Episodic Memory*).

More recently, a model was put forward by Schäfer (2016). Corresponding with SCT, this model emphasises the importance of the past learning experiences of the listener for predicting the strength of their musical preferences. Building upon theories on the development of musical preference by Lehmann (1994) and Behne (1997), Schäfer proposes that past functional success with music influences one's preference for music (see Figure 1.4 - path B), and also influences the effects that are experienced (path A). These effects of music influence one's preference for music in different situations (path C) - such that there will be an increase in engagement with and enjoyment of music listening.

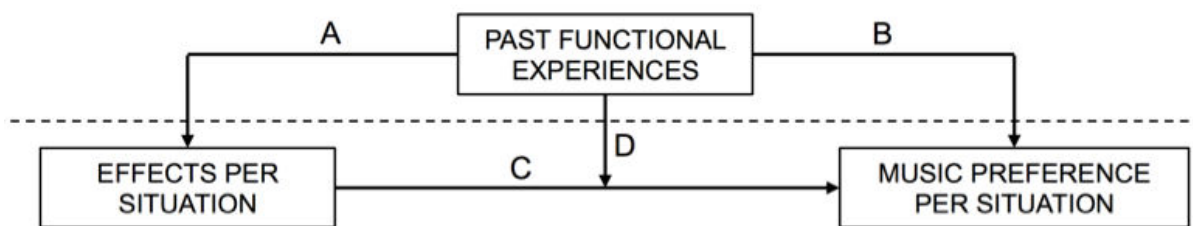


Figure 1.4. Schäfer's (2016) proposed model predicting strength of music preference.

To test this model, 121 participants completed an online questionnaire every day for ten days, which focused on every episode of music listening they had experienced that day. Based on a previous analysis of the FML (Schäfer et al., 2013), this study focused on three higher-order functions in these episodes of music listening.

Participants were asked to rate how important the functions of (1) Arousal and mood

regulation, (2) Social relatedness, and (3) Self-awareness were in each episode. Participants then rated the effects of music they experienced along these three dimensions. For each episode of music listening, participants were asked to rate how frequently they had used that same music in the past to achieve specific goals (defined as past functional experience) and how much they liked the music in that situation (music preference per situation). As predicted by Schäfer's model, higher mean scores on past functional experiences predicted both higher music preference scores (B), and higher ratings of how strongly effects occurred (i.e., arousal and mood regulation, social relatedness and self-awareness) (A). Higher ratings of music's effects predicted higher mean music preference scores (C). However, past functional experience did not moderate the relationship between effects of music experienced and strength of music preference (D). When participant's ratings of their specific goals in music listening episodes (i.e., arousal and mood regulation, social relatedness, and self-awareness) were compared with their ratings of reported effects of music listening (i.e., the strength of arousal and mood regulation, social relatedness, and self-awareness experienced), no statistically significant mean differences were found between the goals pursued and the effects reported across episodes of music listening. Overall, the results of this study suggest that listeners rate themselves to be successful in their functional use of music, that effects or outcomes of music may be good indicators of a listener's goals or FML, and that measuring people's expectations and beliefs as regard the outcomes of music listening may in turn provide a good indication of music listening behaviours and effects in everyday contexts.

Schäfer's (2016) theoretically-derived and empirically tested model is a useful addition to the field, and casts FML in a central role in the development of music preference. SCT, however, may offer some advantages for the research questions posed in the current thesis regarding the relationship between FML and wellbeing. Notably, over three decades of investigation SCT, and in particular the self-efficacy construct at its core, has been found to be a strong predictor of behaviour across the lifespan, including health behaviour, and health behaviour change (Ellickson & Bell, 1990; Resnicow, Davis-Hearn, Smith, Baranowski, & et al, 1997; Stretcher, McEvoy DeVellis, Becker, & Rosenstock, 1986). Considering the positive psychological effects of music described in section 1.2, in the broader context of health and

wellbeing, listening to music could be considered a health behaviour (Saarikallio, Gold, & McFerran, 2015). Given the prevalence of music listening behaviours, this allows for the possibility that adaptive functions of music listening and self-efficacy beliefs and expectations in relation to those adaptive functions could be central to wellbeing across the lifespan. Another advantage of importing a broad theory of behaviour from general psychology to the study of FML, is that the same framework can also be applied to understand non-musical behaviours or activities that music listening might be compared to in empirical studies.

Consistent with the theoretical orientation adopted in this thesis, a number of researchers have concluded that functions of music listening (FML) are mainly affective, cognitive, and social (Hargreaves & North, 1999; Juslin & Sloboda, 2010; North et al., 2004). These conclusions are based largely on the result of survey studies, and a number of qualitative studies. Survey studies have found that listeners consistently report that they listen to music for its emotional effects (Lonsdale & North, 2011; Miranda, Gaudreau, & Morizot, 2010; North, Hargreaves, & O'Neill, 2000; Zentner, Grandjean, & Scherer, 2008), especially for affect regulation functions (Laukka, 2007; Saarikallio, 2011; Tarrant et al., 2000). Social rewards of music, like increased feelings of connection and bonding are also reported in the FML survey literature (Mas-Herrero, Marco-Pallares, Lorenzo-Seva, Zatorre, & Rodriguez-Fornells, 2013). Listening to music for identity development, but also for expressing identity, and affiliation to groups and subcultures are also reported in a number of studies (Lonsdale & North, 2011; North et al., 2000; Tarrant et al., 2000). Cognitive functions, such as music analysis, intellectual appreciation, regulating focus, and facilitating thinking and learning have also been documented (Chamorro-Premuzic & Furnham, 2007; Chin & Rickard, 2012; Lonsdale & North, 2011). In a review of twenty-eight empirical studies, Schäfer and colleagues' (2013) identified 129 FML which they synthesised into three high-level functions: (1) Arousal and mood regulation, (2) Social relatedness and (3) Self-awareness. However, there are few psychometrically validated instruments available to measure these FML constructs. In the review by Schäfer and colleagues only eight studies were identified that had applied item-level factor or cluster analysis to items measuring proposed functions of music listening (Boer, 2009; Chamorro-Premuzic & Furnham, 2007; Laukka, 2007; Lehmann, 1994; Lonsdale & North, 2011; Munch, 2005; North et al.,

2000; Tarrant et al., 2000). With the exception of the Uses of Music Inventory developed by Chamorro-Premuzic and Furnham (2007), item-level factor or cluster analyses were conducted not for the purpose of psychometric scale development, but rather to reduce a larger set of items or FML constructs for use in subsequent analyses (i.e., regression and correlation analyses) addressing specific research questions of the researchers of each study.

Scales that have been developed to measure FML also range in their scope, with many focusing on affective functions. As described in Section 1.2.4 eudaimonic effects of music, such as absorption, transcendence, engagement and meaning have also been identified (Herbert, 2012; Lamont, 2011; Schäfer et al., 2014). However, these do not feature in current multi-dimensional general FML scales. Scale constructs have most often been identified on the basis of a review of the experimental music listening literature and existing FML literature, rather than on the basis of input from music listeners engaged in qualitative research. As such, certain functions, including eudaimonic, may have been overlooked. Eudaimonic effects of music may relate to enhanced subjective, psychological and possibly social wellbeing. Therefore, it would be important to include such constructs in a general measure of the FML. Given the broad range of functions music can serve in everyday life, and the potential independent effects of discrete FML, having access to one integrative scale would be useful for researchers examining the relationship between different FML and wellbeing outcomes.

1.3.1 Functions of Music Listening and Wellbeing

There have been relatively few direct investigations of the relationship between self-reported FML and wellbeing outcomes. This may be due in part to the limited availability of instruments to measure FML. A recent study looking at musical engagement broadly found a significant relationship between music behaviour and wellbeing. In a large sample telephone survey, 1,000 Australian adults were asked whether or not they listen to music, sing, play, dance, compose, or attend musical events. Participants who dance (54%) and attend musical events (66%) had significantly higher subjective wellbeing. However, there were no significant differences between those who listen to music (95%) and those who do not

(Weinberg & Joseph, 2016). The yes/no response format adopted in this study did not measure frequency of music engagement, effects experienced during musical episodes, or the functions of musical behaviours - factors which may influence the relationship between music listening and wellbeing. Everyday music listening may at times be a simple yes or no decision, but qualitative research in particular suggests that music listening is often more than a passive behaviour — it is a self-selected, autonomous, and functional act that is coupled with a range of strategies and expectations in relation to the outcomes of the act (DeNora, 1999; Saarikallio, 2007; 2008). In the interviews carried out by DeNora (1999) women spoke of the transformative power of music to produce effects, leading DeNora to conclude music is a technology that listeners use to adapt to different situations and to meet different needs (e.g., *“with my R&B...I listen to it when I’m...trying to relax...if I’m not really in that relaxed mood...I’ll throw something fast on, or something fast is playing and....[it’s] too chaotic for me....I have to put something slow on”* - Female, 25, p. 35).

Listening to music in a functional, goal-oriented or adaptive way, and success in pursuing specific goals may be rewarding and enhance wellbeing. In a broad sense, some degree of autonomy and control when selecting and listening to music for different functions may empower listeners and enhance their wellbeing, particularly if their expectations in relation to the music listening experience – be they affective, social, cognitive – are realised. According to SCT, any goal that is realised is rewarding and provides subsequent benefits for psychological health and wellbeing (Bandura, 1989; 2001). Models of wellbeing such as the PERMA model (Seligman, 2012), and elements of Ryff’s (1989) psychological wellbeing model (autonomy, environmental mastery) also highlight the importance of autonomy, control, and goal-achievement. Moreover, the ability to flexibly select and optimise goals is central to many theories in developmental psychology. For example, the Lifespan Theory of Control (Heckhausen, 1995) and the theory of Selection, Optimisation and Compensation (SOC; Baltes & Baltes, 1990) propose that individuals have a repertoire of cognitive and behavioural strategies aimed at regulating the self, and aspects of the external world. Both models propose that individuals’ primary control orientation is to first try to modify the environment or situation to suit their needs. However, success is not guaranteed at any life stage, and the ability to control the

environment declines in old age, thus compensatory - or secondary control strategies are needed. These secondary strategies involve modifying or changing our goals in a way that helps us adapt to challenges and the successful application of secondary control strategies can support wellbeing across the lifespan (see Section 2.3 for more details). Again, the FML can be understood within this framework of self-regulation (e.g., affect regulation, regulating cognitive states) and environmental regulation (e.g., connection and bonding with others, blocking out external distraction). Similar to Social Cognitive Theory, these theories suggest that adaptive FML in everyday music listening experiences may be adaptive for wellbeing generally.

Having said that, only a small number of studies have directly examined the relationship between measures of specific FML and specific wellbeing outcomes. Using the Music USE questionnaire, Chin and Rickard (2014a) found that endorsing FML for *social connection* had a negative direct effect on subjective, psychological and emotional wellbeing, as measured by the Mental Health Continuum (Lamers, Westerhof, Bohlmeijer, Klooster, & Keyes, 2010). In contrast, scores on the *dance* factor had a positive direct effect on psychological and social wellbeing, and similarly *engaged production* (i.e., music-making) predicted higher social wellbeing. It was surprising then that these two FML factors (i.e., *dance* and *engaged production*) in addition to *social connection*, also had a negative indirect effect on wellbeing outcomes, an effect that was fully mediated by the regulation strategy of suppression, which was measured separately by the Emotion Regulation Questionnaire (Gross & John, 2003). *Social connection* and *engaged production* FML were associated with higher levels of suppression, while using music for *dance* was associated with lower levels of suppression. Higher levels of suppression predicted lower scores on all measures of wellbeing. The findings linking suppression and wellbeing in the study by Chin and Rickard are consistent with other studies outside the field of music research, which have found that suppression is associated with maladaptive affective and wellbeing outcomes (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Gross & John, 2003). However, it is less clear why *social connection* and *engaged production* FML predicted higher levels of suppression in their study.

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At the same time, Chin and Rickard (2014a) observed no direct relationship between *cognitive and emotional regulation* and wellbeing measures. However, indirect positive relationships between *cognitive and emotional regulation* FML and subjective, emotional, psychological, and social wellbeing were observed, and these relationships were fully mediated by greater use of the affect regulation strategy reappraisal. Another study by the same research team replicated this finding, while also covarying for trait positive and negative affect (Chin & Rickard, 2014b). In this second study (2014b), in addition to predicting higher wellbeing via reappraisal, *cognitive and emotional regulation* FML also predicted greater use of the strategy suppression, which was related to lower wellbeing in line with previous research. However, this negative indirect effect was significantly weaker than the positive indirect relationship between *cognitive and emotional regulation* and wellbeing via reappraisal. The authors suggest that negative and unexpected relationships between FML and wellbeing outcomes indicate there may be other variables not measured in their studies that mediate these associations.

Saarikallio et al. (2015) developed and validated the two-factor Healthy and Unhealthy Music Scale measuring music engagement in adolescence. The first factor, *healthy engagement* is indicated by endorsement of items relating to positive affective experience, negative affect regulation, and social connection effects of music. In contrast, *unhealthy engagement* is indicated by endorsement of scale items measuring rumination and avoidance. In scale validation tests, *unhealthy engagement* with music was associated with lower self-reported happiness and wellbeing (emotional, psychological, and social), and higher levels of stress and depression. *Healthy engagement* was not associated with higher emotional, psychological, and social wellbeing, but was associated with higher reported happiness on a 3-item measure created by the research team. Unexpectedly, scores on the *healthy engagement* subscale also correlated positively with depression and rumination.

In another study by Papinczak et al. (2015), following focus groups with adolescents and younger adults scale items were developed by the researchers to measure two constructs that emerged from this qualitative investigation, specifically, *relationship building* (7 items) and *modifying cognitions* (7 items). The third and fourth factors — *immersing in emotions* and *modifying emotions* — were measured by 9-items that

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had been developed by the authors in a previous unpublished investigation of music and mood. In a survey study involving 107 people aged 17 to 25, these music-use mechanisms did not have a direct effect on emotional or psychological wellbeing. However, the collective indirect effect of the four uses of music did mediate the relationship between music listening frequency and higher social wellbeing. Further, the *modifying emotions* subscale was the only factor score to have a direct effect on wellbeing - specifically increased social wellbeing.

In the study by Laukka (2007) principal components analysis was applied to reduce 28 researcher-identified reasons for listening to music to four higher level FML factors: *mood regulation*, *identity and agency*, *relaxation and company*, and *enjoyment*. Subsequent survey based regression analyses revealed that more frequent music listening for *mood regulation* and for *identity and agency* was associated with both higher PA and higher NA in a sample of older adults. Scores on the *mood regulation* factor were also associated with higher levels of personal growth, whereas, listening to music for *relaxation and company* more frequently was associated with lower levels of environmental mastery (as measured by Ryff's Psychological Wellbeing Scale, 1989).

Another study focusing on the implications of FML for university students' health and wellbeing presented participants with ten researcher-selected reasons for music listening. Path analysis found that listening to music *to reduce loneliness* and *to reduce aggression* were significantly related to both lower quality of life and higher symptom reporting, respectively (Thoma, Scholz, Ehlert, & Nater, 2012). Randall and Rickard (2016) conducted a mobile experience sampling study where participants were provided with a more comprehensive set of 33 reasons for listening to music, based on previous ESM studies and a review of the literature. Again, a number of negative effects were observed. Notably, more frequent listening to music for emotional reasons, especially *to cope* and *to forget*, was related to higher depression and anxiety (Randall & Rickard, 2016).

Evidently, existing findings regarding self-reported FML and wellbeing are complex, and appear somewhat counter to much of the research described earlier in this chapter indicating that music listening positively influences a range of wellbeing

outcomes. Mixed findings are potentially due to the many different measures of FML that are used across investigations. Some studies have used well-developed psychometric measures of FML (Chin & Rickard, 2014a; 2014b; Saarikallio et al., 2015), whereas other studies have used a limited number of researcher-selected lists of FML without carrying out further scale development or validation (Laukka, 2007; Papinczak et al., 2015; Randall & Rickard, 2016; Thoma et al., 2012). This highlights again the potential utility of an integrative scale for examining the FML that is psychometrically sound and which would allow for comparison of effects across different samples and contexts.

Importantly, there are a number of measurement issues associated with existing FML scales that limit the ability of researchers to address outcomes-based research questions. The following issues are noteworthy:

1. One criticism of measures is that for the most part they have not been informed by very specific theoretical and empirical literature from general psychology, or any synthesis of existing theoretical and empirical work in the field. For example, affect regulation is a core FML, and affect regulation is a core component of SWB. Most analyses of the FML have extracted an affect regulation component (Schäfer et al., 2013). However, in the majority of questionnaires music listening is treated as a general regulation strategy with scale items like *'Specific types of music make me feel better'* (Chin & Rickard, 2012). Such items fail to consider the wider range of regulation strategies music may provide, such as distraction, reappraisal, and catharsis (Saarikallio, 2007; 2008; 2012), which may be more or less adaptive for regulation efficacy (Gross & John, 2003) and for wellbeing (Aldao et al., 2010).
2. Another drawback of available FML measures that could lead to contradictory findings across studies is the wording of scale items. Scale items are often measuring endorsement of the goal (e.g. *'I listen to music if/when I try to deal with my problems'*, von Georgi, Grant, von Georgi, and Gebhardt, 2006) rather than endorsement of the extent to which music listening supports success in pursuit of goals, or music's effects/outcomes, for example with items like *'Listening to music helps me to deal with my problems'*. The items used in the studies by Laukka (2007) and Thoma and

colleagues (2012) were measuring the outcomes sought by listening to music (e.g., ‘to relax and calm down’), and some negative relationships between these items and wellbeing outcomes were reported. To address the relationship between music listening and wellbeing, measures are needed that capture listener’s efficacy beliefs regarding their success in achieving certain functions in music listening (Bandura, 1989; Heckhausen, 1995).

3. A related issue with existing scales is the response format adopted. Scales have focused on the frequency with which a goal is pursued (e.g. ‘*To forget about your problems*’, never - always; (Kuntsche, Le Mevel, & Berson, 2016), versus items that would measure the frequency with which success is realised, such as, ‘Listening to music helps me to forget about my problems’, (never - always). The first example is not suitable for research questions regarding the efficacy of music listening for particular outcomes. Listeners may frequently require music to forget because they are frequently stressed by their problems, but this says little about the outcome or efficacy of music listening for affect regulation. Greater use of music ‘to forget’ could relate to lower wellbeing if it reflects a more general disposition to experience high levels of stress or NA. Indeed, the ESM study by Randall and Rickard (2016) measured how frequently participants used music for emotional reasons (e.g., ‘to forget my problems’, ‘to relax’, ‘to cope with a situation’) over a two week period. Overall, more frequent reports of music listening for emotional reasons during this period was significantly associated with worse reported emotional health during the previous week. However, the study also found that emotional reasons were most frequent when the listener was in a negative affective state, and that when the listener was in a negative affective state listening to music for emotional reasons was effective - resulting in mood improvement.
4. Finally, as noted, many scales have been developed without any consultation with music listeners and thus have not been grounded in the expectations or beliefs of music listeners regarding outcomes of various FML. It has been argued that grounding scale development in qualitative work gives greater validity to the factors that are later extracted and confirmed quantitatively (Rowan & Wulff, 2007). Further, qualitative research of this nature has revealed some interesting and novel effects of music, as well as some

intriguing findings worthy of further exploration. For example, Lamont's (2011) thematic analysis of descriptions of *Strong Experiences of Music* listening found no accounts that were purely hedonic. Strong positive emotional experiences were often accompanied by other effects such as a change in cognitions, or increased meaning in life derived from the intense affective experience. Regarding affect regulation functions of music, participants in the diary and interview study by (van Goethem & Sloboda, 2011) indicated that in music listening episodes different regulation strategies operated simultaneously, sequentially, and in different combinations. Likewise, in Saarikallio's (2011) interviews with 21-70 year olds there is indication that strategies are not enacted individually to regulate negative affective experiences. Interviewee's spoke of using music for mood improvement by initially ruminating and deepening their current negative state before using music as a framework for positive reappraisal. The current thesis will employ a qualitative collective intelligence methodology named Interactive Management (IM) (Warfield & Cárdenas, 1994) to identify a broad range of FML scale constructs. The modelling phase of the IM procedure represents an advance on existing qualitative approaches. Specifically, using a structured, facilitated process, groups of participants create models describing relationships between identified FML on the basis of discussion and voting. This will highlight key relationships between a range of FML, and provide a more nuanced understanding of the relationship between FML and wellbeing outcomes.

1.4 Conclusion

Experimental evidence shows that music listening often produces effects that have adaptive consequences for different aspects of wellbeing (i.e. the induction of positive emotions and moods, improved affect regulation, social functioning, peak experience and transcendence). Qualitative and quantitative studies also demonstrate listeners' endorsement of music listening to support affective, social, and cognitive functioning in everyday contexts. Findings from studies employing experience sampling methodologies, cross-sectional quantitative modelling, and one longer-term intervention study together suggested that music listening may support adaptive

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emotion regulation. In two cross-sectional modelling studies adaptive regulation was predicted by *cognitive and emotional regulation* FML, and adaptive regulation predicted some higher level wellbeing outcomes (subjective, psychological and social wellbeing). However, findings were also presented showing self-reported FML to be linked with lower wellbeing outside of the lab. A number of issues surrounding the measurement of FML were highlighted that make it difficult to understand some of these varied findings, including the fact that FML scales often fail to measure the perceived efficacy of discrete FML in supporting adaptive outcomes. As such, while it appears that music listening may enhance wellbeing the link between discrete FML and a broad range of subjective, psychological, and social wellbeing outcomes warrants further investigation. This thesis will adopt a listener-focused approach to examine why people listen to music, whether FML have any adaptive consequences for wellbeing enhancement, and whether there are any age differences in the functions and outcomes of music listening.

1.5 Rationale

The research reviewed in this chapter demonstrates that music has a range of effects that are potentially adaptive for wellbeing. The current thesis extends this line of research in specific ways, in light of key gaps in the literature, across a series of three interconnected studies.

As noted above, the positive effects of music listening may become outcomes that are sought by people listening to music. We have described these as the adaptive functions of music listening (FML) – functions that are likely diverse and endorsed to a greater or lesser extent by different people.

As stated, few studies have examined the relationship between FML and wellbeing outcomes using quantitative measures. A number of these studies also reported negative effects of FML on wellbeing measures that were somewhat incongruous with the theoretical perspectives on wellbeing and the range of adaptive effects of music listening reviewed in Chapter 1. A number of issues relating to psychometric practice and the wording of scale items of existing instruments were identified as

potential sources of unexpected negative effects, suggesting a need for a new measure of the FML that would overcome these limitations. The most significant aim of this thesis is the creation of *The Adaptive Functions of Music Listening Scale*. Research on the efficacy of music listening for different functions should distinguish the effect a listener is pursuing (i.e., the goal), from the effect they experience by listening to music (i.e., the outcome), as different relationships with various outcomes could be expected based on this distinction. For example, if individuals rate themselves as successful in their pursuit of adaptive effects of music listening, like affect regulation, this success rating should relate positively to wellbeing outcomes. The wording of items on the AFML scale will reflect listeners' efficacy beliefs and outcome expectations of experiencing a range of effects when listening to music. This will allow for an examination of the relationships between FML and wellbeing outcomes, as proposed in Figure 1.1.

Following an exhaustive literature review (Chapter 1) the next step in the scale development process outlined by DeVellis (2012) is the identification of scale constructs and items through focus groups with stakeholders or lay experts. Further, it has been noted that previous investigations of the FML have tended to focus on a narrow range of affective, social and cognitive functions, and psychometric measures of the FML have not typically been grounded in the experience of music listeners. Therefore, in order to set the stage for robust scale development work, Study 1 in the current thesis sought to continue the tradition of qualitative research with music listeners, which has helped to uncover a broad and diverse range of FML. Different FML may have different adaptive consequences for wellbeing more broadly defined, and thus it is important to identify the full range of FML. Study 1 extends the qualitative line of FML research by using a collective intelligence methodology to identify, rank, and structure the FML (Interactive Management; Warfield & Cárdenas, 1994). This innovative, multi-phase procedure, not previously employed in music psychology, allows us to consult directly with listeners to determine the full range of FML used in everyday life. In the first phase of the IM procedure, participants will generate FML until saturation is reached. This data will be used in Study 2 to create a conceptual framework for scale development, and an exhaustive pool of scale items in line with DeVellis' (2012) recommendations.

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Two phases of the IM methodology offers some notable advantages over the traditional focus group methodology that permit some additional questions regarding the adaptive FML to be addressed. Specifically, voting patterns emerging from the second phase of the IM procedure will determine what functions listener's themselves consider adaptive for their wellbeing. Finally, the modelling phase of the IM methodology will also consider, for the first time, listeners' beliefs regarding the mechanisms of these effects, specifically, by using group-based modelling techniques to examine potential interdependencies and positive relationships between adaptive functions of music for wellbeing enhancement.

Study 2 in this thesis will adopt a quantitative survey-based approach to determine the key factors that emerge through factor analysis when the full range of FML identified in Study 1 are analysed. Drawing upon the range of FML derived from collective intelligence research in Study 1, Study 2 will develop a new measure of music listening functions: *The Adaptive Functions of Music Listening Scale* (AFML scale). Existing general measures of the FML have typically not been informed by theory and empirical research in psychology, particularly in the fields of affect, affect regulation and wellbeing. Furthermore, factor analysis has not always been applied to identify reliable and valid constructs, and available scales vary in the response format used, which makes it difficult to compare effects across studies. This scale will meet the need for a psychometrically robust, integrative measure of the FML that is suitable for addressing outcomes-based research questions regarding music listening and wellbeing. The lack of such a measure has limited our knowledge of whether the application of FML in everyday listening contexts is related to wellbeing outcomes. Correlation analyses with the AFML scale in Study 2 will examine the relationship between FML factors and subjective, psychological, and social wellbeing outcomes.

While Study 1 and Study 2 focus on the full range of FML, Study 3 adopts an experimental approach to examine the consequences of music listening for one key FML, specifically, the function of affect regulation. Previous qualitative and quantitative research has demonstrated that listeners believe music has a positive influence on their affective functioning, in particular for the function of affect regulation. However, experimental findings regarding the accuracy of listener's beliefs in this regard are inconclusive.

Studies 1 and 2 in this thesis rely on the retrospective self-reports of listeners', which can be limited by recall bias and influenced by commonly held positive beliefs about the efficacy of music for different functions. For instance, listening to music may not be effective for regulating NA, or may be effective on some occasions only. Nevertheless, listeners may hold positive beliefs about music's efficacy for affect regulation based on their music listening experiences overall. Therefore, while Studies 1 and 2 concern music listener's perceived effects of music, the aim of study 3 is to provide more conclusive evidence of music's observed effects in the context of a controlled laboratory study.

An alternative approach would be to use ESM to measure an individuals' goal or function of music listening prior to an episode of music listening, and then measure the efficacy of music listening for that function in that individual episode, as well as over the course of all music listening episodes sampled. Clearly, this is a powerful methodological approach. However, there are a number of drawbacks that limit the application of ESM in the current research project.

In previous ESM studies of music listening pagers and palmtop computers have been used to randomly sample episodes of everyday life. Unfortunately, these devices are prohibitively expensive, and studies using them have had relatively small sample sizes (Sloboda, O'Neill, & Ivaldi, 2001; Juslin et al., 2008). Other ESM studies have required participants to complete paper and pen questionnaires when prompted by text messages sent 1 to 5 times a day for one or two weeks (Greasley & Lamont, 2011; North, Hargreaves, & Hargreaves, 2004). Although this approach is cost-effective and straightforward, the duration between receiving the prompt and completing the questionnaires cannot be verified, and this raises the possibility that response forms can be back-filled or forward-filled reducing the validity of the data. Since the design of this research project, a new tool for conducting ESM studies on music listening has been released: the MUPsych application (Randall & Rickard, 2013). The MUPsych app collects data in real-time using pop-up questionnaires during episodes of music listening on smartphones, but not in other episodes of music listening, or non-musical episodes. Music listening on smartphones is more pervasive in adolescence and younger adulthood, as relative to younger people, older

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adults' mobile phone usage is limited to core functions (i.e., phone calls, text messages) (Zhou, Rau, & Salvendy, 2014). More generally, participant burden is high in ESM studies as participants are requested to carry new devices or questionnaires on their person at all times for the duration of the study. There is also some concern that participant burden would be higher for older cohorts, as they may struggle to adopt new devices and technologies (i.e., pagers, palmtops, mobile phones, portable music players). Experience sampling is certainly a robust method of studying adaptive FML in context. However, considering that the most significant aim of this thesis is scale development, as well as, the focus on age comparisons in the functions and effects of music, more traditional and established controlled laboratory experimental research methods are used in Study 3.

Laboratory studies do not have the ecological validity of ESM studies, but can overcome the potential response bias of qualitative and survey studies. At the same time, well-controlled experimental studies can meet the need to distinguish between the perceived efficacy of music for affect regulation and the observed efficacy of music for affect regulation.

Study 3 will evaluate the efficacy of music listening for affect regulation in a randomised controlled trial with younger adults (18-30 years) and older adults (60-85 years). The design of this study will improve upon existing research on musical affect regulation by incorporating a negative affect induction to better address the question of whether listening to music is adaptive in stressful situations. Secondly, this study will have greater ecological validity than many previous studies by allowing participants to listen to music they themselves selected for the function of affect regulation. Finally, the predictive validity of subscales of *The Adaptive Functions of Music Listening Scale* will be assessed by examining whether FML factor scores predict regulation of induced NA for those in a self-chosen music listening intervention.

Research in music psychology has predominantly employed childhood, adolescent, and young adult samples of participants. When older adults have been included in investigations of music the focus has been the application of music for the treatment of conditions associated with ageing (Vink, Bruinsma, & Scholten, 2011).

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Developmental research highlighting improved social and emotional functioning in older adulthood (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000; Mather & Carstensen, 2005) may influence the functions and effects of music listening in healthy older adults, and this is worthy of investigation. The contribution of older adult participants, in addition to younger adults, in Studies 1 and 3 of this thesis will provide a greater understanding of the adaptive functions of music listening across the lifespan.

2 CHAPTER 2:

Study 1: An Emerging Structure of The Adaptive Functions of Music Listening

2.1 Purpose

As noted in Chapter 1, a review of the literature reveals a wide range of disparate affective, cognitive and social functions of music listening (FML). The current study will use the collective intelligence methodology, Interactive Management (IM) (Warfield & Cárdenas, 1994) to determine what are the functions of music listening as defined by listeners themselves. This is a key starting point for identifying constructs and items for scale development (DeVellis, 2012), however an advantage of using this approach over the traditional focus group method, is that the voting phase of the IM procedure will also enable us to determine what particular functions of music listening participants consider most adaptive for their wellbeing enhancement.

Previous investigations have catalogued functions of music listening (FML) using survey methods and factor analyses. These taxonomies are useful, but do not examine interdependencies between FML, or allow for the development of structural hypotheses in relation to how different functions of music are related in bringing about enhanced psychological functioning. The extent to which the functions of music listening are interrelated, or influence each other remains unknown. Addressing this gap in the literature, the current study using IM, allows us to examine these interdependencies, specifically, by building consensus models describing how different functions of music listening enhance one another in a system of positive influence.

Research has highlighted the importance of music listening for both older adults (Laukka, 2007) and younger adults (Miranda & Gaudreau, 2010; Saarikallio, 2011)

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in enhancing wellbeing and managing psychological distress. The majority of the research in the area however focuses on younger adults, with few studies seeking to examine the broader relationship between music and wellbeing across the lifespan. This study will compare adaptive music listening across separate groups of younger and older adults engaged in collective intelligence sessions.

2.2 Wellbeing and Music Listening

According to traditional perspectives, the components of subjective wellbeing (SWB) are a greater ratio of positive to negative emotions, and a sense of satisfaction with life (Diener, Eunkook, Lucas, & Smith, 1999). The review of qualitative, quantitative and experimental research in Section 1.2 supports the thesis that music listening can induce positive emotions and regulate negative affect. Existing research on the FML has also found that affective experiences and their regulation are key outcomes sought by music listeners in everyday contexts (Chamorro-Premuzic & Furnham, 2007; Saarikallio & Erkkila, 2007). Consistent with theory and research in the field of positive psychology (Sin & Lyubomirsky, 2009), activities that increase positive affect and reduce negative affect such as music listening, have potentially important implications for increasing wellbeing across the lifespan (Larsen, 2009). However, we know less about key differences between younger and older adults in this regard.

As outlined in Chapter 1, other theories in psychology provide a broader definition of wellbeing. There are a number of FML that are relevant to these broader definitions of wellbeing, for instance Maslow's (1999) *Peak Experiences* which are sought out in music listening and which may foster higher order wellbeing outcomes, beyond the affective or hedonic outcomes. Notably, studies of music and wellbeing have tended to focus on the affective aspects of wellbeing, whereas music's impact on eudaimonic, psychological, and social dimensions of wellbeing have, on balance, been relatively neglected. At the same time, research has highlighted the social functions of music listening (Laukka, 2007; North et al., 2000). Positive relations with others, which may be supported by music listening, are central to a number of theories of wellbeing (Keyes, 1998; Ryff, 1989; Seligman, 2012). Individuals may also use music to sustain and reinforce their sense of identity (Hays, 2005; Laiho,

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2004; North & Hargreaves, 2010). A sense of identity can support meaning and purpose in life, leading to psychological growth (Pennebaker & Seagal, 1999), and enhanced wellbeing (Kahn et al., 1985) and these constructs are central to theories of psychological wellbeing (Ryff, 1989).

These distinctions are important for researchers interested in the relationship between FML and wellbeing outcomes. For example, the pursuit of engagement and meaning have been found to contribute more to life satisfaction than hedonic pleasure (Peterson, Park, & Seligman, 2005). Hedonic activities increase pleasure and positive affect in the short term, whereas eudaimonic activities are associated with improved affective functioning in the long term, as well as increased meaning and transcendence (Huta & Ryan, 2009). The potential for music to provide alternate routes to wellbeing other than by pleasure or positive emotions alone is supported by a number of recent qualitative studies exploring experiences of music (Herbert, 2012; Lamont, 2012; Schäfer et al., 2014), where it was found that, in addition to positive emotions, engagement, absorption, and transcendence were commonly reported experiences in music listening.

Overall, research on the FML has highlighted a number of potentially adaptive goals that people may pursue in the context of music listening, each of which may have consequences for enhancing key dimensions of wellbeing. However, less is known about the key FML listeners believe to be of greatest benefit for their wellbeing, and little is known about lifespan differences in these beliefs, specifically, when younger and older adults are compared.

2.3 A Developmental Perspective on The Adaptive Functions of Music Listening

The present study aims to advance understanding of the FML in both younger and older adulthood. This will be the first qualitative study to allow direct comparison between age groups in examining group differences in FML. As noted above, the majority of investigations into music listening behaviours have focused on the period of adolescence and young adulthood. Population demographics have changed over the past century, with increasing numbers of older adults living increasingly longer lives, with implications for models of health, wellbeing and social care across the

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lifespan (WHO, 2014). The bulk of previous work on the FML has focused on younger adults. We sought to extend this work and focus on both younger and older adults. Developmental differences may influence the selection and impact of listening strategies on wellbeing, but we currently know very little about these potential influences. At the same time, there are a variety of theories of lifespan development that may inform our understanding of the relationship between FML and wellbeing in younger and older adults.

For example, Baltes and Baltes (1990) describe selection, optimisation, and compensation (SOC) as life management strategies that contribute to successful ageing and wellbeing. The SOC theory proposes that older adults adapt to age-related decline by selecting environments and experiences in keeping with their abilities, optimising their available resources, and employing compensatory strategies in the face of age-related losses. The Lifespan Theory of Control (Heckhausen, 1995) presents another version of this same theoretical idea, specifically, by proposing two forms of control: primary control and secondary control. Primary control allows us to control or regulate the environment to suit our developmental needs. Failures to control the environment are inevitable and thus secondary control, or self-regulatory strategies (e.g. coping, meaning-making, shift in values or expectancies) are needed to compensate for the shortfall in primary control. In the context of music listening activities, commonly identified FML, such as affect regulation and cognitive stimulation, may have a self-regulatory function and may operate as secondary control strategies. Other FML could be seen as driven by primary control motivation, or efforts to control the external environment, for example the use of music to create social atmosphere, for managing others' perceptions, or minimising environmental distractions. Declines in biological and psychological functioning associated with ageing reduce an individual's ability to affect change in the environment, or exercise primary control, thus compensatory and secondary control strategies become more prominent in advanced age (Baltes & Baltes, 1990; Heckhausen, 1995). Therefore, it is possible that a greater emphasis will be placed on self-regulatory, compensatory or secondary control FML amongst older adults when compared with younger adults. For example, music listening may compensate for biological and psychological decline by facilitating emotion regulation or transcendence in the face of challenges

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or losses, or providing contextual cues that support cognitive activities, or regulating expectations when pursuing physical goals.

Another theory noted in Section 1.2 that may be relevant to understanding the link between FML and wellbeing is *socio-emotional selectivity theory* (Carstensen, 1995). This theory proposes three motives that moderate age-related changes in social interaction: emotion regulation, development and maintenance of self-concept, and information seeking. In old age a limited chronological future directs attention toward the affective dimension of social interaction. By contrast, identity development and information seeking through new social networks are of greater importance for younger adults. As such, we might expect that older adults will focus on the use of music to enhance social connection in close relationships, whereas younger adults might be expected to focus on identity functions and using music in the formation of new social connections and information acquisition related to adaptive success and wellbeing.

Empirical research also suggests that negative affect decreases and emotion regulation improves in old age (Carstensen & Lockenhoff, 2003) and this may be reflected in a stronger emphasis on affect regulation FML amongst older adults. One previous investigation did find a developmental shift in how individuals engage with music listening; specifically, music listening appears to be more frequent in youth, particularly for affect regulation (Lonsdale & North, 2011). Thus, an alternative hypothesis is that the source of enhanced affect regulation in older age derives from more fundamental aspects of personality and emotional development and there may be less of a requirement to use music to regulate emotion; as such, affect regulation FML may be less pronounced among older adults when compared with younger adults.

Similarly, although some studies report a selective preference for positive over negative information, or positivity bias in older adults (Mather & Carstensen, 2005), other studies suggest that the major difference between younger and older adults may be in the reduction of negative affect and relative stability of positive affect in old age (Mroczek & Kolarz, 1998). Therefore, as positive emotion remains important throughout adult development, we do not anticipate less affective FML among older

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adults in general, but possibly a stronger emphasis on positive relative to negative affordances of music listening in older relative to younger adults.

Finally, like positive emotion, transcendence is a core virtue highlighted by positive psychology (Peterson & Seligman, 2004), and has been reported in music listening experiences (Hays & Minichiello, 2008; Schäfer et al., 2014). It has been suggested that older adults have a greater sense of transcendence and spend more time seeking it (Piedmont, 1999), so it is possible that listening to music to experience a sense of transcendence is more common in older adults when compared with younger adults.

2.4 Design

Understanding the full range of music listening functions that influence wellbeing requires further investigation. Importantly, we sought to ground our understanding of the link between FML and wellbeing, and age differences in FML in reports provided directly by younger and older adults. The IM methodology is particularly suited for this function.

The IM process is a system of facilitation and problem solving based on John Warfield's (1990) science of generic design. IM was designed to assist groups in dealing with complex issues (see Ackoff, 1981; Deal & Kennedy, 1982; Kemeny, 1980). IM has been applied in a variety of settings to accomplish many different goals, including assisting city councils in making budget cuts (Coke & Moore, 1981), designing a national agenda for paediatric nursing (Feeg, 1988), improving the U.S. Department of Defence's acquisition process (Alberts, 1992), and training facilitators (Broome & Fulbright, 1995).

The current study represents the first application of IM to understanding the complex system of interdependencies between music listening functions. This study first sought to create a comprehensive list of music listening functions, and to determine which functions listeners consider most adaptive for their wellbeing. Then using IM, participant's generated consensus-based models explaining how FML interact to bring about enhanced wellbeing. Finally, this study sought to determine whether there were age differences in the FML put forth by older and younger adults, and in those FML considered adaptive. The method and results are presented below.

2.5 Method

Participants

Participants were recruited via advertisements in local and national media for volunteers to join a discussion group about the benefits of music listening. In addition, younger adults were recruited via advertisements on campus and university email. Older adults were also recruited through active retirement groups. Male and female English speakers, aged between 18-30 and 60-85 who listen to music and were not resident in a nursing home or care facility were selected to attend a collective intelligence session. Twenty-six younger adults (18-29 years, males = 8) and nineteen older adults (60-75 years, males = 10) participated in the current study. Of the younger adult sample 44% were undergraduate psychology students receiving research participation credit. Of the older adults sample 74% were retired. Participant characteristics are presented in Table 2.1 below.

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Table 2.1. *Demographic Characteristics, Music Engagement, and Musical Experience of 44 Participants Across Four IM Sessions.*

| | Younger Adults | | Older Adults | |
|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| | Group 1 N = 11 (6 male) | Group 2 N = 14 (2 male) | Group 1 N = 9 (5 male) | Group 2 N = 10 (5 male) |
| Age range (M, SD) | 22-29 years (M = 24.91, SD = 2.30) | 18-24 years (M = 20.07, SD = 2.20) | 60-72 years (M = 64.22, SD = 4.26) | 61-75 years (M = 67.50, SD = 4.67) |
| Education | | | | |
| Second level | 28% | 64% | 33% | 30% |
| Undergraduate | 36% | 36% | 33% | 20% |
| Postgraduate | 36% | | 33% | 50% |
| Employment | | | | |
| Student | 91% | 79% | | |
| Retired | | | 67% | 80% |
| Employed | | 21% | 22% | 20% |
| Hours per day spent listening to music | 4.36 (SD = 3.20) | 2.75 (SD = 1.63) | 3.61 (SD = 3.04) | 2.08 (SD = 1.96) |
| Do you play a musical instrument (including voice)? | | | | |
| Yes | 55% | 36% | 45% | 50% |
| Yes, but not anymore | 27% | 28% | 22% | 30% |
| No | 18% | 36% | 33% | 20% |
| If Yes, or Yes, but not anymore; | | | | |
| Years of regular practice | 4 - 14 years (M = 8.11, SD = 3.29) | 1-15 years (M = 8.44, SD = 5.20) | 2-10 years (M = 5.00, SD = 3.55) | 2-50 years (M = 19.25, SD = 21.69) |
| Years of formal training | 0-9 years (M = 4.11, SD = 2.84) | 0-13 years (M = 6.00, SD = 4.95) | 0.5-8 years (M = 3.63, SD = 3.54) | 0-6 years (M = 2.60, SD = 2.70) |

Procedure - Collective Intelligence Sessions

As described in the introduction, IM is a facilitated group design process designed to enhance the collective problem solving ability of groups. Three steps were used in the process.

1. The first step involved idea generation. The current application of IM employed the *nominal group technique* for idea generation (NGT; Delbecq, Van De Ven, & Gustafson, 1975). NGT involves five steps: (a) presentation of a stimulus question to participants, ‘*Why do you listen to music?*’ (b) silent generation of ideas in writing by each participant working alone; (c) “round-robin” presentation of ideas by each participant, with recording and posting of the individual ideas on large post-its on the idea wall in front of the group; (d) serial discussion of the listed ideas by participants for sole purpose of clarifying their meaning (i.e., no evaluation of ideas is allowed at this point).
2. The second step involved implementation of a closed voting process in which each participant was asked to select five ideas from the idea wall which they believed were most significant for enhancing wellbeing.
3. The third step involves structuring selected elements using *Interpretive structural modelling* software (ISM; Warfield & Cárdenas, 1994). ISM is a computer-assisted methodology that helps a group to identify relationships among ideas and to impose structure on those ideas. This structuring work can be considered an activity in ‘mapping perceptions’ of the group members. Participants are given the opportunity to explore connections between ideas in ways that may otherwise go undetected. IM can, thus, provide participants with useful insights into the relationships between ideas and it generates a structural map of those relationships. The five steps of ISM are: (a) identification and clarification of a list of ideas (e.g., using NGT). Ideas and their votes from step 1 and 2 are entered into the ISM software; (b) identification and clarification of a “relational question” for exploring relationships among the ideas generated in the previous step. In the current study, given our interest in examining the interdependencies between music listening functions in bringing about wellbeing, we focused on enhancement relations, specifically, by asking the following question: “*In the context of increasing wellbeing, does music listening function A (e.g. Stress*

reduction) significantly enhance music listening function B (e.g. Social connection)”; (c) using the relational question to explore connections between pairs of ideas. The group engaged in discussion about each relational question and a vote was taken to determine the group’s judgment about the relationship. A “yes” vote was entered in the ISM software by the computer operator only if a majority consensus (> 70%) was reached, otherwise, a “no” vote is entered; (d) display and discussion of the structural map based on the group’s judgement; and (e) amendment to the map by the group, if needed.

The three-phase procedure outlined above (idea generation, voting, structural modelling) was completed in one session lasting 2 to 3 hours. Four IM sessions were conducted, two with younger adults, and two with older adults. IM sessions were recorded and transcribed. These sessions were facilitated by the primary investigator and a co-facilitator who operated the ISM software.

2.6 Results

The results section is divided into three sections. The first describes the four structural models generated during each IM session. The second presents a category analysis of the FML generated by younger and older adults. The third and final section presents a meta-analysis of the top ranked ideas from all sessions, and an overall influence map of adaptive FML for each age group.

2.6.1 Analysis of Structural Models Generated by Younger and Older Adult Groups

Younger adults group 1. Younger adults generated 36 ideas in response to the stimulus question, ‘Why do you listen to music?’. The top eight rank-ordered music listening functions decided upon during voting are presented in Table 2.2 with number of votes in parentheses.

Table 2.2. *Young Adult Group 1 Responses to Stimulus Question 'Why Do You Listen to Music?'*

| Function of Music Listening | Clarification |
|-------------------------------|---|
| Stress Relief (5) | <i>"To relieve stress...If you're stuck in traffic, you put on music and you feel a bit better"</i> (Female, 24) |
| Relaxation (4) | <i>"To relax, I think when you're listening to music you like, no matter what type, it's relaxing"</i> (Male, 22) |
| Personal Meaning (4) | <i>"Because music gives meaning to me, if I feel alienated it sort of gives me personal meaning"</i> (Male, 24a) |
| Emotional Engagement (3) | <i>"I listen to music to really engage with an emotion I'm experiencing"</i> (Female, 26) |
| Entertainment (3) | <i>"To be entertained, particularly in terms of live music"</i> (Male, 26) |
| Personal Space (3) | <i>"It helps kind of create a personal space... even though there's people all around you"</i> (Female, 24) |
| Negative Mood Improvement (3) | <i>"I use music a lot to counter negative moods, negative ways of thinking"</i> (Male, 24a) |
| Persistence (3) | <i>"I always find with music I'll run faster or work longer... because I'll have a rhythm going"</i> (Male, 24b) |

Note; the number of votes FML received during voting phase are presented in parentheses.

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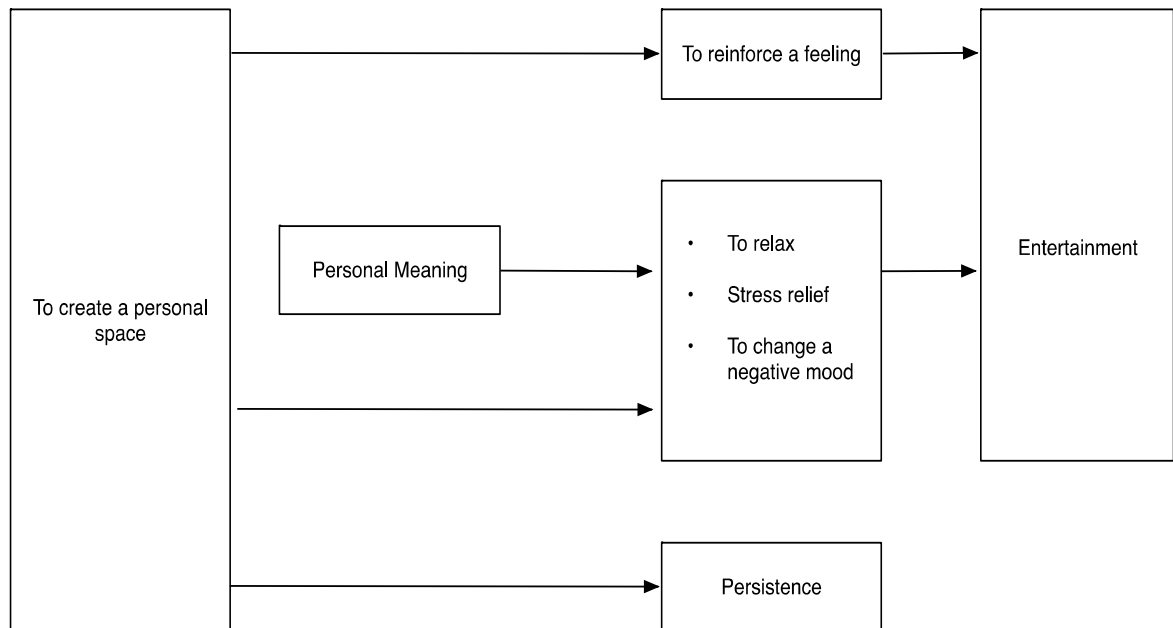


Figure 2.1. Enhancement Structure for Younger Adults Group 1

As can be seen in Figure 2.1, ‘personal meaning’ and ‘personal space’ emerged as the most influential FML for the first group of young adults. Younger adults argued that listening to music supports the creation of a private, personal space. They reported using this personal space in a number of ways, including protection from distraction, and from unwanted interaction with others. They reasoned that the creation of a personal space enhances emotional engagement, by providing a setting for reinforcing, or intensifying your current feeling. Listeners tended to use music to engage with positive affective states, “*so if you’re feeling happy, when you listen to happy music it makes you feel more happy, or really engage with the emotion*” (Female, 26).

