



Emotional and Cognitive Correlates of Hope

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Regarding Hope...

“Our shelves hold many books now on the place of faith in science and psychiatry, and on the vicissitudes of man’s efforts to love and to be loved. But when it comes to hope, our shelves are bare. The journals are silent. The Encyclopaedia Britannica devotes many columns to the topic of love, many more to faith. But hope, poor little hope! She is not even listed.”

Karl Menninger (1959)



Abstract

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This thesis outlines and details work conducted to understand the relationship between the components of hope and a range of trait-like emotional and cognitive constructs. Seven studies were conducted to explore these relationships. In this regard, the first study aimed to illuminate the theoretical and empirical underpinnings of trait agency-trait pathways in terms of Big-Five Personality theory. The second study examined the association between dimensions of hope and trait Emotional Intelligence, which is emotion-related perceptions located at the lower level of the personality hierarchy. The third study attempted to elaborate on the nature of the link between hope components and indicators of psychological well-being. To examine concepts related to cognitive aspects, the current thesis adopts the construct of executive functioning (EF), which is well-established in the heart of cognitive psychology. In addition, the fourth study examined the association between the dimensions of hope (agency and pathways) and five self-report EFs, namely Motivational Drive, Impulse Control, Empathy, Organization and Strategic Planning. The fifth study explored whether performance as an objective measure of Planning demonstrates significant links and correlations with agency and pathways. An additional study was conducted to examine whether selected self-report EF test (EFI) relates to objective measures of Planning, TOL-R. The final study investigates the relationship between agency-pathways and three central and critical objective measures of executive functioning; e.g. Stroop, Corsi Block-Tapping, and Switcher tasks. The findings regarding emotional constructs demonstrated that trait agency is associated with traits related to Conscientiousness, the EI factor of Well-Being, Environmental Mastery and Self-Acceptance as aspects of psychological well-being. In contrast, pathways thinking is associated with a number of traits related to the Big-Five interpersonal global traits that inform personality, i.e. Extraversion and Agreeableness, the EI factor of Sociability, Autonomy and Personal Growth, as aspects of psychological well-being. To assess cognitive constructs, agency is associated with self-reported Motivational Drive, Empathy, Organization and Strategic Planning, while pathways is associated with Strategic Planning. This association was not confirmed by objective EF measures. Findings provided by studies of hope and EF highlight the presence of a link between targeted EFs in self-report questionnaires, but not in objective measures.

Declaration

I hereby declare that this thesis has been composed by myself, under standard terms of supervision has been carried out. Moreover, this is an original copy of my thesis that no portion of the work in this thesis has been submitted in support of an application for another degree, university or an institution.

2017

Hacer Belen



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Table of Contents

Regarding Hope.....	2
Abstract.....	3
Declaration:.....	4
Acknowledgements.....	5
Table of Contents.....	6
List of Tables.....	11
List of Figures.....	13
Chapter 1.....	14
General Introduction.....	14
1.1. Abstract.....	14
1.2. Hope.....	15
1.3. Hope within Psychology.....	16
1.4. Hope: Emotion or cognition?.....	17
1.5. Hope: Single-faceted or Multi-faceted?.....	20
1.6. Snyder's Hope Theory.....	22
1.7. Purpose of the Thesis.....	26
1.8. Structure of the Thesis.....	27
Chapter 2.....	30
Hope and Major Emotional Traits.....	30
2.1. Abstract.....	30
2.2. Emotions.....	31
2.3. Trait Hope.....	32
2.4. Trait Hope and Emotional Traits.....	33
2.5. Personality.....	34
2.6. Hope and Personality.....	35
2.7. Emotional Intelligence.....	35
2.8. Hope and Emotional Intelligence.....	36
2.9. Hope and Psychological Well-being.....	37
Chapter 3.....	39

Exploring the Association between Hope and Personality Traits.....	39
3.1. Abstract.....	39
3.2. Introduction.....	40
3.2.1. Link between Hope and the Five Factor Personality.....	40
3.2.2. Rationale.....	43
3.2.3. Predictions and Research Questions.....	43
3.3. Method.....	44
3.3.3.1. Participants.....	44
3.3.2. Measures.....	44
3.3.3. Procedure.....	46
3.3.4. Data Analysis.....	46
3.4. Results.....	46
3.4.1. Correlation Analyses.....	47
3.4.2. Regression Analyses.....	50
3.5. Discussion.....	56
Chapter 4.....	60
Investigating the Association between Hope and Trait EI.....	60
4.1. Abstract.....	60
4.2. Introduction.....	61
4.2.1. TEI and the Big-Five Personality Traits.....	64
4.2.2. Hope and Trait Emotional Intelligence.....	65
4.2.3. Research Questions.....	66
4.3. Method.....	66
4.3.1. Participants.....	66
4.3.2. Measures.....	66
4.3.3. Procedure.....	69
4.3.4. Data Analysis.....	70
4.4. Results.....	70
4.4.1. Correlation Analyses.....	71
4.4.2. Regression Analyses.....	72
4.5. Discussion.....	75
Chapter 5.....	79

Exploring the Association between Hope and Psychological Well-being	79
5.1. Abstract.....	79
5.2. Introduction.....	80
5.2.1. Dispositional nature of psychological well-being	83
5.2.2. Hope and Psychological Well-being.....	84
5.2.3. Aims and Research Questions	86
5.3. Method	86
5.3.1. Participants.....	86
5.3.2. Measures	86
5.3.3. Procedure	88
5.3.4 Data Analysis	89
5.4. Results.....	89
5.4.1. Correlation Analyses.....	90
5.4.2. Regression Analyses	91
5.5. Discussion.....	97
Chapter 6.....	100
Hope with Cognitive Aspects	100
6.1. Abstract.....	100
6.2 Cognitive Hope	101
6.3. Hope and Executive Functions	102
Chapter 7.....	105
Investigating the Relationship between Hope and Self-report Executive Functions.....	105
7.1. Abstract.....	105
7.2. Introduction.....	106
7.2.1. Hope and Executive Functions	107
7.2.2. The Study's Hypotheses	109
7.2.3. Research Questions.....	109
7.3. Method	110
7.3.1. Participants.....	110
7.3.2. Measures	110
7.3.3. Procedure	111

7.3.4. Data analysis	111
7.4. Results.....	112
7.4.1. Correlation Analyses.....	112
7.4.2. Regression Analyses	113
7.5. Discussion.....	116
Chapter 8.....	120
Association between Hope and Strategic Planning Scores with Objective Measure of TOL-R.....	120
8.1. Abstract.....	120
8.2. Introduction.....	121
8.2.1. Hope components and Executive Function of Planning.....	125
8.2.2. The Hypothesis and Research Questions.....	126
8.3. Method for Study 5	127
8.3.1. Participants.....	127
8.3.2. Measures	127
8.3.3. Procedure	128
8.3.4. Data Analysis	129
8.4 Results for Study 5.....	129
Study 6 Investigation of the Relationship between EFI and TOL-R.....	132
8.5. Method for Study 6.....	132
8.5.1. Participants.....	132
8.5.2. Measures	132
8.5.3. Procedure	132
8.5.4. Data Analysis.....	133
8.6. Results for Study 6.....	133
8.7. Discussion.....	134
Chapter 9.....	137
Investigating the Association between Hope and Executive Functions with Objective Tests	137
9.1. Abstract.....	137
9.2. Introduction.....	138
9.2.1. Hope and three core executive functions.....	140

9.2.2. Current study.....	141
9.2.3. Research Questions.....	142
9.3. Method	142
9.3.1. Participants.....	142
9.3.2. Measures	142
9.3.3. Procedure	146
9.3.4. Data Analysis.....	147
9.4. Results.....	147
9.4.1. Stroop Test Data Analyses.....	148
9.4.2. Corsi Block-Tapping Test Data Analysis	149
9.4.3. Switcher Task Data Analysis	151
9.5. Discussion.....	153
Chapter 10.....	156
General Discussion	156
10.1. Abstract.....	156
10.2. Overview.....	157
10.3. Summary of the Findings and Implications.....	158
10.3.1. Summary of Findings regarding Emotional Constructs	158
10.3.2. Theoretical Implications Regarding Emotional Constructs.....	161
10.3.3. Practical Implications regarding Emotional Constructs	163
10.3.4. Summary of Findings regarding Executive Functions (EFs).....	165
10.3.5. Theoretical Implications regarding Executive Functions (EFs) ...	166
10.4. Proposals for Future Studies	168
10.4.1. Trait Pathways and Interpersonal Traits	168
10.4.2. Hope Components and Executive Functioning (EF)	169
10.4.3. Multiple Other Determinants of Hope Components.....	170
10.5. Limitations	170
10.6. Conclusions.....	172
References.....	173

List of Tables

Table 1: Descriptive statistics and Cronbach’s α for hope components and personality traits.....	47
Table 2: Correlation analysis between hope components and measures of the Short Five	47
Table 3: Intercorrelations between trait agency-pathways and facets of the Big Five ...	49
Table 4: Hierarchical multiple regression results between agency and subscales of Short Five	50
Table 5: Hierarchical Multiple Regression between trait agency and facets of personality traits.....	52
Table 6: Hierarchical multiple regression results between pathways and personality traits.....	53
Table 7: Hierarchical Multiple Regression between pathways and facets of personality traits.....	54
Table 8: Factors and relevant facets of TEIQue-SF	68
Table 9: Descriptive statistics for age, measures of hope and TEI.....	71
Table 10: Correlations between components of hope and EI measures	71
Table 11: Hierarchical multiple regression analysis for hope components and TEI measures.....	73
Table 12: Dimensions of Ryff’s psychological well-being model and relevant example items from SPWB	82
Table 13: Descriptive Statistics of hope components and psychological well-being.....	90
Table 14: Pearson correlation results between hope components and subscales of psychological well-being	90
Table 15 Regression analyses between hope components and dimensions of PWB.....	92
Table 16: Mean scores and standard deviations of the dimensions of hope and EFI... ..	112
Table 17: Intercorrelations between component of hope and executive functions.....	113
Table 18: Summary of hierarchical multiple regression analysis for Hope Components and dimensions of EFI	115
Table 19: Mean Scores and Standard Deviations of variables and t-statistics for current and previous studies	129
Table 20: Correlation results for agency, pathways and TOL-R.....	130

Table 21: Correlation results between hope components and performance on different move lengths	130
Table 22: Intercorrelations of performance on TOL-R, total EFI score and Strategic Planning dimension of EFI, Mean and Standard Deviation of the scores.	133
Table 23: Mean Scores and Standard Deviations of variables and t-statistics for current and previous studies	147
Table 24: Descriptive Statistics for Stroop	148
Table 25: Correlation results between components of hope and measures of Stroop ..	149
Table 26: Descriptive statistics for Block Span and Total Score in the Corsi Block-Tapping Test	149
Table 27: Correlation results between hope components and measures of Corsi Task	150
Table 28: Descriptive Statistics from the Switcher Task.....	151
Table 29: Intercorrelations between the component of hope and the Switcher Task ...	152

List of Figures

Figure 1: Distribution of hope citations through different fields and sub-disciplines of psychology, based on the Web of Science database (20.04.2016)	16
Figure 2: Schematic of feed-forward and feedback functions involving agentic and pathways goal-directed thoughts in hope theory (Snyder, 2000b)	24
Figure 3: Citation distribution of Snyder's Hope Theory over the years and across different sub-disciplines of Psychology	25
Figure 4: Structure of the thesis	28
Figure 5: Typical version of Tower of London. Retrieved from PEBL Wiki	123
Figure 6: Screenshot from TOL-R	128
Figure 7: Screenshot from the Corsi Block-Tapping Test	143
Figure 8: Screenshot from the Stroop Test	144
Figure 9: Screenshot from the Switcher Test	146
Figure 10: Dimensions of personality, emotional intelligence and psychological well-being that are associated to agency and pathways scores	158

Chapter 1

General Introduction

1.1. Abstract

This chapter provides an overview of previous research pertaining to the construct hope and introduces the framework for the conducted studies undertaken in order to achieve the main focus of this thesis. In this regard, present chapter reviews the literature regarding construct hope in terms of consideration of hope as a scientific construct, conceptualizations and definitions as a psychological variable, theories that ground hope from an emotional/ cognitive or unitary/multifaceted perspective, and consideration of hope from the conceptualization of Snyder's Hope Theory. Additionally, this chapter elaborates the purpose of the thesis and outlines the structure of the thesis by detailing how specific chapters in this thesis deals with examination of the relationship between construct hope and some of the emotional and cognitive constructs.

1.2. Hope

Hope is one of the most crucial concepts in human lives, as it enables individuals to pursue psychologically and physically healthy lives. It is highly significant that the construct of the hope is considered as one of the four *psychological capitals*, which refer to higher order and core positively-oriented human strengths and psychological resources (hope, self-efficacy, optimism, and resilience) (Luthans & Youssef, 2004). Conceptually, hope is defined as a future-oriented cognitive construct that is related to goal-directed thinking (Snyder, 2000). Thus, the concept of hope tends to be associated with future orientation (Snyder, 2002), goal setting (Bishop & Willis, 2014), and cognitive and/or emotional aspects in a range of theories and models (Dufault & Martocchio, 1985; Lazarus, 1999; Snyder et al., 1991). Moreover, hope has always been related to crucial life outcomes, both theoretically, within theological and philosophical sciences, and empirically, within the various human sciences. For instance, individuals with high levels of hope were found to have increased levels of life satisfaction (Bailey, Eng, Frisch, & Snyder, 2007), higher self-esteem (Barnum, Snyder, Rapoff, Mani, & Thompson, 1998b; Snyder, 2002), improved psychological and emotional adjustment (Snyder, 2002), and a better quality of life (Cantrell & Lupinacci, 2008). The literature clearly indicates the importance of hope and the positive effects that hope can have on human lives. Thus, defining and conceptualizing hope based on real-life models becomes important.

Although no comprehensive agreement has been reached regarding a universal definition of hope, this construct has been linked to goal attainment in both early and recent theoretical models of hope (Lazarus, 1999; Snyder et al., 1991; Stotland, 1969). In addition, the construct has been defined as a “a life force” (Dufault & Martocchio, 1985, p. 380), “a cognitive state” (Breznitz, 1986, p. 296), “a positive motivational state” (Snyder et al., 1991, p. 8) and “a motivational and cognitive attribute” (Arnau, Martinez, de Guzmán, Herth, & Konishi, 2010).

No matter, various definitions or conceptualizations highlight different aspects of the construct, literature now is on consensus that hope is one of the crucial concepts in psychology field. Although concept hope was always mentioned in religious scripts or philosophical theories, its recognition as an important variable in science encounters 1950s. In early approaches, a number of physicians started to believe that positive emotions, including hope, help patients in all types of healing (e.g. J. Frank, 1968; Menninger, 1959). Later research viewed negative thoughts and feelings as being linked

to poorer health and decreased recovery and suggested that positive thoughts and feelings are worthy to study for vital life outcomes (F. Cohen, 1979; Cousins, 1979; J. D. Frank, 1975). Thus, hope studies became an important domain within the field of psychology.

1.3. Hope within Psychology

The concept of hope is by no means a recent development: it has been discussed scientifically in a number of disciplines for some time. Essentially, hope has captured the attention of scholars since the time of the ancient Greeks. However, the integration of hope within psychology dates back to the 1960s. Carl Menninger (1959) was the first to point out the importance of understanding this construct and investigating it empirically. He gave a lecture entitled *Hope* during the opening of the American Psychological Association, when he was elected as president of APA. Menninger emphasized the vital importance of hope in the field of psychiatry, and discussed the need for empirical studies to be conducted in order to understand the nature of the construct and to develop measures for quantifying hope. Below diagram demonstrates the significant interest in hope with the call of Menninger, president of APA, regarding hope through years.

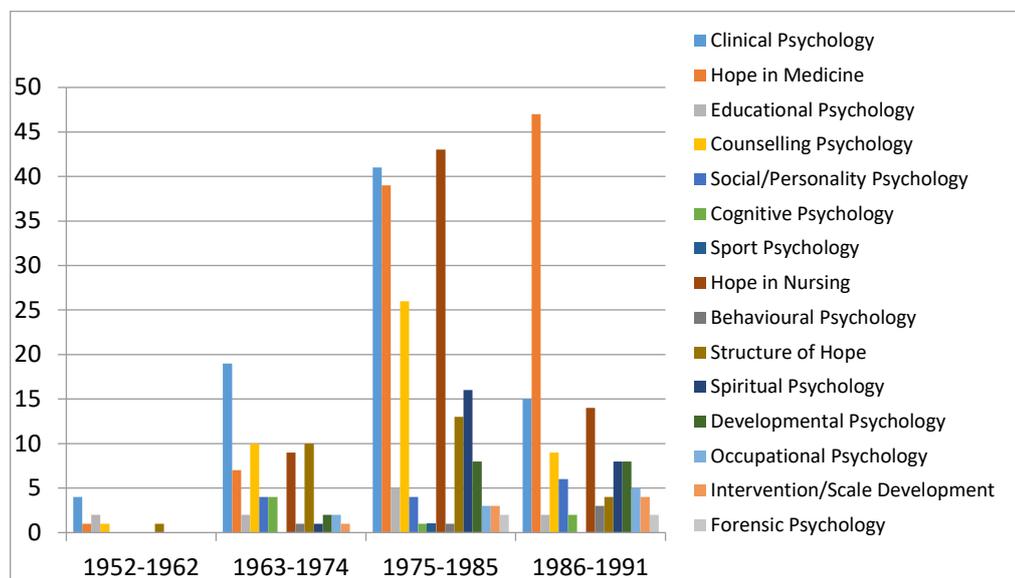


Figure 1: Distribution of hope citations through different fields and sub-disciplines of psychology, based on the Web of Science database (20.04.2016)

This diagram demonstrates the distribution of hope citations across various fields of psychology and through 1991 in which one of the well-researched hope models was developed. This model and relevant diagram will be presented later. For now, above graph was created in order to evidence the increasing interest in exploring hope as a psychological variable and clearly demonstrates the applicability of this construct and shows how much research attention within branches of psychology has been devoted to understanding this important concept. It is based on the number of published works about the construct of hope for each decade starting from 1952 in which early publications were appeared in the literature and was created using the database on the Web of Science on 20 April 2016. When the search query “hope” was entered, the database revealed that 416 published works contained the word “hope” in the title. These were mainly journal articles, although no criteria were set to exclude other types of publication. The publications were investigated in order to determine their relevance to the domain of psychology, and were then assigned to one of the categories shown in the diagram above. As can be seen in Figure 1, there was very little scientific interest in the construct of hope between the early 1950s and the 1960s. However, Carl Menninger’s lecture led to an increased interest among scholars in the various fields and sub-disciplines of psychology during the periods of time shown in the graph.

Stotland (1969), one of the proponents of the study of hope, was first to consider hope as a proper psychological variable. Previously, the concept of hope had been implicitly related to psychology, as it was conceptualized as being related to emotions or located within the soul (Frankl, 1985; Marcel, 1962). However, Stotland (1969) explicitly placed the construct of hope in experimental psychology and considered hope as “an expectation greater than zero of achieving a goal (1969, p. 2). Unlike others, Stotland was interested in the causes and consequences of different levels of goal expectations. Thus, he examined the goal expectation behaviours of human beings and rats under equal situations. His experiments led him to conclude that hope is crucial for taking action and is relevant to one’s previous goal attainment experiences.

1.4. Hope: Emotion or cognition?

Through hope literature, most of the theories or models conceptualized hope as related to goal attainment similar to Stotland (1969). Yet, various models and conceptualizations in the literature have given different descriptions of the construct of hope. Some researchers have categorized hope as an emotional, motivational, or

cognitive construct. Others have developed a conceptualization that states that hope is a complex system that has emotional, cognitive, and various other aspects (Dufault & Martocchio, 1985; Farran, Herth, & Popovich, 1995). Although some agreements were reached regarding the definition and conceptualization of hope, the question of whether hope is a cognition or an emotion remains controversial. Essentially, the debate stems from the question of whether hope is a product of cognitive process or rather an automatic response to a situation (emotion). Scholars who believe that it is a cognition assert that hope is a product of cognitive processes (e.g. Rustøen, 1995; Snyder et al., 1991). Others suggest that hope is an emotion because it motivates actions and behaviours (e.g. Lazarus, 1999).

Historically, this debate began with the question of whether hope is a virtue that can be cultivated (Aquinas, 1968; Marcel, 1962) or an emotion that is beyond one's volition. As we already know, emotions are considered to be automatic responses with no or little control over the situations (Elliott, 2004). On the other hand, cognitions involve human control and thinking. In the context of hope, scholars who believe that it is an emotion suggest that it is an emotional attribute because it motivates individuals to achieve their goals, even in situations over which people have little or no control (e.g. Bruininks & Malle, 2005).

The first scholar that belonged to the school of thought that claims that hope is an emotion was Ernst Bloch (1986). Bloch viewed hope as possessing a goal of "a better life" and striving to achieve this goal. He labelled hope as "the most authentic emotion...of self" (p. 75) and placed hope on the opposite side of the spectrum of anxiety. Bloch did not place hope in either of the categories, but rather described the construct as an emotion with some cognitive characteristics, whilst still considering hope to be an emotion that can be learnt and is controllable. He argued that hope is "capable of concrete and logical correction and sharpening" (p. 112). Moreover, one of Bloch's more important proposals was the suggestion that there is an agentic aspect to hope. He considered that the emotion of hope was "superior" to fear, and made the distinction between the two emotions by pointing out that, unlike fear, hope is not passive and motivates individuals actively to pursue their goals (p.3).

As such, Mowrer (1960) conceptualized hope as an anticipation-like emotion. He found that rats demonstrated increased activity when a stimulus associated with a pleasurable outcome was added to the environment, and he suggested that hope is an affective construct, since the anticipation of the pleasurable outcome encouraged the

subjects to act. Other studies have also placed hope in an emotional context, but have also attributed a cognitive element to hope as a construct. For instance, (Averill, Catlin, & Chon, 1990) examined the nature of hope by asking a sample of college students to compare hope with the two prototypical emotions of love and anger. The participants completed questionnaires, in which they were asked to think about the commonalities between anger and love as emotions, and to compare those with hope. They were asked to describe two similarities and two differences. The results indicated that the majority of the participants considered hope to be an emotion or a feeling that is difficult to control and affects both a person's behavior and their perception of a particular situation in a similar way to love and anger. However, some participants stated that they did not believe hope to be an emotion. Based on the participants' descriptions, the authors concluded that hope satisfies the essential criteria of the emotional model of behavior because of its irrational nature, the fact that it is difficult to control, and its role in motivating behavior. However, in a study conducted by Averill et al. (1990) with the same sample, the participants declared that people should not hope for something that is socially unacceptable. This finding led the authors to conclude that hope is governed by cognitions, such as social norms and rules. Although they suggested that hope is an emotion, the authors stated that, because hope is cognitively oriented, it is different from other emotions.

Lazarus (1999) also proposed that hope should be considered as an emotion. He suggested that emotions are responses to goal outcomes. Negatively-toned emotions, such as anxiety, sadness, shame, and guilt, all stem from the delay or blockage of the goal, and the positively-toned emotions that we experience, such as happiness, love, and pride, are products of the situations that are associated with goal attainment. Lazarus (1999) believed that hope should be considered as a positively-toned emotion because it arises when a strong desire to be in a different situation exists (this might be referred as "goal") and attainment of this goal seems possible.