The private environment afforded by music listening also served to enhance the interrelated functions of relaxation, stress reduction and negative mood improvement. One participant noted, “*When I’m listening to music, I can escape sort of, even though there’s people around... I can escape that stress,*” (Female, 24). When effective, affect regulation by music listening enhances being entertained by music they argued, because “*if you’re releasing stress you’re more susceptible to being entertained*” (Male, 26).

At the third stage of the enhancement structure, it becomes apparent that entertainment, while important for wellbeing, is facilitated by the influence of music on affect. Firstly, the group argued that emotional engagement, whether positive or negative was

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entertaining, *“I suppose any state of heightened feeling would be entertaining”* (Female, 22), and that using music to restore emotional balance also enhances the entertaining qualities of music, by creating the ideal affective conditions for entertainment, *“well, when you’re at a party and they have background music on, it’s to put people at ease....so they can be entertained”* (Female, 24).

The younger adults noted that they listened to music because it is a source of personal meaning for them, and also that it gives added meaning to their everyday experiences. They argued that having a source of personal meaning in their lives facilitated affect regulation because finding meaning in adversity through music listening could enhance mood improvement, *“if you are aware of meaning in your life it can help with changing moods in certain circumstances”*. However, it was argued that affect regulation does not enhance meaning, *“I don’t think feeling less negative in general is gonna make you feel more meaning”* (Female, 28).

They also claimed that listening to music helped them to persist with challenges -- physical, mental, and cognitive -- and this was enhanced by music’s ability to create a private, personal space free from distraction. For example, *“At the gym I used to go to, I was the only girl who went... all the guys were there doing weights... I just had to ignore them and create a personal space, with my music, and just get on with it, and that really helped me”* (Female, 22).

Younger adults group 2. The second younger adult group generated 40 ideas in response to the stimulus question. The top eight rank-ordered music listening functions decided upon during voting are presented below with number of votes in parentheses.

Table 2.3. *Young Adult Group 2 Responses to Stimulus Question 'Why Do You Listen to Music?'*

| Function of Music Listening | Clarification |
|------------------------------------|--|
| To be sociable (10) | <i>"You can listen to music together and go out dancing, so there's a social aspect to it"</i> (Female, 19) |
| Stress reduction (9) | <i>"When I've had a long day, I always listen to music in the shower and leave the stress behind"</i> (Female, 18) |
| Reminiscence (8) | <i>"There are certain songs that remind me of home or my family, you know, if you're feeling homesick"</i> (Female, 19) |
| To reduce boredom (7) | <i>"It helps to cure boredom, it kinda occupies your mind for a while"</i> (Male, 20) |
| Negative mood improvement (6) | <i>"When I'm in a bad mood listening to music makes me feel better"</i> (Female, 18) |
| Bonding (5) | <i>"with one friend you can go to a reggae gig and enjoy that together, whereas with my dad, he'd take me to a classical gig and it's sort of a bonding, mutual appreciation thing"</i> (Female, 24) |
| To feel happy (5) | <i>"It just makes me feel happy"</i> (Female, 18) |
| To reduce fear (4) | <i>"If you're ever scared in the house on your own in the silence you start imagining things, so I always put on music so that you don't hear noises, or whatever"</i> (Female, 18) |

Note; the number of votes FML received during voting phase are presented in parentheses.

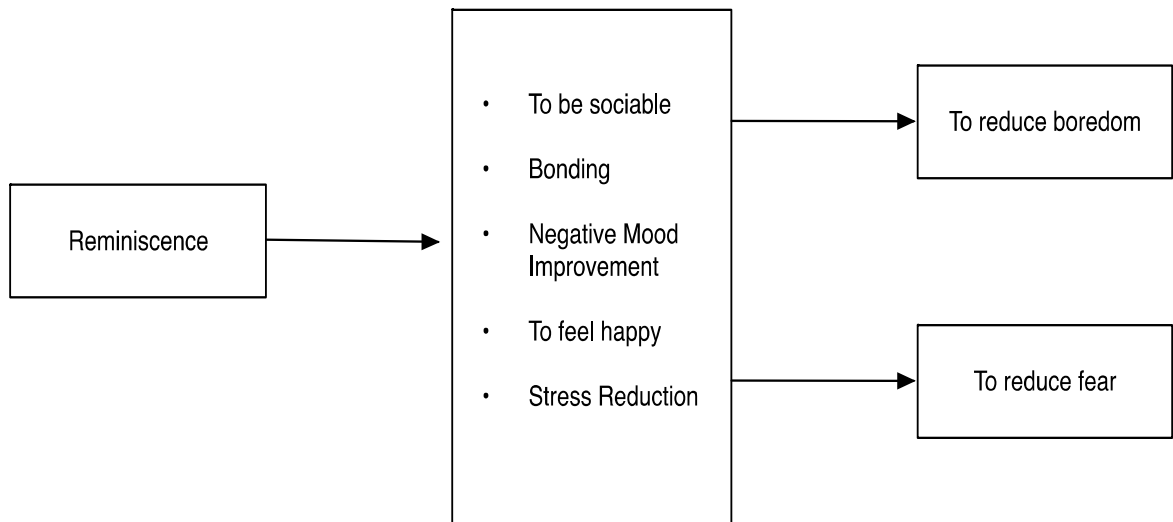


Figure 2.2. Enhancement structure for younger adults group 2.

In this enhancement structure, reminiscence was a driver of all other adaptive music listening functions (see Figure 2.2). The conception of reminiscence put forward by this group was quite specific; it was enacted consciously in an effort to remember significant others, for example, *“if you’re feeling homesick”*, (Female a, 19). They argued that this form of purposeful reminiscence significantly enhances being sociable *“I think...reminiscence probably just makes you happy, and then you’re more inclined to be sociable because you’re happy”* (Female b, 19). Another social function of music listening put forward by participants was bonding through shared musical experiences. Reminiscence was also thought to enhance bonding, because *“If you were listening to certain songs to remind you of say when you were at a concert, you’d want to go to another gig again or something”* (Female a, 18). They argued that listening to music to be sociable and bonding through music were interrelated because *“if you’re being sociable and you have a shared interest in the same kind of music then you’re going to be bonding over that”* (Female b, 18). Further, they argued that bonding by music listening would reduce boredom. *“Well, if you’re bonding with someone then you’re not going to be as bored as [you would be] in an awkward conversation”* (Female, 20).

The ideas of bonding and mood improvement were also seen as enhancing each other reciprocally. *“In the context of a gig, while you’re there together and sharing the experience... that would improve your mood”* (Female, 24), and mood improvement enhances bonding because *“if you’re in a bad mood whenever you’re in a gig or*

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whatever, as soon as they start playing your mood improves and you can get into it more and actually give in to the experience with other people”

The participants distinguished between the affective uses of music for ‘negative mood improvement’ and ‘to feel happy’. Participants found that music could be used to bring happiness when your mood was neutral, but also when in a bad mood. However, in spite of their distinctiveness as FML they were seen as interrelated, because in listening to music to feel happiness “*you are going from a neutral mood to happy, which is an improvement*” (Female, 23), and that mood improvement could enhance feeling happy in the context of music listening because “*you're mood is improving, when you're mood is improved you become happy, it seems to me they go together.*” (Male, 18).

Participants reported using music to provide a sense of security, and to reduce, or avoid feeling fear when home alone. This function of music they reasoned was enhanced by music’s mood improving and stress reducing benefits, “*I think if you're in a good mood, you're bound to be more optimistic, so you hear a noise outside, it's just a cat, but if you're in a bad mood or anxious or something, you'd be more inclined to instantly go for a negative*” (Female, 24).

Older adults group 1. Older adults generated 34 ideas in response to the stimulus question ‘Why do you listen to music’. The top ranked FML can be seen in Table 2.4.

Table 2.4. *Older Adult Group 1 Responses to the Stimulus Question ‘Why Do You Listen to Music?’*

| Function of Music Listening | Clarification |
|------------------------------------|--|
| Relaxation (4) | <i>“For relaxation... I find that having music on sort of calms me, I can feel it in myself”</i> (Female, 62) |
| Personal meaning (4) | <i>“It’s just such an important part of my life, it means so much to me, I don’t know how to put it into words”</i> (Female, 62) |
| Dance (3) | <i>“Because it makes you get up and dance”</i> (Female, 70) |
| Reducing loneliness (3) | <i>“For loneliness... I live on my own, and so the radio is my companion, it feels like there is someone with me when I have the music on”</i> (Female, 70) |
| Social Connection (3) | <i>“To feel connected to others... I find music is so universal that it’s such a connection with the rest of the world”</i> (Female, 62) |
| Therapeutic benefits (3) | <i>“Because music is therapeutic, it brings the body and the brain to life”</i> (Female, 65) |
| Transportation (2) | <i>“Listening to music you can be transported away from the mundane”</i> (Male, 65) |
| Stress reduction (2) | <i>“It reduces stress... one time... I was so angry... so the only thing I had to do was put on a CD to literally lift me out of that type of stress”</i> (Female, 65) |

Note; the number of votes FML received during voting phase are presented in parentheses.

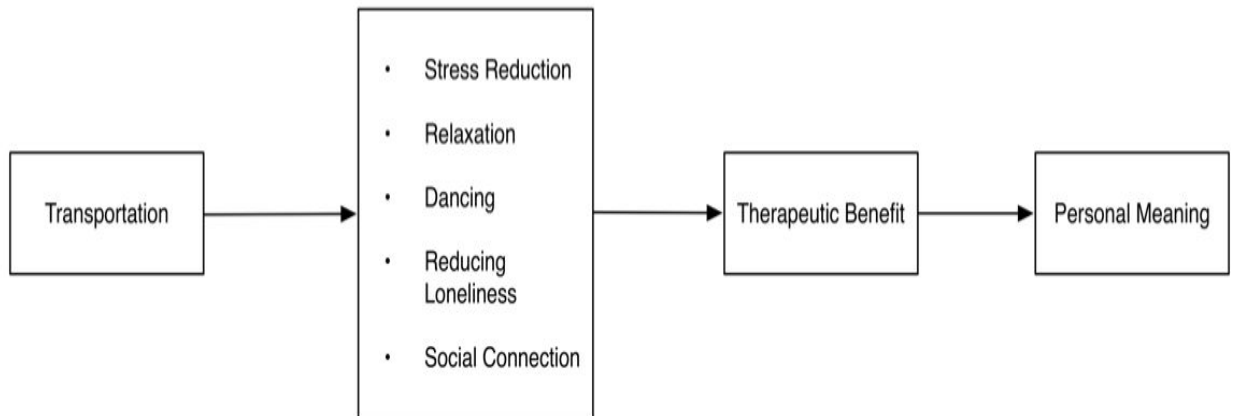


Figure 2.3. Enhancement structure for older adults group 1.

Older adults agreed that ‘transportation’ enhanced all other FML in the system (see Figure 2.3). The older adults in this session reported that music had the ability to transport the listener away from the mundane, to transcend everyday experience. They spoke about being ‘*uplifted*’ and ‘*softened*’ by the music. Although less highly voted than other functions of music, it was seen as a critical driver of other music listening functions. The older adults argued that this function of music enhanced stress reduction, “*absolutely, that’s the door, that’s the way out...it’s [stress reduction] a natural consequence of transportation*” (Male, 60).

The inter-related functions of stress reduction, relaxation, dance, reducing loneliness and social connection were seen as enhancing each other reciprocally by older adults. In the idea generation phase, older adults contrasted between stress reduction and relaxation. Music was used to cope with acute stressors, “*I was so angry with myself... so the only thing I had to do was put on a CD to literally lift me out of that type of stress*” (Female, 65), but also to promote relaxation in non-stressful situations “*I just love to have music in the background, it sort of calms me... I would still consider it to help with the stresses of living, but it’s a different situation*” (Female, 62). In spite of this distinction, stress reduction and relaxation were seen as having a reciprocal relationship in the context of adaptive music listening, “*you know relaxing by its very nature is one where your blood pressure will reduce, stress generally might increase blood pressure, so if you take a physiological marker, then it seems to me that the two are directly related,*” (Male, 60).

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Relaxation and dance were also seen as enhancing each other reciprocally. Older adults reasoned that relaxation would aid dancing, *“you really do have to be in the mood for dancing, and you have to be relaxed”* (Female, 62), but that dancing could also enhance relaxation *“sometimes if my mood isn't great I put on a bit of music and there I go - dancing, and it lifts my mood, so yes, dancing would definitely enhance my relaxation”* (Female, 65). Dance was voted as an important FML, and reducing loneliness was seen as a primary reason to dance, *“I go dancing to get out of the house”* (Female, 70). This relationship was seen as reciprocal because *“if I listen to music I feel less alone, I might then start dancing along to the music”* (Female, 65). Reducing loneliness and social connection were also seen as mutually enhancing each other, *“sometimes I listen to music for both those reasons at the same time. If I'm feeling lonely, I listen to music to reduce that, and then I feel like I'm more connected with my family, the ones that are back home, and then I feel less lonely”* (Female, 62).

In the idea generation phase, the older adults claimed that because of music's effect on the brain, our emotions, and our bodies it could be seen as having therapeutic properties. During structuring, the group reasoned that music's therapeutic benefits were derived from the inter-related music listening functions of stress reduction, relaxation, dance, reducing loneliness and social connection. For example, *“Connection to others can be a form of therapy, so connecting with others through music is therapeutic”* (Male, 60).

Music was seen as having deep personal meaning for this group of older adults (see Table 2.5). The older adults argued that the therapeutic effects of music enhanced its meaning, *“listening to music for therapy can give meaning to your experience, but give meaning to your life as well”* (Male, 60). However this relationship was not seen as reciprocal because *“listening to music as therapy might mean that you need more meaning in your life, and so enhances that, and gives you the meaning”*, but, *“if you have meaning then you have no need for the music as therapy”* (Male, 72). This final reflection highlights the centrality of meaning to these older adults' conception of wellbeing.

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Older adults group 2. Older adults generated 33 ideas in response to the stimulus question ‘Why do you listen to music’. The top ranked FML can be found in Table 2.5.

Table 2.5. *Older Adult Group 2 Responses to the Stimulus Question ‘Why Do You Listen to Music?’*

| Function of Music Listening | Clarification |
|------------------------------------|--|
| Therapeutic benefits (4) | <i>“Music is therapeutic because it promotes balance of the mind, body and soul”</i> (Female, 75) |
| Social connection (3) | <i>“For connection...music breaks down social barriers and helps people to connect”</i> (Female, 61) |
| Meditative effects (3) | <i>“To aid meditation... listening to music has a kind of meditative effect on me”</i> (Male, 75) |
| Critical analysis (3) | <i>“Listening to music, I’d be critical, analysing”</i> (Male, 70) |
| Strong emotional experience (3) | <i>“It can bring a drama to your life, you can touch parts of your emotional self that you might not otherwise be in touch with”</i> (Male, 66) |
| Personal growth (3) | <i>“I’ve become more knowledgeable listening to music, there’s a sort of self-acceptance of what I can and can’t do, and certainly there’s personal growth in that”</i> (Male, 70) |
| Novelty (2) | <i>“The excitement of discovering a new musician forms new memories, or new associations with old memories”</i> (Male, 75) |
| Reminiscence (2) | <i>“It can bring back memories that you associate with the music”</i> (Male, 66) |

Note; the number of votes FML received during voting phase are presented in parentheses.

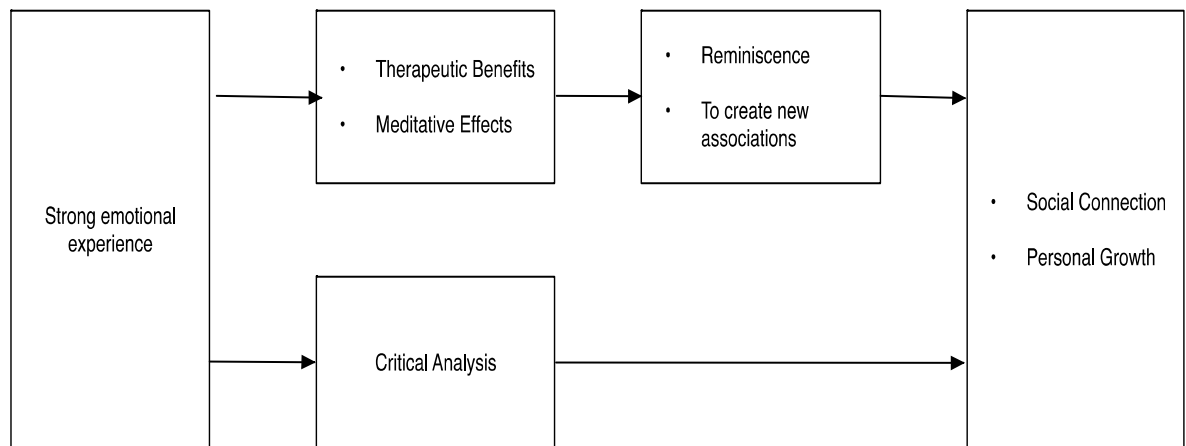


Figure 2.4. Enhancement structure for older adults group 2.

Older adults considered strong emotional experience to be a critical driver of other FML (see Figure 2.4). These music-related emotions, “*add drama to life, and it’s a safe drama*”, (Male, 66). The group spoke of music’s transcendent qualities, acknowledging the contradictory processes of both losing and finding yourself in dramatic emotional experiences in music listening. This intense emotional experience is positioned at the first level of this model, enhancing all succeeding FML across two paths of influence.

The first pathway is through critical analysis. This idea related to a type of music-focused listening, and the resulting enjoyment of hearing a “*bum note*” because “*it really humanises the artist*”. This kind of listening was enhanced by strong emotional experience, by fuelling the desire to understand how the artist’s performance can evoke such feelings. It was argued that critical analysis of this kind can enhance personal growth through self-acceptance (see Table 2.5).

Along the second path of influence strong emotional experience enhances music’s meditative effects because “*you give your full attention to what you’re feeling at that moment, so therefore that could put one into a meditative state*” (Female, 70). It was also stated that music has therapeutic benefits because it “*promotes balance of the mind, body, and soul*” (Female, 75), and these therapeutic benefits are enhanced by strong emotional experience because, “*sadness is there anyway, and this [strong emotional experience] brings it to the surface*” (Male, 75), then, “*you are free to feel and express emotions in a very safe way in music listening*” (Male, 64). The therapeutic

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and meditative effects of music listening were seen as interrelated. They argued that achieving a greater sense of balance enhances your ability to focus inward, and that music could be therapeutic even for *“somebody who may not be the meditative type”*, through the therapeutic and meditative power of rhythmic entrainment, *“the rhythm can alert your senses...it could give you a new vision”* (Female, 70).

They voted that the therapeutic benefits of music could enhance reminiscence, because if you achieve greater emotional and spiritual balance *“you may tend to only remember the good things, you may not remember the negative things”* (Female, 70). Older adults found *“excitement in discovering a different musician”* and that the pursuit of new music *“forms new memories, or new associations”*. Creating new musical memories and recalling past memories through music listening were seen as enhancing each other reciprocally. *“Hearing new styles and genres of music expands the mind, but the music needs a context”* (Male, 75). Novel musical experiences become integrated into a network of past musical and personal experiences.

The group reasoned that reminiscence was a positive experience, especially in old age when it can *“awaken a youthful energy within you...it can make you express yourself in the way you used to when you were younger”* (Female, 70). They reasoned that it could enhance social connection, *“Music brings up lovely memories of a particular person that may have passed on, and it would make me feel more connected to those people”* (Female, 65). Reminiscence could also enhance personal growth because reflection on *“what’s happened in your life... can have a loving effect, you may feel compassion for yourself, and others that are within your memories”* (Female, 70).

2.6.2 Category Analysis of FML Generated by Younger and Older adults

The four sessions generated a total of 142 FML (presented in Appendix A). On the basis of commonality and conceptual similarity between these FML, 38 categories were created in a separate follow-up session with the principal investigator and supervisor only. These categories were then further organised into 9 higher order themes. Namely, (i) affective, (ii) social, (iii) cognitive, and (iv) eudaimonic FML, (v) music facilitated goal-attainment, (vi) everyday music listening, (vii) music-focused listening and 2 ideas which were uncategorised; (viii) music as a sleep aid, and (ix) music listening to create a personal space.

While younger adults generated more affect regulation, reminiscence, goal attainment, and everyday music listening functions, older adults generated more ideas related to transcendence, positive affect, and social connection (see Figure 2.5).

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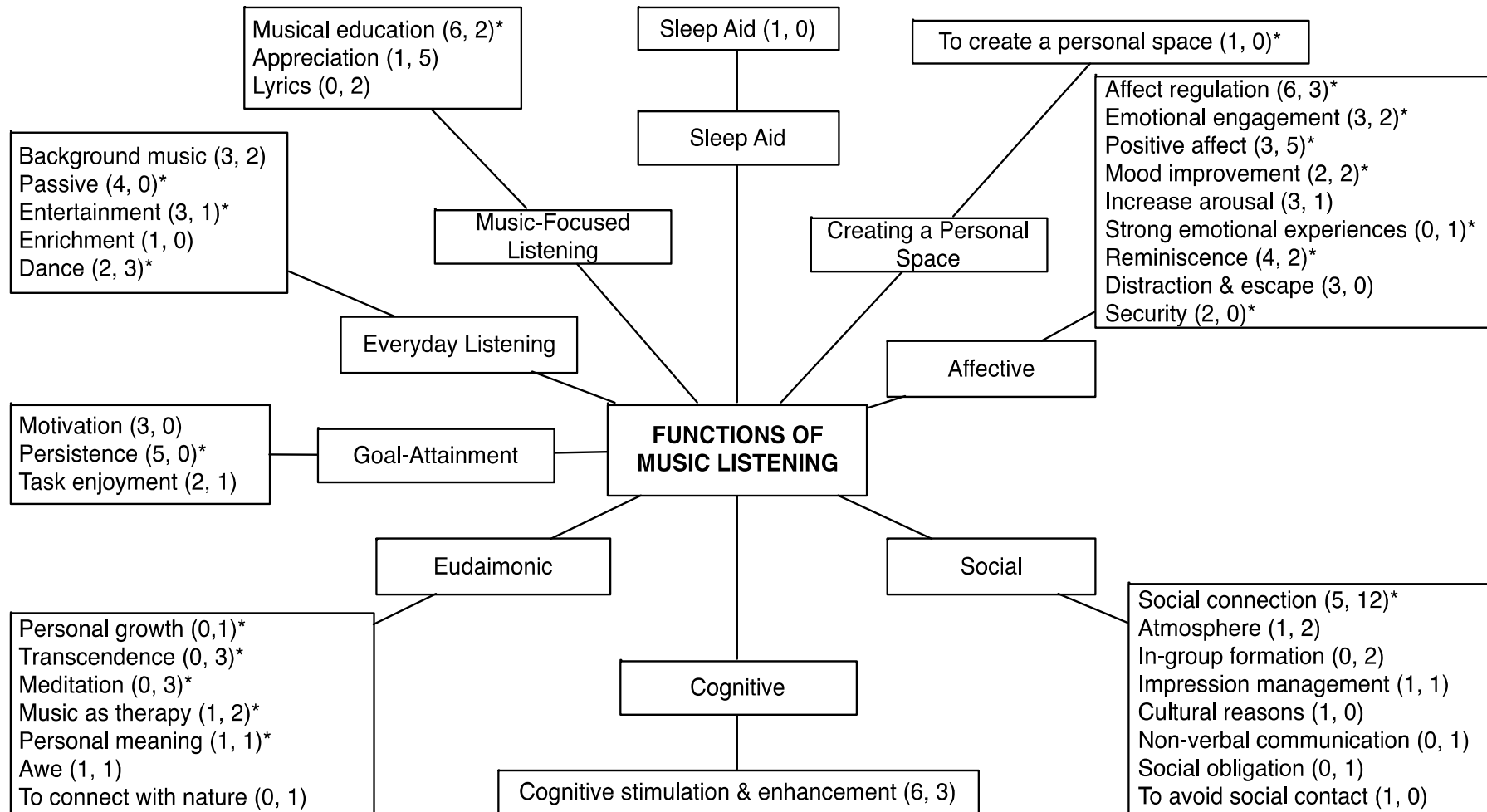


Figure 2.5. Schematic representation of FML generated across four IM sessions.

Note; Number of ideas generated in parentheses (younger adults, older adults); * = highly ranked FML included in enhancement structure

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A total of 19 categories across these themes were selected for Interpretive Structural Modelling. Different patterns of voting were observed at the aggregate level when younger and older adults were compared (see Figure 2.6).

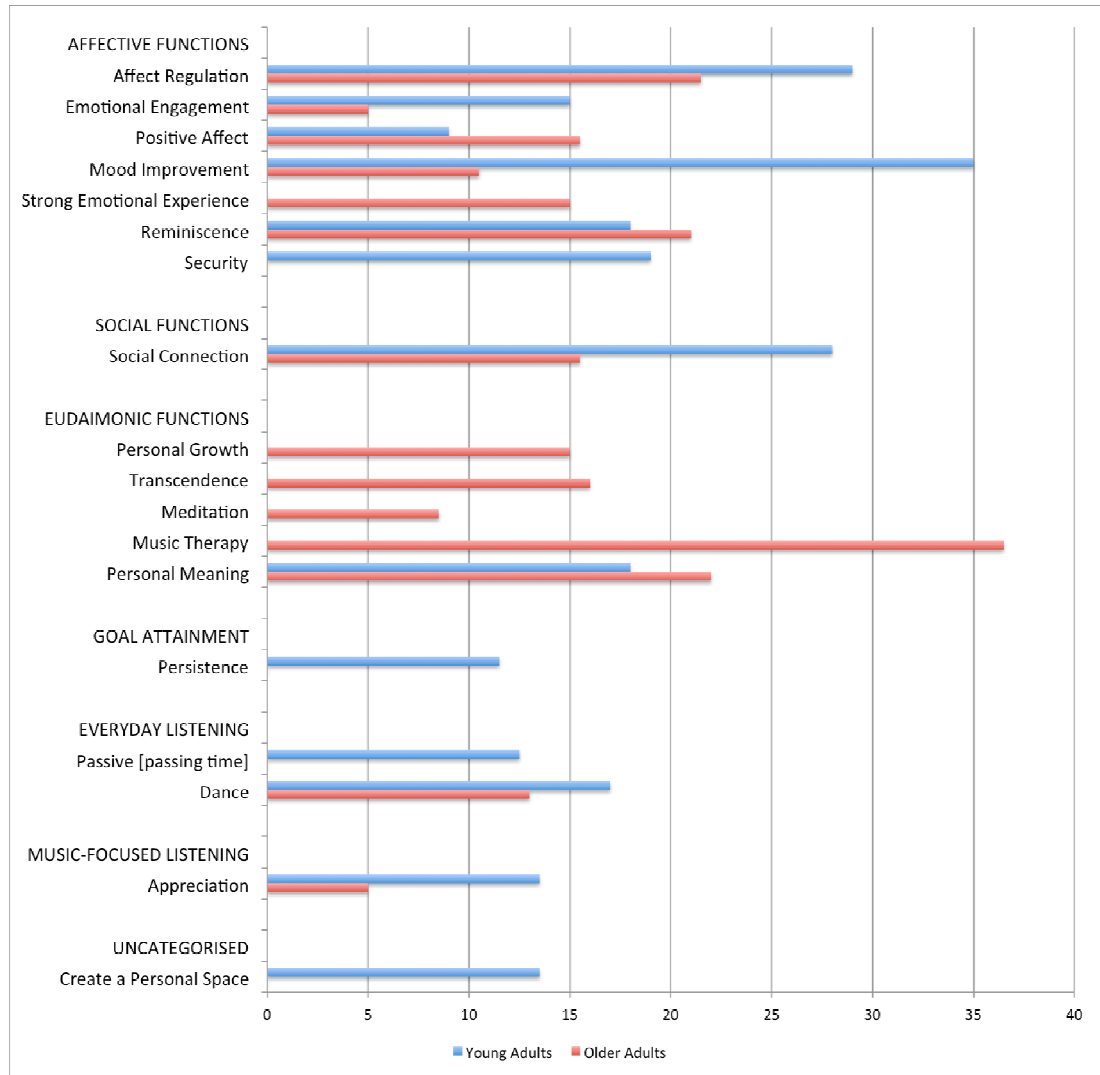


Figure 2.6. Age group differences in voting patterns for 19 top ranked categories of FML.

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2.6.3 Structural Analysis of Enhancement Structures

From across 19 of the 38 categories, a total of 32 music listening functions appeared in the enhancement structures, with 7 of the 9 higher order themes represented in the 4 models generated by younger and older adults.

A structural meta-analysis of the four models was conducted to develop a higher order influence map of categories of music listening functions for the sample as a whole, and for both age groups separately. In order to carry out this meta-analysis, the following scores were computed to estimate the influence of each category and higher-order theme in the system of music listening functions.

Position Score. Each structural map places ideas in stages (Broome, 1995). Ideas to the far right are assigned the lowest position score (i.e., 1) and those in the leftmost stage were assigned the highest score (i.e., depending on the number of levels in the structure). For example, in a four-level structure as in Figure 2.5, elements to the far left have a position score of 4.

Antecedent and Succedent Score. The antecedent score is the number of functions lying to the left of a particular function of music listening which enhance it. The succedent score is the number of functions lying to the right of a music listening function in the structure.

Net Succedent/Antecedent Score. The net succedent/antecedent (Net SA) score is the succedent score minus the antecedent score. If the Net SA score is positive, it means that the function is a net source of enhancement. If the Net SA score is negative, it means that the function is a net receiver of enhancement (Broome, 1995).

Influence Score. The influence score is the sum of the position score and the net SA score.

Influence scores were calculated for each of the 32 FML appearing in the four enhancement structures. Total category influence scores were then calculated by summing the individual element scores, and average category influence scores were

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then calculated by dividing this summed score by the number of elements in the category.

Based on these results, a model portraying adaptive music listening functions grouping categories based on similarity of influence scores is presented in Figure 2.7. Reading from left to right, FML in Level 1 relating to strong emotional experience, transcendence and creating a personal space through music listening exert the greatest degree of influence in the overall system of music listening functions. Level two contains music's meditative qualities and reminiscence experienced during music listening. Stage three includes listening to music to dance, to experience positive affect and to learn more about music. Stage four relates to music listening for affect regulation and mood improvement. Stage five includes music listening to support social connection, music's personal meaning, music as therapy, emotional engagement through music and music facilitated persistence. In stage six, the music listening functions of security, personal growth, passive music listening and listening for entertainment are seen as dependent on other music listening functions included in the model.

The meta-analytical model of influence scores in the younger adult sample is presented in Figure 2.8. FML related to reminiscence, creating a personal space and listening to music because of its personal meaning exert the greatest influence on succeeding music listening functions among young adults. Whereas music listening functions of security, entertainment and passive music listening are seen as highly dependent on the influence of other categories of music listening functions.

Figure 2.9 presents the meta-analytic influence model for older adults. Strong emotional experience and transcendence are seen as the most influential FML among older adults. Personal growth and Meaning then are considered receivers of enhancement in the context of music listening.

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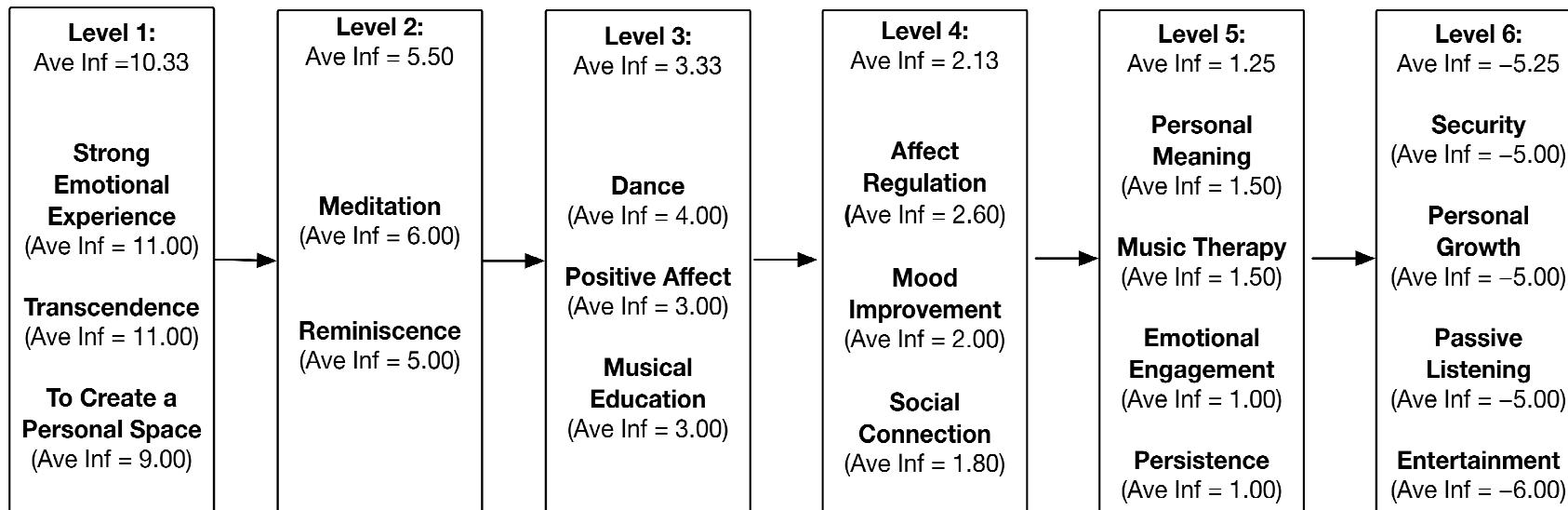


Figure 2.7. Overall model of influence for top ranked FML categories across 4 IM sessions combining younger and older adults.

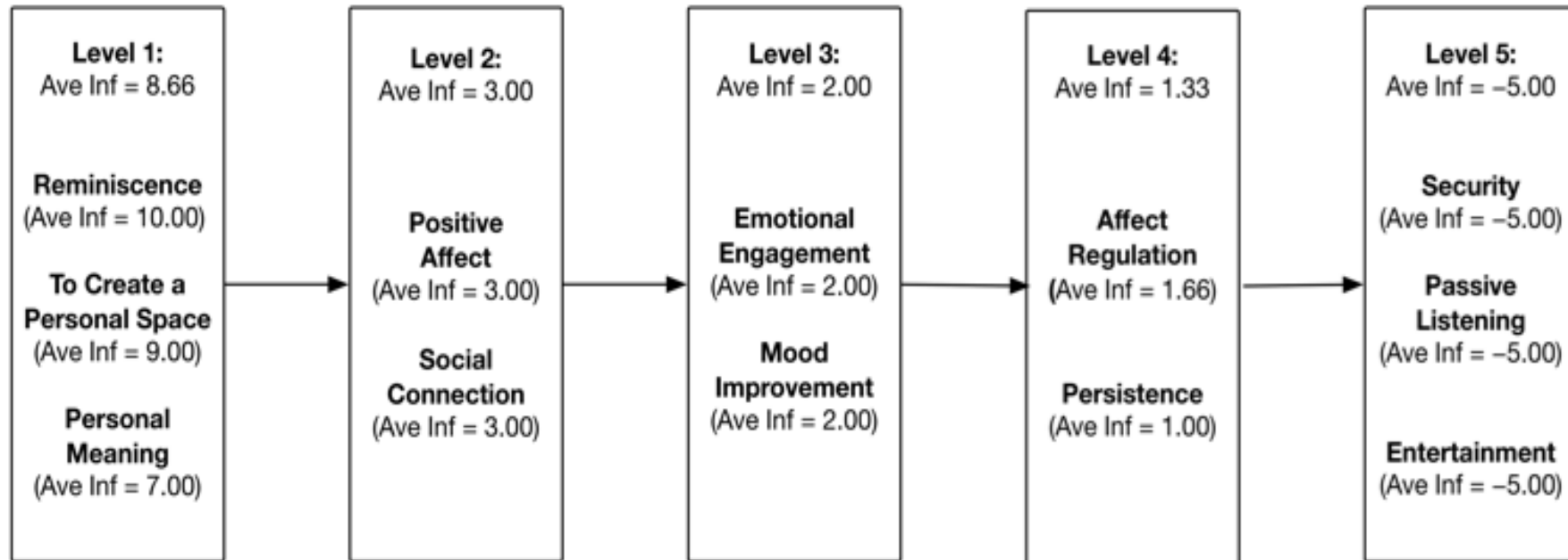


Figure 2.8. Younger adult category influence model.

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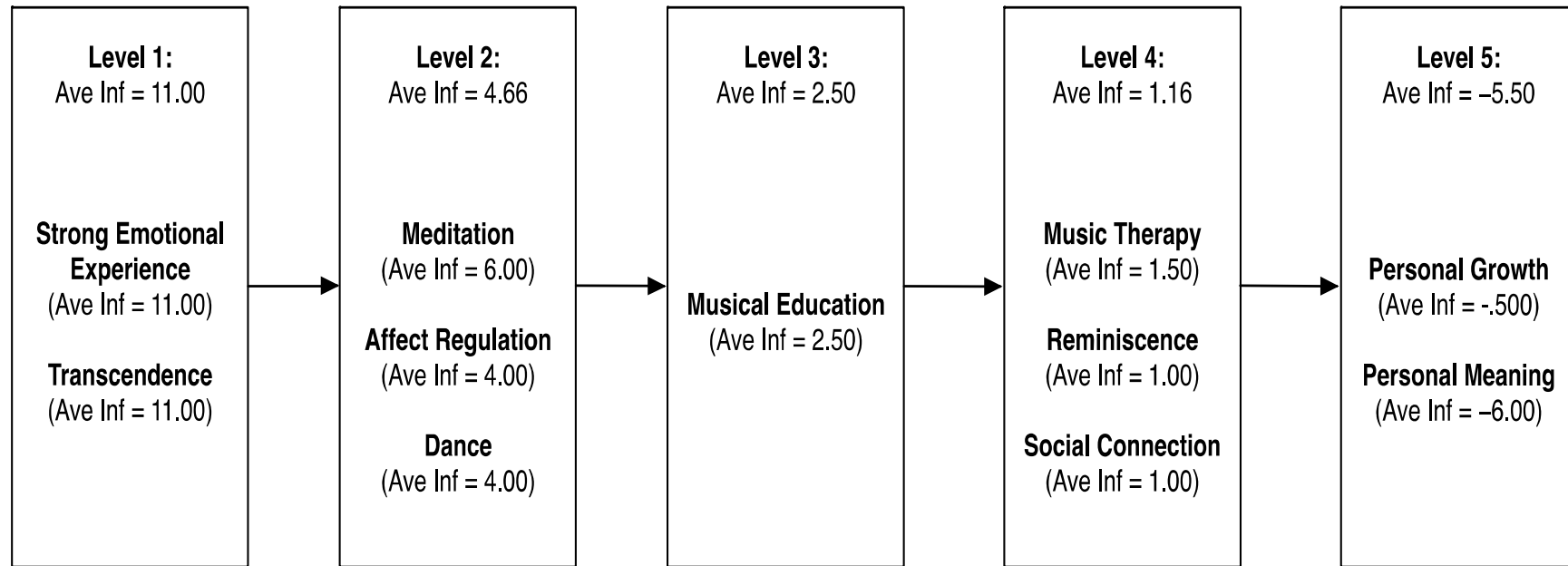


Figure 2.9. Older adult category influence model.

2.7 Discussion

The current study used the collective intelligence methodology, Interactive Management (IM), to identify, clarify, rank, categorise, and structure relations between the FML as described by younger and older adults. Participants identified a range of affective, cognitive and social FML commonly highlighted in the music listening literature. In addition participants identified some more diverse categories of FML, including eudaimonic functions and music-facilitated goal attainment. Notably, a total of 38 categories and 9 higher-order category themes of FML were identified. Younger adults identified more FML associated with affective experience and goal attainment. Conversely, older adults identified more FML related to transcendence and social functions. The top ranked FML for younger adults during the IM voting stage were mood improvement, social connection, and affect regulation, while the top ranked functions for older adults were music as therapy, personal meaning, and affect regulation. Furthermore, analysis of the structural models developed by younger and older adults suggested that the most influential FML for younger adults were reminiscence, personal space, and personal meaning, and the most influential FML for older adults were transcendence and the activation of strong emotional experience. The overall influence model (Figure 2.7) also highlights at a population level the relevance of strong emotional experience, transcendence and creating personal space as key drivers in adaptive music listening. The importance of specific categories of music listening functions and the logic of their possible interdependencies are discussed in more detail below.

Affective Functions

Affect regulation (stress reduction/relaxation) was found to be a common and highly endorsed FML by both older and younger adults in the current study. A wealth of previous studies have noted affect regulation as a core FML (e.g. Chin & Rickard, 2012; Laukka, 2007), and emphasised the importance of affect regulation for wellbeing (Gross & John, 2003; Lischetzke & Eid, 2003). In the idea generation phase, participants highlighted music's ability to influence mood. As expected, mood improvement was a highly valued FML for younger adults' wellbeing, whereas older adults focused more on the use of music to induce positive moods. These findings are

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consistent with previous studies which showed that listening to music for negative mood regulation was more common in younger samples (Lonsdale & North, 2011; Thayer et al., 1994), and may reflect older adults decreased experience of negative affect and increased positivity bias (Cartensen & Charles, 1999; Mroczek & Kolarz, 1998).

Furthermore, contrary to reports that affect regulation is the most important function of music listening (Juslin & Sloboda, 2010) results of the current study highlight that affect regulation is considered by younger and older adults as a secondary outcome of music listening that is enhanced by other music listening functions, such as transcendence and reminiscence (see Figure 2.8). The structuring work afforded by the IM methodology in this study contributes to our understanding of how younger and older adults consider musical affect regulation to be influenced by other functions in the broader context of listening to music to increase wellbeing.

In terms of coping with stress, both younger and older adults also argued that music listening is best used for dealing with everyday hassles rather than major stressors. This is in line with research demonstrating that the adaptive value of different regulatory strategies is dependent on the stressor (Folkman & Lazarus, 1980). In a crisis, a problem-focused approach might be favourable if the situation can be modified by taking action. However, in coping with situations that are long term, or those we cannot control, emotion-focused coping strategies aimed at regulating the emotions aroused by the stressor may be more appropriate: such as distraction, seeking pleasure, and withdrawal (Zakowski, Hall, Klein, & Baum, 2001). Music listening may play an important role in this context (Augustine & Hemenover, 2009).

Younger adults generated a greater variety of music listening functions relating to reminiscence. They distinguished between positive, spontaneous, purposeful, and less adaptive reminiscing, such as listening to ‘break-up’ songs. In line with *socio-emotional selectivity theory* (Cartensen, 1992) older adults in the current study spoke in more positive terms about reminiscence through music listening. Webster’s (2003) reminiscence circumplex describes the functions of reminiscence as being self versus socially focused, and loss or growth oriented. Reminiscence by music listening was deemed important for wellbeing by both younger and older adult groups, however

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age differences emerged in the way it was structured. Figure 2.8 reveals that for younger adults reminiscence is the most influential FML, enhancing all other functions, whereas, Figure 2.9 shows that older adults structured reminiscence at level four. For older adults reminiscence was enhanced by many FML including affect regulation and transcendence. However, reminiscence influences personal growth and personal meaning. Reminiscence through music listening then may be more growth oriented in old age, and may serve a more self-regulatory purpose in youth. A meta-analysis of reminiscence intervention studies with older adults have demonstrated some efficacy in improving wellbeing (Bohlmeijer et al., 2007), although it has also been found that the functions of reminiscence are differentially related to wellbeing (Cappeliez, Guindon, & Robitaille, 2008; O'Rourke, Cappeliez, & Claxton, 2011).

Social Functions

Overall, older adults generated significantly more ideas relating to social FML than younger adults; however a greater proportion of younger adults considered social connection through music listening as significant for their wellbeing. A potential explanation can be found by examining the overall influence models in Figures 2.8 and 2.9. For younger adults affect regulation and mood improvement were voted as the most significant categories of music listening functions for wellbeing. However, Figure 2.8 also reveals that younger adults considered social connection an important antecedent of affect regulation and mood improvement. In contrast, older adults reasoned that social connection is enhanced by successful affect regulation. This could suggest that older adults are using music to optimise available resources, such as their enhanced affect regulation abilities to compensate for losses in social activity, also providing partial support for predictions of the relative prominence of secondary control strategies in older adult music listening.

Reducing loneliness was a highly rated function of music listening for older adults in the current study. Social uses of music have been emphasised in the literature (Hargreaves & North, 1999; DeNora, 2000), and Keyes' (1998) model highlights the importance of social connection for wellbeing. Social isolation is often highlighted as a common problem in advanced age (Luo, Hawkley, Waite, & Cacioppo, 2012), and has been associated with poorer psychological functioning (Victor, Scambler, Bond,

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& Bowling, 2000). Although rates of social interaction decline from early to later adulthood, the quality of social connections becomes increasingly important as people age (Carstensen, 1992; Srivastava, John, Gosling, & Potter, 2003), and this may be expressed in, and supported by their music listening behaviours. Congruous with expectations derived from Cartensen's *socio-emotional selectivity theory* (1995), older adults in the current study spoke of listening to music to feel connected when separated from significant others (e.g. through bereavement or migration). While, younger adults spoke of music's positive role in social activities and bonding for wellbeing. Paradoxically, younger adults also endorsed the use music to avoid social connection, highlighting how music can be used to create a private space that limits social connection. Related uses of music have been highlighted by music sociology and technology (DeNora, 1999; Skanland, 2011). Younger adults provided examples of using music listening to evade awkward or unwanted interaction on public transport, in public places, and in distracting work environments. Although information seeking through new social networks is an important social motive in young adulthood (Cartensen, 1995) music may provide young adults with necessary respite from this type of interaction, which may become somewhat aversive over extended periods. Thus, it may be that young adults are using music to counteract the stresses of their more active social lives, while older adults are using music to compensate for and regulate feelings of social isolation. It could be argued then, that both younger and older adults are using music adaptively to meet their particular developmental needs.

Contrary to our expectations, identity development did not emerge as a significant function of music listening for either age group. It is possible that this particular FML is more important during early adolescence (North et al., 2000; Tarrant et al., 2000), and may be less relevant in old age when self-concept is more stable (Cartensen, 1991). However, a qualitative study carried out with Australian older adults did report listening to music as a way to understand the self and develop a sense of identity (Hays & Minichiello, 2005), and a survey study with older adults also found they reported listening to music for 'Identity & Agency' functions (Laukka, 2007). Having said that, identity FML also failed to emerge as a significant theme in a focus group study with younger adults (16-25 years) (Papinczak et al., 2015).

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Eudaimonic Functions

Piedmont (1999) states that older people have a more developed sense of transcendence due to a greater awareness of their mortality and an accompanying need to find meaning. As predicted, listening to music to experience a sense of transcendence was more common among older adults in the current study.

Transcendence has been associated with a number of benefits including happiness and meaning (Beaumont, 2005), increased life satisfaction in adolescents (Gillham et al., 2011), and reduced loneliness in older adults (Walton, Shultz, Beck, & Walls, 1991). In the structuring phase of this study older adults reasoned that affect regulation was a natural consequence of transcendence. Similarly, transcendent effects of music were put forth as a mechanism for music's affect regulation benefits by the participants in interviews conducted by van Goethem and Sloboda (2011).

Music was seen as a potent source of meaning for old and young participants. An analysis of the meta-analytic influence structures (Figures 2.8 and 2.9) highlights that for young adults meaning-related FML exert influence over all other adaptive FML. For older adults, music's meaning is dependent on the achievement of other adaptive music listening goals, including reminiscence. This is consistent with gerontology literature highlighting the importance of life review in meaning-making (Westerhof, Bohlmeijer, & Webster, 2010). Meaning is central to eudaimonic definitions of wellbeing (Seligman, 2012; Ryff, 1989), and it is argued that, like transcendence, older adults report higher levels of meaning in life (Steger et al., 2009) and a greater capacity for meaning-making (Bluck & Gluck, 2004; Ryff, 1989)

Goal-Attainment Functions

In the current study, younger adults generated more ideas than older adults regarding listening to music to facilitate goal attainment. This was achieved through enhancing motivation, persistence and task enjoyment. Younger adults voted 'persistence' as an important function of music listening for promoting wellbeing. They spoke of music helping them to keep going when exercising or working. Research suggests that persistence at work may support goal-pursuit and competence, both of which have been associated with SWB (Harris, Daniels, & Briner, 2003; Ryan & Deci, 2000). Age differences seen here may reflect the importance of achievement and

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competence to younger adult wellbeing, in contrast to the stronger eudaimonic FML emphasis in the older adult groups.