Unlike the emotion-based school of thought, some scholars conceptualized hope as an attribute that can be gained or cultivated. Erikson (1964), one of the cognitive-based scholars, was interested in human strength and, in particular, hope. In his book entitled *Insight and Responsibility*, Erikson (1964) complained about the psychoanalytical perspective, which focuses more on the causes of mental illnesses, their symptoms, weaknesses, and loss of hope. He also criticized the absence of curiosity regarding "genetic or dynamic determinants of a state of hope or of a state of

controlled willpower” (p 112). Erikson (1964) considered hope to be one of the three rudimentary virtues (*inherent strength or active quality*) that are developed during childhood.

According to Erikson (1964), three basic virtues are developed during childhood (hope, will and purpose), one during adolescence (fidelity), and three during adulthood (love, care and wisdom) (p 115). Erikson (1964) stressed that these virtues are dependent on one another. For instance, will cannot develop until hope is secured, and love cannot be achieved before fidelity. Thus, Erikson (1964) was highlighting the consequent nature and developmental stages of virtues. One important aspect of Erikson’s (1964) work is the fact that he viewed hope as the basis of all virtues. Therefore, other virtues build on hope and, without hope; he argued that it would be impossible for living organisms to sustain life (p. 116). Furthermore, he viewed hope as something that can be gained or strengthened, thereby characterizing hope as a cognition. Erikson (1964) also strongly emphasized the trait-like nature of hope by describing it as an “enduring belief” which, once established, would remain for the rest of an individual’s life.

Another scholar, Snyder, is considered the proponent of the school of thought that believes that hope is cognitive. According to his conceptualization of hope, the cognitive hope process starts with an individual’s mental representation of the future (Snyder, Rand, & Ritschel, 2006). Individuals begin by envisioning future events that are reasonably likely to occur; Snyder refers to these imagined states of affairs as “goals”. The cognitive hope process continues with individuals expending mental energy in pursuing their desired goals and producing workable routes towards the goals (Snyder et al., 2006).

Taken together, the literature demonstrates that, as the theories and models of hope have developed, a general consensus suggesting that hope has both emotional and cognitive components. This notion has formed the basis of current theories of hope. However, there remained some disagreement concerning the precise number of dimensions that make up the construct of hope.

1.5. Hope: Single-faceted or Multi-faceted?

Although early research defined hope as a unidimensional construct (e.g. Mowrer, 1960), over the last 30 years, a broad consensus has emerged that hope is best understood as being multidimensional in nature. However, the precise number, and

indeed the nature, of dimensions remains a matter for debate. Although the majority of theories agree that hope is made up of emotional and cognitive dimensions, the number of additional dimensions are unclear, as are the relationships between them.

Many of the current multidimensional models of hope have been developed in the context of nursing and medicine. For instance, Dufault and Martocchio (1985) developed a theoretical model based on a study of elderly patients with cancer. They defined hope as a “multidimensional, dynamic life force” comprised of spheres and dimensions, rather than as a trait-like and unidimensional construct. On the basis of participants’ descriptions of hope, they then identified six dimensions of hope: affective, cognitive, behavioral, temporal, affiliative, and contextual. All of these dimensions shape the hope process. In the cognitive dimension, hope was viewed as “reality based from the perspective of hoping person” (p. 384) and it was found that individuals sustain hope by assessing the internal and external sources available to them. The affective dimension is concerned with the sensational and emotional aspects of the hoping process. Like Snyder (2000), Dufault and Martocchio (1985) thought of emotions as the products of the hope process, and not the hope experience itself. For example, they stated that “...all feelings and emotional responses described in the affective dimension may be experienced within the hoping process, though there are differences as to which are dominant or present at a particular time” (p. 384); further observing that the behavioral dimension of hope involves actions that “directly affect the desired outcome or to achieve a hope” (p. 385). The affiliative dimension refers to the hoping person’s sense of relatedness to others and to God or a higher power, while the temporal dimension refers to the fact that hope is affected by the past and the present, even though it is a future-oriented construct. Finally, the contextual dimension is concerned with the life situations that are related to the hope process. In addition, the researchers identified two spheres of hope: generalized and particularized. Generalized hope refers to a state of mind or life orientation that needs no specific desired goal and manifests itself as such. An example of this would be “I do not hope for anything in particular, I just hope.” Conversely, particularized hope refers to the identification of targets in order to achieve a specific goal.

In the nursing context, Farran, Herth and Popovich (1995) took a very similar perspective to that of Dufault and Martocchio (1985), as they also viewed hope as a construct that is comprised of dimensions. Moreover, both groups of scholars proposed conceptually similar contexts for the hope dimensions. For instance, Farran et al. (1995)

suggested that the four central attributes for the concept of hope are that it is an experiential, spiritual, rational, and relational process. They accumulated some of the dimensions (reality-based, time-related, action-oriented nature of hope) in “rational process”, because of the overlap between Dufault and Martocchio’s (1985) cognitive, temporal and behavioural dimensions of hope, and they also separated the affiliative dimension into spiritual (higher power) and relational (between people) processes. Furthermore, Dufault and Martocchio (1985) suggested that hope can be “expressed as a way of feeling (affectively), as a way of thinking (cognitively), and a way of behaving (behaviorally) (p. 5). In the affective dimension, hope was viewed as a motivational force that compels individuals to move forward in spite of any impediments. As a way of thinking, hope represents “a sense of fortitude” that pertains to one’s certain assumption that an aversive possibility will not occur, or that, if it does occur, hope will help to find a way of overcoming the situation. In its behavioral dimension, hope includes actions that aim to find solutions for problems.

1.6. Snyder’s Hope Theory

At present, perhaps the best-known theory of hope is Snyder’s Hope Theory (Snyder et al., 1991). This model draws on the cognitive and multi-dimensional conceptualizations of hope. As with previous models, Snyder et al. viewed hope as a perceived expectation of goal attainment. Where their model differs is in the fact that they suggest that hope is not merely a passive expectation; it also involves some cognitive sets that help individuals to initiate and sustain action towards the desired goal (Snyder, 1994). This led to the development of their cognitive-motivational model of hope, which comprises two cognitive elements: “a positive motivational state that is based on an interactively derived sense of successful (a) agency (goal-directed energy) and (b) pathways (planning to meet goals)” (Snyder et al., 1991).

Agency is the motivational component and refers to a cognitive set that conveys an individual’s perceived capacity to achieve their goal. When impediments to a goal are encountered, agency thoughts manifest themselves as internal speech, such as “I can do this” and “I am not going to be stopped” (Snyder, LaPointe, Jeffrey Crowson, & Early, 1998). Pathways thinking refers to an individual’s perceived ability to generate effective routes to the desired goal and is characterized by internal messages, such as “I will find a way to get this done”. Agency and pathways components are “additive,

reciprocal and positively related but not synonymous” (Snyder et al., 1991), and it is suggested that sum of both cognitive components results in the hope experience itself.

Snyder’s (1994) conceptualization extends the previous hope models in two ways. Firstly, previous models described hope as a general expectation that desired goals are attainable. These models did not define the ways in which those goals would be achieved. Snyder (1994) stated that the pathways component of hope identifies the specified routes towards achieving the goal. Secondly, previous models asserted that hope is an emotional state; this emphasizes the passive nature of the hoper in the hoping process (Bruininks & Malle, 2005). Conversely, Snyder et al. (1991) considered hope to be a cognitive construct because it is related to individuals’ perceptions of their ability to achieve their desired goals. Yet, emotions were not excluded from Hope Theory. In his theory, Snyder (2000) suggested that emotions are products of goal-directed thought and argued that positive feelings are produced as a result of the unimpeded pursuit of goals while negative feelings stem from barriers to achieving those goals. Thus, Snyder (2000) considered hope to be a cognition, but also stated that emotions are involved in the hoping process as products of the goal-directed thinking. Figure 2 demonstrates the relationship between emotions, cognitive dimensions of hope (agency, pathways) and goal attainment within the hoping process.

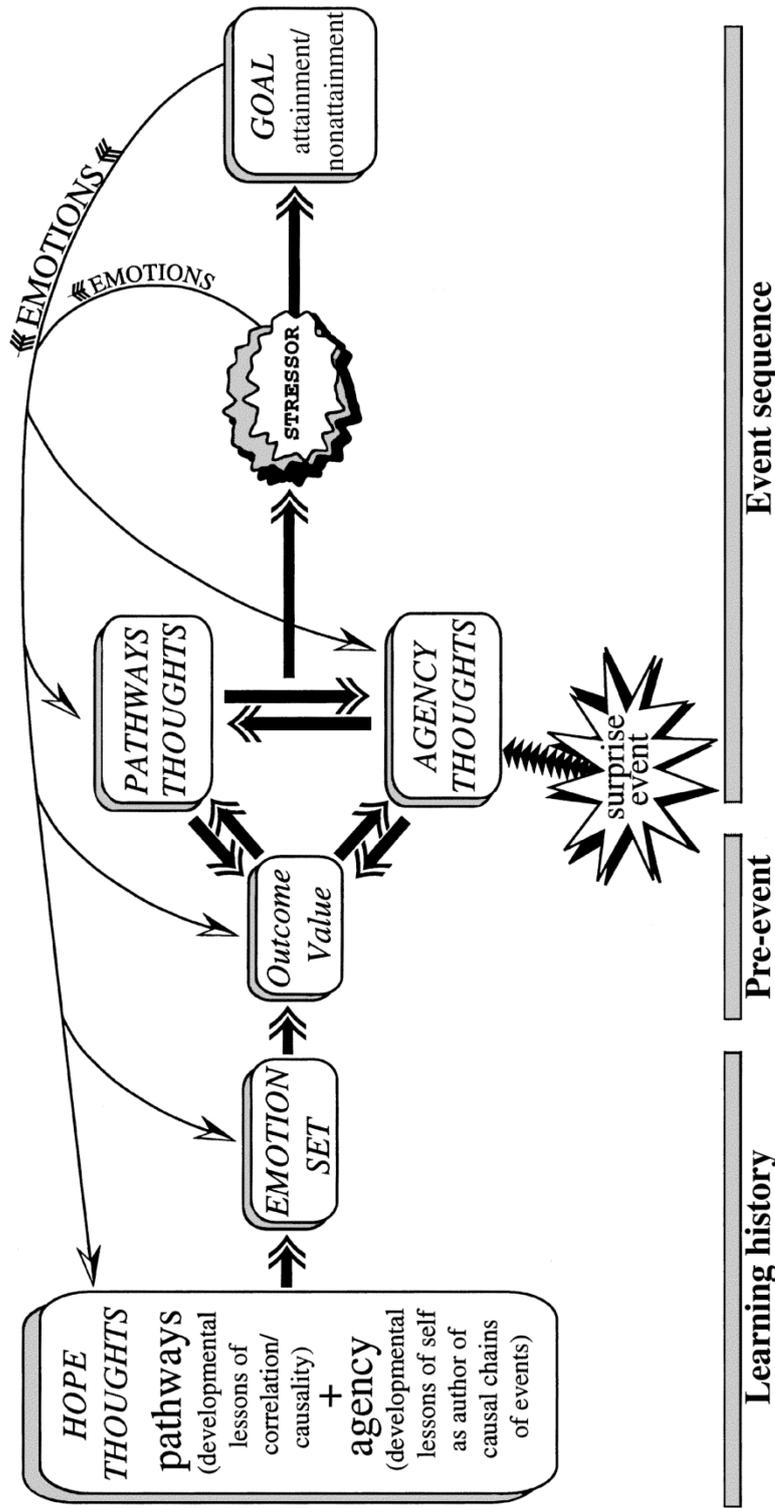


Figure 2: Schematic of feed-forward and feedback functions involving agentic and pathways goal-directed thoughts in hope theory (Snyder, 2000b)

Figure 2 demonstrates a flowchart regarding the operation of hope theory and progression of goal-directed thinking that is presented from left to the right. Agency and pathways thoughts at far left points out the etiology of hope components that were built during developmental stages. Both of the thoughts lead individuals to value the desired outcome and if outcome value warrants reasonably high importance to sustain mental attention, cognitive process of hope begins including agency and pathways thinking. As figure shows, agency and pathways iterate one another throughout the goal pursuit and both components inform individuals to either engage or disengage with the desired goal (Snyder, 2000, p. 12).