Limitations

The generalisability of these results is subject to certain limitations. For instance, the participants in this study were self-selected. Thus, it is possible that these participants hold more positive beliefs regarding music's relationship with wellbeing than the average music listener.

The logic captured in these models of FML represents the observations and experiences of lay people and may not correspond with the literature on music listening or wellbeing. However, the qualitative models generated in the context of IM sessions can be evaluated using quantitative modelling techniques grounded in survey-based measurement of the key FML identified by groups.

Age differences observed in the functions of music listening may be confounded by generational differences in the mode of music consumption (e.g. radio, mp3 player, streaming services). It is assumed that young adult participants predominantly use personal music listening devices. This may have an impact on the resultant listening experience (Krause, North, & Hewitt, 2013), but was not controlled for in the current study.

Conclusion

Older and younger participants believe music listening has an effect on their wellbeing. Contrary to models of wellbeing that emphasise emotional homeostasis, this study highlights the importance of strong emotional experiences, reminiscence and eudaimonic experiences - namely meaning and transcendence - as fundamental drivers of adaptive music listening in the service of enhanced wellbeing.

Developmentally based theories of FML may be needed to account for variations observed in music listening across the lifespan. Age differences in FML did not conform precisely with predictions derived from SOC or the Lifespan Theory of Control, perhaps denoting the unsuitability of these broader developmental frameworks for the field of music psychology. The *socio-emotional selectivity theory*

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did demonstrate some promise in guiding expectations of lifespan differences in uses of music, and this should be explored in greater depth in future research. A developmental frame of reference may help to understand the impact of music on wellbeing at different life stages, and the development of wellbeing broadly speaking. However, future research should also explore the role of individual differences in combination with developmental influences in predicting the selection and adaptivity of music listening behaviours.

Further, participants identified enhancement relationships between independent FML. These interdependencies would be difficult to capture using conventional qualitative methods. Previous research highlighted important FML, but the tendency to isolate discrete functions may have led to a belief that each function is an independent construct, oversimplifying the complexity of music listening behaviours and their interdependencies. While the exploratory nature of the current study precluded direct hypotheses being made - the models generated by older and younger adults provide at the very least some proof of principle of interdependencies in music listening functions in enhancing wellbeing.

The next chapter describes the development of a measure of music listening functions based on the ideas that emerged from these four collective intelligence sessions. Using the results of this study and an extensive literature review as a foundation, and to address limitations identified with existing measures of the FML (i.e., lack of consultation with music listeners in the development of scale constructs), Study 2 generated questionnaire scale items assessing each of the 38 categories of FML identified in the current study. Qualitative work has been identified as the ideal starting point for scale construction, particularly for item development and identifying valid domains to include in item pools (DeVellis, 2012; O'Brien, 1993; Rowan & Wulff, 2007). In Study 2, these items will be subjected to rigorous psychometric analysis to construct a multi-dimensional integrative measure of the FML.

3 CHAPTER 3

Study 2: Psychometric Exploration of The Adaptive Functions of Music Listening: Structure and Correlates

3.1 Purpose

Chapter 1 described the act of listening to music as a common behaviour engaged in by most people from childhood through to adulthood and into advanced old age. The results of Study 1 demonstrate that music listening may serve many adaptive needs of individuals across their lifespan. The purpose of this study is to develop a measure to assess music listening functions that is psychometrically robust, and suitable for outcomes-based research on music listening and wellbeing. Evidence reviewed in Chapter 1 highlighted a role for music in enhancing aspects of wellbeing, and the voting patterns in Study 1 also suggested that mood improvement, social connection, affect regulation, music as therapy, and personal meaning FML were most highly endorsed by listeners as adaptive for their wellbeing. A further aim of this study is to test these relationships quantitatively by examining correlates between FML and subjective, psychological, and social wellbeing outcomes.

3.2 Limitations of Existing Measures of the Functions of Music Listening

A number of issues with questionnaires measuring FML were highlighted in Section 1.3. Therefore, in the current study, we sought to advance psychometric practice in the creation of music listening measures by following guidelines for scale development advocated by DeVellis (2012). These guidelines involve following a series of steps in the scale development process, specifically, conducting a thorough review of the literature surrounding the constructs to be measured, generating an exhaustive item pool, selecting an appropriate response format, item evaluation by experts, application of both exploratory and confirmatory factor analysis in a large scale development sample, alpha reliability assessment, and optimising scale length.

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Notably, the majority of existing scales have not followed these guidelines. For instance, only one of the general FML measures identified in the literature (see Table 3.1) has replicated the dimensionality of the measure using Confirmatory Factor Analysis (CFA) in a separate sample of participants. The practice of conducting a confirmatory factor analysis (CFA) based on the results of an earlier Exploratory Factor Analysis (EFA) is recommended as part of the scale development process (Costello & Osborne, 2005; Fabrigar et al., 1999; Worthington & Whittaker, 2006).

A further limitation of existing measures is that when seeking to identify FML scale factors by EFA, researchers have employed Principal Components Analysis (PCA). PCA involves identifying a first principal component that accounts for as much of the variability in the data as possible, before extracting a second component accounting for as much of the remaining variance as possible under the constraint that it is orthogonal to the preceding component, and so on. However, PCA does not maximise discrimination of the full range of orthogonal factors. PCA is not a true measure of factor analysis, and should be applied for item reduction only, but not factor identification (Fabrigar, Wegener, MacCallum, & Strahan, 1999). Table 3.1 highlights that PCA has been used to uncover a latent factor structure for existing FML scales, without applying EFA. This is problematic.

A related issue with existing measures is that orthogonal rotation (e.g., varimax, equimax) was employed for scales where oblique rotation would have been preferable. Orthogonal rotation does not allow variables to correlate whereas oblique rotation does. It is reasonable to assume that factors measuring functions of music listening would be at least modestly related. Indeed many of the measures that use orthogonal rotation also report significant intercorrelations between the extracted factors. Further, the collective intelligence work in Study 1 highlighted that participants view adaptive FML as interrelated. In psychometric practice more generally, Costello and Osborne (2005) have recommended oblique methods (e.g. direct oblimin, promax) because they produce more nuanced, replicable, and accurate factor structures.

There are a number of existing scales that measure the functions of music-related activities more broadly, such as music reception and music production. These scales

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include questions measuring both the functions of music listening and the functions of music making. However, the functions underlying these different activities are not differentiated at the factor level (Chin & Rickard, 2012; Mas-Herrero et al., 2013; Werner, Swope, & Heide, 2006).

Finally, there are a number of scales that focus *a priori* on specific functions of music listening, such as affect regulation (Saarikallio, 2008; Hewston, Lane, Karageorghis, 2009; von Georgi, Grant, von Georgi, & Gebhardt, 2006), specific musical experiences such as absorption (Sandstrom & Russo, 2013), or related facets of the music listening experience like musical sophistication (Müllensiefen, Gingras, Musil, & Stewart, 2014) and preferences (Litle & Zuckerman, 1986). Existing general measures of the FML have also focused *a priori* on a limited number of constructs. For example, in creating The Barcelona Music Reward Questionnaire (Mas-Herrero et al., 2013), 112 items were developed to represent 6 constructs based on a review of the literature of music's rewarding effects (i.e., emotional evocation, sensory-motor behaviour, mood regulation, musical seeking, social reward, and musical memory). Following EFA and CFA, a 5 factor structure was confirmed, such that all proposed constructs, with the exception of musical memory, were retained in the final scale structure (see Table 3.1). Item development for FML measures has primarily been on the basis of a review of the literature on responses to music and findings from existing studies of the FML. Scale constructs and items for general FML measures have not been informed by music listeners. There is one exception, scale constructs for The Uses of Music Inventory (Chamorro-Premuzic & Furnham, 2007) were identified by focus groups and interviews with university students. Regrettably, the authors report insufficient information on this step in the scale development process, such as how many constructs were identified by participants, or the number of items administered and deleted prior to arriving at the final version of the scale. When music listeners are consulted directly (as in Study 1; Hays & Minichiello, 2005; DeNora, 1999; Herbert, 2011), in addition to mood regulation, a range of other potentially adaptive FML emerge, including eudaimonic and goal-attainment functions, and others, that may be retained as stable factors in factor analysis.

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Table 3.1 provides a summary of the psychometric properties of existing global measures of the FML identified in the literature. A review of existing measures suggests there is a need for a psychometric measure of the functions of music listening that incorporates a larger set of FML in a single multi-factorial scale.

3.3 Limitations of Existing Measures for FML and Wellbeing Research

In analysing the relationship between the FML and wellbeing outcomes, the wording of scale items in measures of music listening functions is important. We could ask people how frequently they use music for different aims or goals, or we could ask listeners whether they listen to music in search of certain benefits (e.g., *'To forget about your problems'*, Kuntsche et al., 2012). However, neither format tells us whether the respondents judge themselves to have successfully achieved specific functions of music listening. This is problematic when trying to determine whether particular functions of music are related to more general adaptive outcomes, and the diverse response formats used in FML scales to date may contribute to the mixed and often counterintuitive findings between self-reported FML and wellbeing outcomes in existing studies (see Section 1.3.1). A scale is needed to allow for measurement of the extent to which people judge a range of specific goals to be achieved by listening to music.

Successful goal pursuit has important implications for wellbeing. The broad meta-theories of regulation, such as the *Lifespan Theory of Control* (Heckhausen, 1995), and the model of selective optimisation with compensation (SOC; Baltes & Baltes, 1990) previously described propose that individuals engage a range of behavioural and cognitive strategies to affect change in the environment and within the self. These strategies are considered functional and adaptive to the extent that specific goals are achieved. These theories propose that optimum development and wellbeing is driven by the successful use of these life management strategies. By consulting directly with music listeners as in Study 1, FML can be viewed as goals individuals have identified as adaptive. In line with Social Cognitive Theory, people may have higher or lower perceived self-efficacy in relation to achieving these goals (Bandura, 1989). Similarly, in line with developmental theories, the extent to which people are

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successfully pursuing these goals should relate broadly to their positive psychological functioning.

Bandura's Social Cognitive Theory (1989; 2001) described in Chapter 1 (see Section 1.3) provides a useful basis for the wording of scale items measuring key FML. According to this theory, outcome expectations guide our future actions and our potential for success in performing those actions. In order to repeatedly and successfully pursue key FML, music listeners must believe their actions can bring about predictable outcomes in the form of self or environmental regulation. The likelihood that they will act on their outcome expectations and carry out these behaviours depends on their efficacy beliefs, specifically, that by taking action a desired outcome will be achieved. For these reasons, *The Adaptive Functions of Music Listening Scale* (AFML scale) asks participants to rate their level of agreement with statements about the efficacy of achieving a range of potential adaptive outcomes when listening to music. This allows researchers to test the hypothesis that endorsing an adaptive function of music listening is indeed associated with an adaptive outcome, such as the enhancement or maintenance of wellbeing.

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Table 3.1. *Psychometric properties of general measures of Functions of Music Listening*

| Name of Measure | Author (year) | Item Development | Item wording | Response Format | Factor Analysis | Factor Structure |
|--|--------------------------------------|---|---------------------|------------------------|--|--|
| Uses of Music Inventory | Chamorro-Premuzic & Furnham (2007) | <ul style="list-style-type: none"> • Unknown number of items - 3 FML constructs • Literature review • Focus groups, interviews with students to identify constructs | Effect of music | Agreement | Sample 1 • PCA • Varimax rotation | 1 Emotional Uses of Music (5 items) 2 Rational/Cognitive Uses of Music (5 items) 3 Background Use of Music (5 items) 15 items |
| Music USE questionnaire: Music Engagement Styles | Chin & Rickard (2012) | <ul style="list-style-type: none"> • 124 items - 4 FML constructs • Literature review • Focus groups to evaluate face validity of items (music psychology scholars and students) | Effect of music | Applicability to me | Sample 1. • PCA • Varimax rotation Sample 2. • EFA (Maximum Likelihood Extraction) • Varimax rotation | 1. Cognitive & Emotional Regulation (7 items) 2. Engaged Production (9 items) 3. Social Connection (3 items) 4. Dance (2 items) 5. Physical Exercise (3 items) 24 items |
| Motives for Listening to Music Questionnaire | Kuntsche, Le Mevel, & Berson, (2016) | <ul style="list-style-type: none"> • 12 items - 4 FML constructs • Adapted from the Motivational Model of Alcohol Use (Cox & Klinger, 1988) | Outcome sought | Frequency of use | Sample 1. • CFA | 1. Enhancement (3 items) 2. Coping (3 items) 3. Social (3 items) 4. Conformity (3 items) 12 items |

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| | | | | | | |
|--|--|--|-----------------|--|---|---|
| The Music Experience Questionnaire | Werner, Swope, & Heide, (2006) | <ul style="list-style-type: none"> • 141 items - unknown number of FML constructs • Literature review • Discussion to evaluate face validity of items (musicians, non-musicians, and music psychology students) | Effect of music | Accuracy of statements describing their reactions to music | <p>Sample 1.</p> <ul style="list-style-type: none"> • Item reduction by item to scale analyses <p>Sample 2.</p> <ul style="list-style-type: none"> • EFA (Principal Factors Analysis) • Varimax rotation | <p>1. Affective reactions (7 items)</p> <p>2. Positive psychotropic effects (16 items)</p> <p>3. Reactive musical behaviour (9 items)</p> <p>4. Commitment to music (7 items)</p> <p>5. Innovative musical aptitude (7 items)</p> <p>6. Social uplift (4 items)</p> <p>53 items</p> |
| The Barcelona Music Reward Questionnaire | Mas-Herrero, Marco-Pallares, Lorenzo-Seva, Zatorre & Rodriguez-Fornells (2013) | <ul style="list-style-type: none"> • 112 items - 6 FML constructs • Literature review • Focus groups to evaluate face validity of items (musicians and non-musicians) | Effect of music | Agreement | <p>Sample 1.</p> <ul style="list-style-type: none"> • EFA of polychoric correlation matrix • Oblique rotation <p>Sample 2.</p> <ul style="list-style-type: none"> • CFA | <p>1. Emotional Evocation (4 items)</p> <p>2. Sensory-Motor (4 items)</p> <p>3. Mood Regulation (4 items)</p> <p>4. Musical Seeking (4 items)</p> <p>5. Social Reward (4 items)</p> <p>20 items</p> |

3.4 Scale Development

As noted, many existing FML scales have focused on affect regulation. Engaging music listeners directly in Study 1 revealed a much broader range of FML, and suggests the need for a more integrative FML scale. The framework informing construct and scale development in the current study was informed by Study 1. The categorisation of the FML based on conceptual similarity (see Figure 2.5) was refined for item development (see Figure 3.1 below) by synthesising available research linking music listening and wellbeing, and by drawing upon established wellbeing theories (see Figure 1.1). At the same time, the application of exploratory and confirmatory factor analysis is needed to establish the psychometric properties of scale items reflecting the range of FML in Figure 3.1.

Four scale developers acted as content experts and were invited to review the scale items created from Study 1 data. Evaluation of items and constructs by expert reviewers is an essential step in scale development (DeVellis, 2012). Reviewers were asked to rate each item for clarity and relevance, and were asked to comment on the comprehensiveness of the hypothesised model. Based on feedback from expert reviewers and a review of the literature a number of modifications were made to the overall conceptual model generated by a synthesis of the participant data in Study 1 (i.e., Figure 2.5). These include the introduction of identity functions, due to their prominence in the research literature (Laukka, 2007; Lonsdale & North, 2011; North et al., 2000). Furthermore, although participants in Study 1 did not describe affect-specific regulation strategies, on the basis of expert review of an initial pool of scale items, it was suggested that each affect regulation strategy highlighted in Figure 3.1 was linked to four different affective states -- *Anger*, *Anxiety*, and *Sadness/depression*, -- drawn from a well-established measure of mood (Profile of Mood States; McNair, Lorr, & Droppleman, 1981) - and also *Stress* coping was added, which is distinct from mood regulation (Scherer, 1984). Based on existing research literature, the cognitive FML were also expanded to include functions relating to music-focused listening identified in Study 1, such as analysis (Chamorro-Premuzic & Furnham, 2007). In addition, following expert review the eudaimonic function of awe was combined with the cognitive function of appreciation. Sleep was reconceptualised as an everyday listening function instead of an independent factor. Finally, FML relating to creating a personal space via music listening was deemed not sufficiently relevant by content

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reviewers, and was thus dropped from the construct framework. Section 3.4.1 below provides an overview of the factors in Figure 3.1.

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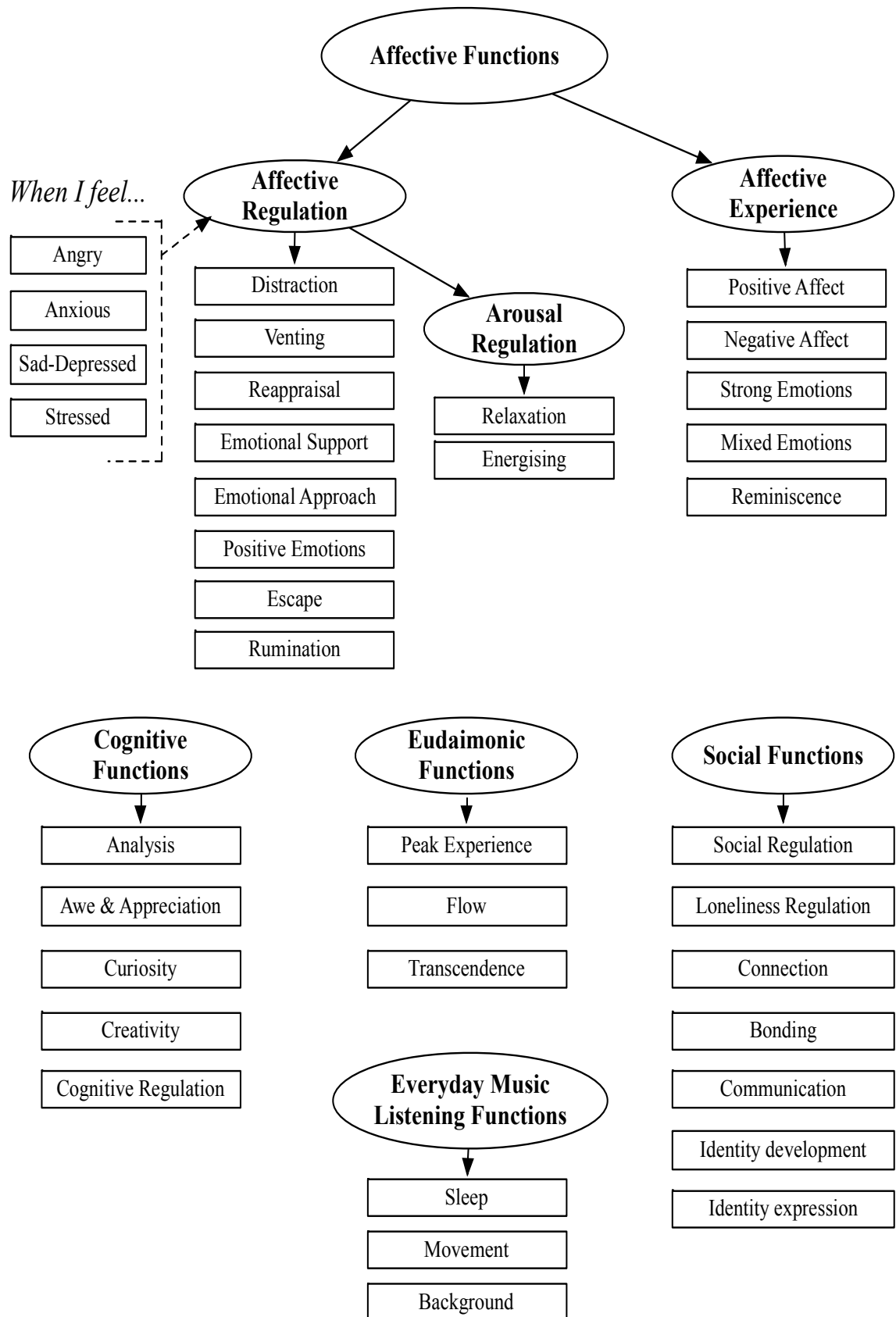


Figure 3.1. Hypothesised factor structure of The Adaptive Functions of Music Listening Scale

3.4.1 Construct validity

The construct validity of a measure is assessed by forming theoretically-based hypotheses regarding potential relationships with other measures (Carmines & Zeller, 1979). The review of existing global measures in Section 3.2 (see Table 3.1) suggests no gold-standard measure of FML currently exists, as such criterion-related validity cannot be assessed. Instead, construct validity will be assessed using convergent validity, that is, how closely scores on the measure under development converge with scores on other measures of related constructs (Furr & Bacharach, 2008). Significant associations should be observed between FML constructs as measured by the AFML scale and measures of affect, affect regulation, and wellbeing, in line with theory and research reviewed in Chapter 1 and summarised below. A measure's construct validity can also be established using concurrent validity, that is, by demonstrating even greater convergence with scores on other measures of the same construct. In the current study the well-validated measure of affective, social, and cognitive FML - The Music USE Questionnaire (MUSE) (Chin & Rickard, 2012) will be employed to test the concurrent validity of the AFML scale.

Affective Functions

As stated, affective functions, such as mood and emotion regulation, are the most commonly reported reasons for music listening (Schäfer et al., 2013; Tarrant et al., 2000). Wellbeing research and theory highlights important distinctions between positive and negative affective experiences, between affective experience and affective regulation, and distinguishes between subjective, psychological, and social dimensions of wellbeing. Scale items on existing FML measures have not been developed in line with these distinctions. This limits our ability to make theoretically-derived hypotheses regarding potential relationships between these discrete FML and wellbeing outcomes.

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Affective Experience. Affective experiences are distinguished by valence (positive and negative) and arousal (high arousal and low arousal) dimensions (Russell, 1980; Watson & Tellegen, 1985), and many studies have demonstrated that music listening can induce a range of affective experiences that vary along these dimensions (Juslin et al., 2008). However, existing FML measures have not always distinguished affective experiences in music listening along these dimensions. For example, The Barcelona Music Reward Questionnaire; (Mas-Herrero et al., 2013) includes an affective factor measuring *emotional evocation*, which includes general items such as “I get emotional listening to certain pieces of music”. The Uses of Music Inventory (Chamorro-Premuzic & Furnham, 2007) includes a factor to measure *emotional use of music* - participants rate their agreement with statements such as “Listening to music really affects my mood”. Such items become problematic when trying to predict relationships between FML factor scores and wellbeing, as they do not distinguish the valence of the emotion referred to, and research shows that positive and negative affective experiences can independently predict wellbeing outcomes (Diener, Larsen, Levine, & Emmons, 2004).

Experimental and qualitative studies of music listening also highlight that the stimulation of affective experiences can be positively and/or negatively valenced. Affective responses can also include strong, mixed, and intense emotional experiences (Gabriellsson, 2010; Schäfer, Smukall, & Oelker, 2014) and affective experiences like reminiscence or nostalgia (Study 1; Sloboda, 1999; 2001). Although the factor analysis methods used are often problematic, when items measuring these experiences have been included in factor analyses they have not emerged as independent factors -- instead they have often loaded with other items measuring affective experience and regulation (Chamorro-Premuzic & Furnham, 2007; Werner et al., 2006). For instance, using item to scale analysis in conjunction with EFA, Werner, Swope and Heide (2006) found the following item measuring reminiscence “hearing a song will sometimes bring to mind a period of my life” loaded on the ‘affective reactions’ subscale of The Music Experience Questionnaire. If determined as independent factors using alternative item pools and alternative factor analysis methods, the extent to which distinct affective goals are successfully pursued may differentially influence wellbeing outcomes, and may relate to both higher positive and negative affect. And importantly, it should not be assumed that negative

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emotions, especially those experienced in music listening, are necessarily detrimental to adaptive psychological functioning (Gruber, Mauss, & Tamir, 2011; Van den Tol & Edwards, 2013). While key affective FML may relate to a greater experience of negative affect (NA), given the independence of positive and negative affective experience, pursuing NA experiences during music listening may not relate to reduced positive affect (PA), life satisfaction, or psychological and social wellbeing more generally (Diener et al., 2004). Again, these considerations highlight the importance of developing an FML scale that distinguishes a range of affective FML.

Affective Regulation. Affect regulation strategies influence the frequency and intensity of ongoing affective experience (Folkman & Lazarus, 1988). As noted above, positive and negative affect experiences in music listening may relate differentially to wellbeing, whereas, the successful regulation of NA in music listening should relate to increased wellbeing. However, with the exception of The Barcelona Music Reward Questionnaire (Mas-Herrero et al., 2013) FML scales have not distinguished between affective experience and affective regulation FML.

Every FML measure reviewed in Table 3.1 has extracted at least one affect regulation factor. However, a drawback of these global FML scales is that affect regulation factors do not always enable simultaneous measurement of the strategies by which music can regulate negative affective experiences. For example, items measuring *cognitive and emotional regulation* on the MUSE questionnaire include “I often listen to music when I’m feeling down” and “Specific types of music makes me feel better” (Chin & Rickard, 2012). Other questionnaires point to more specific strategies of regulation measured, but do not distinguish them in the form of discrete factors. For instance, the four items of the *mood regulation* factor on the Barcelona Music Reward Questionnaire (Mas-Herrero et al., 2013) measure the diffuse strategies of company, relaxation, and comfort. In the Motives for Listening to Music Questionnaire developed by Kuntsche et al. (2016) items measuring ‘enhancement’ and ‘coping’ motives for music listening were adapted from a model of motivations for alcohol consumption and ask respondents how often they listen to music to forget and to generate positive emotions (e.g., “to cheer up”).

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At the same time, music psychology research has pointed to a substantial range of different strategies listeners use to regulate affective experience, such as relaxation, distraction/diversion, venting/discharge, mental work/rational thinking, solace/comfort, and rumination (Saarikallio, 2011; Saarikallio & Erkkila, 2007; van Goethem & Sloboda, 2011). Some of these strategies correspond with the general affect regulation literature described in Section 1.1, which, in the context of mainstream health psychology points to various behavioural and cognitive, emotion-focused and problem-focused regulation strategies (Carver, 1997; Carver, Scheier, & Weintraub, 1989; Lazarus & Folkman, 1984; Gross, 1998; Larsen, 2000). Item development for the AFML scale builds upon this theoretical and empirical research and proposes a diverse and comprehensive range of regulation strategies by which listening to music may regulate NA (see Figure 3.1). The wider literature also suggests regulation strategies may vary in terms of their relationship with wellbeing outcomes (Aldao et al., 2010; Gross & John, 2003). Therefore, including diverse affect regulation FML in scales will be useful for research questions regarding the efficacy of different musical affect regulation strategies for wellbeing enhancement. Given the importance of affect regulation for wellbeing, it is expected that affect regulation FML will be associated with higher SWB, specifically, lower negative affect, higher positive affect and higher reported life satisfaction.

Social Functions

Most existing measures of the FML have extracted a factor relating to social functions of music (see Table 3.1). Factors measuring increased connection and bonding between listeners over shared musical tastes and group listening experiences have been determined (Chin & Rickard, 2012; Mas-Herrero et al., 2013). Other measures have focused on the value of music in social situations, such as increased atmosphere and celebration (Kuntsche et al., 2016). Therefore, music listening may have an important function in the development and maintenance of positive relationships with others. At the same time, using existing measures, the relationship between the social functions of music and wellbeing outcomes have not been firmly established. For instance, in one study, the factor measuring *social connection* on the MUSE questionnaire (Chin & Rickard, 2012) was not associated with enhanced subjective, psychological or social wellbeing; rather it was significantly associated

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with increased use of the emotion regulation strategy of suppression, which predicted lower levels of wellbeing (Chin & Rickard, 2014a). A survey study of younger adults by Papinczak et al. (2015) found that higher social wellbeing was predicted by the total effect of four FML (i.e., relationship building, immersing in emotions, modifying emotions, modifying cognitions). As outlined in Section 1.2.3, theoretically, social FML should be related to greater psychological wellbeing (Ryff & Keyes, 1995) and social wellbeing (Keyes, 1998), empirical support however is lacking.

In relation to identity, although further scale development work was not undertaken, identity functions of music listening have been extracted using PCA in survey studies with adolescent (Lonsdale & North, 2011) and older samples (Laukka, 2007). In line with theory and research, outlined previously (Sections 1.3.2 and 2.2) it is predicted that if identity FML are uncovered in factor analysis, they may relate to greater subjective wellbeing through increased positive affect (Kahn et al., 1985), and higher psychological wellbeing through increased self-acceptance, psychological growth, and meaning (Haslam, Jetten, Postmes, & Haslam, 2009; Pennebaker & Seagal, 1999; Ryff, 1989).

Eudaimonic Functions

Previous investigations, including Study 1, have uncovered a number of FML that could be described as eudaimonic functions. These include music-induced peak experiences (Maslow, 1999; Gabrielsson, 2010), transcendence (Hays & Minichiello, 2008; Schäfer et al., 2014), and engagement or flow (Lamont, 2011; Study 1). Participants in Study 1 voted that a number of these FML (i.e., transcendence and meaning) were beneficial for wellbeing enhancement. Outside of musical contexts, such eudaimonic experiences, particularly transcendence, have been associated with increased happiness and life satisfaction, and greater meaning in life (Gillham et al., 2011). Empirical studies of FML have tended not to include items to measure these eudaimonic functions, thus it remains to be seen whether eudaimonic experiences in music listening also relate positively to subjective, psychological, and social wellbeing outcomes.

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Cognitive Functions

Factors relating to listening to music for its cognitive effects are a focus of existing measures of the FML (Chamorro-Premuzic & Furnham, 2007; Chin & Rickard, 2012). Cognitive functions include music analysis (Chamorro-Premuzic & Furnham, 2007), and it is possible that the pleasure derived from the analysis of music may relate to enhanced SWB. A more reflective style of music listening may also provide a sense of awe and appreciation, stimulating self-reflection and insight (Cupchick, 1994; Study 1), which may theoretically relate to higher psychological wellbeing (Ryff & Singer, 2008).

The use of music to regulate cognitive states like curiosity and creativity, as well as focus, attention, and motivation have been noted in surveys (North et al., 2000; Tarrant et al., 2000) and measures of the FML (Chamorro-Premuzic & Furnham, 2007; Chin & Rickard, 2012). These effects of music may support listeners in the achievement of everyday goals that depend on cognitive engagement and proficiency (DeNora, 2000; Study 1). Goal-attainment and achievement are central to models of wellbeing (Ryan & Deci, 2000; Seligman, 2012), and have been related to emotional wellbeing in empirical research (Schultheiss et al., 2008). Therefore the pursuit of such cognitive goals by music listening may also relate to increased wellbeing. This view is consistent with some available research. For example, the *cognitive and emotion regulation* factor on the MUSE questionnaire was associated with higher subjective, psychological and social wellbeing (Chin & Rickard, 2014a; 2014b). These effects were fully mediated by increased use of the affect regulation strategy reappraisal. Qualitative research has also proposed that cognitive regulation in music may support affect regulation goals (DeNora, 1999; Papinczak et al., 2015). Thus, it is hypothesised that cognitive FML may be associated with higher self-reported wellbeing in the current study.

3.5 Design

The current scale development study involved two phases: Firstly, the development phase involved item generation, assessing the dimensionality of the measure using EFA, reducing the initial pool of questionnaire items, and examining the reliability and construct validity of the AFML scale. The second phase involved confirming the factor structure derived from EFA in a separate sample of participants (recruited nine months later). In the first phase construct validity was assessed by testing hypothesised relationships between AFML factors and subjective wellbeing outcomes. In the second confirmatory phase additional relationships between FML factors and psychological and social wellbeing outcomes were examined, in addition to relationships with an existing general measure of music listening functions, and a general measure of emotion regulation.

3.6 Method

3.6.1 Initial Scale Development

Item generation. 240 items were generated on the basis of an extensive literature review and four focus group sessions, with two younger adult groups ($N = 25$, $M = 22.49$ years, $SD = 2.25$) and two older adult groups ($N = 19$, $M = 65.86$, $SD = 4.46$). At least five items and one reverse scored item were generated for 38 hypothesised functions of music listening.

Content Validity. Four content experts (3 in music psychology, 1 in psychometrics) responding to an online questionnaire rated these 240 items for their clarity, relevance, and comprehensiveness. The experts made a number of suggestions to increase the clarity and meaningfulness of items, removal of redundant items, and restructuring of the affect regulation subscales to allow for more differentiated responding (as described in Section 3.4). Overall, 164 items were rated by experts as relevant and were retained for EFA and a revised model was generated (see Figure 3.1).

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Pilot Testing. The 164 item AFML measure was administered to 9 ‘lay experts’, or potential participants (4 male, 18-30 years, $M = 21.55$, $SD = 4.80$) for pilot testing. All 164 items were rated as very or quite clear. Although participants rated the items highly, they also reported that the questionnaire was long and repetitive in certain respects. However, all items were retained for factor analysis in order to identify the highest quality items for inclusion in the final AFML scale. DeVellis (2012) and Wood et al. (2008) emphasise the need for a large pool of items, and multiple indicators for each hypothesised construct at the development stage. Therefore, multiple indicators (including 1 reverse scored item) representing each of the remaining 33 hypothesised FML were administered to a development sample for item reduction and EFA (see Appendix C).

3.6.2 Scale Development

Participants

Participants were invited to take part in an online survey of why they listen to music via online advertisements, university email campaigns, and national media.

Development Sample. In the development phase, 1396 participants consented to take part. 673 participants (452 Females) completed the online questionnaire packet (48% completion rate).

Confirmatory Sample. Of 1267 prospective participants who consented to take part in the online questionnaire at the confirmatory stage, 47% completed it ($N = 597$ participants, 413 Females).

73% of the development sample and 55% of the confirmatory sample were undergraduate psychology students receiving research participation credit. Thirty seven participants who did not select the correct response to a ‘red herring’ question were removed from the EFA analysis. The 637 respondents included in EFA analyses were mostly female (68%) university students (98%). Thirty two participants were removed from confirmatory analyses, and the remaining 554 participants were mostly female (69%) university students (87%).

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Measures

Development Sample. In addition to demographic questions (i.e. age, gender, educational, and occupational status), participants completed the following measures:

The Adaptive Functions of Music Listening Scale - (The AFML scale). Participants rate their level of agreement with 164 items representing outcome expectations of a range of music listening functions using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The AFML scale has a Flesch-Kincaid Grade level of 5 and a Flesch Reading Ease score of 83.8 placing it in the 'easy' range (Flesch, 1948; Kincaid, Fishburne, Rogers & Chissom, 1975).

Music Engagement Intensity Subscale of the Music USE Questionnaire (MUSE) (Chin & Rickard, 2012). This 8 item measure provides 3 indices of music engagement. Scores range from 1-25 on the Index of Music Listening (IML), with higher scores indicating more intense music listening. The Index of Music Training (IMT) assesses an individual's music education, higher scores indicate more musical training. The Index of Music Instrument Playing (IMIP) provides a total score based on respondents' years of instrument playing, hours of practice per day and regularity of practice. Higher scores represent greater engagement with instrument playing.

Subjective Wellbeing:

Positive and Negative Affect Schedule (PANAS) (Watson, Clark, & Tellegen, 1998). The PANAS consists of 20 adjectives: 10 describe positive emotions and 10 describe negative emotions. Participants indicate the extent to which they have experienced these emotions in the previous week, using a Likert scale ranging from 'very slightly or not at all' (1) to 'extremely' (5). Two sub-scale scores are derived, with higher scores indicating greater positive and negative affect, respectively.

The Satisfaction with Life Scale (SWLS) (Diener, Emmons, Larsen & Griffin, 1985). Participants indicate their level of agreement with 5 life satisfaction statements, using a 7-point scale that ranges from 7 (strongly agree) to 1 (strongly disagree).

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Confirmatory Sample. In addition to the measures completed by participants in the development phase, the participants in the confirmatory sample completed a number of additional measures to further assess construct validity:

Adaptive Functions of Music Listening Scale - A shortened version of the AFML scale with 48 items was administered (based on EFA results). Responses to statements of potential outcomes of music listening were made on a 5 point Likert-scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Subscale scores are calculated by averaging scores across items.

Mental Health Continuum- Short Form (MHC-SF) (Lamers et al., 2010). The MHC-SF is a 14 item measure of positive psychological functioning. It assesses three dimensions of wellbeing: Emotional, Psychological and Social wellbeing. Respondents rate the frequency of various feelings of wellbeing on a 6-point Likert scale (never - everyday) and scores are then summed. The emotional wellbeing dimension is an alternative 3-item measure of SWB, thus only Psychological and Social wellbeing scores on the MHC-SF will be presented.

The Music USE Questionnaire (MUSE) (Chin & Rickard, 2012). The Music Engagement Styles (MES) subscales measure five styles of music listening. These styles are (i) cognitive and emotional regulation, (ii) engaged production, (iii) social connection, (iv) physical exercise, and (v) dance. Respondents rate their agreement with a series of statements (e.g., “I often listen to music when I’m feeling down”) on a 6-point Likert scale from ‘0’ (not at all/not applicable to me) to ‘5’ (strongly agree). Scores are summed.

Emotion Regulation Questionnaire (ERQ) (Gross & John, 2003). The ERQ is a 10 item measure composed of two subscales: Reappraisal and Suppression. Reappraisal is the cognitive restructuring of thoughts to increase positive and reduce negative emotions, whereas suppression involves inhibiting the expression of emotion. Scores, ranging from 1 (strongly disagree) to 7 (strongly agree), are summed for each subscale.

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Descriptive statistics and Cronbach's alpha for all of the measures included in this study with both samples of participants are presented in Table 3.2.

Analysis

Exploratory Factor Analysis. An Exploratory Factor Analysis (Principal Axis Factoring) was carried out using SPSS version 22. Factors representing music listening functions were expected to correlate thus oblique rotation using Direct Oblimin with Kaiser Normalization was deemed appropriate. The Kaiser Meyer-Olkin measure ($KMO = .95$), and a significant Bartlett's test of sphericity ($\chi^2_{(1035)} = 17454.06, p < .001$) indicated suitability of the dataset for factor analysis. Factor retention decisions were made on the basis of Horn's parallel analysis (1965), the Kaiser criterion (Eigenvalues greater than 1) (Kaiser, 1960), visual inspection of the Scree plot (Cattell, 1966), the proportion of variance explained (Beavers et al., 2013), as well as conceptual considerations. Consistent with standard practice, items were retained if they had loadings in excess of .40, no cross-loadings above .32, and item communalities over .40 (Worthington & Whittaker, 2006). Each factor was assessed for the presence of redundant items, and within factors inter-item correlations were between .30 and .90. Item-total correlations were required to be above .30 to allow averaging of factor scores without applying item weights (Field, 2009).

Confirmatory Factor Analysis. In a separate confirmatory sample of participants, CFA was conducted using Structural Equation Modelling (SEM) in Amos version 23 (Arbuckle, 2014). Model fit was assessed using a number of indices. Firstly, a non-significant chi square test is indicative of a well-fitting model. The normed chi-square (Q) is the chi square index divided by the degrees of freedom: acceptable criteria vary from under 2 (Ullman, 2001) to less than 5 (Schumacker & Lomax, 2004). The comparative fit index (CFI) was also used: values at or greater than .90 and .95 reflect acceptable and excellent fit to the data, respectively (Kenny & McCoach, 2003). Finally, we used the root mean square error of approximation (RMSEA), with values between 0.05 and 0.09 indicating adequate model fit and values below 0.05 indicating a very good fit (Hu & Bentler, 1999). Modification

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indices available in CFA can be used to identify misspecification in the model. Decisions regarding modifications were based on theoretical and psychometric considerations of item and scale content. We would not allow error residuals to covary, however we would eliminate items if they had low factor loadings ($<.60$), or if modification indices suggested they had significant loadings ($>.30$) with unintended latent factors.

Reliability. Cronbach's alpha (1951) was used to assess scale score reliability, with values of at least .70 indicating acceptable internal consistency (Nunnally, 1978).

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Table 3.2. *Participant Characteristics and Descriptive Statistics for all Measures Included in Two Phases of Data Collection with the Development Sample and the Confirmatory Sample.*

| Development Sample ($N = 637$) | | | | Confirmatory Sample ($N = 554$) | | | | | | |
|----------------------------------|------------|--------------|--------------|-----------------------------------|--------------|--------------|------------------|--|--|--|
| Study Variables | Test Range | Sample Range | M(SD) | α | Sample Range | M(SD) | α | | | |
| Age | | 17-66 | 22.19(6.25) | | 17-66 | 21.88(6.20) | | | | |
| Index Music Listening | 1-25 | 1-25 | 12.17(5.75) | | 2-25 | 11.34(5.76) | | | | |
| Index Musical Instrument Playing | | 0-575 | 20.23(42.37) | | 0-420 | 12.66(28.72) | | | | |
| Index Musical Training | 0-11 | 2-10 | 6.75(1.51) | | 4-11 | 8.39(1.59) | | | | |
| <i>Subjective Wellbeing</i> | | | | | | | | | | |
| Positive Affect | 10-50 | 10-50 | 32.22(7.84) | .88 | 10-44 | 28.83(7.17) | .89 | | | |
| Negative Affect | 10-50 | 10-48 | 22.80(8.18) | .87 | 10-47 | 21.52(7.75) | .87 | | | |
| Satisfaction with Life | 5-35 | 5-35 | 22.59(7.20) | .89 | 5-35 | 22.51(6.50) | .85 | | | |
| <i>Mental Health Continuum</i> | | | | | | | | | | |
| Psychological Wellbeing | 0-35 | | | | 0-30 | 20.14(5.35) | .85 | | | |
| Social Wellbeing | 0-25 | | | | 0-25 | 14.60(4.61) | .81 | | | |
| <i>MUSE</i> - Total Scale Score | | | | | 0-120 | 74.33(20.74) | .91 | | | |
| Cognitive & Emotional Regulation | 0-35 | | | | 0-35 | 27.89(4.72) | .78 | | | |
| Engaged Production | 0-45 | | | | 0-45 | 18.49(14.85) | .95 | | | |
| Social Connection | 0-15 | | | | 0-15 | 10.94(2.90) | .86 | | | |
| Physical Exercise | 0-15 | | | | 0-15 | 11.74(3.16) | .78 | | | |
| Dance | 0-10 | | | | 0-10 | 5.30(3.33) | .69 ^r | | | |
| <i>ERQ</i> | | | | | | | | | | |
| Reappraisal | 6-42 | | | | 6-35 | 24.72(5.03) | .83 | | | |
| Suppression | 4-28 | | | | 4-28 | 15.10(5.12) | .64 | | | |

Notes; MUSE = Music USE Questionnaire; ERQ = Emotion Regulation Questionnaire; M = Mean; SD = Standard Deviation; α = Cronbach's alpha coefficient; ^r = Pearson's *r* (two item scale).

3.7 Results

3.7.1 Dimensionality

Exploratory Factor Analysis - Development Sample

The related but distinct processes of factor analysis and item deletion should be carried out iteratively (Worthington & Whittaker, 2006). This process involves removing items from the analysis, one at a time, repeating the EFA and comparing the solutions using multiple criterion methods (i.e. parallel analysis, the Kaiser rule, percentage of variance explained, and the scree plot) (Costello & Osborne, 2005; Shonrock-Adema et al., 2009). The EFA in the current study was conducted iteratively in the following sequence:

1. Applying Principal Axis Factoring (PAF) to the 164 item dataset, 32 Factors were extracted accounting for 60.40% variance.
2. However, many factors included a small number of scale items, many with low factor loadings. Following the iterative removal of 77 sub-quality items, a 19 factor solution with 87 items was found (61.50% variance accounted for).
3. Using syntax provided by O'Connor (2000), parallel analysis of this 87 item dataset suggested a 22 factor solution. However, there were 8 factors with fewer than 3 indicators, and two factors with no strongly loading items. Generally, three to five indicators with significant loadings are recommended for factors to be sufficiently identified (Costello & Osborne, 2005).
4. The Kaiser criterion (Eigenvalues greater than 1) and scree plot suggested a simpler 13 factor solution, which when forced accounted for 58.06% of the variance. Nineteen further items were removed, improving the interpretability of the 13 extracted factors.
5. A parallel analysis of this reduced dataset ($k = 68$) suggested retaining 14 factors. A 14 factor solution was subsequently forced accounting for 58.08% of the variance. Though the 14 factors extracted were meaningful, this 68 item scale again contained a number of factors (five) with too few indicators to be deemed stable.
6. Guided by the Kaiser rule a 10 factor solution was forced and accounted for 60.15% of the variance, another 19 items not meeting retention criteria were removed.

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7. A parallel analysis of this 48 item dataset suggested a 13 factor solution, with 63.88% of the variance accounted for. This solution contained four factors that were better represented as two factors.
8. Ultimately, this 11 factor solution accounting for 61.78% of the variance was deemed most parsimonious and comprehensive on psychometric, theoretical, and conceptual grounds. In addition, all 48 items and 11 factors possessed good psychometric properties set forth by item and factor retention criteria, and are reported in Table 3.3.

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Table 3.3. *Results of EFA and Psychometric Properties of 11 Factors of the AFML Scale.*

| AFML Factors | % Variance | Loading (Range) | Loading (M) | α | Eigen Value | M(SD) |
|---|---------------|--------------------|----------------|------------------|----------------|------------|
| 1. Stress Regulation (4 items) | 27% | .52-.62 | .59 | .85 | 12.87 | 4.08(.71) |
| 2. Strong Emotional Experiences (6 items) | 11% | .58-.79 | .69 | .90 | 5.29 | 3.98(.71) |
| 3. Rumination (5 items) | 5% | .56-.78 | .67 | .82 | 2.24 | 3.13(.81) |
| 4. Sleep (2 items) | 4% | .89-.92 | .91 | .84 ^r | 1.90 | 3.08(1.22) |
| 5. Reminiscence (4 items) | 3% | .60-.79 | .71 | .82 | 1.52 | 4.20(.64) |
| 6. Anger Regulation (7 items) | 3% | .44-.79 | .66 | .91 | 1.27 | 3.64(.85) |
| 7. Anxiety Regulation (7 items) | 2% | .54-.76 | .65 | .91 | 1.16 | 3.93(.72) |
| 8. Awe & Admiration (3 items) | 2% | .63-.85 | .76 | .83 | 1.04 | 4.09(.73) |
| 9. Loneliness Regulation (3 items) | 2% | .74-.84 | .78 | .83 | .92 | 3.88(.77) |
| 10. Cognitive Regulation (2 items) | 2% | .84-.87 | .86 | .75 ^r | .86 | 3.11(1.12) |
| 11. Identity (5 items) | 1% | .50-.90 | .63 | .86 | .66 | 3.73(.84) |
| AFML - Total Scale (48 items) | 62% | | | .94 | | |

Note. $N = 637$; M = Mean; SD = Standard Deviation; α = Cronbach's alpha coefficient; ^r = Pearson's r (two item scale)

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Confirmatory Factor Analysis - Confirmatory Sample

The 11 factor solution identified using EFA was tested with confirmatory factor analysis (CFA) with a separate sample of participants. The initial model specified was the 48 scale items loading onto their respective factors. This initial measurement model was an acceptable fit: $X^2_{(1025)} = 2178.92$, $p < .001$, $Q = 2.13$, CFI = .93, RMSEA = .045 (90% CI, .042-.048). One item was removed from the *Rumination* factor, and one from the *Identity* factor for failing to load above .60. These two items were also deemed less conceptually related to the other items. This led to improvement in model fit, and this final model represented a very good fit of the data: $X^2_{(946)} = 1879.33$, $p < .001$, $Q = 1.99$, CFI = .94, RMSEA = .042 (90% CI, .039-.045). The final 46 items of the AFML scale and their psychometric properties in the confirmatory sample are reported in Appendix B.

Intercorrelations between the 11 subscales (see Tables 3.4a and 3.4b) suggest they measure related, yet distinct, constructs. Inspection of factor scale items led to the following interpretations. Factor 1, *Stress Reduction* reflects the use of music for distraction, escape and comfort when stressed. Factor 2, *Strong Emotional Experiences* taps into intense and blended emotional experiences afforded by music listening. Factor 3, *Rumination* measures dwelling and focusing on sadness and anxiety in music listening. Factor 4 focuses on music as an aid to *Sleep*. Factor 5 represents *Reminiscence* as an expected outcome of music listening. Factors 6 and 7 measure listeners' beliefs that music provides positive reappraisal, positive emotions, distraction and comfort for *Anger Regulation* and *Anxiety Regulation*, respectively. Factor 8, measures a sense of *Awe & Appreciation* during music listening. Factor 9, *Loneliness Regulation* captures listeners' expectations that listening to music reduces feelings of loneliness. Factor 10, *Cognitive Regulation* indicates beliefs of increased concentration and focus when listening to music. Factor 11, *Identity* refers to listening to music to develop and express the self.

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Table 3.4a. *Bivariate Correlations Between Factors of the AFML Scale in the Development Sample.*

| AFML Factors | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1. Stress Regulation | 1. | | | | | | | | | |
| 2. Strong Emotional Experiences | .35*** | 1 | | | | | | | | |
| 3. Rumination | .14*** | .40*** | 1 | | | | | | | |
| 4. Sleep | .25*** | .17*** | .16*** | 1 | | | | | | |
| 5. Reminiscence | .24*** | .43*** | .29*** | .13** | 1 | | | | | |
| 6. Anger Regulation | .53*** | .20*** | .08 | .18*** | .16*** | 1 | | | | |
| 7. Anxiety Regulation | .61*** | .28*** | .04 | .23*** | .16*** | .62*** | 1 | | | |
| 8. Awe & Admiration | .32*** | .51*** | .16*** | .11** | .29*** | .16*** | .24*** | 1 | | |
| 9. Loneliness Regulation | .46*** | .35*** | .18*** | .24*** | .21*** | .42*** | .46*** | .25*** | 1 | |
| 10. Cognitive Regulation | .26*** | .18*** | .16*** | .42*** | .10* | .26*** | .26*** | .14** | .23*** | 1 |
| 11. Identity | .42*** | .69*** | .32*** | .23*** | .34*** | .24*** | .35*** | .51*** | .43*** | .27*** |

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. $N = 637$.

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Table 3.4b. *Bivariate Correlations Between Factors of the AFML Scale in the Confirmatory Sample.*

| AFML Factors | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1. Stress Regulation | 1 | | | | | | | | | |
| 2. Strong Emotional Experiences | .29*** | 1 | | | | | | | | |
| 3. Rumination | -.07 | .32*** | 1 | | | | | | | |
| 4. Sleep | .18*** | .10* | .05 | 1 | | | | | | |
| 5. Reminiscence | .18*** | .51*** | .21*** | .14*** | 1. | | | | | |
| 6. Anger Regulation | .65*** | .25*** | -.02 | .17*** | .17*** | 1. | | | | |
| 7. Anxiety Regulation | .77*** | .30*** | -.07 | .21*** | .20*** | .73*** | 1. | | | |
| 8. Awe & Admiration | .22*** | .36*** | -.03 | .12** | .28*** | .17*** | .25*** | 1. | | |
| 9. Loneliness Regulation | .49*** | .27*** | .02 | .18*** | .19*** | .49*** | .53*** | .25*** | 1. | |
| 10. Cognitive Regulation | .21*** | .10* | .01 | .34*** | .02 | .25*** | .21*** | .12*** | .24*** | 1. |
| 11. Identity | .43*** | .51*** | .15*** | .23*** | .30*** | .38*** | .43*** | .40*** | .44*** | .24*** |

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. $N = 554$.

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3.7.2 Reliability

Internal Consistency. Results support the reliability of the AFML scale in both samples. Cronbach's alpha coefficients for all subscales were high suggesting good internal consistency of the measure and its subscales (see Table 3.3 and Appendix B).

3.7.3 Validity

Construct Validity. Gender differences in FML have been noted with females using music for affect regulation more than males (North et al., 2000; Sloboda & O'Neill, 2001). Saarikallio (2008) found that scores on her Music in Mood Regulation scale were significantly higher for females than males (10-20 years) indicating greater endorsement of the affect regulation effects of music. Independent t-tests are expected to find, as in previous research, that scores on the affect regulation FML are significantly higher among females. Gender differences were observed on a number of AFML factors across two samples of participants. Specifically, in the development sample females scored significantly higher than males on the following factors:

Stress Regulation (males $M = 3.95$, $SD = .77$, females $M = 4.15$, $SD = .67$; $t(635) = -3.36$, $p = .001$), *Anger Regulation* (males $M = 3.53$, $SD = .86$, females $M = 3.70$, $SD = .84$; $t(635) = -2.36$, $p = .02$), *Anxiety Regulation* (males $M = 3.80$, $SD = .77$, females $M = 3.98$, $SD = .69$, $t(635) = -2.96$, $p = .005$), *Loneliness Regulation* (males $M = 3.73$, $SD = .79$, females $M = 3.95$, $SD = .75$, $t(635) = -3.39$, $p = .001$) and *Sleep* (males $M = 2.93$, $SD = 1.16$, females $M = 3.15$, $SD = 1.24$; $t(635) = -2.22$, $p = .03$). Females in the confirmatory sample had significantly higher scores than males on the factors of *Anger Regulation* (males $M = 3.52$, $SD = .67$, females $M = 3.75$, $SD = .68$, $t(551) = -3.70$, $p < .001$), *Anxiety Regulation* (males $M = 3.69$, $SD = .58$, females $M = 3.87$, $SD = .64$, $t(551) = -3.04$, $p = .003$) and *Reminiscence* (males $M = 3.95$, $SD = .79$, females $M = 4.13$, $SD = .69$, $t = -2.71$, $p = .01$). Confirming hypotheses and providing evidence of construct validity, scores on affect regulation factors were significantly higher for female relative to male respondents.

Convergent Validity. To evaluate the convergent validity of the constructs being measured, relationships proposed in Section 3.4 between subscales of the AFML

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scale and wellbeing outcomes were assessed by Pearson's correlations. Hypotheses were confirmed and results are presented in Table 3.5.

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Table 3.5. *Bivariate Correlations Between FML Factors and Wellbeing Measures.*

| | Development Sample (N = 637) | | | Confirmatory Sample (N = 554) | | | | |
|--|------------------------------|-------|-------|-------------------------------|-------|--------|--------|-------|
| | PA | NA | SWL | PA | NA | SWL | PWB | SocWB |
| AFML Factors | | | | | | | | |
| 1. Stress Regulation | .03 | .04 | .00 | .08* | .00 | .04 | .04 | .02 |
| 2. Strong Emotional Experiences | .04 | .20** | -.10* | .14** | .18** | -.01 | .07 | -.02 |
| 3. Rumination | -.04 | .13** | -.01 | -.03 | .20** | -.12** | -.13** | -.09* |
| 4. Sleep | -.03 | -.01 | -.07 | .04 | .09* | .03 | -.01 | .05 |
| 5. Reminiscence | .04 | .11** | .00 | .08 | .10* | .05 | .07 | .03 |
| 6. Anger Regulation | .15** | -.02 | .11** | .21** | -.03 | .16** | .14** | .11* |
| 7. Anxiety Regulation | .13** | -.05 | .09* | .16** | -.05 | .13** | .12** | .09* |
| 8. Awe & Admiration | .05 | .09* | -.01 | .08 | .07 | -.01 | .05 | .04 |
| 9. Loneliness Regulation | .01 | .06 | -.01 | .09* | .04 | .02 | .01 | .04 |
| 10. Cognitive Regulation | .09* | -.05 | -.01 | .01 | .01 | -.03 | -.03 | .00 |
| 11. Identity | .12** | .13** | -.07 | .05 | .05 | .07 | .11* | .04 |

Note; * $p < .05$, ** $p < .01$, *** $p < .001$. PA = Positive Affect; NA = Negative Affect; SWL = Satisfaction with Life; PWB = Psychological Wellbeing; SocWB = Social Wellbeing.

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The AFML scale includes a number of affect regulation subscales: *Stress Regulation*, *Anger Regulation*, and *Anxiety Regulation*. To validate these subscales correlations with the emotion regulation questionnaire (ERQ; Gross & John, 2003) were examined. The ERQ measures two regulation strategies: Reappraisal and Suppression. The first strategy, reappraisal, is considered the most effective strategy in regulating NA (Augustine & Hemenover, 2009) and higher reappraisal scores as measured by the ERQ have been associated with higher SWB (Gross & John, 2003). Items measuring positive reappraisal were developed for each AFML affect regulation subscale (see Figure 3.1). Positive reappraisal items loaded on the factors of *Anger Regulation* and *Anxiety Regulation*. It is expected therefore that scores on these factors will converge (i.e., correlate positively) with reappraisal as measured by the ERQ. The second strategy, suppression, involves the inhibition of positive and negative emotional expression. Suppression was unrelated to music listening functions in validation tests of other FML measures, specifically, the MUSE (Chin & Rickard, 2012) and the MMR (Saarikallio, 2008). There are no items measuring the strategy of suppression in music listening on the AFML scale. Additionally, in the regulation of NA it is a largely ineffective strategy (Larsen & Prizmic, 2004). Thus suppression is not expected to correlate with affect regulation FML, demonstrating divergent validity. Further evidence of divergent validity will be provided by the lack of significant associations between scores on the emotion regulation questionnaire and scores on AFML scale factors not measuring emotion regulation (i.e., *Strong Emotional Experiences*, *Sleep*, *Reminiscence*, *Awe & Admiration*, *Cognitive Regulation*, and *Identity*). Results are presented in Table 3.6. Hypotheses were confirmed with two exceptions — scores on the *Rumination* factor of the AFML scale were positively associated with Suppression, and *Sleep* was associated with higher Reappraisal scores as measured by the ERQ.

Concurrent Validity. Bivariate correlations (Pearson's r) between the AFML subscales and another general measure of music listening functions (the MUSE, Chin & Rickard, 2012) examined the concurrent validity of the AFML scale. Results are presented in Table 3.6. It was not expected that the factor of *cognitive and emotional regulation* on the MUSE would correlate with all 11 subscales of the AFML scale. Reassuringly, the largest correlations were with the affect regulation subscales, however, the positive correlation with the *Identity* subscale was slightly larger. It was

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interesting that there was consistently positive, albeit modest, correlations between all subscales of the AFML scale and scores on the MUSE *social connection factor*, as only one social FML was retained in the current study (*Identity*). Again, the relationship between these two factors was the strongest. Such widespread associations across the factors were not predicted, however the remainder of the correlations were low and positive. This is indicative of convergence between the MUSE and the AFML scale, but also suggests there are distinctions between the constructs measured by each scale. Demonstrating concurrent validity of the AFML scale, correlations were considerably stronger between subscales of the AFML scale and the MUSE (i.e., two measures of the same construct), than between scores on the AFML scale and scores on measures of wellbeing (i.e., two measures of related constructs)

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Table 3.6. *Bivariate Correlations between the AFML Subscales and the Music Engagement Subscales of the MUSE and ERQ.*

| AFML Factors | MES | | | | | ERQ | |
|---|-------|-------|-------|-------|-------|-------------|-------------|
| | I | II | III | IV | V | Reappraisal | Suppression |
| 1. Stress Regulation | .48** | .10* | .26** | .25** | .17** | .21** | -.00 |
| 2. Strong Emotional Experiences | .42** | .22** | .27** | .10* | .20** | .01 | -.07 |
| 3. Rumination | .16** | .10* | .11** | .04 | .07 | -.16** | .11** |
| 4. Sleep | .20** | .06 | .19** | .10* | .07 | .08* | .04 |
| 5. Reminiscence | .26** | .11** | .25** | .13** | .11* | .05 | -.06 |
| 6. Anger Regulation | .40** | .14** | .24** | .28** | .23** | .25** | -.07 |
| 7. Anxiety Regulation | .44** | .16** | .25** | .27** | .21** | .23** | -.04 |
| 8. Awe & Admiration | .33** | .25** | .23** | .11* | .11* | .07 | -.04 |
| 9. Loneliness Regulation | .42** | .09* | .24** | .18** | .15** | .17** | .00 |
| 10. Cognitive Regulation | .29** | .02 | .17** | .15** | .06 | .08 | .04 |
| 11. Identity | .53** | .23** | .46** | .18** | .24** | .02 | -.07 |
| MUSE; | | | | | | | |
| | Total | IML | IMIP | IMT | | | |
| AFML - Total Scale (46 items) - Study 2 | .44** | .38** | .05 | -.01 | | | |
| AFML - Total Scale (48 items) - Study 1 | N/A | .45** | .16** | .01 | | | |

Note. * $p < .05$, ** $p < .01$, *** $p < .001$; MUSE = Music Use Questionnaire; MES = Music Engagement Styles subscales; I = Cognitive & Emotional Regulation; II = Engaged Production; III = Social Connection; IV = Physical Exercise; V = Dance; ERQ = Emotion Regulation Questionnaire; MUSE IML = Index of Music Listening; IMIP = Index of Music Instrument Playing; IMT = Index of Music Training.

3.8 Discussion

The AFML scale is a 46 item measure composed of 11 factors. Namely, *Stress Regulation*, *Anxiety Regulation*, *Anger Regulation*, *Loneliness Regulation*, *Rumination*, *Reminiscence*, *Strong Emotional Experiences*, *Awe and Appreciation*, *Cognitive Regulation*, *Identity*, and *Sleep*. In line with past research, factors relating to affective, social and cognitive functions of music listening were extracted.

Contrary to the literature and our previous qualitative work, eudaimonic FML did not emerge as significant factors. The scale and its subscales possess good internal consistency and construct validity.

Informed by established guidelines in scale development (DeVellis, 2012) and in psychometric statistical analysis (Byrne, 2010; Costello & Osborne, 2005; Worthington & Whittaker, 2006), the rigorous scale development process undertaken in this large sample study has contributed to the creation of a high quality measure of FML. Due to the wording of the scale items the AFML measure is especially suited to outcomes-based research, particularly in the field of wellbeing. In developing this measure listeners were consulted directly in a qualitative inquiry of the FML (Study 1). These proposed constructs were expanded upon by review of the music psychology literature, and by importing theories from general and positive psychology. Padgett (1998) advocates for a mixed-methods approach to scale construction - with qualitative study to explore concepts preceding quantitative work. When initially grounded in qualitative work the psychological concepts developed in quantitative research are said to have greater validity because they are derived from real life experiences and observations (Rowan & Wulff, 2007).

Following best practice, structural equation modelling (SEM) using data from an independent sample of participants was used in the current study to confirm the factor structure identified using exploratory factor analysis (EFA) in the development sample. SEM performs best when the model being evaluated is grounded in theory (Byrne, 2010). The measurement model evaluated in the current study provided a very good fit of the data. As is always the case with SEM, there may be alternative models which fit the data equally well. In the case of scale development work

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alternative models could arise if alternative criteria were adopted during the EFA process. That being said, confidence in the dimensionality of the AFML measure is enhanced in that not only was the factor structure replicated in an independent sample using CFA, the measurement model evaluated was initially grounded in qualitative enquiry and further refined through a synthesis with existing theory and research, expert review, and well-established and conservative criteria for the extraction and identification of factors in EFA. The last step in particular, the exploratory factor analysis, is essential to ensure an unbiased approach to the identification of statistically reliable factors that have some chance of being confirmed in subsequent research.

Providing support for the concurrent validity of the measure, the AFML scale was moderately and positively correlated with another measure of music listening functions (i.e., the MUSE; Chin & Rickard, 2012). At the same time the broad range of factors extracted and confirmed in this study builds upon existing measures and allows for a broader investigation of the adaptive functions of music listening. Further, the AFML scale was highly correlated with the MUSE Index of Music Listening and was not related to its Index of Musical Training in either sample. It was modestly correlated with an Index of Musical Instrument Playing. Subscales measuring affect regulation were also positively correlated with a standardised measure of emotion regulation from the mainstream psychology literature (i.e., the ERQ), in line with expectations. Positive relationships between the affect regulation factors (*Stress, Anger, Anxiety and Loneliness regulation*) and the reappraisal subscale of the ERQ, as well as the lack of relationships between these same AFML factors and the suppression subscale of the ERQ was in line with predictions and provide support for the convergent validity of the AFML scale constructs. Providing evidence of divergent validity, the affect stimulation factors (*Strong Emotional Experiences and Reminiscence*), cognitive factors (*Cognitive Regulation, Awe & Appreciation*), everyday listening factors (*Sleep*), and social factors (*Identity*) were not significantly associated with either of the emotion regulation subscales on the ERQ. These findings highlight AFML factors as discrete and meaningfully distinct functions of music listening.

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Construct validity was also assessed by examining correlates between FML factors and wellbeing specifically subjective, psychological and social wellbeing measures. These constructs and their relationship to wellbeing outcomes are discussed below.

Affective Functions

Experience. The literature on music listening functions and the results of Study 1 suggested people use music to generate affective experiences, such as positive and negative emotions, intense emotional experiences, and also to experience reminiscence or nostalgia (Gabrielsson, 2002; Juslin et al., 2008; Sloboda et al., 2001; Sloboda, 1999). In the current study factors related to *Strong Emotional Experiences* and *Reminiscence* in music listening were extracted. It was predicted that higher scores on the affective experience factors would be associated with greater positive and negative affect. Notably, *Reminiscence* was associated with higher negative affect (NA), but *Strong Emotional Experiences* was associated with PA and NA across samples as predicted. Affective functions including *Strong Emotional Experiences* and *Reminiscence* were among participants' highest ranked FML for enhancing wellbeing in Study 1, but were not associated with higher psychological, and social wellbeing outcomes in the current study.

Regulation. Supporting Juslin and Sloboda's (2010) assertion that mood regulation is the most important function of music, the majority of FML factors in the current study were affect regulatory functions. Factors emerged relating to the use of music for *Anger Regulation*, *Anxiety Regulation* and *Stress Regulation*. A diverse set of affect regulation strategies were derived from music psychology (Saarikallio & Erkkila, 2007) and the general psychology literature on mood regulation (Larsen, 2000) and coping (Carver, 1997; Carver, Scheier, & Weintraub, 1989; Folkman & Lazarus, 1985). A number of these proposed strategies (see Figure 3.1) were retained in factor analysis and endorsed as affect regulation strategies by two large samples of respondents in the current study (i.e., distraction, reappraisal, emotional support, positive emotions, escape, and rumination). As predicted, higher scores on affect regulation factors (*Anger Regulation* and *Anxiety regulation*) were significantly associated with a number of core indicators of enhanced SWB (i.e., higher PA and life satisfaction, but not lower NA). In the confirmatory sample, in addition to higher SWB, higher scores on these regulation factors were also associated with greater

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psychological and social wellbeing. In line with past research (Miranda & Claes, 2009; North et al., 2000), the use of music for affect regulation was significantly greater among females. Although *Stress Regulation* scores were also significantly higher in female respondents, the *Stress Regulation* factor was not associated with SWB as expected, with the exception of one small positive correlation with PA in the confirmatory sample. Consistent with research on music listening by Knobloch and Zillmann (2002) and Saarikallio (2011; 2015), a factor measuring the mood regulation strategy of *Rumination* in music listening was also extracted. Items reflect music-induced rumination on sadness and anxiety. Rumination is often considered a maladaptive regulation strategy, due to its role in the maintenance of negative affective states (Aldao et al., 2010). This is also true of musical rumination (Miranda & Gaudreau, 2010). In the current study, *Rumination* was associated with lower subjective, psychological, and social wellbeing. According to theory women are more likely to use rumination (Nolen-Hoeksema, 1991), and this was also true of *Rumination* FML in the current study.

Social Functions

Listening to music for functions of identity development and expression are documented in qualitative and quantitative research with participants of all ages (Hays & Minichiello, 2005; Laukka, 2007; Lonsdale & North, 2011). The formation of identity is a cornerstone in theories of psychosocial development (Erikson, 1959). Further, development and maintenance of self-concept is an important motive driving social interaction, and is of particular significance in youth development (Carstensen, 1995). Identity has been previously linked to enhanced eudaimonic wellbeing (Bauer, McAdams, & Pals, 2006), and in the current study higher scores on the *Identity* factor was associated with higher scores on a measure of psychological wellbeing that included constructs such as *self-acceptance* and *personal growth*.

Previous research has proposed a number of social FML, such as the facilitation of social relationships (Huron, 2001; Panksepp & Bernatsky, 2002). However, few of these proposed social factors emerged in the current study. Although originally conceptualised as a social FML, the *Loneliness Regulation* factor was strongly related to the affect regulation subscales, and was not positively associated with

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social wellbeing as expected. Similar to *Stress Regulation*, however, it was modestly associated with higher PA in the confirmatory sample.

Cognitive Functions

Items pertaining to the use of music for cognitive reasons, such as regulation, music analysis, awe and appreciation, curiosity, and creativity were administered based on previous investigations and existing measures (Chamorro-Premuzic & Furnham, 2007; Chin & Rickard, 2012; North et al., 2000; Tarrant et al., 2000). A factor relating to the use of music for *Awe and Appreciation* was identified through the process of factor analysis. *Awe and appreciation* in music listening was not associated with greater psychological wellbeing as hypothesised. Unexpectedly, it was associated with greater NA in the development sample. The use of music for increased focus and concentration, *Cognitive Regulation*, also emerged as a factor in the current study, but it was not significantly associated with wellbeing as predicted, except for a small positive correlation with PA in the development sample.

Limitations

The large sample of participants across both studies was for the most part drawn from a convenience sample of university students. Further, there was a high degree of attrition. Although steps were taken to minimise loss of data, by randomising page and item order of the online questionnaire, the data was found to not be missing completely at random (Little & Rubin, 1987), and data imputation techniques were not deemed appropriate. This limits the generalisability of the findings to more diverse populations.

A complex multi-factorial model of music listening functions was created from qualitative enquiry, expert and literature review. However a great many of these varied FML did not emerge as distinct factors in the context of EFA. It may be that these FML are less widely distributed or distinctly identifiable in the general population, or less common in a sample of university students. Developmental differences in FML have been observed in cross-sectional surveys (Lonsdale & North, 2011), and were reported in Study 1. For example, eudaimonic FML were more pronounced among older adults. Thus the factor structure of the AFML scale may be more differentiated in older age groups. The conservative approach taken to

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develop a scale of high psychometric quality may have come at the expense of a more comprehensive factor structure. At the same time, while additional factors may have emerged with an older adult sample, given their lifetime of experience and opportunity to cultivate a larger range of adaptive functions of music listening, it is expected that the FML identified in the current study may be core and commonly endorsed functions by younger and older adults alike. Further CFA with older cohorts can be used to evaluate this claim and examine potential differential relations between FML and wellbeing outcomes when younger and older adults are compared. The aim of the current study was to develop a general measure of music listening functions, and determine the latent factor structure underlying a large set of items measuring a great many hypothesised constructs. However, other researchers may wish to develop unidimensional scales around the wider set of constructs uncovered in Study 1 and can expand further upon the scale items developed and administered for EFA. To that end the full set of items are provided in Appendix C.

Retention criteria recommended the removal of all but two of the negatively worded (i.e., reverse scored) items. Although it is recommended to include such items (DeVellis, 2012), some argue that negatively worded items are difficult to understand, do not reduce response bias, and should be avoided (van Sonderen, Sanderman, & Coyne, 2013). While potentially important from a psychometric perspective, other well-developed measures of FML have also found the inclusion of such items problematic (Chin & Rickard, 2012; Saarikallio, 2008).

It has been recommended that studies of music consider features of the listener, the context, and the music (Juslin & Västfjäll, 2008). The AFML scale focuses on the listener's beliefs and expectations regarding the effects of music, but does not fully consider the effects of listening in context, or music preferences and choices (e.g. specific music for specific functions). At the same time, an individual's efficacy beliefs regarding the functions of music listening differ conceptually, and may in fact precede, the music selection strategies that listeners engage to fulfil these FML (North & Hargreaves, 1996a; 2000; Van den Tol & Edwards, 2013). As such, the AFML scale may be used to shed light on individual differences in the listener's approach to music listening that influence how music is experienced in context. Future studies are needed to examine this issue.

3.9 Conclusion

The Adaptive Functions of Music Listening Scale is a measure suited for outcomes-based research on music listening functions. The AFML measure and its 11 subscales possess good internal consistency and validity. Further psychometric investigation is needed to establish the convergent, divergent, discriminant and known-groups validity of all subscales of the AFML measure. However, the affect regulation subscales in particular demonstrate good validity and reliability. In the next study, the predictive validity of the measure will be assessed in a randomised controlled trial of a self-chosen music listening intervention designed to regulate induced negative affect (Chapter 4, Study 3). This final study will address a potential measurement limitation of the current study - common method variance. To overcome the possibility that relationships between AFML factors and the constructs used to validate those factors arise from using the same methodology (i.e., self-report questionnaires) Morrison and Morrison (2006) advocate the use of experimental methods to further psychometrically evaluate questionnaires. The final study in this thesis will therefore examine the impact of music listening on the regulation of induced negative affect. Participants in the RCT will complete the AFML measure developed in the current study, and statistical analyses will examine whether scores on the affect regulation subscales predict regulation of NA in the trial. The results of this analysis will allow for a further test of the validity of the AFML scale.

4 CHAPTER 4

Study 3: Efficacy of a self-chosen music listening intervention in regulating induced negative affect: A randomised-controlled trial

4.1 Purpose

Collective intelligence work in Study 1 revealed that younger and older adults listen to music for the function of affect regulation. Affect regulation functions in Study 1 included stress reduction and relaxation, and also mood improvement. These affect regulation FML were voted as adaptive functions of music listening (FML) for wellbeing enhancement by both age groups. Study 2 also examined FML in listener's everyday life. A factor analysis of a large number of hypothesised FML derived from Study 1, extracted a number of factors relating to functions of music for regulating negative affect (NA), including regulation of stress, anxiety, and anger. Further, these FML were associated with enhanced subjective and psychological wellbeing.

Studies 1 and 2 supported previous survey and qualitative research findings highlighting that listeners endorse the affect regulating effects of music (Chin & Rickard, 2012; Saarikallio & Erkkila, 2007), and the results from Study 2 revealed that the strength of these endorsements (i.e., outcome expectations and efficacy beliefs) was related to wellbeing outcomes. A review of the literature in Chapter 1 suggests that music may regulate NA. However, experimental findings regarding music's efficacy for affect regulation are mixed. Therefore, more studies, especially randomised controlled trials (RCTs) are needed to confirm listeners' beliefs regarding the efficacy of music listening for the function of affect regulation. This is particularly important for understanding the adaptive functions of music listening, as affect regulation is central to wellbeing enhancement (Larsen, 2009).

4.2 Background

In order to understand the dynamics of affect regulation, many experimental studies have examined pre- and post-intervention effects of music listening – analysing changes resulting from different music listening manipulations. These studies have

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generally reported significant increases in relaxation and positive affect (PA), and a decrease in stress or NA after listening to music (see Section 1.2.1 for a review).

When trying to ascertain the efficacy of music for affect regulation, many researchers highlight the value of inducing NA in study participants to examine whether music is more effective at relieving NA than a control condition. This type of study design can provide the researcher a greater degree of experimental control by ensuring that participants in all conditions are experiencing a more similar affective experience at baseline, prior to the examination of experimental (music listening) and control group effects. The following review of evidence will therefore focus on a smaller number of key experimental studies that have incorporated a music listening intervention and a negative affect induction. These studies will be discussed by reference to specific methodological considerations for conducting research regarding the consequences of music listening for regulating negative affect. In particular, considerations regarding the timing of music interventions, and the selection of suitable control conditions, musical stimuli, and participant samples will be discussed.

4.2.1 Timing Of Music Listening Intervention

One factor that has varied across studies is the timing of music listening interventions relative to the negative affect induction procedure. These differences across studies imply consideration of when music exerts its best affect regulation effects - after, during, or before the experience of stress or negative affect.

By inducing NA prior to music listening the vast majority of studies have examined recovery from NA, rather than regulation of ongoing NA. These studies have, in most cases, demonstrated positive effects of music (Khalfa et al., 2003; Labbé et al., 2007; Matsumoto, 2002; Radstaak et al., 2014; Sandstrom & Russo, 2010; Sleight & McElroy, 2014; Sokhadze, 2007). A commonly used stress or NA induction procedure used in these and similar studies is the The Trier Social Stress Test (TSST). The TSST involves preparing a 5-minute speech, attempting a challenging arithmetic task, and then giving the speech (Kirschbaum, Pirke & Hellhammer, 1993). For instance, in the study by Khalfa et al. (2003) the TSST significantly increased salivary cortisol levels in a group of men, and following the stress

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induction, cortisol levels continued to increase for those in a silent control condition, but did not increase for those listening to relaxing music excerpts.

Other designs have had participants listen to music after introducing a stressor but before the completion of the stressor (Burns et al., 2002; Scheufele, 2000), or have examined music listening during preparation for a stressful task (Knight & Rickard, 2001). These designs examine the regulating effects of music during the experience of NA. For example, participants in the study by Knight and Rickard (2001) were asked to prepare a speech, either in the presence of classical music (intervention) or silence (control). Covarying for baseline levels, those listening to music did not experience the significant stress-induced increases in subjective anxiety, heart rate (HR), and systolic blood pressure (SBP) observed in the control group. Though employing a different design to the study by Khalfa et al. (2003), Knight and Rickard (2001) also reported that salivary cortisol levels continued to increase for those in the control condition, but did not for those listening to music.

Only one study was identified that examined the protective effect of music by inducing stress after a music listening intervention. The results of this study did not support a buffering effect of music listening (Thoma et al., 2013), however more studies are needed to examine this effect.

The timing of the intervention influences the questions that are addressed by experimental designs. Overall, available studies suggest that music listening (i) does assist recovery from stress (i.e. music listening after cessation of stressor reduces NA), (ii) may assist with regulating induced NA in preparation for stress (i.e. music listening during or prior to the cessation of stressor), and (iii) does not appear to reduce NA reactivity (i.e. music listening prior to a stressor has no effect on subsequent NA response).

The current study will induce stress in participants using the TSST, and music listening will occur after the induction of stress through speech preparation and an arithmetic challenge, but prior to giving the anticipated speech. This design will enable examination of whether music listening has a regulatory effect on NA induced by a stressor in preparation for a further stressful situation. Studies applying music listening as an intervention after the cessation of a stressor cannot conclude that music listening provides effective regulation, because reduction in NA may be due to

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the stressor ending rather than a regulatory effect of listening to music. Therefore, this study will address the regulatory effect of music in the context of ongoing and anticipatory NA, and not the effect of music on recovery from NA, or the protective effect of music listening prior to a stressor.

4.2.2 Selecting Control Conditions

As described in Section 1.2.2, studies of musical affect regulation have also varied by the type of experiences music listening is being compared to. Chanda and Levitin (2013) recommend introducing an active control condition that may provide similar rewards as music in terms of level of arousal, attentional capture, and affective engagement. They make more specific recommendations to compare music listening with similarly rewarding leisure activities like watching television or reading. As such, greater certainty regarding the efficacy of music listening for affect regulation would be gained from comparing listening to music with other activities that may support affect regulation in everyday contexts. There are few experimental studies focused on music and affect regulation that have adopted this methodological approach.

The majority of studies compare music listening with a silent control condition. This is problematic when trying to ascertain the affect regulation effects of music. One problem is that sitting in silence completely unoccupied is a unique and somewhat infrequent scenario. Indeed, music listening might be beneficial *only* by comparison to sitting in silence, as was the case with the controversial Mozart effect studies showing enhanced spatial abilities following music listening (Rauscher, Shaw & Ky, 1993). When alternative control conditions were used, such as listening to Stephen King audiobooks, the cognitive benefits of music were no longer apparent (Nantais & Schellenberg, 1999). Moreover, a number of investigations found that the benefits of music for cognitive outcomes were best explained as a test-performance artefact caused by the arousal and mood enhancing effects of listening to Mozart, Schubert, Albioni, Blur, and Stephen King (Husain, Thompson, & Schellenberg, 2002; Nantais & Schellenberg, 1999; Schellenberg, 2006; Schellenberg, Nakata, Hunter, & Tamoto, 2007; Thompson, Schellenberg, & Husain, 2001).

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A number of studies have included non-musical control conditions other than silence, such as listening to white noise, or nature sounds. The study by Thoma et al (2013) examined the effect of listening to music *prior* to a laboratory stressor (the TSST) and found no significant differences in self-reported stress, anxiety, or HR between those who listened to classical relaxing music, the sound of rippling water, or silence before the TSST. Further, salivary cortisol concentrations were actually highest in the music condition and lowest in the sound of water condition. Stress reactivity was not inhibited, so these results do not support a protective effect of music listening. However, this study presented music and other conditions prior to the TSST, and it may be that music listening during or after a stress induction procedure is most effective. Other studies incorporating non-musical controls have shown regulatory effects of music following a NA induction (Sandstrom & Russo, 2010; Sokhadze, 2007). For instance, a study that compared experimenter-chosen music with white noise reported that following a stressful speech preparation task, peaceful classical music was superior for autonomic recovery (skin conductance level and HR) than white noise (Sandstrom & Russo, 2010).

There are a small number of studies that have included an active control, where music listening is compared to an alternative experimental condition where participants are engaged in an activity. Two studies concerning induced sadness found mood-repairing benefits of music when compared to solving geometry problems (Matsumoto, 2002) or a cognitive reframing writing task (Sleigh & McElroy, 2014). Concerning stress more specifically, Scheufele (2000) compared the effectiveness of two relaxation interventions (progressive relaxation techniques and classical music), with both an active control and a silent control condition for stress reduction in a sample of 67 males. After preparing for a speech, but before making the speech, participants either listened to progressive muscle relaxation instructions (intervention group 1), or classical music (intervention group 2), waited in silence (passive control group), or completed memory and attention tasks (active control group). There were no significant between-group differences in self-reported relaxation or tension post-intervention. Within-group differences were found only for those in the progressive relaxation condition, with participants in this condition significantly more relaxed and less tense post-intervention. While previous studies employing active controls found music to be more effective than solving geometry

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problems, or writing (Matsumoto, 2002; Sleigh & McElroy, 2014), in this case the author concluded that progressive relaxation was the more effective tactic for affect regulation.

Some studies appear to imply that non-musical control conditions are emotionally neutral, with any observed benefits of music listening being ascribed to its unique affect-repairing properties. However, standard control conditions such as sitting in silence may be boring, irritating, or anxiety provoking for some people. Some studies have reported cortisol levels to increase in silent control conditions, suggesting that silence may be experienced as stressful (Fukui & Yamashita, 2003; Nomura, 2009), rendering silence a potentially less suitable control condition. White noise can also vary in its aversiveness (Miller, Curtin, & Patrick, 1999). Like silence and white noise, geometry and memory tasks could also be considered aversive and stressful by participants. Indeed, cognitive tasks such as solving mathematics problems, verbal memory, and attention tests, and even the prospect of performing them are often used to induce stress in research studies (Burns et al., 1999; Labbé, 2008; Radstaak et al., 2014). If a stress or NA induction is included, and participants in the control condition are further stressed by a silent or active control condition, that may confound effects in favour of music listening. Clearly, this limits the conclusions that can be made regarding the efficacy of music for the function of affect regulation. Control conditions that could be experienced negatively by participants are thus less appropriate. Examples of more appropriate controls include the alternative recreational activities advocated for by Chanda and Levitin (2013), including reading and watching TV. Studies focused specifically on music listening may prefer to use an active control condition that is auditory. Comparable tactics, or activities in the auditory domain might include listening to audiobooks, narrated text, or talk radio (Konieczna-Nowak, 2015; Radstaak et al., 2014).

4.2.3 Selecting Musical Stimuli

The vast majority of studies reviewed have used researcher-prescribed classical, or ‘relaxing’ music. There are a number of studies that have had participants choose their own musical stimuli, or choose from the experimenter’s selection (e.g., Burns et al., 1999; 2002; Chafin et al., 2004; Davis & Thaut, 1989; Garrido & Schubert, 2015;

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Hirokawa, 2004; Radstaak et al., 2014; Rickard, 2004; Sharman & Dingle, 2015; That & Davis, 1993). These studies advance upon existing designs as they more closely resemble everyday music listening contexts where listeners select their own music for affect regulation. However, most studies have had participants select pieces based on some criteria, such as asking them to choose pieces of music expressing sad and happy moods (Garrido & Schubert, 2015; Radstaak et al., 2014) Saarikallio, Nieminen, & Brattico, 2013), a stimulative and sedative piece (Lingham & Theorell, 2009), or music that is relaxing (Burns et al., 1999; 2002; Davis & Thaut, 1989; Radstaak et al., 2014). Limiting the choices of participants to specific musical criteria lacks ecological validity because music selection behaviours are influenced by more than the psychoacoustic features of the piece indicating the affective properties (valence and arousal) of the music. As stated previously, there is strong evidence that ‘happy’ music (e.g., major mode, faster tempo) evokes subjective reports and physiological responses consistent with positive emotional experience (Sloboda, 1991; Juslin, 2001). There is also evidence from qualitative and quantitative studies reporting that in everyday contexts people do not consistently select music with these features for the function of affect regulation (DeNora, 1999; Van den Tol & Edwards, 2013). As such, asking participants to select pieces of music expressing particular moods may constrain their selection behavior in ways that is not optimal for the purpose of supporting affect regulation. A drawback of these studies is that they have compared affect regulation effects across music of different types (e.g., happy versus sad) rather than comparing effects across different regulation activities. It is proposed here that a methodological improvement would be to ask participants to select music for different contexts or for different functions, rather than on the basis of different musical features (e.g., happy versus sad).

That being said, these studies do report positive effects of self-chosen music listening. For example, an early study by Davis and Thaut (1989) found significant reductions in state anxiety after participants listened to their preferred relaxing music. In the online study by Garrido and Schubert (2015) self-reported depressed affect decreased after listening to self-chosen happy music, and increased after listening to self-chosen sad music. Thirty-eight participants in a within-subjects experiment by Lingham and Theorell (2009) were asked to bring two pieces of their favourite music that they believed to be (i) fast, uplifting, stimulative, happy, and

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high-spirited, and (ii) relaxing, slow, gentle and sedative. Both types of music increased HR, but the increase was slight in sedative music listening. Stimulative music increased self-reported feelings of joy, elation, and energy. Sedative music significantly increased these positive emotions, as well as, feelings of calm and relaxation. These studies suggest that listeners are capable of selecting music that can induce desired affective states, and provide preliminary evidence that participants' music selected for the function of relaxation may reduce anxiety. However, a limitation of these studies is that they failed to include a non-music control condition.

A follow-up study by Thaut and Davis (1993) compared (i) participant-chosen music with (ii) experimenter-chosen relaxing music and (iii) a silent control condition. Self-reported relaxation significantly improved for all groups. Similarly, state anxiety decreased for all groups post-intervention, and no between-group differences were observed. Music decreased anxiety more than silence, however there was no difference in change scores between participant-chosen music and experimenter-chosen music conditions. Experimenter-chosen music for the purposes of relaxation conferred no additional benefits over music that was freely chosen by participants. Burns et al (1999) examined post-intervention effects of self-selected relaxing music, experimenter-chosen classical, hard rock, or no music on psychological and physiological indicators of relaxation. Self-reported increases in relaxation were highest in the silent control condition (58%), followed by the self-chosen music group (57%), and the experimenter-chosen classical (29%) and rock (26%). Overall, the results of these studies suggest that when asked to select music for the purposes of relaxation participants' choices are as effective, or more effective, than experimenter-selected music.

Of the studies incorporating self-selected music, only the studies by Burns et al. (2002), Labbé et al. (2007), and Radstaak et al. (2014) examined self-chosen music following a stressor. Burns and colleagues (2002) induced stress in participants with the prospect of performing a challenging and stressful cognitive task. Participants then listened to self-chosen relaxing music, experimenter-chosen classical or rock music, or waited in silence. State anxiety decreased significantly for all four groups. However, anxiety reduction was greatest in the silent condition, followed by participant-selected relaxing music and then experimenter-selected music. There was

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a significant increase in self-reported relaxation following classical music, but not following rock. Increases in relaxation, however, were greatest for those who listened to self-chosen music, followed by no music. Labbé et al. (2007) administered a 10-minute stressful cognitive speed test prior to either 20 minutes of listening to self-chosen relaxing music, researcher-chosen classical or heavy metal music, or waiting in silence. There was significant reduction in state anxiety after classical and self-selected music but not after heavy metal or silence. Relaxation increased after self-chosen relaxing, researcher-chosen classical, or no music, but not following heavy metal. Thus, even in the context of ongoing NA, music chosen by participants for its relaxing properties has better, or at the very least similar, affect regulation effects relative to experimenter-chosen music.

The experiment by Radstaak et al. (2014) compared recovery following a stressor (mental arithmetic with harassment) for two types of self-selected music (relaxing and happy). Further, this experiment is the only self-selected music study with a stress induction to also employ an active control condition (audiobook listening). Significant between-group differences were found in post-intervention scores on the Positive and Negative Affect Schedule (PANAS) (Watson & Tellegen, 1985). PA was significantly higher for those who listened to relaxing and happy self-selected music when compared with those in either an active or silent control condition. The decrease in NA was largest in the self-selected relaxing music condition, but this reduction was only significantly different from the reduction of NA in the silent control condition. NA reduction levels did not differ significantly between those who listened to happy music and relaxing music, or either control condition.

As described in Chapter 1 (see Section 1.2.2), the music chosen by participants is likely to vary in terms of its valence and arousal, as well as other musical properties known to predict affective responses to music (Juslin, 2001). The effect of these different musical features may be particularly pronounced on measures of autonomic arousal such as HR, respiration, and skin conductance, possibly indicating reflexive brainstem responses to acoustic features of the music (Chanda & Levitin, 2013). Physiological measures of affect (i.e., arousal) may be especially difficult to interpret at a group level in experiments employing participant-selected music, as significant individual variability can be expected in the arousal properties (e.g., tempo) of

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participant's music selections. Therefore, in studies where self-selected music is employed self-reported indicators of affective experience are more appropriate. When participant-selected music is used music researchers may gain increased ecological validity, but relinquish a degree of experimental control over the intervention stimulus. At the same time, previous experimental research has found that people have stronger and more positive responses to music which is self-chosen, possibly due to increased preference, familiarity, and memories associated with the music (Liljestrom et al., 2013; North et al., 2004). Thus, self-chosen music may be more suitable than experimenter-chosen music, especially if a stress or NA induction is employed. Choosing music is also said to give listeners a greater sense of agency and control over their situation, context, or self (Krause & North, 2016; Mitchell & MacDonald, 2006). In line with theories of regulation stating that feelings of dominance, agency, and control have adaptive regulatory benefits (Carver & Scheier 1982; Folkman, 1984; Heckhausen, 1995), listening to self-chosen music may facilitate greater affect regulation than music selected by others.

There are a wide range of stimuli used in studies of music and affect, however classical music is most common (Juslin & Laukka, 2003). Eerola and Vuoskoski (2013) urge researchers to choose ecologically valid stimuli in studies focused on music and emotion. Previous research has primarily used researcher-chosen classical or relaxing music, and has focused predominantly on effects of music listening on affect regulation in young adult samples. While classical music listening may be more frequent in older adult samples (Bonneville-Roussy, Rentfrow, Potter, & Xu, 2013), classical music listening is infrequent in younger age groups (North et al., 2004). Therefore, a focus on researcher-selected classical music does not represent the typical experience of young adult music listening very well and may make it difficult to generalise any findings emerging from studies of affect regulation that prescribe these stimuli as a means of supporting regulation. For the reasons outlined above, self-chosen music listening may be more advantageous than the classical or relaxing music that is typically prescribed in studies of music. Also, allowing participants to listen to their own music for specific functions of interest, such as affect regulation, should provide a better understanding of the effects of music listening in everyday life. Finally, if self-selected music is combined with a stressor,

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it may give researchers greater insight into the efficacy of music for regulating NA in everyday contexts.

The first two studies in this thesis illustrate that music listening has a wide range of functions in people's everyday lives, and that affect regulation functions are central to these everyday uses of music. Studies 1 and 2 have examined the relationship between music and affect regulation from listeners' reports based on their lifetime of music listening experiences. By contrast, the current study examines the effects of one short music listening experience for the function of affect regulation. This controlled experimental study is a vital step in this piece of research on the adaptive FML. An RCT is a rigorous approach to evaluating the validity of participants' reports of positive effects of music for the function of affect regulation observed in Studies 1 and 2. Further, the current study builds upon previous experimental work in music listening and affect regulation by incorporating a well-validated laboratory protocol for inducing NA, an active control condition, and the use of participant-chosen music stimuli.

H1: Based on the available evidence, it is hypothesised that a self-chosen music listening intervention will be more effective in reducing induced NA than an active control.

4.2.4 Selecting Samples of Participants

Studies in music psychology have predominately employed samples of young people. Given that studies of music listening and affect regulation have often used classical music, and that preference for classical music is lower amongst younger adults but higher amongst older adults (Bonneville-Roussy et al., 2013; North et al., 2004), it is possible that the classical music manipulations would be more applicable and beneficial to older adults. However, older adults have rarely been included in studies of music listening and affect regulation. When older adult samples have been included in studies of music's effects they are typically drawn from clinical samples and settings - with a particular focus on the efficacy of music therapy for older people with dementia (McDermott, Crellin, Ridder, & Orrell, 2012; Sung & Chang, 2005; Vink et al., 2011). The review of 18 studies by McDermott et al. (2012) concluded that music therapy was associated with short-term improvements in mood

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and behavioural symptoms of dementia, while highlighting the need for more high quality intervention studies. A Cochrane Review (Vink et al., 2011) determined that the quality of studies in this area was too low for conclusions to be drawn. Sung et al. (2005) focused on reviewing 8 studies that had used participants' preferred music as the intervention stimulus. Recommending caution due to the variability in methodological rigour across studies, the review highlighted a beneficial effect of preferred music in decreasing agitation in older people with dementia.

Unfortunately, there are a very limited number of studies conducted with healthy older adults. As such, there is little empirical work to guide hypotheses in the current study as to the affect regulating effects of music with healthy older adults, and potential age group differences in those effects. A number of studies with older adults highlight some relevant findings. For example, a within-subjects naturalistic experiment was carried out with fifteen healthy older women who listened to ten minutes of their preferred music, or relaxation instructions, or spent ten minutes in silence, at home in a comfortable chair once a week for three weeks (Hirokawa, 2004). Self-reported energy level increased after music, but decreased after silence. Tension decreased in all treatment conditions, but especially following relaxation instructions. There were significant increases in self-rated calm after relaxation and silence, but not following music listening. In another within-subjects study carried out by Lai (2004), Taiwanese older adults indicated their preferred type of music from six experimenter-selected types, and listened to that selection of music for 20 minutes. Heart rate and respiration were significantly reduced following music, and finger temperature was higher, indicating increased relaxation. These studies do at least suggest that music listening may benefit older people, however studies are needed that compare music listening effects for groups of younger and older adults. The few previous studies that have compared older and younger adults in one study have been focused on age differences in the accuracy of participants' recognition of emotions expressed by musical stimuli (Laukka & Juslin, 2007; Lima & Castro, 2011; Vieillard, Didierjean, & Maquestiaux, 2012). Across studies, older adults maintained accuracy in recognising positive affective states expressed by music, but demonstrated a modest decline in recognition of negative affective states relative to younger adults.

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There have been only two previous studies examining differences between younger and older adults in affective responses to music. The first compared the effects of different types of experimenter-selected music (relaxing classical or aggressive classical) finding that the onset of music caused different cardiovascular-autonomic responses in ten older and ten younger adults. Relaxing music decreased heart rate in older adults and increased SBP in younger adults. The onset of aggressive music increased SBP for both younger and older adults, heart rate significantly decreased for older adults, and respiration increased for younger adults. In younger adults, there was a reduction in high frequency oscillations of heart rate, but in older adults there was an increase in low frequency oscillations of heart rate. Overall, the authors concluded that age differences reflect an arousal response to music onset, in particular aggressive music, which is dominated by sympathetic nervous system activation in older participants and by parasympathetic withdrawal in younger adults. Interestingly these age differences were not maintained over the course of the 150-second piece of music - but rather reflected age group differences in the arousal response to the first 30 seconds of music (Hilz et al., 2014). In the other study carried out by Vieillard and Gilet (2013) eighteen 19-24 year old and eighteen 60-84 year old participants were asked to rate how strongly they felt happiness, peacefulness, sadness, or fear in response to musical excerpts expressing these four differently valenced states. Relative to younger adults, older adults reported stronger felt emotion to happy music than to peaceful, sad, or scary music, and reported less felt sadness when listening to sad music, and less fear when listening to fearful music. However, neither study included a control condition which makes the effects of music listening difficult to interpret. Further, neither of these two studies addressed the question of potential age differences in the effects of music for regulating or repairing NA.

A number of significant age-group differences highlighted in the studies above do confirm developmental theories of lifespan differences in affective functioning. Specifically, older adults' maintenance of recognition for positive versus negative affect in musical stimuli, as well as, increased emotional response to musical stimuli expressing positive affect and reduced response to negative affect in music highlighted in the age comparison studies by Laukka and Juslin (2007), Lima and Castro (2011), Vieillard et al. (2012), and Vieillard and Gilet (2013). These findings

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from studies of music are very much in keeping with the ‘positivity effect’. The positivity effect or bias describes the increase in the attention, preference, and memory for positive over negative stimuli observed in studies of cognitive processing in older adulthood (Reed & Carstensen, 2012). The positivity effect emerged from investigations of the *socio-emotional selectivity theory* (Carstensen, 1995), which proposes a number of age-related changes in goals associated with attachment, control, and affective needs. This shift in goals brought about by ageing may enhance certain aspects of emotional functioning and the regulation of affective experience. For example, a number of empirical studies have found that older adults report a lower experience of NA and fewer fluctuations in mood compared with younger adults, suggesting better regulation and optimisation of affective experience (Carstensen & Lockenhoff, 2003; Röcke, Li, & Smith, 2009). Other studies report higher emotional intelligence scores in older adults when compared with younger adults (Mayers, Salovey & Caruso, 2000; Scheibe & Carstensen, 2010). It is possible these affective developmental changes may influence the effects and functions of music in everyday life for older people.