As seen, Snyder conceptualizes hope as a cognitive construct and considers emotions as the product of the process in his hope model. Although various theories put forth different explanations regarding emotional or cognitive aspects of hoping process, Snyder's model captured wider research attention compared to both emotion and cognition-based scholars in the field. Only his first published article were cited around one thousand times in articles from different disciplines and domains of psychology (Snyder et al., 1991). Figure 3 is important to understand the impact of the theory on various fields of psychology and similar disciplines.

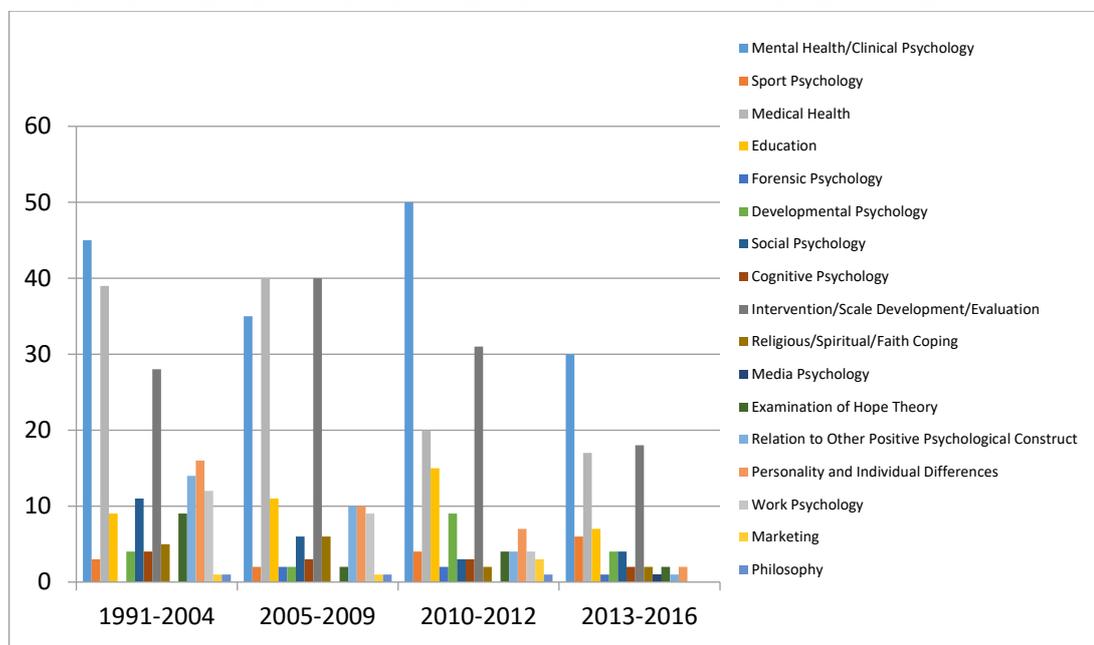


Figure 3: Citation distribution of Snyder's Hope Theory over the years and across different sub-disciplines of Psychology

This diagram was prepared not only to illustrate the distribution of citations pertaining to Snyder's hope theory, but also to demonstrate how this cognitively-based hope model attracted the attention of scholars from different domains of psychology. It shows that Snyder's cognitive hope model was employed within hundreds of publications; we can see that his first article on hope was cited around one thousand times and in at least fifteen different domains, including sports psychology (e.g. Curry, Snyder, Cook, Ruby, & Rehm, 1997; Gustafsson, Skoog, Podlog, Lundqvist, & Wagnsson, 2013; Wurm, Tomasik, & Tesch-Römer, 2010), forensic psychology (e.g. Lloyd & Serin, 2012; Martin & Stermac, 2010), cognitive psychology (Atance & O'Neill, 2001; e.g. Schwarzer, 1994; Shipp, Edwards, & Lambert, 2009), occupational psychology (Avey, Luthans, & Youssef, 2010; e.g. Peterson & Byron, 2008), and, most notably, clinical psychology (Anestis, Moberg, & Arnau, 2014; Mathew, Dunning, Coats, & Whelan, 2014). It has even been cited within non-psychological disciplines, such as marketing (e.g. Henry, 2004). As can be seen in the diagram, scientific interest in Snyder's hope model increased in different fields of psychology over time and the development of Snyder's Hope Theory (1991) attracted more research attention to the construct of hope within various branches of psychology, such as media psychology. Like the previous diagram, this diagram was also prepared based on the number of published works on the topic of hope on the Web of Science (20.04.2016). The results were obtained by searching for articles that included the word "hope" in their title. The publications were then examined in order to determine their relevance to the domain of psychology, and were assigned to one of the categories shown in the legend. The diagram shows the acceptability of the theory and the significant level of research interest in hope within subdomains of psychology, medicine, and nursing.

1.7. Purpose of the Thesis

As demonstrated, Snyder's two-factor hope model has been confirmed as both promising and comprehensive relative to others. According to Snyder's theory, hope arises from two conceptually different components: agency and pathways. Agentic thinking and pathways thinking contribute to hope, but both components are independent of and distinct from hope itself, and from one another. Thus, the nature of hope is not necessarily perceived in the same way when considering agency and pathways thinking. Previous studies examining Snyder's hope model with other variables concentrated solely on whether global hope can be evaluated as a target

construct. Such studies used the global hope score as an outcome measure, thus highlighting the nature of global hope (total hope) and its relationship with other variables but ignoring its components. Thus, research in this area should seek to illuminate the different nature of hope components; i.e. agency and pathways, in relation to emotional and cognitive constructs.

Thus, the purpose of the current thesis is to examine the nature and magnitude of the relationship between agency and pathways and any key emotional and cognitive potential correlates, such as personality traits, emotional intelligence, psychological well-being, and executive functioning. The findings of the thesis will broaden understanding of the components of hope by examining the contribution of agency and pathways in biologically robust variables.

1.8. Structure of the Thesis

As mentioned previously, the current thesis will examine the relationship between the components of hope (agency and pathways), and some of the enduring trait-like emotional and cognitive constructs. In terms of aspects related to emotion, the relationship between trait agency-pathways and personality, emotional intelligence and psychological well-being will be investigated through participants' completion of self-report questionnaires. Similar to the concept of hope, all these emotional constructs are considered to be enduring and relatively stable, and so are categorized as trait-like constructs. By investigating the relationship between hope components and the dimensions/sub-dimensions of these constructs, this thesis aims to obtain additional information regarding the correlates of agency and pathways thinking. In terms of cognitive constructs, this thesis will examine the relationship between agency-pathways and various executive functions (EFs). It is beneficial to study this relationship because EFs are considered to be core cognitive abilities known to govern goal-directed behaviour. Additionally, these cognitive abilities are relatively stable and deliver enduring functions producing individual differences among individuals (Miyake et al., 2000). From this perspective, the construct of executive functioning is viewed as reflecting trait-like qualities associated with goal-directed behaviour, similar to hope. Consequently, hope and its relationship with EF is also considered worthy of investigation in this thesis. This relationship will be examined based on data gathered both from self-report questionnaires and in cognitive performance tests. The collected data will assess core EFs, such as working memory, inhibition control, shifting, and

self-report EFs such as planning, motivational drive, and etc. It is intended that by combining both self-report and objective measures of EFs the data will reliably reveal any potential relationship between hope components and specific EFs. Therefore, the aim of this thesis is to examine the emotional and cognitive aspects of hope when employing Snyder’s model. Figure 4 demonstrates the structure of the thesis.

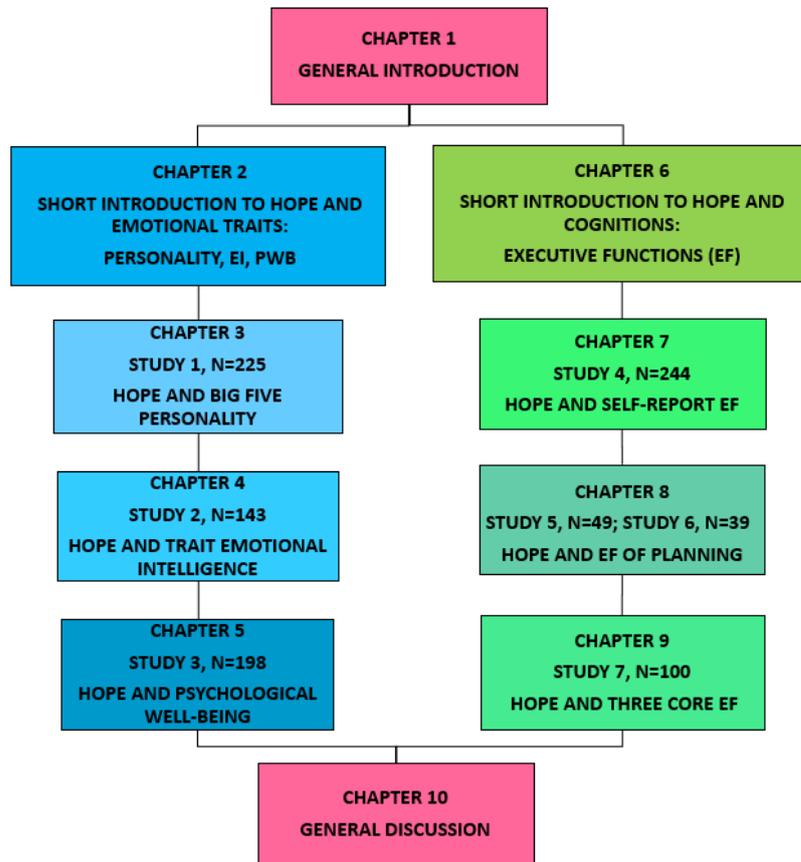


Figure 4: Structure of the thesis

As presented in Figure 4, this thesis is arranged in two parts. The first part will explore the emotional aspects of hope, concentrating on assessing the relationship between hope and personality, emotional intelligence, and psychological well-being. Specifically, Chapter 2 outlines the general approaches taken to establish how hope is mapped on to emotional theories according to variables of personality and individual differences. This is a relatively short chapter that focuses on Snyder’s conceptualizations of the emotional aspects of hope, offering a brief introduction to three major emotion related variables: personality, emotional intelligence, and

psychological well-being. Chapter 3 explores the relationship between hope and Big Five personality traits by examining the fine-grained personality structures and their contribution to trait agency and trait pathways. Chapter 4 examines the relationship between hope and factors of trait emotional intelligence, an integrative construct that is composed of emotion-related self-perceptions at the lower level of personality hierarchy. Chapter 5 addresses the association between hope and various indicators of psychological well-being, a eudaimonic approach to conceptualization of well-being. The second part of the thesis moves on to explore the relevance of cognitive psychology. Specifically, chapter 6 outlines approaches taken to understand the potential relationship between hope and cognitions, emphasizing EFs. This short chapter outlines the cognitive aspects of hope to introduce the subsequent chapters, which explore the relationship between hope and EF. Chapter 7 describes the relationship between hope and self-report EFs according to EFI questionnaire. Chapter 8 examines the relationship between hope and objective measures of planning, TOL-R. Chapter 9 investigates the relationship between hope and three core EFs by utilizing proven and relevant objective measures. Finally, chapter 10 concludes and discusses the findings and implications of the thesis.

In this regard, next chapter will introduce a short introduction to describe the general approaches taken to establish how hope is mapped on to major emotional theories, namely personality, trait emotional intelligence and psychological well-being.