The findings of Study 1, and survey-based research, demonstrate age differences in FML, with older adults reporting using music for affective reasons less frequently (Lonsdale & North, 2011). These results might imply that older adults have less need to use music for affect regulation because of the developmental improvements in affective functioning described above. However, it has been suggested that some of the affective improvements that older adults report reflect a positivity effect in situations where older adults have control over the selection of stimuli in their environment (Mather & Carstensen, 2005). Other studies have found higher levels of reactivity in older adults when compared with younger adults in more aversive situations, such as the Trier Social Stress Test (Kudielka, Buske-Kirschbaum, Hellhammer, & Kirschbaum, 2004) and cognitively challenging tasks (Hogan et al., 2012), suggesting difficulties with affect regulation may arise in more stressful situations where there is less control over the environment. In the study by Hogan et al. (2012), although older adults experienced greater cardiovascular reactivity, they also experienced faster recovery than younger adults did.

As such, a number of possibilities arise. Given the availability of alternative emotion regulation tactics, and the fact that older adults report using music for affective

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reasons less frequently than younger adults, older adults may be less likely, less practiced, and potentially less skilled in using music for affect regulation. In this situation one would predict reduced efficacy of music for regulating induced NA. Alternatively, older adults' improved regulation ability may potentiate the regulating effects of music, particularly in the context of self-chosen music listening and particularly in a situation where a more aversive or stressful situation presents itself to older adults (i.e., the requirement to prepare a speech and engage in cognitively challenging subtraction tasks). Given the potential for higher levels of stress reactivity in older adults in response to a speech preparation and cognitive challenge task, it may be that self-selected music would be used to facilitate greater recovery in older adults when compared with younger adults.

This is the first RCT of music and affect regulation to compare effects in younger and older listeners. Furthermore, it is the first study to examine the affect regulation effects of music with healthy older adults incorporating a stressor and an active control. This study will examine if age group (younger adult, older adult) influences the efficacy of a self-chosen music listening intervention or active control in regulating induced NA. Drawing upon the limited body of empirical music psychology research with older adults, and the theoretical and empirical research on lifespan changes in affective functioning more generally a number of predictions are made:

H2: Older adults will report less negative affect at baseline than younger adults, and older adults will demonstrate more reactivity to the NA induction (H3). These variables will be included as covariates in the analysis of music's effect on NA regulation.

H4: Relative to younger adults, older adults will experience greater regulation of NA in both experimental conditions, in part reflecting the greater reactivity experienced, but also because of their increased emotional intelligence and affect regulation abilities.

H5: Developmental changes in affective functioning (i.e., positivity effect, increased emotional intelligence and affect regulation abilities) will enhance the positive effects of music leading to greater benefits of a self-chosen music listening intervention for older adults.

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Finally, a series of regression models will determine whether beliefs and expectations regarding music listening for the function of affect regulation (as measured by the AFML scale developed in Study 2) predict recovery from an NA induction following a music listening intervention. Based on the results of correlation analyses in Study 2, and the wider theoretical and empirical literature two predictions are made:

H6: The *Anxiety Regulation* factor measures beliefs and expectations that listening to music will provide distraction, emotional support (comfort), positive reappraisal, and positive emotions when feeling anxious. These effects correspond to regulation strategies that have been considered adaptive and effective in the wider theoretical and empirical literature on affect regulation (Augustine & Hemenover, 2009; Folkman & Lazarus, 1988; Gross, 1998; Larsen, 2000; Thayer et al., 1994). Further, in Study 2 scores on this factor were associated with higher levels of positive affect, and greater use of the emotion regulation strategy reappraisal in everyday life. It is hypothesised that higher scores on the AFML subscale *Anxiety Regulation* will predict greater regulation of NA following a music listening intervention.

H7: The *Rumination* factor on the AFML scale measures respondents' beliefs that listening to music leads to dwelling and focusing on negative affect. In Study 2, higher scores on this factor were associated with higher levels of negative affect. Scores on this factor were also positively and modestly associated with the regulation strategy suppression. The regulation strategies of rumination and suppression are both considered less effective for the regulation of NA (Aldao et al., 2010; Larsen & Prizmic, 2004; Miranda, Gaudreau, & Morizot, 2010). It is therefore predicted that higher scores on the *Rumination* subscale of the AFML scale will predict less NA regulation following a music intervention.

The aim of these analyses is twofold. First, to evaluate the predictive validity of two subscales of the AFML scale, and second, to shed light on the relationship between listeners' perceived efficacy of music for the function of affect regulation in everyday contexts and their functional efficacy in regulating induced NA by listening to music in a laboratory setting. The AFML scale provides information on participants' beliefs about the effects of music listening experiences in general. The current study will also measure participants' efficacy beliefs regarding the specific music they selected for the function of affect regulation. Regression analyses will

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therefore also shed light on the relationship between listeners' perceived efficacy of the specific music they chose to regulate negative affect and their functional efficacy in regulating induced NA by listening to that music in this RCT.

H8: For the same reasons outlined in H6 above, it is predicted that higher ratings of the music's perceived efficacy for affect regulation will predict greater regulation of NA.

Existing research has found that familiarity of music is associated with stronger emotional responding, in particular with increased positive responses both in the laboratory (Liljestrom et al., 2013), and in naturalistic studies of music listening in everyday contexts (North et al., 2004).

H9: It is hypothesised that higher ratings of familiarity of participant's self-chosen music will predict greater regulation of induced NA.

4.3 Method

Participants

Data were collected from 40 younger adults (YA) between the ages of 18 and 30 ($M = 19.75$, $SD = 2.57$, 14 males), and 40 older adults between the ages of 60 and 81 years old ($M = 68.48$, $SD = 6.07$, 21 males). 95% of younger adults and none of the older adult group were current undergraduate students. Regarding highest level of educational achievement, of the younger participants 90% had completed second level education, 7.5% had a third level qualification, and 2.5% held a postgraduate qualification. In the older adult group 35% had a postgraduate qualification, 40% had completed undergraduate studies, 15% had completed some primary and secondary level education, and 10% had completed secondary school. An equal proportion (17.5%) of the younger and older adults were employed, 67.5% of the older adult group were retired, 2.5% were self-employed, 5% worked in the home, and 7.5% were unemployed. Eighty percent of the younger adult sample were Irish, 7.5% from the United Kingdom, 10% from the U.S, and 2.5% were Latvian. The older adult group was mostly Irish (92.5%), 5% of older adults were from the U.K and 2.5% from New Zealand. Of the older adult participants 37.5%, and 27.5% of the younger

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adults had formal musical training. Of the younger adults 72.5% were actively involved in musical instrument playing, versus 60% of the older adult participants.

Participants were included if they reported having normal or corrected-to-normal hearing, and spoke competent English, and excluded if they were taking sedative medication, were drug or alcohol dependent, or had a confounding psychological condition or affective disorder. Participants were recruited via advertisements in local and national media seeking volunteers to complete a questionnaire on music listening, and furthermore to take part in a laboratory session examining the effect of music on task performance.

Undergraduate students at the National University of Ireland, Galway, were also recruited through the School of Psychology online research participation system (SONA). First and second year psychology students recruited through SONA received course credits for their participation, whilst travel costs and expenses were covered as an incentive for the older participants.

Apparatus & Materials

Prescreen:

Demographic questions. These assessed age, gender, nationality, highest level of education achieved, employment status, and whether participants were currently students.

Music choices. Participants were asked to provide the artist, song title, and genre of fifteen minutes worth of music that they would listen to in a stressful situation, and fifteen minutes worth of music that they would listen to in a social situation.

The Adaptive Functions of Music Listening Scale - Participants rate their level of agreement with 46 items representing outcome expectations of a range of music listening functions using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Music Engagement Intensity Subscale - Music USE Questionnaire (MUSE) (Chin & Rickard, 2012). This 8-item measure provides 3 indices of music engagement. Scores

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range from 1-25 on the Index of Music Listening (IML), with higher scores indicating more intense music listening. The Index of Music Training (IMT) assesses an individual's music education with higher scores indicating more musical training. The Index of Music Instrument Playing (IMIP) provides a total score based on respondents' years of instrument playing, hours of practice per day and regularity of practice. Higher scores represent greater engagement with instrument playing.

Experiment:

Subjective Affect was measured using Visual Analogue Scales (VAS), on which participants indicate how they are feeling in the moment on a scale from 0-10 between two opposing affective states. The VAS includes 8 items, including: 1. Alert-Bored, 2. Excited-Depressed, 3. Happy-Sad, 4. Calm-Tense, 5. Content-Upset, 6. Relaxed-Nervous, 7. Active-Fatigue, and 8. Not Stressed-Stressed. Higher scores are indicative of more NA. These target affects were drawn from the circumplex model of affect (Russell, 1980).

The Trier Social Stress Test (TSST) (Kirschbaum, Pirke & Hellhammer, 1993) was used to induce mild-moderate psychosocial stress in all participants. During the first part of the task, the participant is told that they will be giving a video-recorded speech to a panel, and are then given five minutes to plan this speech. The participant is told that they will give the speech at the end of the laboratory session. Then the participant must perform an arithmetic task, counting backwards from 2023 in steps of 17 aloud for three minutes - having to restart every time an error is made. The TSST was adapted such that the participants never made their prepared speech, but were not told this until debriefing - thus anticipatory stress was induced by this procedure.

Familiarity and Perceived Efficacy of Music Selected for Stressful Situation: During debriefing participants were asked to rate their music playlists on a 5-point scale from 0 (not at all familiar) to 4 (extremely familiar). Participants were also asked to rate how effective they believed that music to be for regulating negative feelings - such as those aroused by the stress induction on a scale of 0 (not at all) to 4 (extremely).

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Audio - Audio was played via PC through SONY over-ear headphones. Each participant selected a volume that was comfortable for them for the auditory stimulus.

Procedure

After initial contact (by email, phone, or SONA system) and participant screening for inclusion criteria, all eligible participants were mailed or emailed a packet of materials. This packet included the Participant Information Sheet, and the pre-screening questionnaire battery. At this stage, participants were asked to provide examples of 15 minutes of music (artist, song title, genre) that they would typically listen to in two different situations: a stressful situation, and a social situation. Using a random number generator, twenty younger adult participants (6 males) and twenty older adults (12 males) were randomised to the intervention. Twenty younger and twenty older adults were also randomised to the control arm. Condition allocation was concealed from participants.

In the laboratory session, after providing consent, participants rated their baseline level of affect on each of the 8 VAS. Next, NA was induced via the TSST in all participants. Participants rated their affect on the VAS post-induction. Participants in the intervention condition then listened to the first 10 minutes of music from their selection of music chosen for a stressful situation. Participants in the control condition listened to a 10-minute radio documentary on the life and work of Charles Darwin. All participants were told that this 10-minute break was a rest period during which the experimenters would prepare the audio-visual room for their speech. Finally, affect was self-rated post-intervention. Participants in the control condition listened to their self-selected music following the final assessment. Participants were debriefed, the deception regarding the stress induction and nature of the research question were revealed and retrospective consent was sought. All participants were asked to rate the familiarity of the music they selected for stressful situations, as well as their rating of how effective they believe that music to be for regulating NA.

Power. The statistical program G*Power was used to conduct power analysis.

Adhering to Cohen's (1988) guidelines for small ($r = 0.1$), medium ($r = 0.3$), and large ($r = 0.5$) effects, two-tailed alpha of .05 was assumed for all tests. With 4 groups

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(younger adult intervention, younger adult control, older adult intervention, older adult control), 2 treatments (intervention, control), 2 covariates (baseline affect, affect reactivity), as well as a medium effect size and a power of 0.80, the recommended total sample size for ANCOVA was 79.

4.4 Results

Of the participants that played a musical instrument, scores on the *Index of Musical Instrument Playing* (as measured by the MUSE) were comparable for younger ($M = 23.52$, $SD = 70.36$) and older adults ($M = 32.85$, $SD = 44.69$). Independent samples t-tests revealed significant age differences on the *Index of Music Training* and the *Index of Music Listening* only. Younger adults had significantly greater intensity of music listening ($M = 11.35$, $SD = 5.41$, test range = 1-25) than older adults ($M = 8.83$, $SD = 5.77$; $t(78) = 2.02$, $p = .04$), and a higher level of formal musical training ($M = 8.64$, $SD = 1.50$, test range = 0-11; $t(78) = 2.57$, $p = .02$).

Descriptive statistics for older and younger participants scores on *The Adaptive Functions of Music Listening Scale* are provided in Table 4.1. Independent samples t-tests found that younger adults had significantly higher scores than older adults on the subscales of *Stress Regulation*, and *Rumination*. Older adults had significantly higher scores on the *Strong Emotional Experiences* subscale.

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Table 4.1. *Scores on the Adaptive Functions of Music Listening Scale for 40 Younger Adults and 40 Older Adults, and T-Tests Examining Age Differences in Functions of Music Listening.*

| AFML Subscale Scores | Younger Adults M(SD) | Older Adults M(SD) | 95% CI Mean Difference | t(78) | p |
|---------------------------------|----------------------------|-----------------------|------------------------------|-------|-------|
| Stress Regulation | 4.06(0.58) | 3.65(0.64) | 0.14, 0.69 | 3.03 | 0.003 |
| Strong Emotional Experiences | 3.65(0.64) | 3.97(0.57) | 0.05, 0.59 | 2.34 | 0.02 |
| Rumination | 3.14(0.75) | 2.64(1.12) | 0.08, 0.93 | 2.36 | 0.02 |
| Sleep | 3.02(1.01) | 2.92(0.99) | -0.35, 0.54 | 0.47 | 0.66 |
| Reminiscence | 4.05(0.52) | 3.90(0.41) | -0.06, 0.36 | 1.42 | 0.16 |
| Anger Regulation | 3.62(0.75) | 3.63(0.71) | -0.23, 0.42 | 0.56 | 0.58 |
| Anxiety Regulation | 3.79(0.73) | 3.64(0.64) | -0.16, 0.45 | 0.96 | 0.34 |
| Awe & Appreciation | 3.90(0.82) | 4.03(0.70) | -0.47, 0.21 | -0.76 | 0.45 |
| Loneliness Regulation | 3.85(0.66) | 3.56(0.70) | -0.01, 0.60 | 0.51 | 0.05 |
| Cognitive Regulation | 2.65(0.83) | 2.79(0.75) | -0.49, .21 | 0.42 | 0.44 |
| Identity | 3.80(0.67) | 3.66(0.77) | -0.18, 0.46 | 0.61 | 0.37 |

Twenty-five different genres of music were selected by participants for a stressful situation (see Table 4.2). More than one third of the songs selected by older adults for affect regulation were classical pieces (35%), whereas less than 3% of the songs chosen by younger adults were classical. Further, 66% of older adults selected at least one classical music piece, compared to 5% of younger adults. One third of the younger adult music choices, however, were pop songs, compared to only 17% of the

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older adults' selections. All of the musical pieces selected by participants in this study are presented in Appendices E and F.

Table 4.2. *Genres of Music Selected for the Function of Affect Regulation by 40 Older Adults and 40 Younger Adults.*

| | Older Adults | | Younger Adults | |
|---|--------------|--------|----------------|--------|
| Total number of musical pieces selected | 140 | | 173 | |
| Classical | 49 | 35% | 4 | 2.31% |
| Choral & Sacred | 10 | 7.14% | | |
| Opera | 7 | 5.00% | | |
| Instrumental | 2 | 1.43% | 1 | 0.58% |
| Pop | 24 | 17.14% | 66 | 38.15% |
| Country | 11 | 7.86% | 5 | 2.89% |
| Folk | 5 | 3.57% | 15 | 8.67% |
| Jazz/Swing | 7 | 5.00% | 2 | 1.16% |
| Motown/Soul | 2 | 1.43% | 1 | 0.58% |
| Blues | 1 | 0.71% | | |
| Rock | 10 | 7.14% | 13 | 7.51% |
| Indie | | | 24 | 13.87% |
| Metal | | | 3 | 1.73% |
| Alternative | | | 3 | 1.73% |
| Punk | | | 7 | 4.05% |
| Easy listening | 1 | 0.71% | | |
| Musical theatre | 1 | 0.71% | | |
| Traditional Irish | 10 | 7.14% | | |
| Electronic/Ambient | | | 6 | 3.27% |
| Drum & Bass/Dubstep | | | 3 | 1.73% |
| Techno/Dance | | | 5 | 2.89% |
| Rap | | | 5 | 2.89% |
| Hip Hop | | | 4 | 2.31% |
| R&B | | | 2 | 1.16% |
| Trap | | | 4 | 2.31% |

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At the debriefing stage, all participants were asked to rate the musical stimuli by familiarity and perceived affect-regulation efficacy. 60% of participants rated their music playlists as extremely familiar, 30% as moderately familiar, and 10% selected music that was somewhat familiar. Participants were also asked to rate their music choices in terms of perceived efficacy in regulating negative feelings - such as those aroused by the stress-induction. 45% of participants rated their music choices as extremely effective, 25% as moderately effective, 22.5% rated it as somewhat effective, and 7.5% rated their music as not at all effective for regulating negative affect. Independent t-tests demonstrated that Familiarity or Perceived Efficacy of music scores did not differ by condition (*Familiarity*: $t(78) = -1.05, p = .30$; *Efficacy*: $t(78) = -1.11, p = .27$) or by age group (*Familiarity*: $t(78) = 1.07, p = .29$; *Efficacy*: $t(78) = -1.24, p = .22$).

To assess the need to incorporate covariates into the main analyses, the intervention and control group, and younger and older adult groups were compared with each other on VAS at baseline. Unexpectedly, the control group were significantly more *Stressed* at baseline than the intervention group. At baseline, older adults were significantly less *Sad*, *Upset*, *Bored*, *Fatigued*, and *Stressed*, than younger adults (see Table 4.3) consistent with expectations (H2). Baseline NA was included as a covariate in each analysis.

Table 4.3. *Independent Samples T-Tests Comparing Control and Intervention Group, and Younger and Older Adult Samples on Baseline Level of Self-Reported NA By VAS.*

| Baseline NA | Control n = 40 | Intervention n = 40 | 95% CI mean difference | t(78) | p | Younger adults n = 40 | Older adults n = 40 | 95% CI mean difference | t(78) | p |
|---------------------|-------------------|------------------------|------------------------------|-------|------|-----------------------------|---------------------------|------------------------------|-------|-------|
| | M(SD) | M(SD) | | | | M(SD) | M(SD) | | | |
| Stress | 2.97(1.93) | 2.00(1.66) | 0.17, 1.77 | 2.41 | 0.02 | 3.03(1.89) | 1.94(1.68) | 0.29, 1.87 | 2.71 | 0.002 |
| Nervousness | 2.18(1.96) | 2.25(1.66) | -0.88, 0.74 | -0.16 | 0.87 | 2.50(1.81) | 1.93(1.78) | -0.23, 1.36 | 1.41 | 0.16 |
| Tension | 2.44(2.08) | 2.38(1.75) | -0.79, 0.92 | 0.16 | 0.88 | 2.45(1.75) | 2.37(2.08) | -0.77, 0.94 | 0.19 | 0.85 |
| Upset | 1.72(1.48) | 1.40(1.26) | -0.30, 0.93 | 1.03 | 0.31 | 2.00(1.32) | 1.11(1.30) | 0.30, 1.47 | 3.01 | 0.003 |
| Sadness | 2.49(1.67) | 2.35(1.78) | -0.62, 0.91 | 0.37 | 0.71 | 2.93(1.25) | 1.92(1.97) | 0.27, 1.74 | 2.72 | 0.008 |
| Depressed Affect | 2.82(1.50) | 2.85(1.56) | -0.71, 0.65 | -0.08 | 0.94 | 2.88(1.38) | 2.80(1.67) | -0.60, 0.76 | 0.23 | 0.82 |
| Fatigue | 3.48(1.91) | 3.34(1.98) | -0.73, 1.00 | 0.31 | 0.76 | 4.10(1.82) | 2.73(1.81) | 0.56, 2.18 | 3.36 | 0.001 |
| Boredom | 2.55(1.79) | 2.38(2.27) | -0.74, 1.09 | 0.38 | 0.71 | 3.15(1.74) | 1.77(2.09) | 0.52, 2.23 | 3.19 | 0.008 |

Notes; VAS = Visual Analogue Scale.

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Efficacy of NA induction

A series of paired-samples t-tests were conducted to evaluate the impact of the TSST on participants' level of self-reported NA post-induction. There was a statistically significant increase in *Stress*, *Nervousness*, *Tension*, *Upset*, *Sadness*, and *Depressed* affect from baseline to post-induction. There was no statistically significant increase in *Fatigue* or *Boredom*, thus they will not be included in further analyses (See Table 4.4).

Table 4.4. *Descriptive Statistics for 80 Participants Baseline Affect (Time 1) and Post-Induction Affect (Time 2), and Results of Paired Samples T-Tests Demonstrating Efficacy of NA Induction.*

| VAS | Time 1 NA M(SD) | Time 2 NA M(SD) | 95% CI mean difference | t(79) | p |
|------------------|--------------------|--------------------|------------------------------|-------|------|
| Stress | 2.49(1.85) | 4.76(2.52) | -2.82, -1.74 | -8.36 | 0.00 |
| Nervousness | 2.22(1.81) | 4.68(2.17) | -3.01, -1.90 | -8.80 | 0.00 |
| Tension | 2.41(1.91) | 4.98(2.42) | -3.24, -1.90 | -7.61 | 0.00 |
| Upset | 1.56(1.38) | 3.48(2.09) | -2.37, -1.46 | -8.34 | 0.00 |
| Sadness | 2.42(1.72) | 3.25(1.95) | -1.26, -0.40 | -2.27 | 0.00 |
| Depressed Affect | 2.84(1.52) | 3.30(1.90) | -0.87, -0.06 | -2.27 | 0.03 |
| Fatigue | 3.42(1.93) | 3.53(2.44) | -0.69, 0.47 | -0.37 | 0.71 |
| Boredom | 2.46(2.04) | 2.18(1.70) | -0.14, 0.72 | 1.33 | 0.19 |

Notes; VAS = Visual Analogue Scale.

Before listening to music or an active control all participants underwent the NA induction, and its efficacy did not differ across groups. The difference between self-reported NA at baseline (pre-induction, Time 1) and post-induction (Time 2) was calculated for each VAS to determine participants' level of reactivity to the induction. A higher score indicates more reactivity, or a higher degree of NA induction by the TSST. A series of two-way ANOVA's (see Table 4.5) confirmed that NA Reactivity score did not significantly differ by condition. NA Reactivity did not differ by age group, contrary to predictions (H3).

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Table 4.5. Results of 2x2 ANOVA Demonstrating No Significant Group or Age Differences in Reactivity to a NA Induction.

| | Group | Age | Group x Age | Intervention | Control | Younger Adults | Older Adults |
|-----------------------------|--------------|--------------|--------------|--------------|------------|----------------|--------------|
| DV; NA Reactivity Score | $F_{(1,76)}$ | $F_{(1,76)}$ | $F_{(1,76)}$ | M(SD) | M(SD) | M(SD) | M(SD) |
| Stress Reactivity | 2.77 | 1.97 | 0.30 | 2.73(2.37) | 1.83(2.44) | 1.90(1.88) | 2.65(2.86) |
| Nervous Reactivity | 3.13 | 0.56 | 0.11 | 2.95(2.55) | 1.97(2.38) | 2.25(2.35) | 2.67(2.65) |
| Tension Reactivity | 0.82 | 0.12 | 0.50 | 2.88(2.78) | 2.26(3.23) | 2.45(2.82) | 2.68(3.23) |
| Upset Reactivity | 1.52 | 1.61 | 0.00 | 2.20(1.77) | 1.63(2.29) | 1.63(1.75) | 2.21(2.31) |
| Sadness Reactivity | 0.11 | 0.86 | 0.22 | 0.90(1.88) | 0.76(2.00) | 0.63(1.67) | 1.03(2.14) |
| Depressed Affect Reactivity | 0.19 | 2.31 | 0.10 | 0.38(1.60) | 0.55(2.05) | 0.78(1.48) | 0.15(2.10) |

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Efficacy of music listening intervention

A series of six 2x2 between-groups ANCOVA were conducted to assess the effectiveness of a music listening intervention in regulating induced negative affect relative to an active control for younger and older adults. The IVs were condition (music listening intervention, active control) and age group (younger, older adults). The DV was the NA Regulation Score for self-reported 1. *Stress*, 2. *Nervousness*, 3. *Tension*, 4. *Upset*, 5. *Sadness* and 6. *Depressed Affect*. These scores were calculated as the difference between self-reported level of NA at Time 3 (post-intervention) and Time 2 (post-induction), and therefore reflect the degree or extent of regulation achieved. Higher scores represent greater regulation of, or more recovery from, induced NA. Self-reported NA at Baseline (pre-induction), and NA Reactivity score were used as covariates to control for group and individual differences. The results of each of these analyses are described below and summarised in Table 4.6.

1. *Stress Regulation*. After adjusting for baseline *Stress* and *stress reactivity* to the induction, there was no significant group x age interaction effect for *Stress Regulation*. There was a significant main effect of group and of age. Inspection of means in Table 4.6 shows that those in the music listening intervention experienced significantly greater *Stress Regulation* than those in the control group. Older adults reported greater *Stress Regulation* than younger adults overall.

2. *Nervous Regulation*. There was no significant group x age interaction effect for *Nervous Regulation*. There was a significant main effect of group and of age. Those in the intervention experienced significantly greater *Nervous Regulation* than those in the control group, and older adults reported greater *Nervous Regulation* than younger adults.

3. *Tension Regulation*. There was no significant group x time interaction, and no main effects for group, or age for *Tension Regulation*.

4. *Upset Regulation*. There was no significant group x age interaction effect found. There was a significant main effect of group and of age. Those in the music listening intervention experienced significantly greater *Upset Regulation* than those in the

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control group. Older adults reported greater *Upset Regulation* than younger adults overall.

5. *Sadness Regulation*. No interaction effect between group and age was found. There was a main effect for group, with the intervention group reporting significantly greater *Sadness Regulation* than participants in the control group. A main effect for age was also found, with older adults reporting greater *Sadness Regulation* than younger adults.

6. *Depressed Affect Regulation*. No significant group x age interaction effect was found for the regulation of *Depressed Affect*. There was a significant main effect of group and of age. Those in the music listening intervention experienced significantly greater *Depressed Affect Regulation* than those in the control group. Older adults reported greater *Depressed Affect Regulation* than younger adults overall.

The hypothesis that a self-chosen music listening intervention would be more effective than an active control in regulating induced NA was supported (H1). As predicted, older adults experienced greater regulation of NA than younger adults in both conditions (H4). The hypothesis that older adults listening to music would experience greater NA regulation than younger adults was not supported (H5).

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Table 4.6. Results of a 2x2 Between Subject ANCOVA Evaluating the Efficacy of a Music Listening Intervention versus Active Control for 40 Younger Adults and 40 Older Adults.

| DV; NA Regulation Score | Group X Age | Group | | Age | | Intervention | | Control | | Younger Adults | | Older Adults | |
|-----------------------------------|----------------|--------------|----------|--------------|----------|----------------|----------------|-----------------|----------------|-----------------|----------------|----------------|----------------|
| | $F_{(1,74)}$ | $F_{(1,74)}$ | η^2 | $F_{(1,74)}$ | η^2 | M (SD) | $AdjM$ (SE) | M (SD) | $AdjM$ (SE) | M (SD) | $AdjM$ (SE) | M (SD) | $AdjM$ (SE) |
| Stress Regulation | 1.02 | 5.24 | .07 | 7.61 | .09 | 2.63 (2.51) | 2.49 (.25) | 1.58 (2.31) | 1.72 (.25) | 1.58 (2.07) | 1.63 (.25) | 2.63 (2.71) | 2.57 (.26) |
| Nervous Regulation | 2.09 | 15.37 | .17 | 8.57 | .10 | 3.20 (2.34) | 2.84 (.23) | 1.18 (1.85) | 1.54 (.23) | 1.70 (1.80) | 1.71 (.23) | 2.68 (2.70) | 2.66 (.23) |
| Tension Regulation | 1.33 | 3.22 | | 1.45 | | 3.20 (2.68) | 2.95 (.25) | 2.08 (2.61) | 2.32 (.25) | 2.35 (2.26) | 2.43 (.25) | 2.93 (3.06) | 2.85 (.25) |
| Upset Regulation | 2.13 | 5.08 | .06 | 4.54 | .06 | 1.58 (2.27) | 1.37 (.23) | 0.43 (2.33) | 0.64 (.23) | 0.50 (2.16) | 0.64 (.23) | 1.50 (2.47) | 1.36 (.23) |
| Sadness Regulation | 0.11 | 6.64 | .08 | 6.99 | .09 | 1.05 (2.32) | 1.02 (.25) | 0.08 (2.02) | 0.10 (.25) | 0.13 (2.16) | 0.07 (.26) | 1.00 (2.21) | 1.58 (.37) |
| Depressed Affect Regulation | 0.03 | 6.14 | .08 | 25.50 | .26 | 0.23 (1.53) | 0.28 (.21) | -0.40 (1.97) | -0.45 (.21) | -0.63 (1.88) | -0.84 (.21) | 0.45 (1.52) | 0.67 (.21) |

Note; AdjM = Adjusted Mean, SE = Standard Error, η^2 = Partial Eta Squared.

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Predictive validity of the adaptive functions of music listening scale

Five hierarchical regression analyses were used to determine the predictive validity of two subscales of the AFML scale developed in Study 2. These analyses will address whether beliefs regarding perceived regulatory effects of music in everyday contexts, as measured by the AFML scale, predict regulatory effects of music in the current RCT. Based on the results of correlation analyses in Study 2, it was predicted that higher scores on the *Anxiety Regulation* subscale would predict higher levels of affect regulation, and that *Rumination* would negatively predict regulation scores in the current RCT. Results are summarised in Table 4.7. Descriptive statistics for all measures included in regression analyses are provided in Table 4.9.

The regression analysis focused on the 40 participants in the intervention group (20 younger adults, 20 older adults). The DV was the NA Regulation score (1. *Stress Regulation*, 2. *Nervous Regulation*, 3. *Upset Regulation*, 4. *Sadness Regulation*, 5. *Depressed Affect Regulation*). This score measures the reduction in NA experienced by participants from pre to post music listening. Scores on the *Anxiety Regulation* and *Rumination* subscales of the AFML scale were entered as IVs in the first step. In the six ANCOVA analyses the covariates had a significant effect on the DV, to examine the direction of this effect, participants' Baseline NA and NA Reactivity were entered as IVs in Step 2 of the regression analyses. In summary, the following results were observed:

Step 1: (i) Anxiety Regulation (ii) Rumination.

1. AFML factor scores in Step 1 predicted 10% of the variance in *Stress Regulation*. Scores on the *Anxiety Regulation* factor did not significantly predict *Stress Regulation*. As predicted, higher *Rumination* scores predicted less regulation of *Stress* following the intervention.

2. There was a trend towards significance for Step 1 predictors on *Nervous Regulation*. Though the step was non-significant overall, *Rumination* scores did significantly predict less *Nervous Regulation*.

The AFML factor scores in Step 1 did not significantly predict 3. *Upset Regulation*, 4. *Sadness Regulation*, or 5. *Depressed Affect Regulation*.

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The hypothesis that *Anxiety Regulation* scores on the AFML scale would predict greater regulation of induced NA was not supported (H6). There was partial support for the hypothesis that *Rumination* would relate to less regulation of NA by listening to music (H7).

Step 2: (i) Baseline NA (ii) NA Reactivity

1. The predictors in the second step (Baseline NA and NA Reactivity) explained an additional 59% of the variance in *Stress Regulation*. Higher baseline *Stress* predicted greater *Stress Regulation*, and more *Stress* reactivity predicted greater *Stress Regulation* following the music intervention.
2. Step 2 predictors accounted for an additional 48% of the variance in *Nervous Regulation*. Higher baseline *Nervousness* predicted greater *Nervous Regulation*, and more *Nervous* reactivity predicted greater *Nervous Regulation*.
3. Step 2 predictors accounted for an additional 52% of the variance in *Upset Regulation*. More *Upset* reactivity predicted greater *Upset Regulation*.
4. Step 2 predictors accounted for an additional 48% of the variance on *Sadness Regulation*. More *Sadness* reactivity predicted greater *Sadness Regulation*.
5. Predictors in Step 2 did not significantly predict *Depressed Affect Regulation*.

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Table 4.7. *Hierarchical Multiple Regression Examining the Predictive Validity of the Adaptive Functions of Music Listening Scale in 20 Younger And 20 Older Adults Assigned to a Self-Chosen Music Listening Intervention.*

| <i>Stress Regulation</i> | | | <i>Nervous Regulation</i> | | | <i>Upset Regulation</i> | | | <i>Sadness Regulation</i> | | | <i>Depressed Affect Regulation</i> | | |
|--|----------|------------|--|----------|------------|--|----------|------------|--|----------|------------|--|----------|------------|
| Regression: $F_{(4,35)} = 22.73$, $p < .001$, $R^2 = .72$, $Adj R^2 = .69$ | | | $F_{(4,35)} = 13.81$, $p < .001$, $R^2 = .61$, $Adj R^2 = .57$ | | | $F_{(4,35)} = 11.94$, $p < .001$, $R^2 = .58$, $Adj R^2 = .53$ | | | $F_{(4,35)} = 10.70$, $p < .001$, $R^2 = .55$, $Adj R^2 = .50$ | | | $F_{(4,35)} = 2.16$, $p < .05$, $R^2 = .20$, $Adj R^2 = .11$ | | |
| β | F_{ch} | R^2_{ch} | β | F_{ch} | R^2_{ch} | β | F_{ch} | R^2_{ch} | β | F_{ch} | R^2_{ch} | β | F_{ch} | R^2_{ch} |
| Predictors | | | | | | | | | | | | | | |
| Step 1 | 3.23* | .10 | 2.80 | .09 | | 0.87 | -.01 | | 0.56 | -.02 | | 1.01 | .00 | |
| (i) Anxiety Regulation | -.22 | | .02 | | | .10 | | | .04 | | | .12 | | |
| (ii) Rumination | -.41* | | -.36* | | | -.15 | | | -.15 | | | -.16 | | |
| Step 2 | | | | | | | | | | | | | | |
| | 36.09*** | .59 | 21.69*** | .48 | | 22.02*** | .54 | | 20.27*** | .48 | | 3.19* | .11 | |
| (i) Baseline NA | .31** | | .50*** | | | .10 | | | .20 | | | .28 | | |
| (ii) NA Reactivity | .78*** | | .86*** | | | .74*** | | | .28** | | | .38* | | |

Note; * $p < .05$, ** $p < .01$, *** $p < .001$. $N = 40$, F_{ch} = F change; R^2_{ch} = Adjusted r^2 change.

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Predictive effect of familiarity and music-specific efficacy beliefs

Listeners' beliefs regarding the efficacy of music for affect regulation in everyday life as measured by the AFML subscales did not significantly predict regulation of negative affect by music in this RCT. A second series of regression analyses were conducted to examine the predictive effect of listeners' beliefs about the specific music chosen and heard during the intervention. It was expected that higher ratings of familiarity and the participants' perceived efficacy of that music for the function of affect regulation would predict greater regulation of NA in this RCT. Given their predictive power in the previous regression analyses, baseline NA and NA reactivity were entered in Step 1, and participants' ratings of familiarity and perceived efficacy scores were entered in Step 2. Results of this analysis are presented in Table 4.8.

Step 1: (i) Baseline NA (ii) NA Reactivity

1. Predictors in Step 1 (Baseline NA and NA Reactivity) continued to explain the greatest proportion of variance in *Stress Regulation* (65%). Higher baseline *Stress* predicted greater *Stress Regulation*. More *Stress* reactivity predicted significantly greater *Stress Regulation*.
2. 56% of the variance in *Nervous Regulation* was explained by Step 1 predictors. Higher baseline *Nervousness* predicted greater *Nervous Regulation*, and more *Nervous* reactivity predicted greater *Nervous Regulation*.
3. 53% of the variance in *Upset Regulation* was explained by Step 1. More *Upset* reactivity predicted greater *Upset Regulation*.
4. 47% of the variance in *Sadness Regulation* was explained by Step 1. More *Sadness* reactivity predicted greater *Sadness Regulation*,
5. Step 1 predictors did not significantly predict *Depressed Affect Regulation*.

Step 2: (i) Familiarity (ii) Perceived efficacy

1. The variables in Step 2 significantly explained an additional statistically significant 5% of the variance in *Stress Regulation*. Higher ratings of music's perceived efficacy related to greater *Stress Regulation*.
2. These variables did not predict *Nervous Regulation*.

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3. Step 2 predictors explained an additional 9% of the variance in *Upset Regulation*. Higher ratings of music's familiarity predicted greater *Upset Regulation*. Higher ratings of music's perceived efficacy significantly predicted more *Upset Regulation*.
4. Step 2 predictors explained a further 10% of the variance in *Sadness Regulation*. Higher ratings of perceived efficacy predicted greater *Sadness Regulation*.
5. In contrast to the regulation of other affective states in the current study, regulation of *Depressed Affect* was more significantly predicted by Step 2 predictors than by Step 1 variables (Baseline *Depressed Affect* and *Depressed Affect* reactivity). Step 2 predictors explained 17% of the variance in *Depressed Affect Regulation*. Higher ratings of familiarity predicted greater *Depressed Affect Regulation*. Higher ratings of music's efficacy significantly predicted more regulation of *Depressed Affect*.

The hypothesis that the perceived efficacy of the music selected for the intervention would predict greater NA regulation was supported (H8). Participants' ratings of familiarity of the music had a less significant role on regulation of induced NA than music-specific efficacy beliefs (H9).

An overview of all results for Study 3 are presented in Table 4.10 below.

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Table 4.8. *Hierarchical Multiple Regression Examining the Influence of Familiarity of Music and Music-Specific Efficacy Beliefs on Negative Affect Regulation in 20 Younger and 20 Older Adults Assigned to a Self-Chosen Music Listening Intervention.*

| DV: | Stress Regulation | | | Nervous Regulation | | | Upset Regulation | | | Sadness Regulation | | | Depressed affect Regulation | | |
|-------------------------|--|----------|------------|--|----------|------------|--|----------|------------|--|----------|------------|--|----------|------------|
| Regression: | $F_{(4,35)} = 23.23$, $p < .001$, $R^2 = .73$, $Adj R^2 = .70$ | | | $F_{(4,35)} = 14.43$, $p < .001$, $R^2 = .62$, $Adj R^2 = .58$ | | | $F_{(4,35)} = 19.09$, $p < .001$, $R^2 = .66$, $Adj R^2 = .62$ | | | $F_{(4,35)} = 14.08$, $p < .001$, $R^2 = .62$, $Adj R^2 = .57$ | | | $F_{(4,35)} = 4.40$, $p < .01$, $R^2 = .33$, $Adj R^2 = .26$ | | |
| Predictors | β | F_{ch} | R^2_{ch} | β | F_{ch} | R^2_{ch} | β | F_{ch} | R^2_{ch} | β | F_{ch} | R^2_{ch} | β | F_{ch} | R^2_{ch} |
| Step 1 | | 37.19*** | .65 | | 25.93*** | .56 | | 23.17*** | .53 | | 18.48*** | .47 | | 2.96 | .09 |
| (i) Baseline NA | .29** | | | .52*** | | | .09 | | | .20 | | | .30 | | |
| (ii) NA Reactivity | .83*** | | | .91*** | | | .75*** | | | .78*** | | | .36* | | |
| Step 2 | | 3.75* | .05 | | 1.81 | .02 | | 5.40** | .09 | | 5.34** | .10 | | 5.17* | .17 |
| (i) Familiarity | .09 | | | .08 | | | .20* | | | .20 | | | .30* | | |
| (ii) Perceived Efficacy | .23* | | | .19 | | | .27* | | | .28** | | | .36* | | |

Note; * $p < .05$, ** $p < .01$, *** $p < .001$. $N = 40$, $F_{ch} = F$ change; $R^2_{ch} = \text{Adjusted } r^2$ change.

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Table 4.9. *Descriptive Statistics for all Study Variables for 40 Participants included in Regression Analyses.*

| | Younger Adults (n = 20) M(SD) | Older Adults (n = 20) M(SD) |
|-----------------------------|-------------------------------------|-----------------------------------|
| IV | | |
| Anxiety Regulation | 3.73(0.82) | 3.78(0.63) |
| Rumination | 3.10(0.84) | 2.56(1.24) |
| Baseline Stress | 2.50(2.01) | 1.50(1.05) |
| Baseline Nervous | 2.30(1.66) | 2.20(1.70) |
| Baseline Upset | 1.90(1.37) | 0.90(0.91) |
| Baseline Sadness | 3.10(1.29) | 1.60(1.90) |
| Baseline Depressed Affect | 3.10(1.41) | 2.60(1.70) |
| Stress Reactivity | 2.20(1.85) | 3.25(2.75) |
| Nervous Reactivity | 2.65(2.34) | 3.25(2.77) |
| Upset Reactivity | 1.90(1.45) | 2.50(2.03) |
| Sadness Reactivity | 0.80(1.40) | 1.00(2.29) |
| Depressed Affect Reactivity | 0.75(1.29) | 0.00(1.81) |
| Familiarity | 3.81(0.42) | 3.73(0.55) |
| Perceived Efficacy | 2.82(0.82) | 3.51(0.85) |
| DV | | |
| Stress Regulation | 1.80(2.14) | 3.45(2.62) |
| Nervous Regulation | 2.30(1.56) | 4.10(2.67) |
| Upset Regulation | 0.85(2.08) | 2.30(2.27) |
| Sadness Regulation | 0.75(2.12) | 1.35(2.52) |
| Depressed Affect Regulation | -0.20(1.61) | 0.65(1.35) |

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Table 4.10. *Summary of Hypotheses and Results in Study 3.*

| | | |
|----|---|---------------------|
| H1 | A self-chosen music listening intervention will be more effective in reducing induced NA than an active control. | Fully supported |
| H2 | Older adults will report less negative affect at baseline than younger adults | Fully supported |
| H3 | Older adults will demonstrate more reactivity to the NA induction than younger adults | Not supported |
| H4 | Older adults will experience greater regulation of NA than younger adults in both experimental conditions | Fully supported |
| H5 | Older adults listening to self-selected music will experience greater regulation of NA than younger adults | Not supported |
| H6 | Higher scores on the AFML subscale <i>Anxiety Regulation</i> will predict greater regulation of NA following a music listening intervention | Not supported |
| H7 | Higher scores on the <i>Rumination</i> subscale of the AFML scale will predict less NA regulation following a music intervention | Partially supported |
| H8 | Higher ratings of the music's perceived efficacy for affect regulation will predict greater regulation of NA | Fully supported |
| H9 | Higher ratings of familiarity of participant's self-chosen music will predict greater regulation of induced NA | Partially supported |

4.5 Discussion

Studies 1 and 2 in this thesis indicated that listeners use music for regulating affect in everyday life. Study 1 demonstrated that listeners believe affect regulation FML to be adaptive for enhancing their wellbeing. Perceived efficacy of music for affect regulation functions (as measured by the AFML scale) was also correlated with affective functioning and wellbeing in Study 2. Building upon this work, the current RCT examined the efficacy of a brief music listening intervention for the function of affect regulation. The hypothesis that a self-chosen music listening intervention will be more effective in regulating induced NA than an active control was supported (H1). There was a significant main effect for condition found for all affective VAS

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with the exception of *Tension*. Specifically, post-intervention the NA regulation score was significantly higher, signifying better regulation of NA for those in the music listening condition (intervention) than for those listening to a radio documentary (control). Consistent with the studies by Sleight and McElroy (2014), Matsumoto (2002) and Radstaak et al. (2014), which found positive effects of music relative to an active control, the current study found that listening to music had greater regulatory effects than listening to a radio documentary.

Supporting previous work demonstrating benefits of participant-selected musical stimuli (Burns et al., 2002; Labbé, 2008; Radstaak et al., 2014), this study found that the music that was chosen by participants for the function of affect regulation facilitated the reduction of NA. Indeed, a key predictor of the level of affect regulation achieved, or the degree of recovery from the laboratory stressor, was the participants' belief that their self-selected music was efficacious in relieving stress.

More generally, this finding suggests that listening to personally-chosen music may provide an effective means of regulating affect in times of stress. Stress in the current study resulted from the anticipation of having to deliver a speech in front of a camera, a speech that would subsequently be evaluated by a panel of judges. Participants believed that they would have to give a speech throughout the period they were either listening to music or listening to a radio documentary. They were only informed that they would not be required to make the speech after the final assessment phase. NA regulation was significantly higher during this final assessment phase for music listeners compared to those who listened to a radio documentary. Listening to self-selected music was found to regulate the NA induced by anticipation of the stressor more effectively than the active control, suggesting that music listening may be adaptive in preparing for a stressful challenge.

The hypothesis that scores on the *Adaptive Functions of Music Listening* subscales would predict regulation of induced NA in the current RCT was partially supported. *Anxiety Regulation* was not related to greater recovery as expected (H6). As hypothesised, endorsement of *Rumination* FML predicted less recovery of stress and nervousness (H7). Further analyses of the predictive validity of the AFML scale and its subscales are thus required. These regression analyses did reveal that an

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individual's reactivity to a stressor, and to a lesser extent their baseline level of NA, predicted success in regulating induced NA following the music listening intervention. Specifically, a stronger negative reaction to the induction and higher levels of NA at baseline related to greater regulation of NA after listening to music. Controlling for these variables in the ANCOVA analyses examining the efficacy of this RCT thus provides strong evidence supporting the benefits of self-chosen music listening on affect regulation. This analytical approach represents an important advance by the current study, as other studies reviewed have not controlled for reactivity, with the exception of the study by Knight and Rickard (2001), which did covary participants' baseline affect.

The lack of significant interaction between age group and experimental condition in the current study suggest that, despite expectations, younger and older adults do not respond differentially to a self-chosen music listening intervention relative to an active control condition (H5). Both younger and older adults showed similar affect regulation benefits of music listening relative to the active control condition. It is noteworthy that the affect regulation benefits in younger and older adult groups were so similar, particularly given that younger and older adults did differ in the type of music they selected for coping with a stressful situation. Specifically, older adults selected many more classical music pieces than younger adults did. Classical music is the type of music most often chosen by experimenters in previous affect regulation studies, largely because of its purported relaxing properties. In the current study, the genres, and corresponding valence and arousal properties of the music selected, varied within and between age groups and individuals. These features of music are often contrasted in experimental studies, and may influence regulation efficacy, but were not controlled for in the current study. Yet, the common affect regulation benefits observed in both younger and older adult groups in this study suggests that, even in the context of significant variation in music selections, individuals across the lifespan are competent at selecting music that is suitable for addressing their personal needs (DeNora, 1999; North et al., 2004).

It is important to note that the positive effects of personally chosen music listening in the current study may be explained in part by the role of choice and control as a key mechanism of stress reduction. A significant methodological difference between the

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intervention and control conditions in this RCT was the level of choice and control exercised and experienced by participants in advance of being randomly assigned to experimental conditions. Each participant in the intervention listened to music personally chosen for a stressful situation, whereas participants in the control condition listened to a researcher-assigned radio documentary. The regulatory effects of music may be enhanced when stimuli are self-selected due to increased feelings of control, dominance, and agency (Krause & North, 2016; Mitchell & MacDonald, 2006), which may assist with adapting to stressors (Folkman, 1984; Heckhausen, 1995; Carver & Scheier 1982). The absence of choice or control in the active control condition may have impacted its relative efficacy. Though it was not as significant, a reduction in NA was observed in the active control condition. This suggests, at least, that control/agency is not the sole mechanism of this regulatory effect. Furthermore, although participants assigned to the music listening condition exercised control *in advance* of the experiment (i.e., by selecting music), the control group experienced the same advance level of control (i.e., they were also allowed to select music in advance) and the experimental group did not have any further control in the experimental session -- they were offered no further choices and were simply provided with an opportunity to listen to the music that the experimenter made available from two options the participant had previously selected. As such, choice and control may not be a mechanism that features strongly, or differs significantly, in the comparison between the two experimental conditions in this study, and future research is needed to manipulate and measure perceptions of control more explicitly to examine effects.

The vast majority of participants selected music that they themselves rated as extremely familiar. Emotional effects of music are said to be enhanced by familiarity and liking (Liljestrom et al., 2013). In the current study, familiarity of participants' music selections predicted some regulation effects of music (H9), but had a minor role relative to participants' ratings of the perceived regulation efficacy of the music they chose (H8). Future studies should seek to manipulate the effects of choice and control, even in the context of familiar, well-liked music listening experiences, to disentangle the independent and interactive effects of choice, efficacy beliefs, and familiarity/liking on affect regulation in stressful situations.