Chapter 2

Hope and Major Emotional Traits

2.1. Abstract

This short chapter introduces hope as an individual differences variable, and discusses its possible relationship to three major, trait-like and emotional concepts; namely, personality, trait emotional intelligence, and psychological well-being. As detailed in Chapter 1, this thesis will investigate emotional and cognitive correlates of trait agency and trait pathways. In this chapter, the possible emotional correlates of hope components will be discussed as a basis upon which to construct emotion. Herein, emotional traits, the trait of hope and its relationship with other emotional traits will be introduced to provide a broad framework to describe the relationship between the components of hope and three emotional and major variables that produce individual differences.

2.2. Emotions

An emotion can be described as a “feeling that motivates, guides and organizes perception, thought and action” (Izard, 1991, p. 14). Unlike the relative agreement among scholars when defining cognition, definitions of emotion remain subject to debate. In particular, debate is ongoing concerning what constitutes an emotion, and how and where emotions are generated (Gross & Barrett, 2011). To date, various theories have been introduced by researchers to answer these and other questions as a basis for developing theories such as the theory of basic emotions (Ekman, 1992; Plutchik, 1962), the circumplex model of affect theories (Lang, Bradley, & Cuthbert, 1998; D. Watson, Wiese, Vaidya, & Tellegen, 1999), motivational theories (Rolls, 2005), and cognitive appraisal theories (Lazarus, 1982).

In reference to basic emotions, Ekman (1992) proposed that emotions such as anger, sadness or surprise are basic emotions, each of which is elicited by the activation of unique and independent neural pathways in the central nervous system. In contrast, the theory of the circumplex model of affect suggests emotions are elicited based on cognitive interpretations of sensations that are produced by two fundamental neurophysiological systems (Posner, Russell, & Peterson, 2005). Additionally, the theory explains the emotions from a multidimensional perspective, arguing that emotions combine two dimensions linearly, such as pleasure/displeasure and arousal. Alternatively, motivational theories consider emotions from the perspective of drive and motivation, conceptualizing emotions as elicited based on reward or punishment (e.g., Rolls, 2005). Conversely, cognitive appraisal theories conceptualize emotions as the *sequela* of conscious or unconscious evaluations of situations deemed significant for one’s well-being, needs and desires (Lazarus, 1982).

Although contemporary cognitive appraisal theories imply a relationship between emotions and cognition, early theories of emotions simply considered emotions and cognition as separate entities. Current theories highlight the interdependence of both constructs, based on findings such as the interrelationship between the emotion-related subcortical brain (amygdala, hypothalamus) and the cognition-related cortical brain. When detailing the influence of cognitions on emotions, some emotion theories suggest cognitions are antecedents of emotions. For instance, cognitive appraisal theories suggest emotions are elicited based on one’s self-appraisal of a situation, in relation to the effects of that situation on one’s goals, and needs (Lazarus, 1991; Roseman, 1984; e.g. Smith & Kirby, 2000). On the other hand, the literature also

documents the effects of emotions on cognitions, noting that they can be either enhancing or detrimental, long-term or short-term, bottom-up or top-up, and lower-level (perceptual) or higher level (executive) (Dolcos & Denkova, 2014). Additionally, several other theories have cited the effects of emotional stimuli on cognitions. For instance, Eysenck et al. (2007) proposed the attentional control theory of anxiety, which contends that elevated anxiety impairs the performance of executive function particularly in terms of shifting and inhibition. In support of this, several studies have presented findings illustrating the detrimental effects of elevated anxiety on so called executive functions (e.g. Ansari, Derakshan, & Richards, 2008).

Additional to importance of emotions in cognitive psychology, individual differences literature also generally accepts that emotions contribute to an individual's uniqueness (Kuppens, Stouten, & Mesquita, 2009). Individuals are thought to be unique in terms of how they experience emotions, as apparent from their expression of them, and their reported intensity of emotional experiences. For this reason, personality research is increasingly concentrated on identifying emotional experience, and the individual differences in emotional traits have garnered considerable scholarly attention. Essentially, the literature considers emotions as either emotional states or emotional traits. Emotional states are usually short in duration, responding to the frequent changes within an individual's environment, whereas emotional traits represent enduring emotional patterns and characteristics that show relative stability over time and situations (e.g., Izard, 1991). Hence, emotional traits are related to the core characteristics of personality traits; such as trait anger, trait anxiety, etc.

2.3. Trait Hope

Similar to emotions, the construct hope is considered in two ways; as both state and trait hope. State hope is conceptualized as a goal and situation specific form of hope (Snyder, 2000). While interviewing people for his study, Snyder recognized that hope relates to more than simply thinking about a specific goal. Although hopeful thinking can reflect both state and trait-like processes, individuals possess enduring self-referential thoughts concerning their capacity to attain their goals in general (Snyder, 2002), thereby representing the dispositional nature of hope. He observed that individuals form generalized beliefs about their abilities, in particular regarding whether they can achieve their identified goals (trait agency) and produce pathways towards those goals (trait pathways), based on childhood learning experiences (Snyder, 2002).

These generalized beliefs can be identified as trait/dispositional hope, trait agency, and trait pathways (Snyder, 2002). In this regard, Snyder's view of trait hope suggests a reliance on one's cognitive evaluation of oneself whether one can achieve an identified desired goal.

2.4. Trait Hope and Emotional Traits

As explained, both emotions and cognitions are demonstrably both important and interdependent, referring influencing one another. As a cognitive construct, hopeful thinking affects emotions and is also influenced by emotional processes. In his hope theory, Snyder (2002) postulated that emotions are responses to one's perception of how one has done previously and is doing in pursuit of the current goal. Thus, positive emotions should move towards goal attainment, and negative emotions should be elicited in cases of goal blockage. Additionally, he suggested that emotions can play contributory roles in the process of hopeful thinking. Furthermore, he explained the process of developing emotional traits as follows: based on numerous previous experiences, individuals form enduring positive or negative emotional sets in relation to pursuit of goals. Before embarking on activities relating to goal-pursuit, enduring emotions are recalled, leading to a sense of zest where previous similar goal pursuits have resulted in success, or with a sense of lethargy when previous goals were blocked (Snyder, 2002). By this mechanism, emotions influence, inform, and contribute to hopeful thinking, and dispositional emotional sets influence self-appraisal and generalized beliefs regarding goal achievement capacity and levels of trait hope, agency and pathways thinking. Thus, individuals who are high in trait hope generally demonstrate positive and active feelings towards embarking on future goals, while low-hope people's self-referential emotions predispose them negatively towards engaging in future goals (Snyder et al., 1991).

As noted above, dispositional emotion sets crucially shape or is shaped by agency and pathways thinking. Thus, it is beneficial to document which trait-like, emotional concepts might associate to the processes of agency and pathways thinking. In terms of the personality and individual differences literature, personality, emotional intelligence, and psychological well-being are the three major trait-like emotional constructs. Thus, this thesis will begin with an investigation of the relationship between hope and three major emotional concepts established in individual differences literature.

2.5. Personality

In psychology literature, emotions are generally considered to be personality prototypes. Conceptually, emotions reflect the integration of feelings, action, appraisals and wants for a certain duration of time and in a particular situation (Ortony, Norman, & Revelle, 2005; Revelle & Scherer, 2009). On the other hand, personality represents this integration over time and situations (Revelle & Scherer, 2009).

Due to the complexity of the construct, it remains a struggle to produce a universal definition of the personality (Maltby, Day, & Macaskill, 2013, p.5). Thus, various definitions and models have been introduced into the literature. For instance, Funder (2015, p.5) defined personality as “an individual’s characteristic pattern of emotion, thought and behaviour, together with the psychological mechanisms-hidden or not- behind those patterns.” Similar to the lack of consensus over a definition, scholars’ views regarding personality also differ. However, the five-factor model of personality (FFM) is the primary model of personality, due to its universal and cultural validity (Schmidt, Wagner, & Kiesler, 1999).

Of the major FFM personality models, the Big Five personality models represent the higher order traits of a normal adult personality. Although earlier independent studies had also proposed a five-factor personality solution using factor analysis (Fiske, 1949; Norman, 1963; Tupes & Christal, 1961), one of the most comprehensive and widely accepted personality models was that developed by McCrae and Costa (1987). This model is determined by biological factors, and explains personality in terms of the following five major traits: Neuroticism, Extraversion, Agreeableness, Openness to Experiences, and Conscientiousness. Based on the model’s conceptualizations, neurotic individuals demonstrate a tendency to experience negative emotions, such as elevated anxiety, worry, insecurity, and emotional instability (Costa & McCrae, 1985). Extraversion refers to one’s level of talkativeness, sociability, cheerfulness, and assertiveness (Costa & McCrae, 1985). Agreeable individuals are characterized by friendliness, trustworthiness, cooperation, altruism, a caring nature, kindness, and are supportive and sympathetic. Individuals who are high in the trait Openness to Experiences are typically curious, imaginative, insightful, original, intellectual, open-minded and creative. The Big Five trait of Openness describe individuals who express a curiosity for both the inner and outer world, and who are open to unconventional values and novel ideas (Costa & McCrae, 1985, p.10). According to McCrae and Costa, individuals found to be high in Conscientiousness are characterized by goal-orientation,

responsibility, self-discipline, carefulness, and perseverance.

2.6. Hope and Personality

Hope is considered as a critical variable in personality research (Zhou & Kam, 2016). As noted, personality traits refer to one's generalized and personalized predisposition to adapt to one's environment (Allport & Odbert, 1936). As such, hope can be characterized as a trait, due to its relative stability and cross-situational tendency (Arnau, Rosen, Finch, Rhudy, & Fortunato, 2007). In Snyder's model (2000), trait hope is conceptualized as a tendency towards agentic and pathways thinking. In the literature, several studies have already documented the relationship between the Big-Five Personality traits and hope (Halama & Dedova, 2007; Halama, 2010; Mascaro & Rosen, 2005), and trait agency-trait pathways (Day, Hanson, Maltby, Proctor, & Wood, 2010). However, no study has yet examined the relationship between trait agency-trait pathways and the various distinct facets of personality traits. Essentially, the facets of personality traits comprise fine-grained emotional dispositions (e.g. anger, hostility or assertiveness). Thus, working on such fine-grained emotional dispositions could potentially illuminate the nature of hope in depth. Additionally, several studies have documented the advantage of using specific facets to explain complex outcomes relative to broader personality traits (e.g. Paunonen, Rothstein, & Jackson, 1999) Thus, this leads to a need to investigate whether such specific traits predict trait agency and pathways, so as to examine the association between different facets of personality traits. Chapter 3 investigates the possibility of such an association.

2.7. Emotional Intelligence

Emotional intelligence is another major concept associated with individual differences. The adoption of the idea that management of one's emotions comprises a form of intelligence dates to Thorndike's social intelligence theory (1920), which attempted to understand the characteristics required to effectively navigate and negotiate with the social environment (Honeywill, 2015). In addition, more recently, Gardner's (1983) concept of interpersonal intelligence was based on the theory that there are multiple intelligences. Combining emotion with intelligence led to attempts to synthesize emotion-related concepts into a single unified framework (Bar-On, 2000; Salovey & Mayer, 1990).

The term emotional intelligence, “EI”, was first introduced by Mayer and Salovey (1990), who identified emotion-related cognitive abilities that help individuals recognize, express and manage their own and others’ emotions. From this perspective, EI was understood within the framework of human intelligence, and was assessed according to maximal performance tests similar to the IQ (intelligence quotient) measure (Petrides, 2011). Subsequently, the power of EI as a distinct form of IQ was recognized in Goleman’s book, in which he argued EI is a more powerful predictor of crucial life outcomes than IQ (Goleman, 1995).

Petrides and Furnham (2001) later distinguished trait EI from the ability-based EI described by Mayer and Salovey (1990). Trait EI was conceptualized as a constellation of emotion-related self-perceptions, located at the lower levels of the personality hierarchy (Petrides, Pita & Kokkinaki, 2007). The associated literature also supported the notion of a conceptual and empirical difference between trait EI and ability EI. For instance, trait EI is conceptualized as a component of the personality framework, while ability EI considers EI as a cognitive ability. Additionally, empirical evidence also demonstrates limited correlation between trait EI and ability EI, further establishing there is a difference between these EI types (Brannick et al., 2009).