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The current study also revealed a consistent significant main effect for age group on affect regulation. As hypothesised, older adults experienced greater recovery from NA than younger adults did, regardless of the tactic employed for affect regulation (music listening or listening to a radio show) (H4). One interpretation for this effect is that it reflects more general positive affective changes that occur across the lifespan. The significantly greater affect regulation effects observed with older adults in both conditions of the current study, and their significantly lower reported NA at baseline, is in line with the *socio-emotional selectivity theory*, reduction and stabilisation of NA, and improved affect regulation abilities in older adulthood (Carstensen, 1995; Carstensen & Lockenhoff, 2003; Röcke et al., 2009; Scheibe & Carstensen, 2010). Mean NA Regulation scores were highest for older adults in the music listening condition. This RCT found that music listening provided regulatory benefits greater than those observed in an active control, and older adults had significantly greater regulation of NA following a stressor in general. This suggests that music listening may be a beneficial strategy for regulating stress for healthy older adults.

Findings regarding age differences, however, should be interpreted with caution, as the younger and older adult samples differed across variables other than age. They also differed in their incentives to participate. Younger adults were drawn from a convenience sample of university students, the majority of whom received course credit for their participation. Older adults were volunteers drawn from a community sample. As predicted, older and younger participants differed significantly in baseline affect (H2). Younger adults were more *Sad, Upset, Bored, Fatigued* and *Stressed* on arrival at the laboratory, potentially due to different incentives to participate in the study - or because of more fundamental developmental differences in affective functioning. Older adults did not react more negatively to the NA induction as anticipated (H3). This finding appears to contradict some existing empirical research, however a number of previous studies of age differences in reactivity have focused on physiological indicators of affective experience (Hogan et al., 2012; Jennings et al., 1990; Kudiella et al., 2004; Sathyaprabha et al., 2008), which may differ from self-reported affective experience. Age differences in reactivity can also clearly be seen in other studies showing negative affect impairs cognition more strongly in older adults relative to younger adults (Hogan, 2003;

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Cohen, Eisdorfer, Vitaliano, & Bloom, 1980). It may be that the hypothesised age differences in reactivity are less pronounced in subjective reports of affective experience employed in the current study. However, by statistically controlling for group and individual differences in baseline affect and NA reactivity in the analyses, confidence in reported findings regarding the unique benefits of music listening for affect regulation is increased.

Older adult participants may have experienced significantly greater NA regulation across both experimental and control conditions because they also enjoyed the control condition. The radio documentary about Charles Darwin may have generated more positive feelings for older adults because they found it to be more interesting. Alternatively, this effect could be due to developmental changes in affective processing, specifically the positivity effect observed in older adulthood (Mather & Carstensen, 2005). This effect is a bias in older adults' attention towards positively-valenced stimuli. This positivity bias is observed in a variety of perceptual and memory tasks, and is also observed in affect identification in speech and in music listening (Laukka & Juslin, 2007). As such, older adults may have been attuned to more positive speech features in the Darwin radio documentary. However, this potential greater 'liking' effect in the control condition was not measured or controlled for in the current study, which makes this interpretation of effects speculative.

Limitations

As suggested above, additional experimental controls could have enhanced our understanding of effects observed in the current study. A third condition allowing for a comparison of self-selected music with an active control and a silent control would have been advantageous. Better still, the addition of a fourth condition further contrasting the relative effects of experimenter-selected music would have been useful. However, this methodological design was not adopted in the current study due to sample size constraints and considerations of statistical power given the sample size constraints.

Participants were self-selected and motivation to participate may have arisen from a desire to confirm the benefits of music. A number of steps were taken preemptively

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to minimise potential bias stemming from demand characteristics. Firstly, to avoid a direct focus on affect regulation, participants were informed that the study was concerned with the effect of music on task performance. Allocation to the control or intervention group was concealed from participants. The intervention or control condition itself was presented as a break or rest period in the experimental procedure, and participants in the control condition listened to their self-selected music after the final assessment. It is hoped that taking this approach reduced the confounding effect of demand characteristics on findings of the current study.

Following Russell (1980), self-report measures of affect employed in this study adopted a bipolar definition of affect, with scales ranging from positive to negative affective experience - rather than bivariate, where positive and negative affect are rated independently. Independent ratings of positive and negative affective experience may have provided further information. Furthermore, mixed and complex emotions, including the co-experience of positive and negative emotions, are more common in aesthetic experience (Juslin, 2013). These mixed and complex emotions could not be examined using the VAS measure of affect adopted here. Further, the inclusion of physiological measures to compliment the subjective reports of listeners would also have been an improvement on the current method. Though findings regarding physiological arousal have not always aligned with the listener's subjective experience, and while affective responses cannot be differentiated by reference to autonomic activity (Cacioppo, Berntson, Larsen, Poehlmann, & Ito, 2000), physiological measurements can provide complementary information regarding the overall affective response profile of participants in experimental music listening studies. However, as stated, in studies of self-selected music they may be difficult to interpret at a group level due to intra-individual variation in the music selected and subsequent physiological response.

A strength of this study is that it aligns broadly with the van Goethem and Sloboda (2011) *Goals Strategies Tactics Mechanisms* framework conceptualising music listening as a tactic for the goal of affect regulation. Affect regulation goals are achieved through a number of potential regulation strategies (i.e., distraction, reappraisal) and beneficial effects are brought about through different mechanisms of action (i.e., emotional contagion, episodic memory). The current study suggests that

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the tactic of music listening may be better than the tactic of listening to a radio documentary for the goal of NA regulation. However, a limitation of the RCT is that it does not address the particular regulation strategies employed by participants, or the mechanisms of this effect. Participants were not given instructions on how to engage with the intervention or active control as a means to regulate affect, and their perceived efficacy in the use of specific regulation tactics was not measured directly. This study did not enquire as to what participants were doing during the intervention or control conditions, such as what regulation strategies they may have used, or how they attempted to cope. However, scores on subscales of the *Adaptive Functions of Music Listening Scale* did provide some insight into the beliefs of participants in the current study regarding the extent that different affect regulation strategies are experienced by listening to music in everyday contexts over time. The subscale measuring the regulation strategy *Rumination* on the AFML scale includes items such as ‘when I feel anxious listening to music makes me dwell upon those feelings’. As hypothesised, higher scores on this factor predicted less NA regulation in the current laboratory study (H7). The *Anxiety Regulation* factor measures endorsement of four affect regulation strategies that may be experienced when listening to music (i.e., distraction, emotional support, positive reappraisal, and positive emotions). However endorsing positive beliefs regarding the efficacy of music listening for *Anxiety Regulation* did not significantly predict greater regulation of NA in the current study as predicted (H6). Beliefs about the affect regulatory effects of music listening more generally and over time (as measured by the AFML scale) had limited predictive power over the functional efficacy of a music listening intervention for affect regulation in the laboratory. Efficacy beliefs about the specific music selected and heard during the intervention however did significantly predict NA regulation. Higher ratings of the music’s effectiveness predicted more regulation of induced NA for participants in the intervention (H8). A study similar to this one carried out by Thaut and Davis (1993) did ask participants to indicate what strategies they had used to achieve relaxation following a self-chosen versus an experimenter-chosen music listening intervention. Options included attention to the music, reminiscence, imagery, breath control, and muscle relaxation. It was found that attention to the music was the most commonly reported. Moreover, this strategy was most frequently reported in combination with physical relaxation methods (breath control and muscle relaxation). This finding supports qualitative research reporting that affect regulation

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strategies are not enacted individually, but rather operate in combination (Saarikallio, 2011; van Goethem & Sloboda, 2011). Thus, perhaps the tactic of listening to music prompts a range of strategies which together can support affect regulation.

At the same time, the aim of this study was not to determine the strategies or mechanisms by which affect was regulated in this RCT. Rather the aim was to evaluate, in the context of rigorous experimental controls, the claim that music listening can be used for the function of affect regulation as highlighted in Studies 1 and 2, and in the wider research literature on FML (Saarikallio & Erkkila, 2007; Schäfer et al., 2013). Future studies should seek to examine the strategies or mechanisms by which affect regulation is optimised when listening to music. Reliable and valid methods will need to be developed that allow participants to report on strategies they are using, in a way that provides both insight into the nature and timing of strategies used throughout a music listening experience that does not interfere with the music listening experience. In practice, this may be difficult but it will be important if models like that developed by van Goethem and Sloboda (2011) are to be evaluated more fully.

Finally, in the current study, participants were asked to select music they would listen to in a stressful situation. This study does not address how or on what basis that music was selected. Choices in music listening are said to be informed by the function of music listening being served (Greasley & Lamont, 2011; Schäfer & Sedlmeier, 2009; Van den Tol & Edwards, 2013) and the music listening context or situation (Krause et al., 2014). Results presented here demonstrate that participants selected music that was familiar, and that they believed to be effective for the function of affect regulation. Positive effects of participant-selected music for a stressful situation in this study suggest that in everyday contexts where listeners select their own music for the goal of regulating affect, they may be successful in regulating NA. However, studies that examine the process of selecting and listening to music in real-world stressful situations are needed to evaluate the extent to which findings from the current laboratory study generalise to real-world situations.

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Conclusion

The results of this study supports the idea that, relative to related leisure activities – in particular, listening to a radio documentary -- personal music listening offers additional advantages for regulating NA aroused by the prospect of a stressful challenge, and this effect does not differ for younger and older adults. Future research should examine the mechanisms through which self-selected music listening serves to regulate NA in stressful situations.

5 CHAPTER 5

General Discussion: The Adaptive Functions of Music Listening: Structure, Correlates, & Consequences.

5.1 Thesis Overview

Over recent years there has been a growing interest in the role of music in psychological functioning. Chapter 1 reviewed a significant body of research suggesting a beneficial role of music listening for wellbeing enhancement. However, there is considerable heterogeneity in methodological, analytical, and conceptual approaches across studies of music listening, which make it challenging to understand the role of music listening for enhancing wellbeing. There are for instance many experimental studies that examine a variety of subjective and physiological responses to music of different types, or following a stress or mood induction. Other studies have focused on understanding responses to music over time in everyday listening experiences, often using self-report measures and qualitative methodologies. Empirical investigations have also varied in their conceptual starting point, with some studies treating music listening as a general strategy of regulation, and others defining it as a tactic or tool associated with a range of more specific regulation strategies that can bring about varied effects in multiple domains. There is an ongoing challenge of bringing synthesis to discrete theories focused on the effects of music, and generalising results of music listening effects in the laboratory to the experience of music listeners in everyday contexts. The present research aimed to combine qualitative, quantitative, and experimental approaches to achieve a greater understanding of the adaptive functions of music listening and associated wellbeing outcomes.

Qualitative research provided a starting point for the inquiry presented in the current thesis. Notably, survey and ESM studies examining the functions of music listening (FML) have tended to focus on a narrow set of common and recurrent FML constructs, derived from a review of the existing literature on music listening functions and effects. In contrast, qualitative investigations have uncovered a broad

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range of FML identified by music listeners. Qualitative enquiry has also identified a number of unique functions, as well as, providing a more nuanced picture of specific FML. Building upon this work, Study 1 in the current thesis used an innovative qualitative methodology - Interactive Management - to catalyse the collective intelligence of music listeners to create a comprehensive factorial structure of the FML composed of a broad range of constructs that were conceptually distinct and theoretically meaningful. The outputs from this study were used to inform scale development work.

Importantly, quantitative survey-based research on the relationship between the functions of music listening and wellbeing outcomes has been limited by the lack of a comprehensive and theoretically grounded FML scale. Therefore, a key aim of Study 2 was the creation of *The Adaptive Functions of Music Listening Scale* (AFML scale). Involving stakeholders in the identification of AFML scale constructs in Study 1 ensured the factors extracted in subsequent psychometric analyses were representative of the functions of everyday music listening experiences. A further aim of Study 2 was to use this measure to examine the relationship between people's self-reported FML in everyday life and their level of wellbeing, broadly defined.

This thesis also examined the effects of a brief music listening experience in the laboratory on immediate affective functioning (Study 3). Much experimental work reviewed in Chapter 1 highlighted positive effects of music for affect regulation. Participants in Studies 1 and 2 consistently endorsed beliefs and expectations regarding positive effects of music for the function of affect regulation in everyday life. In contrast with much of the experimental work conducted thus far, which has tended to focus on the effects of prescribed music on affective outcomes, in everyday contexts individuals self-select music to regulate negative affect. A gap in this literature was identified regarding the effect of participant-selected music for the function of affect regulation, suggesting that a randomised controlled trial (RCT) evaluating a self-chosen music listening intervention for the regulation of induced negative affect was warranted.

Finally, there is a paucity of research on the functions and effects of music listening in healthy older adults. Addressing this gap in our knowledge, Studies 1 and 3

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compared younger and older adult participants to examine potential changes in FML and effects of music across the lifespan.

This concluding chapter will provide a succinct overview of findings from the three studies presented in this thesis focused on the structure, correlates, and consequences of the Adaptive Functions of Music Listening. It will also highlight the unique contribution of this research in terms of its implications for theory and research on the functions of music listening and wellbeing across the lifespan. Limitations of the research will also be discussed and suggestions for future research investigations will be proposed.

5.2 Overview of Research Findings

5.2.1 Structure

Study 1 used a collective intelligence methodology, Interactive Management (IM) (Warfield & Cárdenas, 1994), to identify the FML as described by groups of younger and older adults. Participants generated 138 unique functions. When these FML were categorised based on conceptual similarity, a total of 38 categories emerged, which in turn clustered into 9 higher-order factors: *Affective, Social, Cognitive, Eudaimonic, Goal-Attainment, Everyday Listening, Music-Focused Listening, Sleep Aid* and *Creating a Personal Space*.

The FML construct structure that emerged from Study 1, in conjunction with theoretical and empirical research reviewed in Chapter 1, informed both the generation of a large pool of scale items and a scale structure designed to measure key constructs. In Study 2, review of scale items by experts in psychometrics and music psychology, as well as by music listeners themselves, was followed by exploratory and confirmatory factor analyses with two separate samples of participants (N = 1191). This resulted in the identification of a psychometrically sound 46 item scale with an 11 factor structure. Existing general scales focused on the functions of music measure between 3 and 6 discrete factors, therefore, the factorial structure of the AFML scale is more extensive than the structure of

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available instruments. The FML factors extracted in the final round of factor analysis were *Stress Regulation, Anxiety Regulation, Anger Regulation, Loneliness Regulation, Rumination, Reminiscence, Strong Emotional Experiences, Awe and Appreciation, Cognitive Regulation, Identity and Sleep*. Four of the 9 higher-order factors resulting from the categorisation of Study 1 data were represented in the measurement model of The AFML scale, that is, *Affective, Social, Cognitive, and Everyday Listening (Sleep)* functions were identified using factor analysis. The factors that were retained support previous assertions that the structure of FML includes predominantly *Affective, Social and Cognitive* functions. Moreover, the constructs represented in the final scale structure are predominantly affect regulation FML.

5.2.2 Correlates

Although many surveys and a number of qualitative investigations have been carried out on the functions of music listening, and many of the FML identified in research have potential implications for enhancing wellbeing, there have been no direct investigations of which functions listeners themselves rate as the most adaptive for their wellbeing. An analysis of the voting patterns of participants in Study 1 revealed that, overall, FML for *mood improvement, social connection, affect regulation, music as therapy, and personal meaning* were the top ranked FML for wellbeing enhancement.

The AFML scale developed in Study 2 measures respondents' efficacy beliefs regarding a range of potential effects of music listening, and their expectations of achieving specific adaptive outcomes when listening to music in everyday contexts. Bandura's Social Cognitive Theory (1989; 2001) was used to frame the way in which questions were presented on the AFML scale. Social Cognitive Theory (SCT) suggests that efficacy beliefs regarding the outcomes of specific behaviours predict the application and success of specific behaviours in context. Specific behaviours become incentivised by producing desired effects (e.g., self-regulation, identity, entertainment), the realisation of which may produce adaptive outcomes that contribute to increased wellbeing. While effects were modest overall, correlation analyses carried out with two large samples of university students in Study 2 suggest

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a positive, but somewhat complicated relationship between FML and self-reported wellbeing outcomes.

Using the AFML scale, some positive effects of FML on wellbeing outcomes were observed. Specifically, high scores on the FML factors of *Anger Regulation*, *Anxiety Regulation*, *Stress Regulation*, *Loneliness Regulation*, *Cognitive Regulation*, *Strong Emotional Experiences* and *Identity* were correlated with higher levels of self-reported positive affect (PA) experienced in the previous week. *Identity* functions were associated with higher psychological wellbeing, and both *Anger Regulation* and *Anxiety Regulation* were associated with higher life satisfaction, and higher psychological and social wellbeing. Further, affect regulation FML (i.e., *Anger Regulation*, *Anxiety Regulation*, *Stress Regulation*, *Loneliness Regulation*) were positively associated with greater use of *reappraisal*, an emotion regulation strategy which is considered among the most effective strategies for reducing or regulating the impact of negative affective experiences (Gross & John, 2003). This adaptive affect regulation strategy can also support and maintain an individual's general level of wellbeing (Larsen, 2009).

Study 2 also reported a number of negative effects of FML with respect to wellbeing levels. *Rumination*, as expected, was associated with reduced life satisfaction, and lower psychological and social wellbeing. Regarding emotion regulation, *Rumination* was also associated with less use of the adaptive regulation strategy of reappraisal, and increased use of the less adaptive strategy suppression (Gross & John, 2003). In other research suppression has been associated with affective dysfunction and reduced wellbeing (Aldao, Nolen-Hoeksema, & Schweizer, 2010). Higher scores on the factors measuring *Strong Emotional Experiences*, *Rumination*, *Sleep*, *Reminiscence*, *Awe and Appreciation* and *Identity* were associated with greater reported negative affect (NA).

Interestingly, the factors *Strong Emotional Experiences* and *Identity* were both associated with greater experience of NA, but also with greater experience of PA. This was not completely unexpected given prior research highlighting the independence of positive and negative affective experiences (Diener et al., 2004; Reich, Zautra, & Davis 2003). Furthermore, demonstrating the complexity of results,

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not only did *Identity* functions relate to greater experience of PA and NA, higher scores on *Identity* FML were also associated with higher psychological wellbeing. Correlations between *Cognitive* and *Everyday Listening* functions and wellbeing measures were few and inconsistent.

In sum, correlation analyses support the idea that self-reported efficacy in the use of discrete FML may be important in optimising affective experience and wellbeing, particularly in the case of affect regulation FML. Notably, *Anger* and *Anxiety Regulation* FML, and to a lesser extent *Stress* and *Loneliness Regulation* were positively associated with a number of wellbeing outcomes. In contrast, *Rumination* FML scores were related to less adaptive affective functioning and wellbeing. Overall, relationships were more widespread between FML and affective experience component measures of wellbeing (i.e., self-reported PA and NA) than with higher-level measures of wellbeing (i.e. subjective, psychological, and social wellbeing). Correlates between FML and wellbeing measures were modest, but for the most part positive.

5.2.3 Consequences

Evidence reviewed in Chapter 1 highlighted the importance of affect regulation in maintaining hedonic balance, which is central to many theoretical models of wellbeing. Study 1 documented an array of adaptive functions of music listening used by younger and older adults in everyday life. A great many of these functions were for the goal of regulating negative affective experiences. In Study 1 affect regulation functions were among the most highly ranked for wellbeing enhancement. As described, Study 2 found that endorsing positive beliefs regarding the affect regulatory effects of music listening in everyday contexts (as measured by the AFML scale) was associated with increased use of adaptive affect regulation strategies (i.e., reappraisal), and higher scores on measures of wellbeing (i.e., positive affect, life satisfaction, psychological and social wellbeing).

However, the question of whether listening to music has adaptive consequences for the function of affect regulation was not addressed directly in Study 1 and 2. To address this question, Study 3 conducted an RCT with forty younger adults and forty

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older adults to evaluate the effects of a self-chosen music listening intervention for the regulation of induced negative affect. To increase the ecological validity of the study participants assigned to the music listening intervention heard music they had previously selected for a stressful situation. Following a social-stress induction, listening to self-chosen music significantly reduced induced *Stress*, *Nervousness*, *Upset*, *Sadness*, and *Depressed Affect* more than an active control condition (i.e., listening to a radio documentary). These positive effects of music listening did not differ for younger or older adults, thus highlighting the robustness of the effect. The experimental rigour in this well-controlled study provides strong evidence of music's positive effects, specifically, by comparing music to another tactic that may provide affect regulation effects, and statistically controlling for both the participant's baseline level of affect, and reactivity to the negative affect induction.

Furthermore, for participants in the music intervention condition, greater reactivity to the negative affect induction procedure, and higher NA at baseline, were both found to significantly predict greater regulation of induced NA. As such, the positive effects of music listening on affect regulation in Study 3 were accentuated by a stronger negative emotional reaction to the induction, and by greater NA prior to the experimental manipulation.

Participants' beliefs regarding effects of music for the function of *Anxiety Regulation* and *Rumination* in everyday contexts (as measured by the AFML scale) did not significantly predict regulation efficacy for participants in the music intervention condition in Study 3. However, participants' music-specific beliefs did predict the benefits of music listening in regulating NA in the laboratory. In general, participants in Study 3 selected music for the function of affect regulation that was rated 'extremely familiar', and ratings of familiarity had a positive, albeit small, effect on NA regulation in the RCT. However, participants' ratings of the perceived efficacy of their music selections for regulating NA did significantly and positively predict greater *Stress Regulation*, *Upset Regulation*, *Sadness Regulation* and *Depressed Affect Regulation*, denoting the suitability of self-chosen music listening for the function of affect regulation.

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What has been learned as a result of the three studies in this thesis will now be considered by returning to the proposed model of adaptive music listening effects and potential relationships with wellbeing outcomes, as proposed in Chapter 1 (see Figure 1.1, included below for reference). This model was the result of a review of the music psychology literature through the lens of different theoretical perspectives on wellbeing. The model identified a range of affective, social, and eudaimonic effects of music listening deemed adaptive for wellbeing. Chapter 1 also presented a theoretically-based rationale for considering these effects of music listening experiences as functions of music listening (FML).

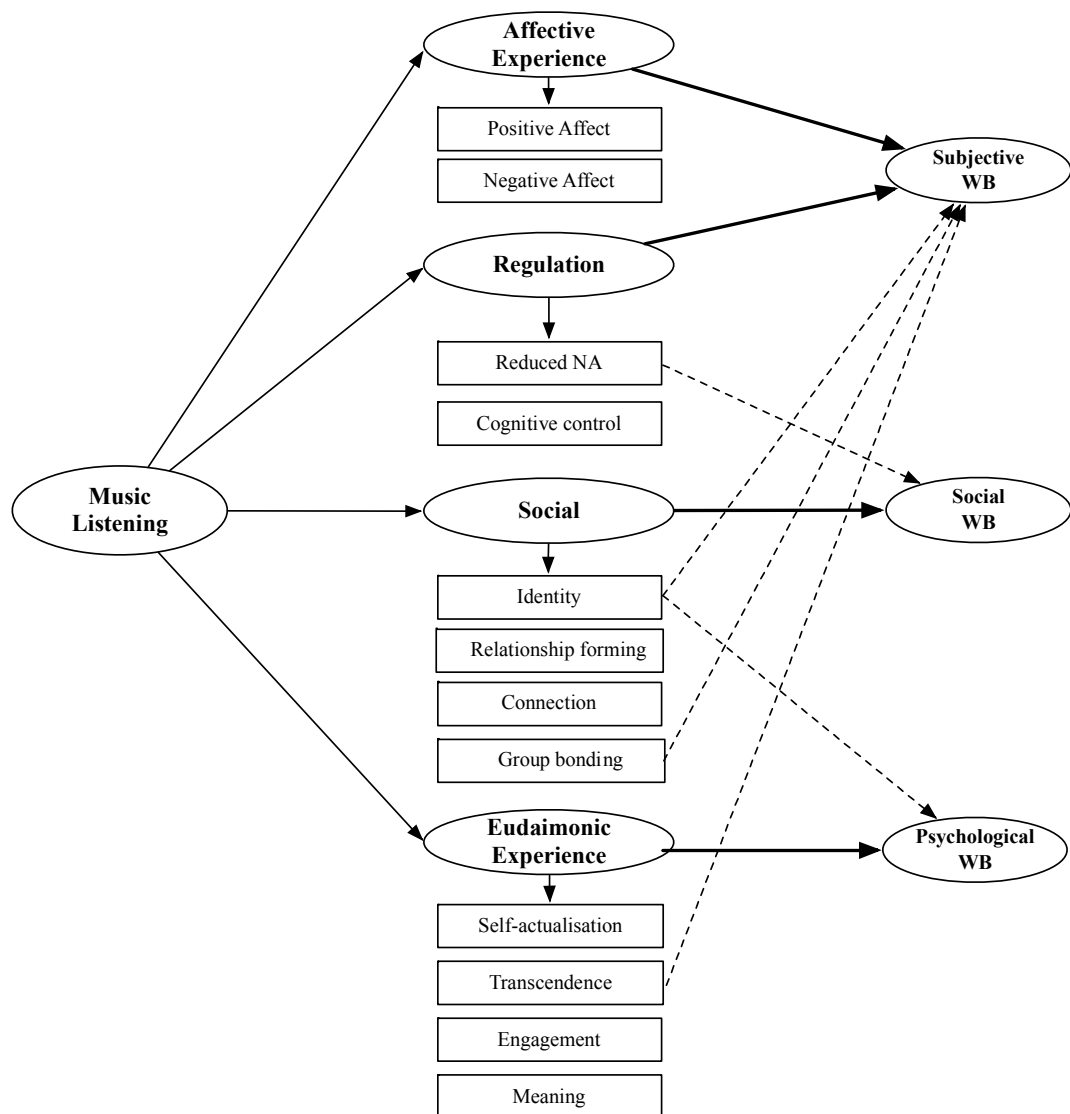


Figure 1.1. Proposed model of adaptive music listening effects and potential relationships with wellbeing outcomes.

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With the exception of identity functions, all 12 of the FML proposed in Figure 1.1 were alluded to by younger and older adults engaged in collective intelligence sessions in Study 1, as well as a range of additional FML that were also identified by participants (see Figure 2.5). The category analysis of the large number of unique FML generated by the participants in Study 1 (see Section 2.5.2) informed the development of a conceptual framework for rigorous scale development work in Study 2 (see Figure 3.1). Following factor analyses, an 11 factor model of FML was confirmed.

The FML generated by participants in Study 1 have expanded upon those discussed at the beginning of the thesis and presented in Figure 1.1, and tests of dimensionality in Study 2 have confirmed 11 of these FML quantitatively at a population level. The voting patterns of participants in Study 1, and the results of correlation analyses in Study 2 supported many of the proposed relationships with wellbeing outcomes. Providing preliminary evidence for the adaptivity of the music listening effects highlighted in this theoretical model, FML related to Affective Experience, Regulation, Social, and Eudaimonic Experience were among those voted most significant for enhancing wellbeing by participants in Study 1. Yet there were other FML not included in this model that were also highly ranked for wellbeing enhancement by younger and older adults, such as musical education, dance, and persistence in pursuit of goals (see Figure 2.5).

In Chapter 1 of the thesis it was argued that a strong, emerging empirical basis exists for predicting positive effects of music listening on affect regulation, alongside a solid theoretical basis for linking affect regulation and wellbeing. The results across the three studies in this thesis contribute to this emerging evidence base. Many affect regulation FML were identified by participants in Study 1, and four of the eleven factors on the AFML scale developed in Study 2 measure efficacy beliefs regarding the reduction of NA by listening to music (i.e., *Stress Regulation*, *Anxiety Regulation*, *Anger Regulation*, *Loneliness Regulation*). Further, the results of the RCT in Study 3 confirmed reduced NA as an adaptive effect of listening to music. As predicted in the proposed model, affect regulation FML were among the most significant FML for enhancing wellbeing according to younger and older adults in

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Study 1, and correlation analyses in Study 2 showed that affect regulation FML were associated with higher levels of subjective wellbeing.

On the basis of results from one previous survey study with younger adults that found a positive direct effect of modifying emotions by music listening on social wellbeing (Papinczak et al., 2015), a more tentative link was proposed between reduced NA and social wellbeing (see broken line in Figure 1.1). The positive association between *Anger* and *Anxiety Regulation* factors of the AFML scale and higher social wellbeing in Study 2 supports the study by Papinczak et al. (2015). Additionally, an unexpected positive association was observed between scores on *Anger* and *Anxiety Regulation* factors and higher scores on a psychological wellbeing measure, providing initial evidence for a link between affect regulation FML and psychological wellbeing. Regarding regulation of cognitive states, relative to other FML cognitive control was not highly ranked for wellbeing enhancement in Study 1, and *Cognitive Regulation* scores on the AFML scale were not significantly associated with wellbeing measures in Study 2.

Participants in Study 1 highlighted a number of FML related to the experience of positive and negative affect. Functions of music to increase positive affect, such as, ‘to feel happy’ were highly voted for enhancing wellbeing. In Study 2, *Strong Emotional Experiences* and *Reminiscence* FML were determined as independent factors. However, relationships between Affective Experience FML and wellbeing outcomes were not as clear-cut or straightforward as outlined in Figure 1.1. Rather than predicting increased subjective wellbeing, *Reminiscence* associated with increased NA, whereas, *Strong Emotional Experiences* associated with increased PA, but also with increased NA and reduced life satisfaction. Items measuring *Strong Emotional Experiences* and *Reminiscence* on the AFML scale did not distinguish the valence of the affective experience (e.g., positive versus negative), and this may explain these unexpected findings.

At the outset of the thesis a number of adaptive Social and Eudaimonic effects of music were proposed, and a large amount of Social and Eudaimonic FML were identified in Study 1. However, no Eudaimonic factors and only one Social FML factor, *Identity*, were determined by factor analyses in Study 2. Drawing upon a

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limited body of research, especially regarding the outcomes of Eudaimonic Experiences in music, a number of relationships between Social and Eudaimonic FML and wellbeing outcomes were proposed (see Figure 1.1.). Support for these predictions can be garnered from the voting patterns of participants in Study 1 only, which reported that Social FML such as connection and group bonding, and Eudaimonic Experiences like transcendence and meaning, were among the most highly ranked FML. Unfortunately, because factors measuring Social and Eudaimonic FML were not determined in Study 2 the relationships with wellbeing outcomes proposed in the model were not tested quantitatively, and therefore empirical support regarding relationships with social and psychological wellbeing is still lacking.

One Social FML that is measured by the AFML Scale is *Identity*, however, scores on this factor were not associated with social wellbeing as expected. It was speculated that *Identity* FML might relate to other dimensions of wellbeing (see broken lines Figure 1.1), and these relationships were confirmed in Study 2. Specifically, higher scores on the *Identity* factor were associated with higher levels of psychological wellbeing, consistent with the survey of older adults' FML by Laukka (2007). Higher scores on the *Identity* factor were also associated with higher PA, in line with experimental work by Baumgardner (1990).

By consulting directly with music listeners from contrasting age groups, Study 1 has shown that the range of adaptive FML is broader than Figure 1.1 suggested. Still, the results of the factor analyses of a large set of survey items (Study 2) highlighted the centrality of affect regulation FML in everyday music listening, and Study 3 provided controlled evidence that music listening can effectively reduce NA. As stated, there was strong theoretical and empirical support for the adaptivity of affect regulation in music listening for wellbeing, and in Study 2, affect regulation functions in particular (i.e., *Anger Regulation*, *Anxiety Regulation*, *Stress Regulation*, *Loneliness Regulation*) demonstrated positive relationships with wellbeing outcomes, corresponding with the collective intelligence of music listeners in Study 1 and the results of Study 3.

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Adopting self-report methods in Studies 1 and 2 was important for determining the scope of music listening functions and effects, and highlighted affect regulation as a very common and valued FML in everyday life. However, there is a challenge going forward in understanding the relationship between self-reported effects of music (FML) and a variety of outcomes. An important aim of Study 3, therefore, was to evaluate the effect of a music listening experience on affect regulation in the context of a controlled trial in the laboratory, and in so doing, attempt to overcome some of the limitations of drawing conclusions about music's regulation efficacy solely on the basis of retrospective accounts of music listeners. To increase the representativeness of the music listening intervention, Study 3 focused on self-selected music. It was also hoped this would increase the correspondence between the single music listening experience being evaluated in the laboratory and the type of music listening experiences in everyday contexts that participants reflected and reported on in Studies 1 and 2. The positive effects of music on affect regulation found in Study 3 provide initial validation and support for participants' reports of successful affect regulation in everyday contexts described in Studies 1 and 2. However, the lack of association between scores on constructs of the AFML scale measuring endorsement of musical affect regulation in everyday contexts and the extent of affect regulation achieved by participants listening to music in the laboratory in Study 3, may suggest that retrospective self-report FML measures do not fully capture the efficacy of music listening for affect regulation, and highlights the need to further consider measurement and methodological issues in future investigations of the adaptive functions of music listening.

5.3 A Developmental Perspective on the Adaptive Functions of Music Listening

Differences in the functions and effects of music across the lifespan was identified as a gap in the literature. Study 1 in this thesis was one of very few empirical investigations of the functions of music listening in older adulthood. Furthermore, it was the first qualitative study to directly compare younger and older adult FML, or to compare younger and older adults in respect to the FML rated most adaptive for their

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wellbeing. The enhancement structures created by participants engaged in collective intelligence sessions in Study 1 also highlighted a variety of interrelationships between adaptive FML for the enhancement of wellbeing. A comparison of the models generated by younger and older adults highlighted a number of age differences in the structuring of these interdependencies, with potential implications for understanding how FML support wellbeing across the lifespan. Similarly, the RCT in Study 3 provided the first opportunity to examine age group differences in the efficacy of a music listening intervention for the function of affect regulation. Within this context, older and younger adults in Study 3 also completed the AFML scale developed in Study 2, and analyses of subscale scores revealed a number of age differences in the endorsement of FML in everyday contexts that may be relevant to understanding the relationship between FML and wellbeing. Unfortunately, a larger and more comprehensive analysis of developmental differences in adaptive FML was not possible because sufficient numbers of older adults did not complete the questionnaire battery in Study 2. A synthesis and overview of findings offering a developmental perspective on the Adaptive Functions of Music Listening is provided below.

Age group differences in Affective FML

In Study 1 age differences were observed in the FML generated by older adults, with younger adults identifying more *Affective* FML overall. This replicates findings from the only previous study of generational differences in FML (Lonsdale & North, 2011) where listening to music for all functions, but particularly for affective functions, became progressively less common with increasing age. One criticism of the cross-sectional survey study by Lonsdale & North (2011) is the oldest age group included for comparison was a sample aged 50 years and over (age range and mean not provided). An interesting contribution in this thesis was that though older people (aged 60-75 years) in Study 1 suggested fewer *Affective* FML overall, in line with theories of positive affective developments in older adulthood (Carstensen & Lockenhoff, 2003; Mather & Carstensen, 2005), the *Affective* FML they did propose included more functions relating to the use of music for generating and maintaining positive affective experiences, and fewer functions relating to regulating negative affective experiences.

Confirming age group differences in *Affective* FML observed in the survey by Lonsdale and North (2011), and in Study 1, of the 80 participants that took part in the RCT in Study 3, age differences were also observed in scores on *Affective* FML factors of the AFML scale. In particular, older adults had significantly lower scores than younger adults on the subscales of *Stress Regulation* and *Rumination*. Age differences in scores suggest older adults may be less reliant on music for the function of *Stress Regulation* in everyday contexts because of increased affective stability that comes with age; and older adults may also be less inclined to use the less adaptive strategy of *Rumination* because of their advanced affect regulation skills (Scheibe & Carstensen, 2010) and higher emotional intelligence (Mayers, Salovey & Caruso, 2000). Though the sample size was small, these findings are interesting, and support the idea that, in everyday contexts, affect regulation FML support an individual's affective goals, which may vary at different life stages because of developmental changes in the requirement to regulate NA, and the ability to do so.

Lower scores on affect regulation factors of the AFML scale may suggest that older adults have less need for affect regulation FML, and as such, may apply them in everyday contexts less frequently. Nevertheless, the RCT in Study 3 found that older adults do experience affect regulation immediately following music listening. The results of an extensive literature review revealed no previous controlled experimental study of musical affect regulation with older adults, and very few experiments of music listening more generally that had been conducted with healthy older adults. Study 3 has therefore demonstrated experimentally, for the first time, that healthy older adults also experience regulation of induced negative affect by listening to music. Study 3 was also the first RCT of musical affect regulation to compare younger and older adults, demonstrating that older adults experienced greater regulation than younger adults regardless of condition (i.e., whether listening to music or a radio documentary). These results supported developmental theories of positive ageing, which suggest an enhancement of affect regulation skill in old age (Carstensen & Lockenhoff, 2003).

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Additional differences between younger and older adults' *Affective* FML identified in the current thesis may provide insight into potential changes in the adaptivity of FML throughout the lifespan. As noted (see Section 5.2.2), in Study 2 scores on the *Strong Emotional Experiences* factor of the AFML scale were correlated with higher positive affect, but were also correlated with higher negative affect, and slightly lower life satisfaction in a sample of younger adults. When older and younger adults' scores on the *Strong Emotional Experiences* factor were compared in Study 3, older adults scored significantly higher than younger adults. Greater endorsement of this FML by older adults may result from affective improvements associated with ageing, such that for older adults *Strong Emotional Experiences* in music listening are more commonly of positive valence, and subsequently relationships with hedonic wellbeing may be more positive in older adulthood relative to younger adulthood. However, further analyses with larger samples are required to determine quantitatively if relationships between *Affective* FML and wellbeing outcomes are different for younger and older adults.

Age group differences in Social FML

A number of notable age differences in *Social* FML were observed in Study 1. In older adulthood, as the rates of social interaction decline the quality of relationships becomes more important (Carstensen, 1992; Srivastava, John, Gosling, & Potter, 2003). This suggests that, in everyday life, older adults may have a greater requirement for *Social* FML than younger adults. In support of this, compared with younger adults, older adults did identify a greater number of discrete *Social* FML in Study 1.

However, *Social* FML were more highly rated for wellbeing enhancement by younger adults than by older adults. The top ranked FML for older adults were *music as therapy*, *personal meaning*, and *affect regulation*. Younger adults top ranked FML were *mood improvement*, *social connection*, and *affect regulation*. A meta-analysis of the enhancement structures created by younger adults during the structuring phase of the IM procedure, focused specifically on the relative influence of FML, demonstrated that in the context of wellbeing enhancement *social connection* significantly enhances *affect regulation* and *mood improvement*. This is in direct opposition to the decision making of older adults in Study 1, who voted that *affect*

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regulation positively influences *social connection* in the influence structures focused on FML interdependencies shaping wellbeing outcomes (see Figures 2.8 and 2.9).

Age differences in the structuring of influence relationships between FML may provide insight into the relationship between affective and social functioning and FML in everyday life. For instance, Baltes and Baltes (1990) describe Selection, Optimisation, and Compensation (SOC) as life management strategies that increase an individual's adaptation to developmental change and support wellbeing across the lifespan. The SOC theory can be applied to supporting an understanding of age group differences in the influence relations between *Affective* and *Social* FML in Study 1. First, selection of affect regulation FML by older adults may optimise and positively influence their social connections with others, thereby increasing the quality of existing relationships and compensating for any declines in levels of social interaction. Younger adulthood, by comparison, may be characterised by higher levels of social interaction and the ongoing development of affect regulation abilities. Analysis of the enhancement structures suggests that in young adulthood affect regulation FML may require additional support from other FML, such as social connection, to enhance wellbeing. The enhancement structures of younger adults suggest younger adults may optimise and capitalise upon their more frequent social interactions by selecting social connection FML to enhance affect regulation FML, which may compensate for potential shortcomings in regulation skill.

Age group differences in Eudaimonic FML

In Study 1 FML that were conceptually related to components of eudaimonic wellbeing were identified by both younger and older adults. These functions were named *Eudaimonic* functions, and included categories of FML such as personal growth, personal meaning, transcendence, music as therapy, and meditation. It is of note that a greater number of these functions were put forth by older adults than by younger adults, and similarly, a greater proportion of older adults voted these *Eudaimonic* FML as adaptive for enhancing their wellbeing. One interesting difference that emerged was the relative influence of personal meaning FML within the enhancement structures of younger and older adults. Music listening was described as a source of meaning-making by participants, and personal meaning FML were highly ranked by both younger and older adults. For older adults personal

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meaning was dependent on all other adaptive FML, however, for younger adults, personal meaning was considered among the three most influential FML, enhancing other FML such as *Affective* and *Social* FML.

The structure of FML revealed in Studies 1 and 2 highlighted the frequency of report and factorial dominance of affect regulation FML in everyday musical experiences. At the same time, a meta-analysis of the four enhancement structures generated in Study 1, demonstrated that, overall, *Affective* (i.e., strong emotional experience) and *Eudaimonic* (i.e., transcendence, personal meaning) functions of music listening exerted the greatest positive influence over other adaptive FML, including *affect regulation* functions. As such, *Eudaimonic* FML, although less commonly studied in the wider literature, were voted as critical drivers of adaptive FML for the enhancement of wellbeing.

A substantial number of *Eudaimonic* FML were proposed, many were voted as adaptive for enhancing wellbeing, particularly by older adults, and highly-ranked *Eudaimonic* functions were seen to influence other adaptive FML in the enhancement structures generated by participants in Study 1. It is somewhat unfortunate that *Eudaimonic* FML were ultimately the subject of less examination in the current thesis, specifically in Study 2. This is because the final scale structure of the AFML scale, determined with a large sample of predominantly younger adult participants, did not include *Eudaimonic* FML factors, and so relationships between *Eudaimonic* FML and wellbeing endorsed by participants in Study 1 were not tested quantitatively in correlation analyses in Study 2.

Overall, results show that younger adults emphasised the importance of *Affective* and *Social* FML for wellbeing, compared to older adults' focus on *Eudaimonic* FML and to a lesser extent affect regulation. Age differences in FML may emerge from the different requirements of maintaining and enhancing wellbeing in younger and older adulthood. *Eudaimonic* FML may have greater relevance for enhancing broader dimensions of wellbeing - such as personal growth, self-acceptance, transcendence, and meaning, than for increasing hedonic or subjective wellbeing. Greater endorsement of the adaptive value of *Eudaimonic* FML by older adults may suggest that enhancing eudaimonic dimensions of wellbeing is of greater importance in older

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adulthood. This may relate back to positive affective developments associated with ageing (e.g., reduction of NA, increase in ability to regulate NA), such that the maintenance of hedonic wellbeing is less fundamental for older adults - and this is reflected in their music listening behaviours. Relative to older adults, research suggests that younger adults experience more NA and have less ability to regulate negative affective experiences, and therefore music listening for the function of affect regulation may be more important to maintain hedonic balance in young adulthood. Further, there may be a greater requirement on younger adults to engage in social interaction, and music may increase connection in social contexts, contributing to improved social functioning and enhanced wellbeing. Ultimately, the enhancement and maintenance of affective and social dimensions of wellbeing may be more fundamental in younger adulthood.

Findings of these three studies suggest that music is used adaptively at different stages of development, and age differences in FML were consistent with key differences between older and younger adults outlined by a number of influential theories of lifespan development (Baltes & Baltes, 1990; Carstensen, 1995, 2003), indicating music listening behaviours can be representative of developmental challenges. Future research comparing younger and older adults' FML in everyday contexts may further our understanding of the relationship between FML and wellbeing, and the development of wellbeing across the lifespan more generally.

The comparison of younger and older adults in this thesis provided a unique approach and original insights supporting a deeper understanding of the relationship between music listening and wellbeing in younger versus older adulthood. Yet, this approach also raises questions about the structure, correlates, and consequences of FML in middle adulthood. As stated, there have been very few empirical studies focused on music listening in older adulthood, however research focused on middle adulthood is virtually non-existent. More generally, lifespan perspectives and theories on development in middle age are lacking (Martin, Grunendahl, & Martin, 2001). Without significant theory or empirical research, there is little to guide predictions regarding differences in the way music listening is harnessed for wellbeing enhancement at middle adulthood.

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Lonsdale and North's (2011) study compared groups of 16-18 year olds, 19-24 year olds, 25-29 year olds, 30-39 year olds, 40-49 year olds and over 50 year olds, reporting that music listening declined in frequency and importance over the age of 30. The authors propose that because of increased responsibilities of career, childcare, and financial commitments, adults in middle age have less time and less money available to spend on music listening experiences. A recent report from the Office of National Statistics in the UK (2016) proposes that the relationship between age and wellbeing is U-shaped, and has reported that personal wellbeing is at its lowest between the ages of 45 to 54. The growing demands of work and family are cited as possible reasons for this decline in wellbeing. The report also states that because of greater responsibility in midlife, individuals have less time available for activities that promote their wellbeing. This thesis proposes that music listening is one activity that promotes the wellbeing of younger and older adults, and future studies are needed to determine whether this is also the case in middle adulthood when free time is significantly more constrained.

It was suggested above that younger adults' most highly valued FML reflect their greater focus on affect regulation and social functioning, and older adults greater emphasis on *Eudaimonic* FML may be representative of their reduced need for activities that support affective and social functioning, and greater need for positivity and meaning in life (Carstensen, 1995; 2003). Following this line of reasoning, affect regulation ability may be increasing for those in their middle years but this growing ability may be impeded by a growing number of stressors during this phase of life. This may imply that activities that support regulation are still required as individuals struggle to balance family and work commitments. Adults in middle age may have a greater requirement for music to support higher-level cognitive goals at work, for example, or to cope with the burden of caring for children and ageing parents simultaneously. Although music listening might be less frequent, middle-aged adults may require music for many different functions in order to meet competing affective, social, and cognitive demands, and to support hedonic and eudaimonic wellbeing. One could speculate then that music could be used most adaptively in middle adulthood, when the demand for activities and interventions that enhance wellbeing may be highest. Future research should examine if the FML differ in middle age, and also whether the pervasiveness and adaptivity of particular FML vary during the

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years of middle adulthood. Such research could begin to inform research and theory on psychological development in the years of middle age.

5.4 Contribution of the Current Research

5.4.1 Contribution to Research on The Adaptive Functions of Music Listening

Study 1 represents the first application of the collective intelligence methodology - Interactive Management (IM) in the field of music psychology. This method is particularly well suited to the study of complex and multi-faceted experiences, such as music engagement. It is hoped the introduction of this methodology will initiate a fruitful line of enquiry to further our understanding of the inter-related and multi-dimensional nature of everyday music listening functions, and related phenomena. Warfield's (1994) IM method provides the researcher with a wealth of data. In the current thesis the application of IM has contributed to our theoretical knowledge of the rich and varied functions of music across the lifespan and identified younger and older adults' key FML for wellbeing enhancement. In the Interpretive Structural Modelling (ISM) phase of the IM procedure, participants generated consensus-built theoretical models proposing interdependencies in adaptive FML in the enhancement of wellbeing. An important finding resulting from ISM was that affect regulation FML may be dependent on other FML, and these interdependencies were different for younger and older adults. Understanding these interdependencies may provide insights into the unique experiences of different groups of listeners. The IM method shed light on developmental dynamics in the importance and influence of FML, and this may inform intervention design work, where music listening is leveraged to enhance the wellbeing of different cohorts. For instance, music interventions aimed at enhancing the affect regulation abilities of younger adults may also focus on FML that influence affect regulation functions, such as meaning-making in music, or social connection. A natural progression of this work is to continue to analyse the validity of these models quantitatively using valid and reliable instruments of FML, such as the AFML scale.

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The use of substandard measures may lead to erroneous conclusions and jeopardise the validity of research (DeVellis, 2012). The principal contribution of this dissertation is the development of a valid and reliable questionnaire specifically targeted for measuring listener's beliefs about the effects of music in everyday contexts; *Adaptive Functions of Music Listening Scale*. This comprehensive scale measures a broad range of factors commonly identified in the literature on FML, whilst meeting the need for an integrative measure of FML that is both psychometrically robust and composed of theoretically and conceptually differentiated factors. The wording of scale items was informed by Bandura's Social Cognitive Theory (1989; 2001) in order for it to be suitable for researchers conducting outcomes-based research on everyday music listening behaviour. SCT proposes that through past experience and learning, individuals develop beliefs and expectations in regard to the effects and outcomes of their behaviours. These beliefs and expectations shape an individual's goals, and goals in turn drive behaviour. The application of Bandura's theory of learning and behaviour in the current thesis aligns with recent theoretical developments in the field of music research. For instance, Schäfer's (2016) model emphasises prior learning in explaining the development of musical preference.

Also similar to Bandura's theory, goals are paramount in the *Goals, Strategies, Tactics, Mechanisms* (GSTM) framework describing affect regulation by music listening (van Goethem & Sloboda, 2011). Building upon the GSTM framework and Saarikallio's research on mood regulation strategies in music (2007; 2008) (See Section 1.2.2), Baltazar and Saarikallio are developing a unified theory focused on one function of music - affect regulation (see Figure 5.1). Their model adds a temporal sequence to the GSTM framework, and proposes that affective goals drive the selection of musical activity, and through various regulation strategies and mechanisms the tactic of musical activity produces effects that alter the cognitions, feelings, and physiology of the listener, which in turn produce outcomes such as wellbeing.