2.8. Hope and Emotional Intelligence

Trait EI emphasizes personal differences in emotion-related perceptions. Several important behavioural-genetic and twin studies have evidenced both the heritability of EI and the feasibility of conceptualizing the construct as a component of the personality framework (Vernon, Petrides, Bratko, & Schermer, 2008). Furthermore, a study by De Raad demonstrated that EI is located within the Abridged Personality Circumplex (De Raad, 2005). As such, hope and its dimensions are considered trait-like constructs, reflecting the generalized belief that goals can be achieved (agency) and impediments overcome by generating alternative approaches towards a desired goal (pathways). Although Snyder highlighted the potential relationship between enduring emotional dispositions and goal-directed thinking, agency and pathways, no studies have yet investigated whether emotion-related perceptions are associated with self-appraisals of the own capacity in regards to achieve goals (agency), and nor have they perceived capacity required to produce routes towards desired goals (pathways). Thus, Chapter 4 investigates the relationship between trait agency-pathways and trait EI.

2.9. Hope and Psychological Well-being

Well-being is evaluated in two ways in psychology literature; either as the absence of mental illnesses or the presence of positive functioning (Ryff, 1995). For decades, studies have focused on the former construct and neglected the latter, although positive psychological functioning is no less evident as a component of well-being. On the other hand, the philosophical roots of well-being historically belong to hedonic or eudaimonic traditions (Ryff, 2014). The hedonic tradition approaches well-being from the perspective of pleasure attainment and the avoidance of pain. Conversely, the eudaimonic tradition views well-being as related to finding the true potential, purpose, and meaning of life (Ryff & Keyes, 1995). Fewer than three decades ago, the positive psychological aspect of well-being was limited to aspects of the hedonic tradition, such as satisfaction with life, happiness and positive affect. Nevertheless, possessing aims and objectives, designing a genuine environment to meet one's needs, and promoting personal development are all components of well-being. Due to the absence of a rational model, research conclusions have been elusive on the topic of psychological well-being. Ryff integrated six key components (autonomy, environmental mastery, positive relations, purpose in life, personal growth and self-acceptance) relative to diverse positive psychological theories in order to substantiate construct psychological well-being.

Hope was conceptualized as a cognitive construct conveying goal-directed thinking according to Snyder's model. Nevertheless, emotions were not excluded from the model, but rather theorized as responses to pursued goals. Snyder's hope theory suggested that goal pursuit perceptions drives emotions. For instance, one's self-appraisal of oneself as capable of achieving desired goals by creating pathways that result in positive emotions and vice versa. Thus, people with a high level of hope would be expected to have a different set of emotions and opinions regarding life than those with low hope (Snyder, 2002). Moreover, highly hopeful people would be expected to have enduring positive emotions, while people with low hope would be expected to express negativity regarding the pursuit of goals. This has been evidenced in the literature, in studies demonstrating opinions regarding perceived lack of progress (Brunstein, 1993), experiences of goal blockage (Omodei & Wearing, 1990), and the influence of pursuit of goals on reducing reported well-being. Therefore, it appears that one's level of hope and well-being are related.

To date, hope has been investigated in terms of its association with aspects of subjective well-being, such as life satisfaction (Lopez, Rose, Robinson, Marques, & Pais-Ribeiro, 2009) and positive affect (Rego, Sousa, Marques, & Cunha, 2012). However, subjective well-being reflects hedonic concepts, such as pleasure, balance between positive and negative emotions, and cognitive evaluations of satisfaction. In contrast, psychological well-being reflects the idea of eudaimonic well-being. Although its importance, hope and eudaimonic well-being research remained scarce in the literature and only one prior study to this one has attempted to explicitly explore the link between hope and Ryff's classification of psychological well-being (Hasnain, Wazid, & Hasan, 2014). Yet, this study solely focused on the relationship between the constructs from the level of global psychological well-being score and global hope score, ignoring the dimensional level. Thus, Chapter 5 will investigate whether such a link exists in dimensional levels.

In summary, this chapter has introduced three major and emotional individual differences variables; namely, personality, emotional intelligence and psychological well-being and described their theoretical link to construct hope. Although theoretical links are evident between these variables and hope, empirical evidence is needed to determine whether such relationships exist. Therefore, the following chapter will begin by examining the potential link between hope and personality traits.

Chapter 3

Exploring the Association between Hope and Personality Traits

3.1. Abstract

Hope is a critical variable in personality research. Previous studies have detailed the relationship between hope and personality traits at a global trait level. To date, however, no study has examined this relationship at the facet level, although this would provide more specificity and explanation. In order to address this limitation, this study examines the association between trait agency/trait pathways and the facets of the Big Five personality traits. The Adults Dispositional Hope Scale (ADHS) and the short version of the NEO PI-R (S5) were administered to 225 university students. The hierarchical multiple regression results suggested that agency is associated only with the facets of Conscientiousness, namely, competence, achievement striving, and order (in reverse). Additionally, pathways thinking is associated with the facets of interpersonal traits, namely trait assertiveness and excitement seeking (Extraversion) and modesty (Agreeableness). In light of the findings, the study extends the literature on the facets of the Big Five model of personality to agency and pathways thinking.

3.2. Introduction

The literature conceptualizes hope, unlike other positive psychological characteristics, in two different ways, i.e. as a 'state' and a 'trait'. Snyder (2000), a proponent of hope models, described the trait hope as a "tendency to engage in agentic thinking and pathways thinking" (Tong, Fredrickson, Chang, & Lim, 2010). Thus, an individual with a high level of trait agency will have tendency to initiate and sustain goal-directed behavior, while sustaining motivation during the goal attainment process. In addition, high trait pathways result in behaviors that generate new and alternative methods of achieving goals on occasions when the usual avenues are blocked.

Allport & Odbert (1936, p.26) described traits as: "generalized and personalized determining tendencies-consistent and stable modes of an individual's adjustment to his environment." They viewed traits as core constructs responsible for a significant percentage of personality psychology and individual differences. As noted above, personality traits refer to a tendency to behave in a certain manner. Despite an ongoing debate, the majority of psychologists agree that the main traits of personality variables are embodied in the Big Five Personality taxonomy (Goldberg, 1990). The model classifies personality as being comprised of five higher-order personality traits: (1) Neuroticism; (2) Extraversion; (3) Openness to Experiences; (4) Agreeableness; and (5) Conscientiousness (Costa, McCrae, & Dye, 1991). (1) Neuroticism is defined as negative emotionality, or a vulnerability to negative emotions, e.g. anxiety and depression (Costa & MacCrae, 1992). (2) Extraversion refers to positive emotionality, sociability, and assertiveness (Costa & MacCrae, 1992), with research suggesting that extraverts possess higher levels of social skills and gain higher positions within social groups (e.g. Akert & Panter, 1988). (3) Agreeableness refers to traits such as altruism, trust and tender-mindedness, along with compliance, and a concern for others (Costa & MacCrae, 1992). (4) Openness to Experience refers to characteristics including: imagination; being cultured; curiosity; originality; broad-mindedness; intelligence; and artistic sensitivity. (5) Conscientiousness is the personality trait relevant to goal or task orientation (John & Srivastava, 1999). Thus, higher levels of conscientiousness are associated with improved organization, responsibility, and self-control.

3.2.1. Link between Hope and the Five Factor Personality

Previous research has emphasized that personality traits are linked to several constructs relating to human strength (e.g. Ehrenberg, Juckes, White, & Walsh, 2008).

A large number of these positive psychological characteristics are considered trait-like constructs, and substantial correlations have been documented between these characteristics and personality traits. Thus, there have been an increased number of discussions as to whether these characteristics are derivatives of Big Five personality traits. Halama and Dedova (2007) examined whether positive psychological characteristics are aspects of Big Five personality traits, establishing that hope is a different, and independent construct, rather than being an aspect of the Big Five.

Previous studies on hope and personality traits failed to directly examine the association between the two, although findings revealed a strong link between hope and a number of traits from the Big Five. Thus, Mascaro et al. (2005) examined a sample of 329 undergraduates to determine whether existential meaning predicts significant amounts of variance in hope and depressive symptoms above, and beyond, social desirability and personality traits. The findings demonstrated that as both a trait and a state hope is a significant correlate of Neuroticism, Extraversion, Agreeableness and Conscientiousness, albeit with different levels of effect. Halama and Dedova (2007) aimed to establish whether positive psychological characteristics are derivatives of basic personality traits or independent constructs. They tested the influence of two positive psychological characteristics in a sample of 148 adolescents in relation to mental health, while excluding the five personality traits, these being (1) hope and (2) meaning in life. Using hierarchical multiple regression analysis, they established that hope was responsible for approximately 8% of the variance in self-esteem scores. This study concluded that positive psychological characteristics are independent constructs of personality traits. In addition, Halama et al. (2010) identified significant correlations between total hope scores and Neuroticism and Extraversion, with a relatively higher correlation with Conscientiousness. In a further study with a sample of 451 secondary school and university students, Halama (2010) examined whether hope mediates between personality traits and satisfaction with life, establishing that the total hope score was associated positively and significantly with Extraversion and Conscientiousness, and negatively with Neuroticism. Thus, these studies revealed similar findings regarding the total hope score and personality traits, confirming that Neuroticism, Extraversion and Conscientiousness are associated with hope.

Maltby et al. (2010) examined the association between specific personality traits and components of hope. During a three-year longitudinal study with 129 participants, they tested whether hope predicts academic achievement controlling for intelligence,

personality and previous academic achievement. The study established that hope uniquely predicts objective academic achievement, above and beyond the effect of intelligence, personality and previous academic achievement. Additionally, the findings revealed that both trait agency and trait pathways are significantly negatively associated with Neuroticism, and that trait agency has a positive and significant association with Extraversion.

As noted above, a limited amount of research has examined the relationship between hope and personality traits. However, without exception, all previous studies identified hope as a significant correlate of personality traits. Only Maltby et al. (2010) focused on the relationship between trait agency-pathways and the five personality traits, and thus their study is significant in terms of presenting the link between specific personality traits and the dimension of hope, while emphasizing that specific personality traits are implicated in different dimensions of hope. However, the study focused exclusively on correlational links between higher-order personality traits and hope dimensions. These studies provided vital information regarding the nature of hope/hope components through their investigation of those relationships. However, scholars have noted the existence of narrower consistencies of behavior lying beyond the influence of big five personality traits (Paunonen and Ashton, 2001). These consistencies are considered as lower levels, or facets of personality traits. Similar, correlated but distinct facets produce higher-level personality traits, i.e. the personality trait of Neuroticism is comprised of facets including Anger, Hostility, Anxiety, while the trait of Extraversion is composed of facets including Excitement Seeking and Assertiveness.

A number of studies have demonstrated the robustness of the use of lower-level personality traits in empirical studies, i.e. Paunonen et al. (1999) revealed that complex outcomes are more clearly explained in terms of combinations of a small number of facets of personality traits. In addition, the literature has evidenced that broad factors cannot conventionally capture much of the variance of personality traits, referring to the fact that lower-order personality traits sometimes 'outpredict' outcomes beyond the Big Five (Paunonen and Ashton, 2001).

It can therefore be concluded that working on more fine-grained emotional dispositions (e.g. anger, hostility or assertiveness) has the potential to illuminate the correlates of hope components and thus assist further studies. This leads to the need to investigate whether these specific traits predict trait agency and pathways, and to examine this association with different facets of personality traits. To date, no study has

examined the link between hope dimensions and facet levels of personality, and therefore, the aim of the present study is to fill this gap in the literature.