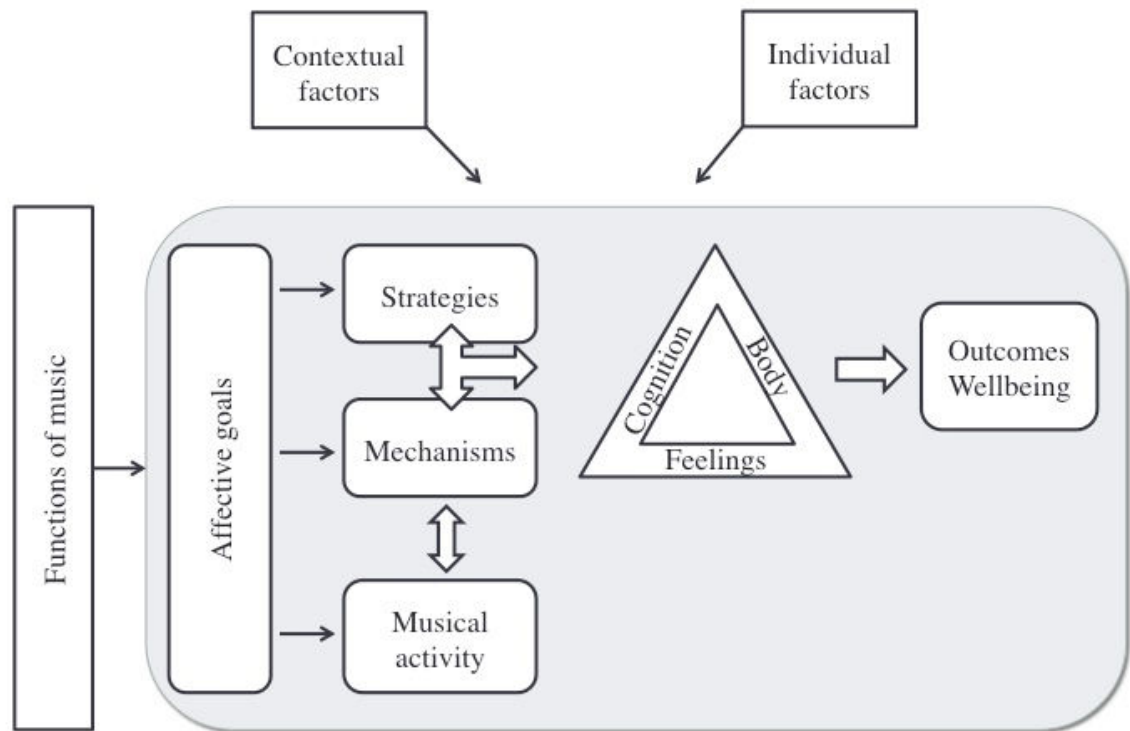


Figure 5.1. Integrative model for musical affect regulation under development, reproduced with permission of Baltazar and Saarikallio (2016).

A recent paper by Baltazar & Saarikallio (2016) applies the GSTM framework to review thirty four studies of music and affect regulation. The review concludes that individual studies have tended to focus on one or other level of the framework rather than interactions across levels, and that empirical knowledge regarding each level (i.e., *Goals, Strategies, Tactics, Mechanisms*) is not equally distributed. For example, the majority of empirical studies have focused on the tactic of music listening, and yet other musical activities can be considered tactics for affect regulation (e.g., playing, singing, dancing), as can non-musical activities (e.g., watching television, talking with friends). As such, the relative influence of these different tactics on affect regulation is not yet known. Study 3 in the current thesis comparing the tactic of music listening with another affect regulation tactic (i.e., listening to a radio show) represents an important advance in this direction. Baltazar & Saarikallio (2016) also point out that the majority of studies of the FML have conceptualised music listening as a strategy for affect regulation as opposed to a tactic that supports a variety of regulation strategies. Tests of the GSTM framework and related models, they argue,

must be supported by well-designed empirical investigations. The conceptual model underlying the AFML scale focuses on the tactic of music listening, and incorporates measurement of a number of affect regulation goals (i.e., *Anger Regulation*, *Anxiety Regulation*, *Stress Regulation*), and associated regulation strategies (i.e., positive reappraisal, positive emotions, distraction, emotional support, escape). As such, the scale may be a suitable tool for use in broader investigations that focus on more than one level of musical affect regulation.

5.4.2 Contribution to Theory on The Adaptive Functions of Music Listening

The results of three studies in this thesis demonstrate that affect regulation FML are commonly identified, highly valued, and associated with adaptive outcomes such as affect regulation and increased wellbeing. Having said that, there are a range of other potentially adaptive FML. Investigations employing the AFML scale may contribute to theoretical knowledge on the adaptive consequences of other FML, in addition to affect regulation. The AFML scale deals primarily with FML at the global level. However, as stated, the *Affect Regulation* FML constructs includes subconstructs – that is, a variety of specific regulation strategies (see Figure 3.1). Subscales of the AFML scale, therefore, provide more nuanced measurement of affect regulation FML than existing general measures, while at the same time allowing for measurement of a broader range of functions than available instruments currently allow. Researchers now have access to a valid and reliable integrative measure of 11 FML constructs, and when researchers consider them further, they may be able to use this measure in studies to disentangle the interactions between functions of music for affect regulation, the strategies used to regulate discrete affective experiences, and the outcomes of affect regulation FML. However, studies can also be designed to examine interdependencies between different FML, including affect regulation, in predicting a range of adaptive outcomes, including wellbeing.

Interpretation of results from correlation analyses in Study 2 begin to address these questions, and may contribute to theoretical knowledge regarding the relative influence of discrete regulatory FML for the regulation of different affective states. Of note is the finding that *Anger Regulation* and *Anxiety Regulation* FML were

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positively associated with wellbeing outcomes, whereas *Stress Regulation* had a positive but minimal association with wellbeing outcomes. Looking closer at the AFML scale, the factors measuring *Anger* and *Anxiety Regulation* are each composed of seven items representing the regulation strategies of distraction, emotional support (comfort), positive reappraisal, and generating positive emotions when feeling anger or anxiety. The *Stress Regulation* factor (4 items) measures the strategies of distraction, emotional support, plus escape - but not reappraisal or positive emotions. These two strategies, particularly reappraisal, are widely regarded as highly effective for the regulation of NA, and subsequently for wellbeing enhancement (Gross & John, 2003; Fredrickson, 2004; Larsen, 2009), and this may help to explain the pattern of correlations between FML factor scores and wellbeing outcomes reported in Study 2.

It is possible that the *Stress Regulation* factor was not significantly associated with wellbeing outcomes because of the lack of more adaptive affect regulation strategies (i.e., reappraisal and positive emotions) composing that factor. The strategies endorsed by the younger adult sample of participants in Study 2 for *Stress Regulation* were predominantly avoidant coping mechanisms (i.e., distraction and withdrawal/escape) and these strategies are considered less adaptive (Folkman & Lazarus, 1980; Miranda & Claes, 2009). Whereas, the strategies endorsed by participants for regulating *Anger* and *Anxiety* included these avoidant coping strategies, along with reappraisal and positive affect. Corresponding factor scores for *Anger* and *Anxiety Regulation* were positively associated with scores on wellbeing measures.

Alternatively, the lack of positive correlations between *Stress Regulation* FML and wellbeing may suggest that music listening is less effective for the regulation of stress as opposed to the regulation of anger and anxiety. In the literature on affect there is a distinction drawn between stress and moods - with anger and anxiety falling under the definition of moods (e.g. The Profile of Mood States; McNair, Lorr & Droppleman, 1981). Stress is often described as distinct from mood in the sense that it is less diffuse and free-floating, and more closely linked to specific external events or problems (Thayer, 1996; Gross, 1998). Responding to a stressor therefore may require taking a more active and problem-focused approach than listening to

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music can provide. Participants engaged in collective intelligence sessions spoke of the variability in music's efficacy for *Stress Regulation* as being dependent on the stressor or situation causing stress. In discussing music and stress reduction, both older and younger adults provided examples of listening to music to cope with everyday hassles, such as, traffic jams, the frustration of work/study, or as one female puts it, "*to help with the stresses of living*", as opposed to more aversive or high stress scenarios. An older man highlights this distinction with the following comment, "*I don't think I would use music in a crisis, or when something had gone wrong...I would be more inclined to use music for stress...in a kind of ordinary situation*".

At the same time, the RCT in Study 3 did find that listening to music following a stressor regulated induced stress, supporting the idea that music listening can provide stress reduction in stressful contexts. This finding from Study 3 gives some support for the first interpretation - that the lack of significant correlates between *Stress Regulation* and measures of wellbeing obtained in Study 2 is related to the adaptivity of the strategies making up the *Stress Regulation* factor on the AFML scale. However, different methods in studies 2 and 3 (i.e. retrospective self-report versus RCT effects) may also explain the different findings observed. Further investigation and experimentation focused on the relative efficacy and consequences of different strategies for the function of affect regulation is strongly recommended. Future studies should consider the mechanisms of regulatory effects achieved by the tactic of listening to music (e.g. the BRECVEMA model; Juslin, 2013), as advocated by the *Goals, Strategies, Tactics and Mechanisms* framework of van Goethem and Sloboda (2010) and more recently by Baltazar and Saarikallio (2016).

Developing a Theoretical model of Adaptive Functions of Music Listening

The age differences that emerged in Studies 1 and 3 did correspond in part with predictions derived from a number of theories from developmental psychology, such as the *socio-emotional selectivity theory* (Cartensen, 1995) and the Theory of Selection Optimisation and Compensation (Baltes & Baltes, 1990). Likewise, developmental theories of self regulation, and theories of affect, affect regulation, and wellbeing from general psychology predicted a number of proposed relationships

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between self-reported FML and wellbeing outcomes assessed in a sample of younger adults (Heckhausen, 1995; Gross & John, 2003; Larsen, 2000). Grounding the studies conducted in this thesis in well-established theories of affect, wellbeing, and lifespan development is a strength of the research, and future research could apply these models to predict developmental differences in other aspects of music listening experiences.

At the same time, there may be a case for arguing that music listening is a unique domain of experience, and as such requires domain-specific theoretical models. For example, there are categories of emotions that are experienced infrequently in everyday contexts but are more common in musical experiences, such as wonder, transcendence and tenderness (Zentner, Grandjean, & Scherer, 2008). Mainstream theories of affect do not fully account for these aesthetic emotions. There are also differences between musical emotions and everyday emotions. For example, although there is significant individual variability, people typically avoid negative emotional experiences (Maio & Esses, 2001). However, negative emotional experiences, especially sadness, are often sought out in music listening (Eerola & Peltola, 2016). Others argue that affective experiences evoked by music are inherently different because music is an abstract and aesthetic stimulus, and therefore is not a stimulus that arouses typical affective responses that evolved to assist survival (Kivy, 1990; Scherer & Zentner, 2001). Thus, musical experiences may be more complex, or simply different from other psychological experiences and as such require more specific theories. In light of the developmental perspective offered here, theories should also consider the influence of developmental factors on music listening experiences.

The field of music psychology is burgeoning and a range of specific models have been proposed focused on musical affect induction (e.g. BRECVEMA; Juslin, 2013), musical affect regulation (e.g. GSTM; van Goethem & Sloboda, 2010; Saarikallio & Erkkila, 2007), strong experiences of music (Gabrielsson, & Bradbury, 2011; Gabrielsson & Lindström Wik, 2003), and intense musical experiences (Schäfer, Smukalla, & Oelker, 2014). Important aims for future research include the synthesis, validation and application of these models, which will require large scale empirical investigations, that can incorporate the AFML scale along with other psychometric

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instruments in the evaluation of emergent theoretical models. In spite of recent developments, there remains a need for further theory-building regarding the functions of music more generally, taking into account individual, as well as, developmental differences, that can predict adaptive outcomes such as wellbeing enhancement across the lifespan.

5.4.3 Contribution to Theory and Research on Affect Regulation and Wellbeing

The wider contributions of this work concern the impact of individual and developmental differences on the efficacy of affect regulation interventions or tactics, the development and maintenance of wellbeing across the lifespan, and the interdependence of wellbeing dimensions.

In relation to individual and developmental differences on the efficacy of affect regulation interventions, in Study 3, listening to self-chosen music or a radio show for ten minutes significantly reduced induced NA. Listening to music was more effective for affect regulation, nevertheless, NA reduced for younger and older adults in both the intervention and active control conditions. These results imply that music listening can be applied for affect regulation in stressful situations, such as in preparation for public speaking, an examination, or awaiting a medical appointment or procedure. More generally, these results imply that affect regulation can be provided by common leisure activities, and recommends personal music listening as a simple way to effectively regulate NA in everyday life.

Regression analyses in Study 3 showed that individuals who were more reactive to the stress induction were also more responsive to the music listening intervention. A strong negative reaction to a stressor was not indicative of poorer affective outcomes, rather it was predictive of greater regulation efficacy. These results suggest there are individual differences that predict the efficacy of affect regulation attempts, including an individual's emotional reactivity and temperament (e.g., baseline affect). Individual differences in affective functioning moderated regulation efficacy of music listening and thus should be considered in the design and evaluation of affect regulation interventions outside of music psychology also. An individual's emotional responsivity should also inform the selection of regulation strategies and

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tactics in everyday life. For example, highly emotionally reactive people may benefit more from emotion-focused coping strategies, such as listening to music. On the other hand, it is possible that those who are less emotionally reactive in stressful situations may receive greater benefit from regulation strategies that are more problem-focused in nature, and this should be examined in future research.

Developmental differences in affect regulation ability may also predict differences in the efficacy of regulation interventions, activities, and strategies. Relative to younger adults, older adults are superior affect regulators - and in support of this, older adults demonstrated better regulation efficacy in both experimental conditions of Study 3. Therefore, affect regulation interventions may be especially effective with older adults, due to their increased regulatory ability. However, results of age comparisons of the value of different FML for wellbeing enhancement in Study 1 imply that while affect regulation is paramount for younger adults' sense of wellbeing, wellbeing in older adulthood may be more dependent on other factors than affect regulation.

Interventions to enhance the wellbeing of older adults should therefore consider focusing on broader dimensions of psychological and social wellbeing. For example, activities such as expressive writing, or narrative life review may foster making *meaning* of one's life, enhancing *personal growth* and *self-acceptance*. Other interventions may focus on transferring independent living skills to increase older adults' sense of *environmental mastery*, *autonomy* and *purpose in life*. Social clubs for older adults may provide opportunities for *positive relations with others*. There are some innovative projects for addressing wellbeing in later stages of life when residential health care may be needed. In the Netherlands, for example, university students can live rent-free in nursing homes in exchange for sharing skills and spending time interacting with their older neighbours. There are also a number of intergenerational learning centres in the US, Canada, and Japan where nursing homes and nurseries for children are combined. Dimensions of social wellbeing such as *social integration* and *contribution* may be enhanced through interventions and activities that give community-dwelling older adults an active role in teaching, helping, or supporting others. Future research could examine the feasibility of cross-generational interventions where older adults support younger adults in developing affect regulation abilities, and also determine whether this has any positive impact on

the subjective wellbeing of younger adults and the psychological and social wellbeing of older adult participants.

That being said, interventions or activities that provide affect regulation, may still be an effective way of maintaining and enhancing subjective, psychological, and social wellbeing across the lifespan. Correlation analyses in Study 2 found that higher factor scores on *Affect Regulation* FML were not only associated with higher levels of subjective wellbeing as expected, positive associations were also found with psychological and social wellbeing measures. This suggests that in addition to benefitting subjective wellbeing, the regulation of negative affective experiences by music listening may positively impact broader dimensions of wellbeing, at least in younger adulthood. Further, this supports Diener and Tov's (2012) assertion that components of hedonic and eudaimonic wellbeing are closely related and potentially interdependent. Although older adults may have less requirement for affect regulation, and their sense of wellbeing may be less reliant on efforts to maintain affective balance than younger adults', affect regulation interventions and activities may still meet older adults' need for enhancing psychological and social wellbeing. Further research will be required to determine whether this is the case.

5.5 Future Research

The review of evidence in Chapter 1 demonstrates that the bulk of research has focused on affective experiences in music listening and hedonic wellbeing. This thesis sought to adopt a broader approach to the study of adaptive music listening functions and wellbeing. Broad and diverse factors emerged from collective intelligence enquiry in Study 1, including the *Eudaimonic* functions of transcendence, personal growth, and personal meaning, and a wide range of *Social* functions such as connection, communication, and in-group formation. As the research progressed these FML were not determined quantitatively in Study 2 with a sample of mostly younger adults, and had not been intended as the focus of investigation for Study 3. Thus the remainder of the thesis is heavily weighted on the affective dimension of musical experience, which does, at least, reflect the general trend of research that has come before. It is worth noting however, that some of the more novel and most intriguing ideas relating to adaptive FML were contributed by

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older adult participants in Study 1. Contributions from older adults in this research project were highly valuable. The commonalities and contrasts between older and younger adult endorsement and structuring of the FML should inspire future empirical investigations with older adults. For example, research should aim to determine whether cross-sectional age differences observed in the current thesis represent shifts in music engagement due to developmental changes in psychological functioning or cohort differences in music engagement due to historical changes in music preferences and music consumption. Further, including older adults in research investigations may redress any potential imbalance in the profile of research findings, for example, by shedding greater light on *Eudaimonic* and *Social* functions of music listening which were more dominant in the accounts of older adults in the first study of the current thesis. Further, these *Social* and *Eudaimonic* FML are worthy of continued study for their potential importance for enhancing dimensions of both hedonic and eudaimonic wellbeing, as well as, the potential for increasing our theoretical knowledge of the development of subjective, psychological, and social wellbeing across the lifespan.

This thesis provides one demonstration of the insights that can be achieved by combining innovative qualitative, psychometrically-sound quantitative, and rigorous experimental approaches for understanding the structure, correlates, and consequences of adaptive FML across the lifespan. This approach of synthesising methodologies across studies could certainly be applied to understand other aspects of the music listening experience. That being said, there may be a developmental or temporal dimension to music's effects that requires further innovation in research methods. For example, the experiment in Study 3 provided strong evidence of NA reduction immediately following music listening in the laboratory. However, cross-sectional analyses in Study 2 found no significant relationships between participants' endorsement of the efficacy of music for NA regulation in everyday contexts (as measured by the AFML scale) and lower levels of NA experienced over the previous week. It is possible that the duration and frequency of music listening influence the outcome and effect of musical experiences. However, this is not easily assessed using typical self-report methods. Analysis of music listening experiences over time, coupled with self-reported efficacy of discrete FML in context is needed to examine temporal and developmental effects, and dynamic variation in the relationship

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between music listening beliefs, behaviours, and wellbeing outcomes. This requires innovation of microgenetic and developmental methods of analysis that effectively track behaviour and experience over time and the application of appropriate statistical methods to analyse the dynamic relationships and change processes.

Furthermore, while participant-selected music was employed in Study 3 to increase the ecological validity of the RCT, nevertheless, the laboratory remains an unnatural listening environment and innovative research methods need to be developed that allow for controlled observation and analysis of dynamic relationships between music listening behaviours and experiences and a range of real world outcomes.

Experience and mobile sampling technologies provide considerable potential in this regard, allowing for more naturalistic data collection, which may overcome a number of challenges associated with ecological validity, dynamic and developmental analysis of effects over time, and the challenge of control and rigour in field experimental work. For example, the beneficial effects of music listening relative to listening to a radio show demonstrated in Study 3 could be evaluated and potentially confirmed in everyday contexts using cross-sectional, microgenetic, or longitudinal ESM methods comparing affective change in music listening episodes versus episodes where participants are engaged in another activity. A limitation of existing ESM studies (Greasley & Lamont, 2011; Juslin, Liljeström, Vastfjäll, Barradas, & Silva, 2008; North, Hargreaves, & Hargreaves, 2004; Randall & Rickard, 2016; Sloboda, O'Neill, & Ivaldi, 2001) is that they have generally not included established measures of study variables; in particular - none have used a psychometric measure of the FML, instead using a limited number of researcher-selected lists to track different functions, goals, and reasons for listening to music in episodes of daily life. In addition to confirming the positive effects of listening to music on NA regulation observed in Study 3 of the current thesis, studies employing ESM methods in conjunction with the AFML scale could also examine the role of different FML in shaping everyday music listening behaviours and music listening effects across different contexts and over time. In this context, using mobile tracking technology, subtle factors such as the influence of the duration of the music listening experience on outcomes could be examined with greater ease. Future research employing such methodologies and measures could be extended to examine whether the frequency of music listening, or indeed whether the frequency of success in achieving adaptive

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FML, is related to enhanced functioning across a range of developmental outcomes over longer periods of time in everyday contexts.

Whereas previous studies, including existing ESM studies and Study 2 in the current thesis, have treated FML as independent constructs, the application of Interpretive Structural Modelling (ISM) in Study 1 highlighted a range of interdependencies between FML. Inspired by these findings future research could examine, for example, if there are combinations of FML constructs that frequently co-occur in driving music listening behaviour. Innovative methods and further analyses will be required to determine if there are specific combinations of FML that are particularly adaptive, whether the interdependencies between FML proposed by participants in Study 1 are valid and predictive of wellbeing outcomes in real-world contexts, and if there is a temporal dimension to the efficacy and adaptivity of constellations of FML constructs within and across music listening experiences. Modifying the ISM procedure to work in combination with experience sampling methods could benefit research in the area of FML. For example, this approach could examine relationships between different FML in music listening experiences, and track these interdependencies and their influence on outcomes over time for individuals on a case-by-case basis. The methods employed in Study 1 were innovative and revealing, however, longitudinal mobile data collection methods with large samples in combination with advanced statistical analysis (e.g., structural equation or latent growth modelling) would be the ideal method for testing complex FML relationships quantitatively. Moreover, by allowing for simultaneous measurement of a range of FML constructs that listeners themselves have identified as adaptive, the AFML scale may have practical applications in this context.

5.6 Limitations

Limitations associated with each study were discussed in Chapters 2, 3 and 4. However, several key issues common to all studies will be noted briefly.

First, there are some issues surrounding the generalisability of findings reported in this thesis. Participants were for the most part ethnically, socio-economically, and educationally homogenous and findings should be interpreted in light of samples

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studied. Further, participants in all studies were self-selected, and thus may have participated on the basis of strong positive beliefs regarding the effects of music. Convenience sampling of university students was relied upon to achieve the necessary sample size for conducting rigorous scale development work reported in Study 2. Across all three studies the majority of the younger adult samples were university students, with many being psychology students in receipt of research participation credit. Older adult participants, in contrast, did not have this course credit incentive to participate in these studies and this may be related to some specific recruitment challenges experienced during the research process. Though a paper and pencil version of the online questionnaire battery from Study 2 was specially designed for readability and ease of use for older adults, it was not feasible to get the requisite number of older adults to complete the measure in order to perform factor analyses. Future research is required to validate the *Adaptive Functions of Music Listening* scale both cross-culturally and cross-generationally. Although older adults were eager to participate and contribute in Studies 1 and 3, which had smaller sample requirements, younger and older adults included in these two studies differed in certain respects. As is typical for studies employing university samples the younger adult group across all studies had a greater proportion of female participants. Emotional responding generally, responses to music, and functions of music are known to differ by gender (Gross & Levenson, 1995; Fukui & Yamashita, 2003; Lonsdale & North, 2011), and gender differences were observed in key FML in Study 2. The older adult age group in Studies 1 and 3 were more balanced in the proportion of male and female participants, with a slightly higher number of older males taking part. It is important to bear in mind these sample characteristics when interpreting the findings regarding age differences in functions and effects of music listening presented in this thesis.

Another limitation of the current study is the cross-sectional nature of the correlation research relating FML and wellbeing in Study 2. The positive correlations reported in Study 2 do not allow us to conclude that adaptive FML lead to higher levels of wellbeing. The relationship may be reversed, specifically, those with higher levels of wellbeing may be more likely to endorse adaptive FML like *Anger Regulation* and *Anxiety Regulation*. Experimental designs provide better evidence of causation, and results from Study 3 do support the idea that listening to music regulates negative

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affective states, suggesting immediate affect regulatory effects of music that may be adaptive for wellbeing enhancement over the longer term. However, these long term benefits remains speculative and thus, as proposed above, future research should incorporate superior predictive modelling analyses using longitudinal and experience sampling techniques in combination with high quality psychometric tools, such as *The Adaptive Function of Music Listening Scale* to better address this question.

It is advocated by Juslin and Västfjäll (2008) that studies should consider elements of the listener, the context, and the music. This thesis focuses almost exclusively on the experience of the listener. Although, research described in Chapter 1 indicated that type of music and features of the music may have an influence on the listener's experience, this was not controlled for in any study in the current research project. In Studies 1 and 2 participants were asked to think of the music they typically listen to across a variety of contexts (e.g., public and private) to achieve certain functions, and their perceived success in doing so. It may indeed be the case that different music is selected for different functions, and that the type of music selected may in fact predict functional success. However, this was not possible to address because of the existing complexity of the design and aims of Studies 1 and 2. In Study 3 the decision to not control participants' selection of music (i.e., by prescribing specific genres or specific features of musical stimuli that needed to be selected) was motivated by a desire for increased ecological validity, as recommended by Eerola and Vuoskoski (2013) and Chanda and Levitin (2013). It was hoped this approach would provide a closer representation, and thus a greater understanding of music listening experiences in everyday contexts where listeners select their own music. However, future research may wish to also incorporate measurement of music selection behaviours for specific functions and contexts (Krause, North, & Hewitt, 2014; North & Hargreaves, 1996), and examine the influence of any specific musical features of the music selected on the outcomes of music listening experiences. The recently developed MUPsych application (Randall & Rickard, 2013) represents a promising avenue for such research. The MUPsych app works within the participants' mobile device, and data is collected regarding the music heard in musical episodes. Individual researchers can also modify the content of the MUPsych app to incorporate measurement of constructs relevant to addressing key research questions. One drawback of this approach is that personal music listening on

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mobile devices and mp3 players is more common among younger cohorts and less common among older cohorts (Krause, North, & Hewitt, 2015), which may restrict our understanding of these complex musical experiences across the lifespan, that is, until uptake of mobile music listening devices increases in older cohorts.

5.7 Conclusion

Enhancing Wellbeing by Adaptive Functions of Music Listening

The *Dynamic Equilibrium Model* (Headey & Wearing, 1992) and the *Hedonic Treadmill* theory (Brickman & Campbell, 1971) propose that individuals have a set point of subjective wellbeing (SWB) that is determined at the trait level. According to these theories, life events may alter wellbeing temporarily, but individuals will return to their pre-determined baseline levels. This does correspond with findings that about half the variance in SWB is genetically determined (Bouchard & Loehlin, 2001; Tellegen, et al., 1988). Reassuringly, these set points are most often positive (Diener & Diener, 1996). That being said, SWB is increasingly being considered a skill that can be enhanced and increased, in the main via adaptive affect regulation (Larsen, 2009). Previous research focused on music listening, as well as the findings presented in this thesis highlights the affect regulation benefits of music listening. Affect regulation was also highlighted as an important FML in everyday life that may have adaptive consequences for enhancing subjective wellbeing in particular. However, Study 1 in this thesis also highlighted a number of other FML, such as transcendence, personal meaning, and personal growth that have received less attention empirically, and these FML may be of greater relevance in older adulthood and for increasing aspects of eudaimonic wellbeing. An important aim of future research will be to further understand these potentially less common FML and their relationship to wellbeing across the lifespan.

The investigations conducted in this research project highlight the diversity of benefits that people experience listening to music. Many benefits were described by

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listeners during collective intelligence sessions, and were confirmed somewhat by the correlation analyses in Study 2. Beneficial effects of music listening were also clearly evident in the experimental work conducted in Study 3. The range of FML revealed in this thesis demonstrate that music is very much alive in people's everyday lives, and the insights gleaned from this work will hopefully be generative in the science of psychology in the types of investigations that this thesis may inspire.

Reducing the gap in our knowledge on FML in older adulthood, the participation of both younger and older adults in this research reveals that listening to music retains its functional significance across the lifespan. The psychological needs of an individual may vary at different stages of life, but the research presented in this thesis suggests that people continue to choose music listening to address their affective, social and cognitive needs at different developmental stages. Further, although the requirement for musical affect regulation may decline with age, the effectiveness of music for regulating negative affective experiences does not seem to vary from younger to older adulthood. Music remains a valued stimulus that can produce a range of adaptive consequences for listeners in adolescence and young adulthood and later in life, too. The broad culture of how we expose each generation to music and how it relates to their wellbeing and subjective experience more generally is worthy of continuing study because of the utility of music listening to the individual across the lifespan, as well as, its wider importance in human society and culture.

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Appendices

Appendix A

All Responses to the Stimulus Question 'Why Do You Listen To Music' Across Four IM Sessions with 25 Younger and 19 Older Adults

AFFECTIVE FUNCTIONS OF MUSIC

| | IM session |
|--|---------------|
| AFFECT REGULATION | |
| 1. Relaxation * | OA1 |
| 2. Stress reduction * | OA1 |
| 3. To relax | OA2 |
| 4. To relax * | YA1 |
| 5. Stress relief * | YA1 |
| 6. Distraction from stressful thoughts | YA1 |
| 7. Stress reduction * | YA2 |
| 8. Distraction from stress | YA2 |
| 9. Keep calm while driving | YA2 |
| EMOTIONAL ENGAGEMENT | |
| 10. Reflect on a negative mood | OA1 |
| 11. Connect with emotions | OA2 |
| 12. Reinforce current feeling | YA1 |
| 13. Relating to lyrics gives comfort [match feelings] | YA2 |
| 14. To express current feeling | YA2 |
| POSITIVE AFFECT | |
| 15. Enhance positive mood | OA1 |
| 16. To bring happiness | OA1 |
| 17. To experience pleasure | OA1 |
| 18. For enjoyment | OA1 |
| 19. Because it gives pleasure | OA2 |
| 20. Create mood for romance | YA1 |
| 21. To feel happy * | YA2 |
| 22. If I listen to my favourite artists before and during sleep, I wake up happy | YA2 |
| MOOD IMPROVEMENT | |
| 23. To improve mood | OA1 |
| 24. To improve mood | OA2 |
| 25. To change a negative mood * | YA1 |
| 26. Negative mood improvement * | YA2 |
| INCREASE AROUSAL | |
| 27. Create energy [psyche up] | OA2 |
| 28. To energise | YA2 |
| 29. To get excited before a night out | YA2 |
| 30. Psyche up before match/competition | YA2 |

| | | |
|---|--|-----|
| STRONG EMOTIONAL EXPERIENCES | | |
| 31. Strong emotional experience * | | OA2 |
| REMINISCENCE | | |
| 32. Reminiscence | | OA1 |
| 33. Reminiscence * | | OA2 |
| 34. Positive reminiscence | | YA1 |
| 35. Reminiscence [breakups] | | YA1 |
| 36. Spontaneous reminiscence | | YA2 |
| 37. Reminiscence * [homesickness] | | YA2 |
| DISTRACTION & ESCAPE | | |
| 38. Distraction - help sleep | | YA1 |
| 39. Distraction from pain | | YA1 |
| 40. Escape thoughts of troubles/conflict | | YA2 |
| SECURITY | | |
| 41. For a sense of security [when alone] | | YA1 |
| 42. To reduce fear * [when alone] | | YA2 |
| SOCIAL FUNCTIONS OF MUSIC LISTENING | | |
| SOCIAL CONNECTION | | |
| 43. Social connection * | | OA1 |
| 44. To strengthen ties in your family | | OA1 |
| 45. Reducing loneliness * | | OA1 |
| 46. To connect with other generations | | OA1 |
| 47. To share a collective experience with others | | OA1 |
| 48. Social connection * [breaks down barriers] | | OA2 |
| 49. To bond with others who like the same music | | OA2 |
| 50. To connect with the music's creator | | OA2 |
| 51. To relate to a different generation | | OA2 |
| 52. To connect/bond with special/significant others | | OA2 |
| 53. To share a collective experience with others | | OA2 |
| 54. To connect with other cultures | | OA2 |
| 55. To connect with each other | | YA1 |
| 56. Bonding * [shared experience] | | YA2 |
| 57. To share a common interest with others | | YA2 |
| 58. To be sociable * | | YA2 |
| 59. In social situations background music makes people more talkative | | YA2 |
| ATMOSPHERE | | |
| 60. To fill the silence in social situations | | OA1 |
| 61. To create atmosphere | | OA1 |
| 62. Create a mood in social situations | | YA1 |
| IN-GROUP FORMATION | | |
| 63. To inspire religious zeal/patriotism | | OA1 |
| 64. To stir strong group emotions [national/team anthems] | | OA2 |

| | | |
|--|---|-----|
| IMPRESSION MANAGEMENT | | |
| 65. | To impress others with your taste in music | OA1 |
| 66. | To impress people you're attracted to | YA1 |
| CULTURAL REASONS | | |
| 67. | Because of my cultural background [always present/tells story] | YA1 |
| NON-VERBAL COMMUNICATION | | |
| 68. | As communication in the absence of language [brain injury/disorder] | OA1 |
| SOCIAL OBLIGATION | | |
| 69. | As a social obligation [attending concerts] | OA1 |
| TO AVOID SOCIAL CONTACT | | |
| 70. | To avoid contact/talking with others | YA2 |
| COGNITIVE STIMULATION & ENHANCEMENT | | |
| 71. | To keep the brain active | OA1 |
| 72. | To inspire the desire to be challenged | OA2 |
| 73. | Inspiration for new ideas | OA2 |
| 74. | To stimulate faded memory | YA1 |
| 75. | Learning through musical mnemonics | YA1 |
| 76. | Inspiration for other art forms | YA1 |
| 77. | Help with foreign language learning | YA2 |
| 78. | Help concentration/focus | YA2 |
| 79. | Because it's thought provoking | YA2 |
| EUDAIMONIC FUNCTIONS OF MUSIC LISTENING | | |
| PERSONAL GROWTH | | |
| 80. | Personal growth * [self-acceptance] | OA2 |
| TRANSCENDENCE | | |
| 81. | Transportation * [transcend the mundane] | OA1 |
| 82. | Transcendence | OA2 |
| 83. | Connection with the divine | OA2 |
| MEDITATION | | |
| 84. | As a mindfulness practice | OA2 |
| 85. | Meditative effects * | OA2 |
| 86. | To connect with the body | OA2 |
| MUSIC AS THERAPY | | |
| 87. | Therapeutic benefit * [balance mind, body, soul] | OA1 |
| 88. | Therapeutic benefits * | OA2 |
| 89. | Music as therapy | YA1 |
| PERSONAL MEANING | | |
| 90. | Personal meaning * | OA1 |
| 91. | Personal meaning * | YA1 |
| AWE | | |
| 92. | To feel awe | OA1 |
| 93. | To feel awe | YA1 |

| | | |
|--|--|-----|
| TO CONNECT WITH NATURE | | |
| 94. To connect with nature | | OA2 |
| GOAL-ATTAINMENT | | |
| MOTIVATION | | |
| 95. It motivates me to practice my instrument | | YA2 |
| 96. Music motivates me to be more assertive [after conflict] | | YA2 |
| 97. Music motivates me to 'get things done' | | YA2 |
| PERSISTENCE | | |
| 98. Persistence * [exercise, housework, mundane task] | | YA1 |
| 99. To set a rhythm for action [cleaning, sex] | | YA1 |
| 100. Helps me move faster [walking somewhere] | | YA2 |
| 101. Persistence with exercise [I can go longer and faster] | | YA2 |
| 102. While exercising gives me something to focus on | | YA2 |
| TASK ENJOYMENT | | |
| 103. Make tasks more pleasurable | | OA1 |
| 104. Makes cooking more enjoyable | | YA2 |
| 105. Makes chores less boring | | YA2 |
| EVERYDAY LISTENING FUNCTIONS | | |
| BACKGROUND MUSIC | | |
| 106. Block out unpleasant background noise | | OA1 |
| 107. As background noise/sound | | OA1 |
| 108. As background noise | | YA1 |
| 109. Drown out noise [of others] | | YA1 |
| 110. As background music [constantly] | | YA2 |
| PASSIVE | | |
| 111. Because it's a habit | | YA1 |
| 112. To pass the time | | YA1 |
| 113. Make time go faster at work | | YA2 |
| 114. To reduce boredom * | | YA2 |
| ENTERTAINMENT | | |
| 115. Because it's fun | | OA2 |
| 116. Because it's a hobby | | YA1 |
| 117. Entertainment* | | YA1 |
| 118. Music can be funny/laugh | | YA2 |
| ENRICHMENT | | |
| 119. To just enrich everyday experience | | YA1 |
| DANCE | | |
| 120. To inspire creative movement | | OA1 |
| 121. Dancing | | OA1 |
| 122. To dance or move to | | OA2 |
| 123. To dance | | YA1 |
| 124. To dance to | | YA2 |

| MUSIC-FOCUSED LISTENING FUNCTIONS | | |
|---|--|-----|
| MUSICAL EDUCATION | | |
| 125. To create new associations [novelty] * | | OA2 |
| 126. Critical Analysis of a piece | | OA2 |
| 127. The mental challenge of learning a piece | | YA1 |
| 128. Learning more about different aspects of music | | YA1 |
| 129. To discover something new | | YA1 |
| 130. To 'figure out' a song | | YA2 |
| 131. Listening to repertoire you can play gives a feeling of accomplishment | | YA2 |
| 132. To broaden musical knowledge | | YA2 |
| APPRECIATION | | |
| 133. To admire virtuosity | | OA1 |
| 134. To appreciate different elements of a piece of music | | OA1 |
| 135. To admire expertise | | OA2 |
| 136. To admire the beauty | | OA2 |
| 137. To become absorbed in the beauty of the music | | OA2 |
| 138. To appreciate the music | | YA1 |
| LYRICS | | |
| 139. To hear stories | | OA1 |
| 140. To hear lyrics/stories | | OA2 |
| SLEEP AID | | |
| 141. To help me sleep | | YA2 |
| TO CREATE A PERSONAL SPACE | | |
| 142. To create a personal space* | | YA1 |

Notes; OA1 = Older adult group 1; OA2 = Older adult group 2; YA1 = Younger adult group 1; YA2 = Younger adult group 2; * = highly-ranked FML included in structural modelling phase of the IM procedure.

Appendix B

The Adaptive Functions of Music Listening Scale, Internal Consistency and Descriptive Statistics of 11 subscales, and Psychometric Properties of 46 Final Scale Items.

| The Adaptive Function of Music Listening Scale | β | r^2 | α | M (SD) |
|---|---------|-------|------------------|----------------|
| Stress Regulation | | | .85 | 3.97 (.64) |
| 1. Listening to music distracts me from stress | .74 | .54 | | |
| 2. When I feel stressed listening to music helps to take my mind off it | .78 | .60 | | |
| 3. I can escape from stressful situations by listening to music | .77 | .59 | | |
| 4. When I feel stressed I get comfort from listening to music | .75 | .56 | | |
| Strong Emotional Experiences | | | .90 | 3.85 (.73) |
| 1. When listening to music I feel intense emotions | .83 | .68 | | |
| 2. When listening to music I feel a range of emotions | .78 | .61 | | |
| 3. When listening to music I feel emotions deeply | .81 | .66 | | |
| 4. When listening to music I feel a variety of emotions simultaneously | .71 | .50 | | |
| 5. When listening to music I feel a mixture of many different emotions | .75 | .56 | | |
| 6. I feel strong emotions when listening to music | .81 | .67 | | |
| Rumination | | | .80 | 2.91 (.80) |
| 1. When I feel sad/depressed listening to music makes me dwell upon those feelings | .77 | .59 | | |
| 2. When I feel sad/depressed listening to music leads me to focus on those feelings | .77 | .59 | | |
| 3. When I feel anxious listening to music makes me dwell upon those feelings | .67 | .45 | | |
| 4. When I feel anxious listening to music leads me to focus on those feelings | .62 | .39 | | |
| Sleep | | | .87 ^a | 3.00 (1.23) |
| 1. Listening to music in bed helps me fall asleep | .88 | .78 | | |
| 2. I listen to music in bed because it helps me get to sleep | .99 | .98 | | |
| Reminiscence | | | .88 | 4.10 (.73) |
| 1. Listening to music does not bring back memories for me (R) | .73 | .53 | | |
| 2. When listening to music I reminisce about the past | .84 | .72 | | |
| 3. When listening to music I remember my past | .82 | .68 | | |
| 4. Listening to music reminds me of people from my past | .81 | .66 | | |

| | | | |
|--|-----|-----|---------------|
| Anger Regulation | | .90 | 3.68 (.69) |
| 1. When I feel angry listening to music helps me look on the bright side | .82 | .67 | |
| 2. When I feel angry listening to music helps me see things in a more positive light | .78 | .62 | |
| 3. When I feel angry listening to music helps to take my mind off it | .77 | .59 | |
| 4. When I feel angry listening to music distracts me from feelings of anger | .73 | .53 | |
| 5. When I feel angry I listen to music that makes me happy | .70 | .49 | |
| 6. When I feel angry listening to my favourite music makes me feel happier | .73 | .54 | |
| 7. When I feel angry I get comfort from listening to music | .71 | .51 | |
| Anxiety Regulation | | .90 | 3.82 (.62) |
| 1. When I feel anxious listening to music helps me look on the bright side | .75 | .56 | |
| 2. When I feel anxious listening to music helps me see things in a more positive light | .76 | .58 | |
| 3. When I feel anxious listening to my favourite music makes me feel happier | .74 | .54 | |
| 4. When I feel anxious I listen to music that makes me happy | .69 | .49 | |
| 5. Listening to music distracts me from feelings of anxiety | .72 | .52 | |
| 6. When I feel anxious listening to music helps to take my mind off it | .77 | .60 | |
| 7. When I feel anxious I get comfort from listening to music | .74 | .55 | |
| Awe & Appreciation | | .82 | 4.03 (.73) |
| 1. Listening to music I feel a sense of awe for the talent of the composer | .85 | .72 | |
| 2. Listening to music I feel a sense of awe for the talent of the performer | .83 | .69 | |
| 3. When listening to music I do not admire the talent of the performers (R) | .66 | .44 | |
| Loneliness Regulation | | .87 | 3.74 (.80) |
| 1. I feel less lonely when I listen to music | .82 | .67 | |
| 2. Listening to music reduces feelings of loneliness | .82 | .67 | |
| 3. Listening to music makes me feel less alone | .86 | .73 | |

| | | | |
|---|-----|------------------|----------------|
| Cognitive Regulation | | .81 ^r | 3.06 (1.09) |
| 1. Playing music in the background helps me to concentrate | .95 | .90 | |
| 2. Having background music makes it easier to focus on what I'm doing | .86 | .74 | |
| Identity | | .84 | 3.73 (.82) |
| 1. Music listening is a fundamental part of who I am | .67 | .44 | |
| 2. The music I listen to expresses who I am as a person | .66 | .44 | |
| 3. Listening to music has helped me discover who I am | .82 | .67 | |
| 4. Listening to music has helped me to understand myself | .85 | .72 | |

Notes: β = regression coefficient (i.e., factor loading); r^2 = % of variance in the latent construct explained by item; α = Cronbach's alpha; ^r = Pearson's r (provided for 2 item scales); (R) = reverse scored item.

Appendix C

Full Set of 164 Scale Items Representing 33 Hypothesised Functions of Music Listening

Affective Functions

Affect Regulation

Distraction

1. Listening to music distracts me from stress
2. Listening to music distracts me from feelings of sadness/depression
3. When I feel angry, listening to music distracts me from feelings of anger
4. Listening to music distracts me from feelings of anxiety
5. When I feel stressed, listening to music helps to take my mind off it
6. When I feel sad/depressed listening to music helps to take my mind off it
7. When I feel angry, listening to music helps to take my mind off it
8. When I feel anxious, listening to music helps to take my mind off it

Venting

1. Listening to music helps me release feelings of stress
2. Listening to music helps me release feelings of sadness/depression
3. Listening to music helps me release feelings of anger
4. Listening to music helps me release feelings of anxiety
5. When I'm stressed, listening to music helps me release my feelings
6. When I feel sad/depressed, listening to music helps me release those my feelings
7. When I feel angry, listening to music helps me release those my feelings
8. When I feel anxious, listening to music helps me release those my feelings

Reappraisal

1. When I'm stressed, listening to music helps me see things in a more positive light
2. When I feel sad/depressed, listening to music helps me see things in a more positive light
3. When I feel angry, listening to music helps me see things in a more positive light
4. When I feel anxious, listening to music helps me see things in a more positive light
5. When I feel stressed, listening to music helps me look on the bright side
6. When I feel sad/depressed, listening to music helps me look on the bright side
7. When I feel angry, listening to music helps me look on the bright side
8. When I feel anxious, listening to music helps me look on the bright side

Emotional Support

1. When I feel stressed, I get emotional support from music
2. When I feel sad/depressed, I get emotional support from music
3. When I feel anxious, I get emotional support from music
4. When I feel angry, I get emotional support from music
5. When I feel stressed, I get comfort from listening to music
6. When I feel sad/depressed, I get comfort from listening to music
7. When I feel angry, I get comfort from listening to music
8. When I feel anxious, I get comfort from listening to music

Emotional Approach

1. When I'm stressed, listening to music helps me to figure out what I'm really feeling
 2. When I feel sad/depressed, listening to music helps me to figure out what I'm really feeling
 3. When I feel angry, listening to music helps me to figure out what I'm really feeling
-

-
4. When I feel anxious, listening to music helps me to figure out what I'm really feeling
 5. When I'm stressed, listening to music helps me to delve into my feelings to get a deeper understanding of them
 6. When I feel sad/depressed, listening to music helps me to delve into my feelings to get a deeper understanding of them
 7. When I feel anxious, listening to music helps me to delve into my feelings to get a deeper understanding of them
 8. When I feel angry, listening to music helps me to delve into my feelings to get a deeper understanding of them

Positive Emotions

1. When I feel stressed, listening to my favourite music makes me feel happier
2. When I feel sad/depressed, listening to my favourite music makes me feel happier
3. When I feel anxious, listening to my favourite music makes me feel happier
4. When I feel angry, listening to my favourite music makes me feel happier
5. When I feel stressed, I listen to music that makes me happy
6. When I feel sad/depressed, I listen to music that makes me happy
7. When I feel anxious, I listen to music that makes me happy
8. When I feel angry, I listen to music that makes me happy

Escape

1. Listening to music helps me escape from my troubles
2. I can escape stressful situations by listening to music
3. I can withdraw and escape from sad/depressing situations by listening to music
4. I can withdraw and escape from situations that make me angry by listening to music
5. I can escape situations that make me anxious by listening to music

Rumination

1. When I feel stressed, listening to music leads me to focus on those feelings
2. When I feel sad/depressed, listening to music leads me to focus on those feelings
3. When I feel angry, listening to music leads me to focus on those feelings
4. When I feel anxious, listening to music leads me to focus on those feelings
5. When I feel stressed, listening to music makes me dwell upon the feelings
6. When I feel sad/depressed, listening to music makes me dwell upon the feelings
7. When I feel angry, listening to music makes me dwell upon the feelings
8. When I feel anxious, listening to music makes me dwell upon the feelings

Arousal Regulation

Relaxation

1. Listening to music helps me to relax
2. Listening to music does not help me to relax (RS)
3. When I need to relax, I listen to music
4. When I feel tense, listening to music calms me down

Energising

1. When I'm tired, listening to music activates me
2. Listening to music gives me an energy boost
3. Listening to music makes me feel more alert and awake
4. Listening to music does not energise me (RS)

Affective Experience

Positive Affect

1. Listening to music gives me feelings of joy
 2. Listening to music gives me feelings of elation
 3. Listening to music does not give me feelings of excitement (RS)
 4. Listening to music gives me feelings of calmness
-

-
5. Listening to music gives me feelings of contentment
 6. Listening to music does not gives me feelings of serenity (RS)

Negative Affect

1. Listening to music gives me feelings of sadness
2. Listening to music gives me feelings of melancholy
3. Listening to music does not gives me feelings of misery (RS)
4. Listening to music gives me feelings of anger
5. Listening to music gives me feelings of tension
6. Listening to music does not gives me feelings of anxiety (RS)

Strong Emotions

1. I feel strong emotions when listening to music
2. When listening to music, I feel intense emotions
3. I do not feel intense emotions when I listen to music (RS)
4. When listening to music, I feel emotions deeply

Mixed Emotions

1. When listening to music, I feel a mixture of many different emotions
2. When listening to music, I feel a range of emotions
3. When listening to music, I feel a variety of emotions simultaneously
4. When listening to music, I do not feel a mixture of emotions (RS)

Reminiscence

1. Listening to music reminds me of people from my past
2. When listening to music, I remember my past
3. Listening to music does not bring back memories for me (RS)
4. When listening to music, I reminisce about the past

Cognitive Functions

Analysis

1. I like to critically analyse a piece of music as I listen
2. I like to figure out a piece of music as I listen
3. I do not critically analyse music as I'm listening (RS)
4. Music listening is an intellectual activity pursuit for me

Awe & Appreciation

1. When listening to music I admire its beauty
2. When listening to music, I do not admire the talent of the performers (RS)
3. Listening to music I feel a sense of awe for the talent of the composer
4. Listening to music I feel a sense of awe for the talent of the performer

Curiosity

1. Discovering new music excites me my curiosity
2. Through music listening I can explore different ideas
3. Listening to music I get to experience new sensations
4. Listening to music I do not experience new ideas (RS)

Creativity

1. Listening to music gives me inspiration for other art forms
2. Listening to music helps me to come up with new ideas
3. I find listening to music thought provoking
4. I do not feel creative when I'm listening to music (RS)

Cognitive Regulation

1. Playing music in the background helps me to concentrate
 2. Having music in the background does not make it easier to think (RS)
 3. Having background music makes it easier to focus on what I'm doing
-

-
4. Listening to music keeps my mind occupied

Eudaimonic Functions

Peak Experience

1. I have had life changing experiences listening to music
2. I have completely lost my self in music listening
3. Listening to music I can feel a connection with something larger than myself
4. I have not had a life changing experience as a result of listening to music (RS)

Flow

1. I can lose track of time when listening to music
2. I have had moments of total absorption in music listening
3. I do not lose track of time when I'm listening to music (RS)
4. When listening to music I feel a sense of increased awareness

Transcendence

1. Listening to music opens up another world of experience
2. Listening to music does not take me to another world (RS)
3. When listening to music I am in my own private world
4. When listening to music I feel I can transcend everyday experience

Social Functions

Social Regulation

1. Background music helps to create a certain atmosphere when socialising
2. Background music helps people to relax more at social gatherings
3. Background music can create the mood for romance
4. Background music does not create atmosphere in social situations (RS)

Loneliness Regulation

1. Listening to music makes me feel less alone
2. Listening to music reduces feelings of loneliness
3. When I'm feeling lonely, music does not help (RS)
4. I feel less lonely when I listen to music

Connection

1. Listening to music helps me feel more connected to others
2. When I listen to music from different eras, I feel connected with the past
3. Listening to music is a way to connect with other cultures
4. When I listen to music I do not feel more connected to society (RS)

Bonding

1. Listening to music together is a way to bond with people
2. Shared musical experiences have helped me to bond with others
3. I have not bonded with others over shared musical experiences (RS)
4. Listening to music gives me loving feelings towards others

Communication

1. Listening to song lyrics is like listening to a story
2. I learn about the lives of others when listening to music
3. When listening to music, I feel like I am communicating with the song-writer
4. Music is a way to communicate with others without using language

Identity Development

1. Listening to music has helped me discover who I am
 2. Music listening is a fundamental part of who I am
 3. Listening to music has helped me to understand myself
 4. My identity has not been influenced by music listening (RS)
-

Identity Expression

1. The music I listen to expresses who I am as a person
2. Through music listening I can communicate my values to others
3. Through music listening I can communicate my attitudes to others
4. Through music listening I can not communicate my self to others (RS)

Everyday Music Listening Functions

Sleep Aid

1. I listen to music in bed because it helps me get to sleep
2. Listening to music in bed helps me fall asleep
3. Listening to music does not help me fall asleep (RS)
4. I fall asleep easier when listening to music

Movement

1. Listening to music does not makes me feel like dancing (RS)
2. I work faster when listening to music
3. Listening to music when I'm walking helps me to keep going longer
4. Listening to music when I'm exercising helps me to keep going longer

Background

1. I like to have music on in the background constantly
2. Listening to music does not block out distracting background noise (RS)
3. Listening to music blocks out unpleasant background noise

Note; RS = Reverse Scored item

Appendix D

Study 2 Paper and Pen version of Questionnaire Battery

A Theory of Adaptive Music Listening

Study Description

The Adaptive Functions of Music Listening: Structure, Correlates, and Consequences.