3.2.2. Rationale

This study is significant in terms of replicating and extending previous studies concerning hope and personality traits and (given the gap in the literature relating to research concerning the association between hope and personality) expanding the literature related to hope. The aims of the study are threefold. Firstly, the findings of all previous studies have demonstrated the significant association between hope and personality traits, yet only the study of Maltby et al. (2010) has examined the relationship between personality and hope dimensions. Thus, the first research question addressed in the present study concerns whether it is possible to replicate the findings of Maltby et al. (2010). Secondly, previous studies have omitted to investigate whether specific types of global personality traits predict trait agency and trait pathways scores. Thirdly, the current study explores whether facet level personality traits can predict agency and pathways scores. As explained previously, facet level personality traits reflect more fine-grained structures of personality. Thus, examining their relations to hope components might expand more in terms of understanding the correlates and underpinnings of trait agency and trait pathways.

3.2.3. Predictions and Research Questions

This study hypothesized that Conscientiousness would be positively and significantly correlated with both agency and pathways thinking. As discussed above, Conscientiousness is involved in characteristics including self-discipline, self-control, perseverance and task-goal directedness. One of the characteristics of a hopeful individual is being task-goal oriented, with Snyder (2000) using both terms interchangeably, considering hope to be goal-directed thinking. Furthermore, characteristics such as perseverance are essential for agentic thinking, i.e. the motivational aspect of hope. Additionally, Openness to Experience was hypothesized to have a significant and positive correlation with pathways thinking. As a personality trait, Openness to Experience includes being planful and open to new ways of life. Likewise, pathways thinking indicates an ability to generate new ways of achieving goals. Furthermore, the trait Openness to Experience includes corresponding

characteristics (e.g. curiosity, broad-mindedness, and intelligence) capable of assisting individuals to find alternative methods of achieving their goal when the more usual means are blocked. Finally, Neuroticism was expected to have a negative and significant correlation with both agency and pathways. As noted above, hope is comprised of agency and pathways thinking, and the sum of both components makes up the hope process itself. As a construct, hope is conceptually associated with positive characteristics, and previous studies have empirically identified positive associations between these characteristics and hope (e.g. Thimm, Holte, Brennen, & Wang, 2013). By contrast, Neuroticism refers to negative emotionality, e.g. anxiety and depression. Due to the characteristics associated with Neuroticism (e.g. self-pity, anxiousness, and nervousness), it was hypothesized that individuals who scored high in Neuroticism would prove less motivated to achieve their goals and less likely to recognize their ability to generate multiple means of achieving their goals when the more usual means are blocked. Thus, it was expected that the current study would find a negative and significant relationship between Neuroticism and both components of hope.

Research Question 1: Do the results of this study replicate Maltby and his colleagues' (Day et al., 2010) findings?

Research Question 2: Which personality traits predict trait agency and trait pathways?

Research Question 3: Which personality facets predict trait agency and trait pathways?

3.3. Method

3.3.3.1. Participants

The participants were 225 undergraduate and post graduate students from the University of Leicester (19 male and 206 female). The mean age of the sample was 19.99 (SD=2.46) years.

3.3.2. Measures

3.3.2.1. The Adult Dispositional Hope Scale (Snyder et al., 1991). The Adult Dispositional Hope Scale (ADHS) is a twelve-item self-report hope scale developed for adults aged fifteen and above. In the test: (1) four items act as distracters; (2) four items assess the agency component of hope (e.g. "I energetically pursue my goals"); and (3) four items assess the pathways component of hope (e.g. "I can think of many ways to get out of a jam"). Items are scored based on an 8-point scale, ranging from 1=definitely

false to 8=definitely true. The sum of the agency and pathways subscales gives a total hope score. In terms of the psychometric properties of the scale, previous studies have established good and acceptable levels of reliability for Cronbach's α coefficients for the total hope score of the measure, ranging from .74 to .80 for six different samples of undergraduate students and two different samples with mental health problems. Test-retest correlations revealed .80 and above over a ten week interval (Snyder et al., 1991).

3.3.2.2. S5 (Short Five). Personality traits were assessed in this study with the Short Five personality inventory, i.e. a sixty-item inventory developed to assess personality traits identified by NEO PI-R. S5 is a shorter measure than NEO PI-R, with good internal consistency reliability coefficients (i.e. from .87 to .74 for the broad facets of the measure), and in previous studies has been found to have convergent and discriminant validity (Konstabel, Lönnqvist, Walkowitz, Konstabel, & Verkasalo, 2012). The scale includes sixty items assessing five major dimensions of personality, with six sub-dimensions for each, giving thirty sub-dimensions in total of the big five personality traits. The scale includes the following dimensions of personality: Neuroticism; Extraversion; Openness to Experience; Agreeableness; and Conscientiousness. Two items measure each sub-dimension, with one reflecting negatively-keyed items within each sub-dimension, while the other reflects positively-keyed items, i.e. the item measuring the trait 'Neuroticism' and its lower-order facet 'Anxiety' is exemplified in the question "I am often nervous, fearful, and anxious, and I worry that something might go wrong" as a positively keyed item, and "I am a calm person who does not worry much about what may go wrong" as a negatively keyed item. The response scale ranges from +3 (Completely agree) to -3 (Completely disagree), with '0' representing a neutral position. The negative items were reverse coded and two scores of the items regarding each lower-order facet were summed to establish the score of each facet. The scores of higher order domains, along with big five personality traits (i.e. Neuroticism), were calculated by summing scores of each lower-order facet. Previous studies have established good and acceptable levels of reliability for Cronbach's α coefficients for the subscales of the measure, i.e. Neuroticism (.87-); Extraversion (.89); Openness to Experience (.78-); Agreeableness (.74); and Conscientiousness (.85) (Konstabel et al., 2012). The total sample in the current study established the following: Neuroticism .79; Extraversion .77; Openness .89; and Agreeableness and Conscientiousness .85.

3.3.3. Procedure

The current study received ethical approval from the Ethics Board of the University of Leicester's School of Psychology. The study was advertised through EPR, i.e. the system provided by the University of Leicester for the benefit of both researchers and undergraduate-masters students. EPR places students and researchers in contact with each other, with students awarded additional credits for participating in studies and researchers able to find participants for their research. The final sample of the study consisted of 225 undergraduate and postgraduate students, who agreed to participate in the study. They were all provided with consent forms, completed via the first page of the electronic survey, and the questionnaires were also completed through EPR, a process that lasted no more than twenty minutes.

3.3.4. Data Analysis

The analysis was undertaken using SPSS version 22. Scores were calculated and a Pearson Product-Moment correlation analysis was used to examine the relationship between personality facets and the hope components, trait agency and trait pathways. Hierarchical multiple regression analysis was also used to analyse the scores in order to determine whether personality facets predict agency and pathways scores excluding the effect of age and gender. In order to determine the independent effect of personality facets on trait agency and trait pathways, the effects of the demographic variables were controlled since these variables were found to be correlated with personality traits and hope components. In Step 1, age and gender were entered into the model as demographic variables as it is recommended that these be included in the initial entry step (Cohen & Cohen, 1983). In Step 2, personality facets were entered into the regression models, as these are the variables of interest. G Power Software was used to determine the adequacy of sample size for the hierarchical multiple regression analyses. To perform regression analyses with the power of .80 with a medium effect size, power calculations established that the required minimum sample size is 187. The sample size used in this study met this criterion.

3.4. Results

Table 1 reveals the descriptive statistics and the internal reliability coefficients for the components of hope and the subscales of the Short Five Personality Scale.

Cronbach's alpha coefficient for all the subscales was found to be good and acceptable, ranging from .89 for Neuroticism to .77 for Agreeableness.

Table 1: Descriptive statistics and Cronbach's α for hope components and personality traits

	M	SD	Max	Min	α
Hope Agency	23.54	4.57	32	8	.79
Hope Pathways	22.97	4.15	32	11	.77
Neuroticism	-4.65	13.04	30	-36	.89
Extraversion	7.83	10.93	34	-29	.84
Openness	13.13	10.41	36	-10	.82
Agreeableness	12.66	9.14	34	-12	.77
Conscientiousness	12.06	10.55	35	-21	.85

Note. M=Mean; SD=Standard Deviation; Max=Maximum; Min=Minimum; α =Coefficient alpha

3.4.1. Correlation Analyses

A Pearson product-moment correlation analysis was performed to examine the relationship between the components of hope and the measures on the personality scale, as the scores were normally distributed. Table 2 demonstrates the intercorrelations between the five personality traits and the hope components, agency and pathways.

Table 2: Correlation analysis between hope components and measures of the Short Five

	Agency	Path	N	E	O	A	C
Agency	1						
Path	.600**	1					
N	-.380**	-.402**	1				
E	.469**	.426**	-.475**	1			
O	.249**	.331**	-.064	.340**	1		
A	.153*	.157*	-.143*	.141*	.451**	1	
C	.459**	.378**	-.344**	.309**	.311**	.369**	1

Note. Path= Pathways; N= Neuroticism; E= Extraversion; O= Openness to Experience; A= Agreeableness; C= Conscientiousness; ** $p < .001$. * $p < .05$

Pearson product-moment correlation analysis revealed that all personality traits are significantly correlated with the components of hope, trait agency and trait pathways. As hypothesized, Neuroticism has a significant negative correlation with hope components. Of the other personality traits, Extraversion has the highest correlation with agency and followed by Conscientiousness, Neuroticism (-), Openness and Agreeableness. In terms of pathways, Extraversion is the highest correlate as well and followed by Neuroticism (-), Conscientiousness, Openness and Agreeableness. Agreeableness has the lowest effect size in terms of the correlation coefficient for both of the components. In this regard, the findings of the study by Maltby and colleagues (Day et al., 2010) were partially replicated as they reported the association between trait agency and Neuroticism and Extraversion and pathways thinking and Neuroticism. Table 3 demonstrates the intercorrelations between trait agency-pathways and facets of the Big Five Personality Traits.

Table 3: Intercorrelations between trait agency-pathways and facets of the Big Five

	Agency	Pathways
N-Anxiety	-.274**	-.317**
N-Angry Hostility	-.204**	-.328**
N-Depression	-.326**	-.290**
N-Self Consciousness	-.319**	-.273**
N-Impulsiveness	-.142*	-.144*
N-Vulnerability	-.423**	-.444**
E-Warmth	.331**	.247**
E-Gregariousness	.225**	.139*
E-Assertiveness	.367**	.465**
E-Activity	.366**	.282**
E-Excitement Seeking	.332**	.357**
E-Positive Emotions	.342**	.290**
Openness to Fantasy	.042	.224**
Openness to Aesthetics	.169*	.247**
Openness to Feelings	.141*	.157*
Openness to Actions	.293**	.241**
Openness to Ideas	.296**	.315**
Openness to Values	.032	.101
A-Trust	.222**	.168*
A-Straightforwardness	.278**	.172**
A-Altruism	.124	.221**
A-Compliance	-.006	.096
A-Modesty	-.191**	-.258**
A-Tender mindedness	.186**	.227**
C-Competence	.519**	.397**
C-Order	.211**	.212**
C-Dutifulness	.348**	.225**
C-Achievement Striving	.457**	.315**
C-Self Discipline	.303**	.278**
C-Deliberation	.119	.186**

Note. The first letters of the variables refer the main personality traits, N=Neuroticism, E= Extraversion, Openness to Experience, A= Agreeableness, C= Conscientiousness)

Table 3 demonstrates the intercorrelations between facets of the big five personality traits and both the trait agency and trait pathways. It reveals that all facets of Neuroticism and Extraversion were related to both agency and pathways thinking. Openness to Values and Compliance (i.e. facets of Agreeableness) were not found to be associated with either agency or pathways thinking.

3.4.2. Regression Analyses

Hierarchical multiple regression analysis was also performed to determine the shared variance between the hope factors and the subscales of the personality scale. Components of hope, agency and pathways were set as the dependent variables in the regression model. Age and gender were entered into the model in Step 1, followed by the addition of a number of personality traits in Step 2. In order to determine the magnitude of the association, Cohen's convention will be used in terms of whether accounted variance by the variable is small ($f^2 = .02$), medium ($f^2 = .15$) and large ($f^2 = .35$) (J. Cohen, 1988). Table 4 demonstrates the results of the hierarchical multiple regression between agency and personality traits. For both the regression results, tests to establish whether the data met the assumption of collinearity indicated that tolerance levels for the measures ranged from .73 to .66, while VIF values of less than 5 referring to multicollinearity were not a concern (Kutner, Nachtsheim, Neter, & Li, 1996).