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

What is the purpose of the study?

We are interested in the functions of music listening and whether those functions have any unique consequences for well-being. To do this we want to develop a questionnaire that measures the reasons why people listen to music, and to test the outcomes of those functions of music listening.

Who are the researchers and who is funding the research?

This research is being carried out by **Jenny Groarke**, supervised by **Dr. Michael Hogan** in the School of Psychology, NUI, Galway. This research has been approved by the NUI, Galway Research Ethics Committee, and is funded by the Irish Research Council.

Who can take part?

Any English speaker, who listens to music and is over **18 years** of age can take part. Even if you don't listen to music very often, or have no musical knowledge or training, I am interested in what motivates you to listen to music.

What would be involved?

If you choose to participate, this will involve you, answering a series of questions, which measure your reasons for listening to music. You will also be asked questions about which emotions you feel when you listen to music, and whether you use music to deal with stress and negative emotions, as well as questions about your everyday well-being, education, employment status, and if you have any musical training.

How long will it take?

The questionnaire takes up to 45 minutes to complete. You can complete the questionnaire at your own pace taking breaks as you wish.

If you do not fully complete the questionnaire, or decide not to take part, please do consider sending the questionnaire back using the FreePost envelope enclosed - incomplete data is still very useful to us!

When and where will this happen?

This questionnaire study is running until **Winter 2015**, so you can answer it in your own time, wherever you like and return to the School of Psychology using the FreePost envelope enclosed.

Alternatively, you can complete the questionnaire online at:

<http://sgiz.mobi/s3/AFML>

What will I do with the information?

The answers you provide will be used to develop a psychometrically valid and reliable measure of music listening motivations. All questionnaires will be completed anonymously; the researcher will not know who has completed each questionnaire. The data will only be seen by the researcher and her supervisor. All data will be stored in accordance with the data protection act.

Are there any risks involved in taking part?

We foresee no risks to participants as a result of taking part. Many people use music to cope with stress or manage negative moods, some participants may feel discomfort when answering questions about these personal experiences.

What if I wish to withdraw?

Your participation is entirely voluntary and you can withdraw at any time you wish, without giving a reason and without penalty.

What if I have more questions?

If you have any further questions about the study, or if you encounter any difficulty understanding or completing the questionnaire, please contact me.

Demographic Information

We would like to ask you a few questions about yourself...

What is your age (in years)?

Are you currently a registered third-level student?

☐ NO

☐ YES

What is your gender?

☐ MALE

☐ FEMALE

What is your nationality?

What is your employment status?

- ☐ EMPLOYED
- ☐ SELF-EMPLOYED
- ☐ STUDENT
- ☐ HOMEMAKER
- ☐ RETIRED
- ☐ UNEMPLOYED
- ☐ UNABLE TO WORK
- ☐ WOULD RATHER NOT SAY

What is the highest level of education that you have completed?

- ☐ PROFESSIONAL DEGREE (E.G. M.D)
- ☐ DOCTORAL DEGREE
- ☐ POSTGRADUATE DEGREE
- ☐ UNDERGRADUATE DEGREE
- ☐ OTHER [E.G. FETAC, HETAC, PLC]
- ☐ LEAVING CERTIFICATE (OR EQUIVALENT SUCH AS A-LEVELS)
- ☐ JUNIOR CERTIFICATE (OR EQUIVALENT SUCH AS GCSE'S)
- ☐ PRIMARY SCHOOL
- ☐ WOULD RATHER NOT SAY

AFML Scale

I am interested in why you **choose** to listen to music in different situations and what benefits you experience as a result. This includes listening to the radio or your favourite album., going to a concert/gig, or even listening to music at a party.

How you feel may depend on the **TYPE** of music you listen to. We want you to think about the music you **USUALLY** listen to in different situations, and what effect it has.

Listening to music distracts me from stress.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel anxious listening to music helps to take my mind off it

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Listening to music reduces feelings of loneliness

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Listening to music I feel a sense of awe for the talent of the performer

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Listening to music does NOT bring back memories for me

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel anxious I listen to music that makes me happy.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When listening to music I feel a mixture of many different emotions

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel stressed listening to music helps to take my mind off it.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Listening to music has helped me to understand myself

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel anxious I get comfort from listening to music.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Playing music in the background helps me to concentrate

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I have completely lost my self in music listening

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When listening to music I feel a range of emotions.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I can escape from stressful situations by listening to music.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Listening to music in bed helps me fall asleep

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel sad/depressed listening to music leads me to focus on those feelings

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When listening to music I feel intense emotions.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When listening to music I reminisce about the past

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel anxious listening to music helps me look on the bright side.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel anxious listening to music makes me dwell upon those feelings

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I listen to music in bed because it helps me get to sleep

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel anxious listening to music helps me to delve into my feelings to get a deeper understanding of them

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Listening to music I feel a sense of awe for the talent of the composer

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel angry listening to music distracts me from feelings of anger.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When listening to music I do NOT admire the talent of the performers

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel anxious listening to music leads me to focus on those feelings

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel angry I get comfort from listening to music.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Listening to music reminds me of people from my past.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel angry music helps me look on the bright side.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel angry I listen to music that makes me happy.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel anxious listening to my favourite music makes me feel happier.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

The music I listen to expresses who I am as a person

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I feel less lonely when I listen to music

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Music listening is a fundamental part of who I am

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel angry listening to music helps me see things in a more positive light.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

I feel strong emotions when listening to music.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel stressed I get comfort from listening to music.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel anxious listening to music helps me see things in a more positive light.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When listening to music I feel a variety of emotions simultaneously

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel angry listening to my favourite music makes me feel happier.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Listening to music makes me feel less alone

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel sad/depressed listening to music makes me dwell upon those feelings

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Having background music makes it easier to focus on what I'm doing

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When I feel angry listening to music helps to take my mind off it.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Listening to music has helped me discover who I am

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When listening to music I feel emotions deeply.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

When listening to music I remember my past

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Listening to music distracts me from feelings of anxiety.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Music Engagement and Musical Training

We would like to know about your music listening habits, and your musical training, if any.

On average, how often do you listen to music in a week?

- ☐ LESS THAN ONCE A WEEK
- ☐ 1-2 TIMES A WEEK
- ☐ 3-4 TIMES A WEEK
- ☐ 5-6 TIMES A WEEK
- ☐ MORE THAN 6 TIMES A WEEK

On average, how many hours do you purposely listen to music a day?

- ☐ LESS THAN 1 HOUR PER DAY
- ☐ 1-2 HOURS PER DAY
- ☐ 3-4 HOURS PER DAY
- ☐ 5-6 HOURS PER DAY
- ☐ MORE THAN 6 HOURS PER DAY

Have you played/do you play a music instrument?

- ☐ NO
- ☐ YES

For how many years have you played a musical instrument (including voice)?

At the peak of your interest, how many hours per day did you play/practise the musical instrument?

A THEORY OF ADAPTIVE MUSIC LISTENING

How long since you last regularly played a musical instrument?

- ☐ LESS THAN A WEEK AGO
- ☐ LESS THAN A MONTH AGO
- ☐ LESS THAN 1 YEAR AGO
- ☐ BETWEEN 1 AND 5 YEARS AGO
- ☐ BETWEEN 5 AND 10 YEARS AGO
- ☐ MORE THAN 10 YEARS AGO

What is the highest level of formal music training you have received?

- ☐ NONE
- ☐ PRIMARY (ELEMENTARY) SCHOOL MUSIC CLASSES
- ☐ SECONDARY (HIGH) SCHOOL LESSONS
- ☐ TERTIARY (UNIVERSITY) UNDERGRADUATE TRAINING, CONSERVATORY OF MUSIC OR MASTER CLASSES
- ☐ POSTGRADUATE TRAINING, OR ADVANCED OVERSEAS TRAINING

What other type of music training did you receive?

- ☐ NONE
- ☐ SELF-TAUGHT (NO FORMAL TRAINING)
- ☐ PRIVATE (INDIVIDUAL MUSIC CLASSES/TUITION)
- ☐ GROUP MUSIC CLASSES/TUITION

Have you completed Royal Irish Academy of Music (or equivalent such as ABRSM) music examinations?

- ☐ NO
- ☐ YES

What is the highest grade you have completed?

- ☐ GRADE 1-2
- ☐ GRADE 3-4
- ☐ GRADE 5-6
- ☐ GRADE 7-8

Satisfaction with Life Scale

Below are five statements with which you may agree or disagree. Indicate your agreement with each item by using the 1 - 7 scale below.
Please be open and honest in your responding.

In most ways my life is close to my ideal.

| | | | | | | |
|-----------------------|-----------------------|-----------------------|----------------------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Strongly Disagree | Disagree | Slightly Disagree | Neither Agree nor Disagree | Slightly Agree | Agree | Strongly Agree |

The conditions of my life are excellent.

| | | | | | | |
|-----------------------|-----------------------|-----------------------|----------------------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Strongly Disagree | Disagree | Slightly Disagree | Neither Agree nor Disagree | Slightly Agree | Agree | Strongly Agree |

I am satisfied with life.

| | | | | | | |
|-----------------------|-----------------------|-----------------------|----------------------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Strongly Disagree | Disagree | Slightly Disagree | Neither Agree nor Disagree | Slightly Agree | Agree | Strongly Agree |

So far I have gotten the important things I want in life.

| | | | | | | |
|-----------------------|-----------------------|-----------------------|----------------------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Strongly Disagree | Disagree | Slightly Disagree | Neither Agree nor Disagree | Slightly Agree | Agree | Strongly Agree |

If I could live my life over, I would change almost nothing.

| | | | | | | |
|-----------------------|-----------------------|-----------------------|----------------------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Strongly Disagree | Disagree | Slightly Disagree | Neither Agree nor Disagree | Slightly Agree | Agree | Strongly Agree |

PANAS Questionnaire

This scale consists of a number of words that describe different feelings and emotions. Indicate to what extent you have felt this way over THE PAST WEEK.

| | <i>Very slightly or not at all</i> | <i>A little</i> | <i>Moderately</i> | <i>Quite a lot</i> | <i>Extremely</i> |
|---------------------|--|-----------------------|-----------------------|-----------------------|-----------------------|
| Interested | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Distressed | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Excited | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Upset | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Strong | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Guilty | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Scared | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Hostile | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Enthusiastic | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Proud | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Irritable | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Alert | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Ashamed | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Inspired | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Nervous | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Determined | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Attentive | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Jittery | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Active | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Afraid | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Mental Health Continuum

Please answer the following questions which are about how you have been feeling during the past month. Place a check mark in the box that best represents how often you have experienced or felt the following:

During the past month, how often did you feel...

| | NEVER | ONCE OR TWICE | ABOUT 2 OR 3 TIMES A WEEK | ALMOST EVERY DAY | EVERY DAY |
|---|-----------------------|-----------------------|------------------------------------|-----------------------|-----------------------|
| 1. Happy | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 2. Interested in life | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 3. Satisfied with my life | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 4. That you had something important to contribute to society | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 5. That you belonged to a community (like a social group, or your neighborhood) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 6. That our society is a good place, or is becoming a better place, for all people | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 7. That people are basically good | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | NEVER | ONCE OR TWICE | ABOUT 2 OR 3 TIMES A WEEK | ALMOST EVERY DAY | EVERY DAY |
|---|-----------------------|-----------------------|---------------------------------|-----------------------|-----------------------|
| 8. That the way our society works makes sense to you | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 9. That you liked most parts of your personality | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 10. Good at managing the responsibilities of your daily life | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 11. That you had warm and trusting relationships with others | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 12. That you had experiences that challenged you to grow and become a better person | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 13. Confident to think or express your own ideas and opinions | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 14. That your life has a sense of direction or meaning to it | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Emotion Regulation Questionnaire

We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your EMOTIONAL EXPERIENCE, or what you feel like inside. The other is your EMOTIONAL EXPRESSION, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the scale provided.

When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about.

☐ Strongly Disagree ☐ Moderately Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Moderately Agree ☐ Strongly Agree

I keep my emotions to myself.

☐ Strongly Disagree ☐ Moderately Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Moderately Agree ☐ Strongly Agree

When I want to feel less negative emotion (such as sadness or anger), I change what I'm thinking about.

☐ Strongly Disagree ☐ Moderately Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Moderately Agree ☐ Strongly Agree

When I am feeling positive emotions, I am careful not to express them.

☐ Strongly Disagree ☐ Moderately Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Moderately Agree ☐ Strongly Agree

When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm.

☐ Strongly Disagree ☐ Moderately Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Moderately Agree ☐ Strongly Agree

I control my emotions by not expressing them.

☐ Strongly Disagree ☐ Moderately Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Moderately Agree ☐ Strongly Agree

When I want to feel more positive emotion, I change the way I'm thinking about the situation.

☐ Strongly Disagree ☐ Moderately Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Moderately Agree ☐ Strongly Agree

I control my emotions by changing the way I think about the situation I'm in.

☐ Strongly Disagree ☐ Moderately Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Moderately Agree ☐ Strongly Agree

When I am feeling negative emotions, I make sure not to express them.

☐ Strongly Disagree ☐ Moderately Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Moderately Agree ☐ Strongly Agree

When I want to feel less negative emotion, I change the way I'm thinking about the situation.

☐ Strongly Disagree ☐ Moderately Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Moderately Agree ☐ Strongly Agree

A THEORY OF ADAPTIVE MUSIC LISTENING



Thank You!

**Thank you for
taking our survey.
Your response is very
important to us.**

*This research was made possible by funding from
the Irish Research Council.*



Appendix E

All Music Chosen for the Function of Affect Regulation by 40 Younger Adult Participants in Study 3.

| | Artist | Song Title | Genre |
|-----|---------------------------|--|--------------|
| 1. | Band Of Horses | For Annabelle | Indie |
| 2. | The Shins | Phantom Limb | Alternative |
| 3. | First Aid Kit | Wolf | Folk |
| 4. | The Staves | Teeth White | Folk |
| 5. | Band Of Horses | The General Specific | Indie |
| 6. | Boombox Cartel | B2U | Trap |
| 7. | Troyboi | No Substitute | Trap |
| 8. | Jetta | I'd Love To Change The World (Matstubs Remix) | Trap |
| 9. | What So Not | Jaguar | Trap |
| 10. | My Chemical Romance | Bulletproof Heart | Rock |
| 11. | Muse | Supermassive Black Hole | Alternative |
| 12. | Buckcherry | Rescue Me | Rock |
| 13. | Eminem | Lose Yourself | Rap |
| 14. | Fratellis | Chelsea Dagger | Rock |
| 15. | Flight Facilities | Clair De Lune | Electronic |
| 16. | Paolo Nutini | Iron Sky | Indie |
| 17. | Bakermat | Brighter Days | Jazz |
| 18. | Lorde | Tennis Court (Flume Remix) | Indie |
| 19. | Danrell X Småland | Hostage | Indie |
| 20. | Ed Sheeran | Photograph | Pop |
| 21. | Hozier | In A Week | Folk |
| 22. | Hudson Taylor | World Without You | Indie |
| 23. | Mumford And Sons | Babel | Folk |
| 24. | Avril Lavigne | Skater Boy | Punk |
| 25. | Alt-J | Something Good | Indie |
| 26. | Sha Na Na | Those Magic Changes | Rock |
| 27. | Shakira | La Tortura | Pop |
| 28. | EXO-M | Angel | Pop |
| 29. | Elliot Moss | Slip | Alternative |
| 30. | Kelly Clarkson | Breakaway | Pop |
| 31. | Florence & The Machine | Cosmic Love | Pop |
| 32. | KT Tunstall | Through The Dark | Pop |
| 33. | Pink | Just Give Me A Reason | Pop |

Appendices

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|-----|------------------------|-----------------------------|-----------|
| 34. | Duffy | Warwick Avenue | Pop |
| 35. | Ben Howard | Only Love | Indie |
| 36. | Ben Howard | Keep Your Head Up | Indie |
| 37. | Ed Sheeran | Thinking Out Loud | Pop |
| 38. | Ed Sheeran | Bloodstream | Pop |
| 39. | Calum Scott | Dancing On My Own | Pop |
| 40. | Florence & The Machine | St Jude | Indie |
| 41. | Alt-J | Hunger Of The Pine | Indie |
| 42. | Alt-J | Something Good | Indie |
| 43. | Florence & The Machine | Breaking Down | Indie |
| 44. | Florence & The Machine | Falling | Indie |
| 45. | Fleetwood Mac | Landslide | Rock |
| 46. | Oscar Isaac | Fare Thee Well | Folk |
| 47. | The Head and The Heart | Lost In My Mind | Indie |
| 48. | Fleet Foxes | Tiger Mountain Peasant Song | Folk |
| 49. | Ben Howard | I Forget Where We Were | Folk |
| 50. | Taylor Swift | Change | Pop |
| 51. | Foxes | Body Talk | Pop |
| 52. | The Shirelles | Mama Said | Motown |
| 53. | Ed Sheeran | Even My Dad Does Some Times | Pop |
| 54. | Norah Jones | The Long Day Is Over | Jazz |
| 55. | Adele | Hello | Pop |
| 56. | Eminem | Legacy | Rap |
| 57. | Eminem | When I'm Gone | Rap |
| 58. | Eminem | Beautiful | Rap |
| 59. | Bruce Springsteen | Waitin On A Sunny Day | Pop |
| 60. | Bruce Springsteen | The River | Folk |
| 61. | U2 | Every Breaking Wave | Rock |
| 62. | Toto | Africa | Pop |
| 63. | Adele | Someone Like You | R&B |
| 64. | Johnny Cash | Hurt | Country |
| 65. | Johnny Cash | I Hung My Head | Country |
| 66. | Johnny Cash | On The Evening Train | Country |
| 67. | Howard Shore | Concerning Hobbits | Classical |
| 68. | Hans Zimmer | Time | Classical |
| 69. | Kodaline | Brand New Day | Indie |
| 70. | Ed Sheeran | Gold Rush | Folk |
| 71. | Coldplay | Us Against The World | Pop |

Appendices

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|------|-------------------------|-------------------------------|-------------|
| 72. | Ed Sheeran | Photograph | Folk |
| 73. | Shawn Mendes | Never Be Alone | Pop |
| 74. | Ludovico Einaudi | Primavera | Classical |
| 75. | Franz Schubert | Piano sonata in B flat minor | Classical |
| 76. | Ellie Goulding | Beating Heart | Pop |
| 77. | Snow Patrol | Just Say Yes | Pop |
| 78. | Coldplay | A Sky Full Of Stars | Pop |
| 79. | Mr.Probz | Waves | Pop |
| 80. | The 1975 | Settle Down | Pop |
| 81. | Eminem | Lose Yourself | Rap |
| 82. | Adele | Rolling In The Deep | Pop |
| 83. | Black Eyed Peas | Where Is The Love | Pop |
| 84. | Rhianna | Stay | Pop |
| 85. | Pink | Dear Mr. President | Pop |
| 86. | Hollow Coves | The Woods (Alex Schulz Remix) | Electronic |
| 87. | Macklemore | Growing Up | Pop |
| 88. | Afrojack | Freedom | Dance |
| 89. | MAJOR Lazer & DJ Snake | Lean On | Pop |
| 90. | Martin Garrix | Forbidden Voices | Dance |
| 91. | Imagine Dragons | Demons | Pop |
| 92. | Ed Sheeran & Rudimental | Bloodstream | Drum & Bass |
| 93. | Wiz Khalifa | Promises | Hip Hop |
| 94. | Dappy | Money Can't Buy It | Hip Hop |
| 95. | Walking On Cars | Catch Me If You Can | Indie |
| 96. | John Mayer | Free Fallin | Folk |
| 97. | John Mayer | Your Body Is A Wonderland | Folk |
| 98. | Cheryl Crowe | Everyday Is A Winding Road | Country |
| 99. | Ed Sheeran | You Need Me | Pop |
| 100. | John Mayer | Walt Grace | Folk |
| 101. | Taylor Swift | Wildest Dream | Pop |
| 102. | One Direction | Drag Me Down | Pop |
| 103. | Florence & The Machine | Ship To Wreck | Pop |
| 104. | Taylor Swift | Blank Space | Pop |
| 105. | Rachel | Fight Song | Pop |
| 106. | Of Monsters And Men | Organs | Indie |
| 107. | Mumford And Sons | Believe | Indie |
| 108. | Crystal Waters | Gypsy Woman | Dance |
| 109. | Toto | Africa | Rock |

Appendices

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|------|--------------------------|---------------------------------|--------------|
| 110. | The Human League | Don't You Want Me Baby | Pop |
| 111. | Aphex Twin | Stone In Focus | Ambient |
| 112. | Thomas Newman | Any Other Name | Instrumental |
| 113. | Moby | Memory Gospel | Electronic |
| 114. | Aphex Twin | Lichen | Ambient |
| 115. | Ben Klock | Before One | Techno |
| 116. | Tame Impala | Feels Like We Only Go Backwards | Rock |
| 117. | Villagers | The Soul Serene | Indie |
| 118. | Jack Garratt | Worry | Rock |
| 119. | Red Hot Chili Peppers | Make You Feel Better | Rock |
| 120. | Ben Howard | Old Pine | Folk |
| 121. | Kendrick Lamar | Cartoons And Cereals | Hip Hop |
| 122. | Childish Gambino | Heartbeat | Hip Hop |
| 123. | Moby | One Of Those Mornings | Electronic |
| 124. | Lana Del Rey | Born To Die | Indie |
| 125. | Hozier | Jackie And Wilson | Indie |
| 126. | Robin Schulz | When The Sun Goes Down | Pop |
| 127. | Zedd | Beautiful Now | Dance |
| 128. | Alan Walker | Fade | Dubstep |
| 129. | Dubvision | Hollow | Dubstep |
| 130. | Passenger | Hearts On Fire | Pop |
| 131. | Ed Sheeran | Thinking Out Loud | Pop |
| 132. | Shane Ward | That's My Goal | Pop |
| 133. | Wiz Khalifa | See You Again | Pop |
| 134. | Nathan Carter | Wagon Wheel | Country |
| 135. | Simon and Garfunkel | Cecilia | Pop |
| 136. | Imagine Dragons | Radioactive | Pop |
| 137. | Calvin Harris | Outside | Pop |
| 138. | Labrinth | Let The Sun Shine | Pop |
| 139. | The Beatles | She's Leaving Home | Pop |
| 140. | Mumford And Sons | The Cave | Folk |
| 141. | The Doors | Touch Me | Rock |
| 142. | Green Day | Castaway | Punk |
| 143. | Hozier | Jackie And Wilson | Indie |
| 144. | Beach Boys | Heros And Villians | Pop |
| 145. | The Weekend | Cant Feel My Face | Pop |
| 146. | Justin Beiber | What Do You Mean | Pop |
| 147. | Jason Derulo | Want To Want Me | Pop |
| 148. | Chris Brown | Five More Hours | R&B |
| 149. | Little Mix | Black Magic | Pop |

Appendices

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|------|-------------------------------|------------------------------|-------|
| 150. | Fleetwood Mac | Everywhere | Pop |
| 151. | Rihanna | Umbrella | Pop |
| 152. | Spice Girls | Wannabe | Pop |
| 153. | Vengaboys | Boom Boom Boom | Pop |
| 154. | Coldplay | Yellow | Pop |
| 155. | Sam Smith | Lay Me Down | Pop |
| 156. | Taylor Swift | Wildest Dreams | Pop |
| 157. | Ed Sheeran | Thinking Out Loud | Pop |
| 158. | Cristina Perri | A Thousand Years | Pop |
| 159. | One Direction | Little Things | Pop |
| 160. | Ed Sheeran | Kiss Me | Pop |
| 161. | The La's | There She Goes | Indie |
| 162. | The Red Hot Chilli Peppers | The Zephyr Song | Rock |
| 163. | George Harrison | I Got My Mind Set On You | Pop |
| 164. | Hall and Oats | You Make My Dreams Come True | Pop |
| 165. | Leftover Crack | Infested | Punk |
| 166. | Leftover Crack | Rock The 40oz | Punk |
| 167. | Rancid | Cocktails | Punk |
| 168. | Rancid | Let Me Go | Punk |
| 169. | NOFX | Don't Call Me White | Punk |
| 170. | Linkin Park | Faint | Rock |
| 171. | Slipknot | Eyeless | Metal |
| 172. | Marilyn Manson | Pretty As A Swastika | Metal |
| 173. | Disturbed | Stupify | Metal |

Appendix F

All Music Chosen for the Function Of Affect Regulation by 40 Older Adult Participants in Study 3.

| | Artist | Song Title | Genre |
|-----|---------------------------|-------------------------------|-------------|
| 1. | Bruce Springsteen | Glory Days | Rock |
| 2. | The Eagles | Heartache Tonight | Rock |
| 3. | Bruce Springsteen | Oklahoma Home | Folk |
| 4. | John Whelan | Bucks Of Oranmore | Traditional |
| 5. | Noel Hill | Concertina Reel | Traditional |
| 6. | Jimmy McCarthy | The Bright Blue Rose | Traditional |
| 7. | Katie Melua | Nine Million Bicycles | Pop |
| 8. | Perry Como | Portrait Of My Love | Pop |
| 9. | Perry Como | I Want To Give | Pop |
| 10. | Andre Rieu | Blue Danube | Classical |
| 11. | Andre Rieu | Thunder And Lightening | Classical |
| 12. | Andre Rieu | The Gypsy Baron | Classical |
| 13. | Andre Rieu | Village Swallows | Classical |
| 14. | Andre Rieu | Song Of Vilja | Classical |
| 15. | Mozart | Concerto No. 21 Adante | Classical |
| 16. | Shostakovich | Romance of the Gadfly | Classical |
| 17. | Gerry & The Pacemakers | You'll Never Walk Alone | Pop |
| 18. | Hermann Von Reichenau | Salve Regina Gregorian | Sacred |
| 19. | John Lennon | Imagine | Pop |
| 20. | Faure | Requiem | Classical |
| 21. | Faure | Cantique De Jean Racine | Classical |
| 22. | Don Moen | I Will Sing | Sacred |
| 23. | Don Moen | Give Thanks | Sacred |
| 24. | Don McLean | Vincent | Popular |
| 25. | Carlos Santana | Samba Pa Ti | Rock |
| 26. | Chet Atkins | Ave Maria | Popular |
| 27. | Massenet | Meditation from Thais | Classical |
| 28. | Glen Campbell | A Lady Like You | Country |
| 29. | Don Williams | Oklahoma River | Country |
| 30. | Connie Smith | Blue Transistor Radio | Country |
| 31. | Alan Jackson | The Day The World Stood Still | Country |
| 32. | The Byrds | Tamborine Man | Pop |
| 33. | George Jones | White Lightning | Country |
| 34. | Gerry Mulligan | Bark For Barksdale | Jazz |
| 35. | Chet Baker | My Funny Valentine | Jazz |
| 36. | Billy Holliday | Strange Fruit | Blues |
| 37. | Grieg | Hall Of The Mountain King | Classical |

Appendices

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|-----|--------------------------|--------------------------------------|--------------|
| 38. | Shostakovich | Jazz Waltz | Classical |
| 39. | Schubert | Piano Sonata in A Major | Classical |
| 40. | Rachmaninoff | Piano Concerto No. 3 | Classical |
| 41. | Tchaikovsky | The Pathétique Symphony | Classical |
| 42. | Rimskt Korsakov | Schehenazade | Classical |
| 43. | Verdi | The Quartet From Rigoletto | Classical |
| 44. | Declan Nearn | Stop The World | Country |
| 45. | Van Morrison | There'll Be Days Like This | Pop |
| 46. | Ray Charles | Hit The Road Jack | Soul |
| 47. | Michael Buble | Haven't Met You Yet | Swing |
| 48. | Louis Armstrong | What A Wonderful World | Swing |
| 49. | Yehudi Menuhin | Beethoven's Violin Concerto | Classical |
| 50. | Elgar | Cello Concerto | Classical |
| 51. | Bizet | Any Song From Carmen | Opera |
| 52. | Bellini | Any Part Of Norma | Opera |
| 53. | Leonard Cohen | That's No Way to Say Goodbye | Pop |
| 54. | James Last | Seinn Alleliua | Sacred |
| 55. | The Fureys | My Love Is A Red Rose | Traditional |
| 56. | Adele | Hello | Pop |
| 57. | Coldplay | Clocks | Pop |
| 58. | Mozart | Symphony no. 40 in G Minor | Classical |
| 59. | Monks of Glenstall Abbey | Gregorian Chant | Sacred |
| 60. | Frank Sinatra | I Did It My Way | Pop |
| 61. | Harry Belafonte | Oh My Pappa | Pop |
| 62. | Glen Miller | Go To Sleep My Little Drummer Boy | Swing |
| 63. | Schubert | Ave Maria | Classical |
| 64. | Aeolian Quartet | Schubert String Quartet In C Maj | Classical |
| 65. | Michael O'Rourke | John Field Sonata In E Maj | Classical |
| 66. | Berlin Philharmonic | Beethoven 5th Symphony | Classical |
| 67. | Mozart | Clarinet Concerto in A | Classical |
| 68. | Mozart | Eine Kleine Nachtmusik | Classical |
| 69. | Mozart | Flute & Harp Concerto | Classical |
| 70. | Chopin | Nocturne No 8 | Classical |
| 71. | Chopin | Prelude Op. 28 | Classical |
| 72. | W A Mozart | Clarinet Concerto Adagio | Classical |
| 73. | J S Bach | Ach Herr St. John Passion | Classical |
| 74. | Thomas Tallis | Spem In Alium | Choral |
| 75. | W A Mozart | Soave Il Vento | Classical |
| 76. | Barber S | Adagio For Strings | Instrumental |
| 77. | Ghorghe Zamfir | The Lonely Shepherd | Classical |
| 78. | Charles Wood | Oculi Omnium | Choral |
| 79. | Johnny Cash | Ring Of Fire | Country |

Appendices

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|------|---------------------------------|------------------------------------|-----------------|
| 80. | Don Mclean | American Pie | Folk |
| 81. | Beethoven | 1st Mov. Symphony 5 | Classical |
| 82. | Tchaikovski | 1812 Overture | Classical |
| 83. | Vivaldi | Four Seasons - Spring | Classical |
| 84. | Mozart | Symphony No 40 | Classical |
| 85. | Wilson Pickett | In The Midnight Hour | Soul |
| 86. | Shaggy | Feel The Rush | Pop |
| 87. | Elvis Presley | Return To Sender | Rock |
| 88. | Creedence Clearwater Revival | Green River | Rock |
| 89. | Daft Punk | Get Lucky | Pop |
| 90. | Jackson Brown | The Load Out | Rock |
| 91. | Bobby Bare | Willie Jones | Country |
| 92. | Lenard Skynrd | Sweet Home Alabama | Rock |
| 93. | Cast Of Hair | Aquarius | Musical Theatre |
| 94. | The Doors | LA Woman | Rock |
| 95. | Segovia | Recuerdos De Alhambra | Instrumental |
| 96. | The 16 | Agnus Dei | Choral |
| 97. | Rossini | Barber Of Seville | Opera |
| 98. | Deirbhile Ní Bhrolchain | Una Bán | Traditional |
| 99. | Cois Cladaigh | Lay a Garland | Choral |
| 100. | George Harrison | Here Comes The Sun | Pop |
| 101. | The Beatles | Let It Be | Pop |
| 102. | Albert Hammond | Down By The River | Pop |
| 103. | Gilbert O'Sullivan | A Friend Of Mine | Easy Listening |
| 104. | Bob Dylan | Mr. Tambourine Man | Folk |
| 105. | Kiri Te Kanana | O Mia Babino Caro | Opera |
| 106. | Nigel Kennedy | Meditation | Classical |
| 107. | Renee Fleming | Casta Diva | Opera |
| 108. | Russell Watson | Ave Maria | Sacred |
| 109. | Bach | Cello Suite no. 1 | Classical |
| 110. | Mozart | Nozze Di Figaro | Opera |
| 111. | Verdi | Hebrew Slaves Chorus | Opera |
| 112. | Maura O'Connell | I Hope You Have The Feet | Traditional |
| 113. | Dolores Keane | My Own Dear Galway Bay | Traditional |
| 114. | Strauss | Skater's Waltz | Classical |
| 115. | Grieg | Piano Concerto Slow Movement | Classical |
| 116. | Beethoven | 6th Symphony | Classical |
| 117. | Eagles | Hotel California | Rock |
| 118. | Rolling Stones | Wild Horses | Rock |
| 119. | Rachmaninov | Rhapsody On A Theme Of Paganini | Classical |
| 120. | Rodney Crowell | Closer To Heaven | Country |
| 121. | Bob Dylan | Knockin' on Heaven's Door | Pop |
| 122. | Buttons And Bows | The Norweigan Waltz | Traditional |

Appendices

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|------|---------------|----------------------------|-------------|
| 123. | Altan | The Snowy Path | Traditional |
| 124. | John Martyn | Sweet Little Mystery | Folk |
| 125. | Frankie Gavin | Slieve Namban | Traditional |
| 126. | Bob Dylan | Just Like a Woman | Folk |
| 127. | Abba | Mama Mia | Pop |
| 128. | Ravel | Bolero | Classical |
| 129. | Tchaikovsky | Piano Concerto In Bb Minor | Classical |
| 130. | Edvard Grieg | Peer Gynt Suite | Classical |
| 131. | Tchaikovsky | 1812 Overture | Classical |
| 132. | Charlie Pride | Crystal Chandeliers | Country |
| 133. | Marty Robbins | El Paso | Country |
| 134. | Elvis Presley | Love Me Tender | Pop |
| 135. | Tom Jones | Green Green Grass of Home | Pop |
| 136. | Bach | Italian Concerto | Classical |
| 137. | Arvo Part | Berliner Messe | Classical |
| 138. | Nina Simone | Feeling Good | Jazz |
| 139. | The Beatles | The Fool On The Hill | Pop |
| 140. | Dave Brubeck | Brandenburg Gate | Jazz |

Appendix G

Participant Information Sheet: Study 1.

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

What is the purpose of the study?

We are interested in the functions of music listening and whether those functions have any consequences for well-being. To do this we want to utilise a collective intelligence methodology, where small groups of up to 15 people discuss the reasons why they listen to music

Who are the researchers and who is funding the research?

This research is being carried out by Jenny Groarke, supervised by Dr. Michael Hogan in the School of Psychology, NUI, Galway. This research has been approved by the NUI, Galway Research Ethics Committee, and is funded by the Irish Research Council.

Who can take part?

Any English speaker, who listens to music and is aged between 18 and 30* can take part. Even if you don't listen to music very often, or have no musical knowledge or training, I am interested in why you listen to music.

What would be involved?

If you choose to participate, this will involve you, as part of a small group, generating ideas in relation to the reasons you listen to music, and then working with your group to map out how these reasons relate to each other in the context of wellbeing. The mapping process will be carried out using computer software which the assistant facilitator will operate. Once this process has been completed, the software will generate a visual representation of the functions of music listening and their inter-relationships. The audio from the group sessions will be recorded, so that we have a record of what was said.

When and where will this happen?

These sessions will take place on campus at NUI, Galway over the summer months (2013)

How long will it take?

These sessions are expected to take up to 3 hours. There will be a 15 minute break and refreshments and a light lunch will be provided

What will I do with the information?

With your permission, I will record these group discussions and then write it up into what is called a transcript. These transcripts will only be accessible to the lead researcher and her supervisor, and will be kept securely, in strict accordance with the data protection act. An analysis of these discussions will be included in my doctoral thesis, submitted for publication in scientific journals and presented at international conferences. No one will be named or identifiable in any way in the reports of the study.

Are there any risks involved in taking part?

We foresee no risks to participants as a result of taking part. Many people use music to cope with stress or manage negative moods, some participants may feel discomfort talking about these issues, you are free to say as much or as little as you choose about any topic under discussion.

What if I wish to withdraw?

Your participation is entirely voluntary and you can withdraw at any time you wish, without giving a reason and without penalty.

What if I have more questions?

If you have any further questions about the study, or if you encounter any difficulty understanding or completing the questionnaire, please contact me.

Contact Information

If you would be interested in taking part, you can contact me at any time on []. I'd be happy to answer any questions you have about the project.

If you have any concerns about this study and wish to get in touch with someone independent and in confidence, you may contact:

The Chairperson of the NUI Galway Research Ethics Committee, C/o Office of the Vice President for Research, NUI Galway Tel: 091 524411 (extension 5312) 091 495312 (direct) Email ethics@nuigalway.ie.

* 60 and 85 years in older adult version of the Participant Information Sheet

Appendix H

Consent Form: Study 1

Project Title: The Adaptive Functions of Music Listening: Structure, Correlates, and Consequences

Researcher: Jenny Groarke

Supervisor: Dr. Michael Hogan

The purpose and nature of the study has been explained to me in writing ☐

I understand that my participation is voluntary and I can withdraw from the study, without repercussions, at any time, whether before it starts or while I am participating ☐

I understand that anonymity will be ensured by disguising my identity. ☐

I agree to be contacted during the study, if necessary by the researcher. ☐

I give permission to be recorded (audio). ☐

I understand that anonymous extracts from group sessions may be quoted in the thesis and subsequent publications if I give my permission below. ☐

I agree to take part in the above study. ☐

By signing below you are agreeing that you have read and understood the participation summary and that you agree to take part in this research study.

| | | |
|-------------------------|-----------|------|
| Participant's signature | ID Number | Date |
|-------------------------|-----------|------|

| | | |
|----------------------------|-------------------------|------|
| Printed name of researcher | Signature of researcher | Date |
|----------------------------|-------------------------|------|

Appendix I

Participant Information Sheet: Study 2

The Adaptive Functions of Music Listening: Structure, Correlates, and Consequences.

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

What is the purpose of the study?

We are interested in the functions of music listening and whether those functions have any consequences for well-being. To do this we want to develop a questionnaire that measures the reasons why people listen to music, and to test the outcomes of those functions of music listening.

Who are the researchers and who is funding the research?

This research is being carried out by Jenny Groarke, supervised by Dr. Michael Hogan in the School of Psychology, NUI, Galway. This research has been approved by the NUI, Galway Research Ethics Committee, and is funded by the Irish Research Council

Who can take part?

Any English speaker, who listens to music and is over 18 years of age can take part. Even if you don't listen to music very often, or have no musical knowledge or training, I am interested in why you listen to music.

What would be involved?

If you choose to participate, this will involve you, answering a series of questions, which measure your reasons for listening to music. You will also be asked questions about which emotions you feel when you listen to music, and whether you use music to deal with stress and negative emotions, as well as questions about your everyday well-being, education, employment status, and if you have any musical training.

How long will it take?

The questionnaire takes up to 45 minutes to complete. You can complete the questionnaire at your own pace taking breaks as you wish.

When and where will this happen?

This questionnaire will be available to complete until Winter 2015.

The questionnaire is available online at <http://www.surveymoz.com/s3/2101829/AFML>, so you can answer it in your own time, wherever you like.

Alternatively, you can complete a paper version and return it to the School of Psychology using the FreePost envelope enclosed.

What will I do with the information?

The answers you provide will be used to develop a psychometrically valid and reliable measure of music listening motivations. All questionnaires will be completed

anonymously; the researcher will not know who has completed each questionnaire. The data will only be seen by the researcher and her supervisor. All data will be stored in accordance with the data protection act.

Are there any risks involved in taking part?

We foresee no risks to participants as a result of taking part. Many people use music to cope with stress or manage negative moods, some participants may feel discomfort when answering questions about these personal experiences.

What if I wish to withdraw?

Your participation is entirely voluntary and you can withdraw at any time you wish, without giving a reason and without penalty.

What if I have more questions?

If you have any further questions about the study, or if you encounter any difficulty understanding or completing the questionnaire, please contact me.

Contact Information

If you would be interested in taking part, you can contact me at any time on []. I'd be happy to answer any questions you have about the project.

If you have any concerns about this study and wish to get in touch with someone independent and in confidence, you may contact:

The Chairperson of the NUI Galway Research Ethics Committee, C/o Office of the Vice President for Research, NUI Galway Tel: 091 524411 (extension 5312) 091 495312 (direct) Email ethics@nuigalway.ie.

I agree to take part in the above study*

[] I agree

Appendix J

Participant Information Sheet: Study 3

Note; Younger adults, older adult information in parentheses

The Adaptive Functions of Music Listening: Structure, Correlates, and Consequences.

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

What is the purpose of the study?

We are interested in age differences in responses to music. We also want to know if music has any effect on task performance. You will be asked to fill out questionnaires focusing on how you listen to music in everyday life. You will be asked to visit the laboratory in the School of Psychology for one 2-hour session. You will also be asked to complete some computerised and oral tasks.

Who are the researchers and who is funding the research?

This research is being carried out by Jenny Groarke, supervised by Dr. Michael Hogan in the School of Psychology, NUI, Galway. This research has been approved by the NUI, Galway Research Ethics Committee, and is funded by the Irish Research Council.

Who can take part?

We are recruiting adults aged between 18 and 30, / [60 and 85] who have English as a first language or university level English (i.e. equivalent to 80 on TOEFL or 6.5 on IELTS).

Due to the nature of the study the following people are not eligible to participate:

- those who do not possess normal or corrected-to-normal vision and hearing
- those diagnosed with an affective disorder (i.e. depression, PTSD, generalised anxiety disorder, social anxiety)
- [those resident in a nursing home or residential care facility]

What would be involved?

Before visiting the lab you will be asked to fill out questionnaires measuring your personality, well-being, demographics and music listening habits. These questionnaires take up to 45 minutes to complete. Next you will make an appointment to visit our lab. In this session you will complete a number of verbal and numerical tasks, some participants may find these tasks mildly to moderately stressful. The experiment will take around 30 minutes, factoring in time for breaks and refreshments you will spend up to 1 hour in the lab with us.

What will I do with the information?

All data are, in accordance with the Data Protection Act, strictly confidential. Your data will be given a unique participant number and this number will be stored without your name or other personal information attached. The personal and experimental data is therefore stored anonymously. It is anticipated that the findings of this study will be written up for publication in peer-reviewed scientific journals and presented at international conferences. All results will be anonymous. Your information will never be given to third parties.

Are there any risks involved in taking part?

We foresee no risks to participants as a result of taking part. You may get tired - in which case we will give you a break and refreshments. Listening to music may bring up difficult emotions or memories, in which case you will be welcome to remain in the lab as long as you need for your mood to return to normal. You might find you would like to talk to someone about some of the issues raised. We will be happy to recommend someone to you.

Are there any benefits in taking part?

Benefits include the opportunity to contribute to the understanding of the role of music in task performance, and contributing to psychological research.

What if I wish to withdraw?

Your participation is entirely voluntary and you can withdraw at any time you wish, without giving a reason and without penalty.

What if I have more questions?

If you have any further questions about the study, please contact me at []

If you have any concerns about this study and wish to contact someone in confidence, you may contact:

The Chairperson of the NUI Galway Research Ethics Committee, C/o Office of the Vice President for Research, NUI Galway

Tel: [091 524411](tel:091524411) (extension 5312) 091 495312 (direct)

Email: ethics@nuigalway.ie

Appendix K

Consent Form: Study 2 & 3

Project Title: The Adaptive Functions of Music Listening: Structure, Correlates, and Consequences

Researcher: Jenny Groarke

Supervisor: Dr. Michael Hogan

The purpose and nature of the study has been explained to me in writing ☐

I understand that my participation is voluntary and I can withdraw from the study, without repercussions, at any time, whether before it starts or while I am participating. ☐

I understand that anonymity will be ensured by disguising my identity. ☐

I agree to be contacted during the study, if necessary by the researcher. ☐

I agree to take part in the above study ☐

By signing below you are agreeing that you have read and understood the participation summary and that you agree to take part in this research study.

| | | |
|-------------------------|-----------|------|
| Participant’s signature | ID Number | Date |
|-------------------------|-----------|------|

| | | |
|----------------------------|-------------------------|------|
| Printed name of researcher | Signature of researcher | Date |
|----------------------------|-------------------------|------|

Appendix L

Debriefing Form: Study 3

The Adaptive Functions of Music Listening: Structure, Correlates, and Consequences.

Thank you for participating in our research study.

As explained at the outset, this study looked at the link between music and task performance. We were interested in finding out if listening to music has any positive effects on emotional functioning. To examine this we wanted you to feel stressed. To do this we told you that you would be expected to give a speech that would be evaluated by others. Most people become nervous at the prospect of public speaking. It was not our intention to have you make this speech, but we did want you to feel anxious about doing so. We did not tell you this at the outset of the study, as it may have impacted on the way you responded.

Such deception is commonly used in psychological research. Now that you have been provided with the full intentions of the researcher, we would ask that you again consider providing consent to having your data used in this research by ticking the box below.

Having read this debriefing form, are you happy for us to use your data?

Yes ☐ No ☐

If you have been adversely affected by this research, or if you feel upset by any of the topics brought up in this study, please contact the researchers, the helplines listed below, or the student counseling service*.

Contact the Researchers: []

If you have any concerns about this study and wish to contact someone in confidence, you may contact:

The Chairperson of the NUI Galway Research Ethics Committee, C/o Office of the Vice President for Research, NUI Galway. Tel: [091 524411](tel:091524411) (extension 5312) 091 495312 (direct).
Email: ethics@nuigalway.ie

Helplines:

The HSE recommends the following help lines:

AWARE 1890 303 302; Samaritans 1850 60 90 90; Console 1800 201 890.

[The student counseling service: counseling@nuigalway.ie]*

Out of hours Emergency help:

If a person is feeling suicidal out of hours, they can access a psychiatric assessment 24 hours a day through the Accident and Emergency department of University Hospital Galway, on the Newcastle Rd at the back of NUIG. Their contact number is (091) 544544.

Thank you for your participation in this study.

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