Table 4: Hierarchical multiple regression analysis results between agency and subscales of Short Five

Variable	B	Std. Error	Beta	t	Sig
Step 1					
Age	.027	.11	.01	.23	.817
Gender	-.431	.91	-.03	-.47	.639
Step 2					
Age	.05	.09	.03	.54	.590
Gender	-.10	.78	-.00	-.12	.897
Neuroticism	-.04	.02	-.13	-2.00	.046
Extraversion	.12	.02	.29	4.33	.000
Openness to Experience	.03	.03	.06	1.03	.300
Agreeableness	-.02	.03	-.04	-.73	.464
Conscientiousness	.13	.02	.31	4.94	.000

Note. $R^2 = .001$ for Step 1 ($p > .05$); $\Delta R^2 = .34$ for Step 2 ($p < .001$).

Table 4 demonstrates the results of the hierarchical multiple regression analysis for the agency component of hope and personality traits. The results indicate that age and gender explain 0.1% of the variance in the agency scores. Following the inclusion of the five personality traits in the model in Step 2, the complete model explained 34.6% of the total variance ($F_{7, 214}=16.16, p<.001$). The various personality traits explained medium amount of variance ($f^2 = .15$, Cohen, 1988) as 34.5% of the variance in the total agency score controlling for the influence of age and gender ($\Delta R^2=.345, \Delta F_{5, 214}=22.54, p <.001$). In addition, Extraversion ($\beta=.29, p <.001$), Conscientiousness ($\beta=.31, p <.001$) and Neuroticism ($\beta=-.13, p <.05$) were found to be predictors of agency scores among the remainder of the personality traits, including following the exclusion of the effect of age and gender.

As shown above, Neuroticism, Extraversion and Conscientiousness were found to be predictors for trait agency. In order to understand the relationship between agency and narrower personality consistencies, hierarchical multiple regression analysis was performed between agency and facet scores of personality scale, Short Five. Table 5 demonstrates the relationship between trait agency and different facets of personality traits.

Table 5: Hierarchical Multiple Regression between trait agency and facets of personality traits

Variable	B	Std. Error	Beta	t	Sig
Step 1					
Age	.02	.11	.01	.23	.817
Gender	-.43	.91	-.03	-.47	.639
Step 2					
Age	.04	.10	.02	.42	.672
Gender	.44	.83	.03	.53	.593
N-Anxiety	.07	.13	.05	.58	.562
N-Angry Hostility	.05	.12	.03	.41	.676
N-Depression	-.04	.12	-.03	-.36	.713
N-Self Consciousness	-.04	.12	-.03	-.39	.696
N-Impulsiveness	.08	.10	.05	.79	.425
N-Vulnerability	-.29	.16	-.16	-1.82	.070
E-Warmth	.25	.14	.15	1.73	.084
E-Gregariousness	-.21	.142	-.12	-1.48	.140
E-Assertiveness	-.02	.14	-.01	-.20	.842
E-Activity	.23	.13	.12	1.73	.084
E-Excitement Seeking	.07	.13	.04	.57	.567
E-Positive Emotions	.09	.14	.05	.62	.536
Openness to Fantasy	-.04	.11	-.02	-.43	.663
Openness to Aesthetics	.03	.10	.02	.29	.766
Openness to Feelings	-.01	.12	-.00	-.11	.907
Openness to Actions	-.02	.14	-.01	-.16	.868
Openness to Ideas	.14	.13	.07	1.03	.302
Openness to Values	-.13	.12	-.07	-1.07	.282
A-Trust	.15	.11	.09	1.42	.157
A-Straightforwardness	.20	.14	.10	1.38	.167
A-Altruism	-.15	.16	-.07	-.96	.337
A-Compliance	-.06	.09	-.03	-.62	.533
A-Modesty	-.09	.13	-.05	-.67	.501
A-Tender mindedness	-.09	.17	-.04	-.53	.595
C-Competence	.64	.15	.32	4.25	.000
C-Order	-.27	.12	-.16	-2.18	.030
C-Dutifulness	.01	.16	.009	.10	.917
C-Achievement Striving	.41	.14	.22	2.78	.006
C-Self Discipline	.11	.11	.07	.99	.323
C-Deliberation	-.004	.13	-.002	-.02	.979

Note. The first letters of the variables refer to the global personality traits, N=Neuroticism, E= Extraversion, A=Altruism C= Conscientiousness). *Note.* $R^2 = .001$ for Step 1 ($p > .05$); $\Delta R^2 = .44$ for Step 2 ($p < .001$).

Table 5 demonstrates the results of the hierarchical multiple regression between trait agency and facets of the big five personality traits. In Step 1, age and gender were entered into the model, and were found to explain 0.1% of the variance in agency scores. Following the addition of the facets of personality traits (facets of N, E, O, A and C) the complete model explained 44% of the variance. Thus, thirty facets of personality were accounted for a large amount of variance ($f^2 = .35$) by explaining 44% of the variance in agency scores. As discussed above, three facets of Conscientiousness were found to be valid predictors for trait agency: (1) Competence ($\beta = -.175$, $p < .001$); (2) Order ($\beta = -.16$, $p < .05$); and (3) Achievement Striving ($\beta = .22$, $p < .01$). No relationship was found between the facets of Neuroticism, Extraversion, Agreeableness or Openness to Experience.

Hierarchical multiple regression analysis was also performed to determine the shared variance between the pathways and the subscales of the personality scale. Pathways was set as the dependent variable in the regression model. Age and gender were entered into the model in Step 1, followed by the addition of a number of personality traits in Step 2. Table 6 demonstrates the hierarchical multiple regression result between pathways and personality traits.

Table 6: Hierarchical multiple regression analysis results between pathways and personality traits

Variable	B	Std. Error	Beta	t	Sig
Step 1					
Age	-.02	.10	-.01	-.21	.832
Gender	-2.54	.80	-.20	-3.1	.002
Step 2					
Age	.01	.08	.01	.036	.971
Gender	-2.13	.70	-.17	-3.04	.003
Neuroticism	-.06	.02	-.20	-3.04	.003
Extraversion	.07	.02	.19	2.80	.005
Openness to Experience	.08	.02	.20	3.05	.003
Agreeableness	-.02	.03	-.04	-.68	.493
Conscientiousness	.08	.02	.21	3.33	.001

Note. $R^2 = .04$ for Step 1 ($p < .01$); $\Delta R^2 = .29$ for Step 2 ($p < .001$).

Table 6 reveals the hierarchical multiple regression analysis results for the pathways component of hope and personality traits. The results indicate that age and gender explained 4% of the variance in the pathways subscale of Hope. Following the inclusion of the five personality traits into the model in Step 2, the complete model explained 34.6% of the total variance ($F_{7, 216}=16.04, p<.001$). The various personality traits explained 29% of the variance in the total pathways score, controlling for the influence of age and gender ($\Delta R^2=.29, \Delta F_{5, 216}=19.61, p<.001$). In addition, Conscientiousness ($\beta=.21, p<.001$), Openness to Experience ($\beta=.20, p<.01$), Extraversion ($\beta=.19, p<.01$) and Neuroticism ($\beta=-.20, p<.01$) were valid predictors for significant amounts of the variance in pathways scores among the other personality traits. Thus, the findings suggest that three of the big five personality traits are significant in predicting the pathways component of hope. Additionally, the findings emphasize that gender explained a significant amount of the variance in pathways scores.

In order to determine the shared variance between the pathways and the personality facets, hierarchical multiple regression analysis was also performed. Pathways was set as the dependent variable in the regression model. Age and gender were entered into the model in Step 1, followed by the addition of a number of personality facets in Step 2. Table 7 demonstrates the hierarchical multiple regression result between pathways and various personality facets.

Table 7: Hierarchical multiple regression analysis results between pathways and facets of personality traits

Variable	B	Std. Error	Beta	t	Sig
Step 1					
Age	-.02	.10	-.01	-.21	.832
Gender	-2.54	.80	-.20	-3.16	.002

Step 2	B	Std. Error	Beta	t	Sig
Age	.02	.09	.01	.26	.788
Gender	-1.70	.74	-.14	-2.28	.023
N-Anxiety	-.14	.12	-.11	-1.19	.235
N-Angry Hostile	-.10	.11	-.07	-.93	.351
N-Depression	.01	.11	.01	.15	.878
N-Self Consciousness	.12	.11	.08	1.10	.271
N-Impulsiveness	-.01	.09	-.01	-.16	.866
N-Vulnerability	-.19	.14	-.12	-1.34	.182
E-Warmth	.11	.13	.07	.84	.400
E-Gregariousness	-.11	.13	-.07	-.86	.390
E-Assertiveness	.25	.12	.17	2.00	.046
E-Activity	-.08	.12	-.05	-.69	.489
E-Excitement Seeking	.32	.12	.19	2.58	.011
E-Positive Emotions	.09	.13	.05	.66	.508
Openness to Fantasy	.19	.10	.13	1.96	.051
Openness to Aesthetics	.08	.09	.06	.91	.361
Openness to Feelings	.07	.11	.04	.63	.526
Openness to Actions	-.19	.13	-.12	-1.48	.138
Openness to Ideas	.05	.12	.03	.39	.691
Openness to Values	-.07	.11	-.04	-.68	.497
A-Trust	-.07	.10	-.05	-.73	.466
A-Straightforwardness	-.01	.13	-.001	-.01	.986
A-Altruism	.21	.15	.11	1.44	.151
A-Compliance	.11	.08	.08	1.29	.197
A-Modesty	-.27	.12	-.18	-2.24	.026
A-Tender mindedness	.04	.15	.02	.30	.765
C-Competence	.22	.13	.12	1.59	.113
C-Order	.027	.11	.01	.23	.818
C-Dutifulness	-.03	.14	-.01	-.20	.839
C-Achievement Striving	.04	.13	.02	.34	.727
C-Self Discipline	.03	.10	.02	.35	.722
C-Deliberation	.17	.12	.10	1.47	.143

Note. The first letters of the variables refer to the main personality traits, N=Neuroticism, E= Extraversion, A= Agreeableness, C= Conscientiousness. *Note.* $R^2 = .04$ for Step 1 ($p < .01$); $\Delta R^2 = .42$ for Step 2 ($p < .001$).

Table 7 demonstrates the hierarchical multiple regression results between trait pathways and facets of big five personality traits. In Step 1, age and gender explained 4% of the variance in pathways scores. When facets of the personality traits were added, the complete model explained 46% of the variance. Various facets of the personality traits accounted for 42% of the variance in pathways scores, while Assertiveness (Extraversion, $\beta = .17$, $p < .05$), Excitement Seeking (Extraversion, $\beta = .19$, $p < .05$) and Modesty (Agreeableness, $\beta = -.18$, $p < .05$) were found to be valid predictors for trait

pathways. Gender, in contrast to agency, explained a significant amount of variance in pathways scores.

3.5. Discussion

The current study indicates a significant association between hope and personality traits. Regarding the correlational analysis, all five personality traits were found to correlate with both components of hope, i.e. agency and pathways. This finding is partially consistent with the findings of the study by Maltby and colleagues (Day et al., 2010) who reported the association between trait agency and Neuroticism and Extraversion and pathways and only Neuroticism.

As the significant findings of the study are demonstrated by the regression analysis, the hierarchical multiple regression analysis results revealed Conscientiousness, Extraversion and Neuroticism as significant predictors of agency, while significant predictors of pathways thinking were Conscientiousness, Openness to Experience, Neuroticism and Extraversion. Conscientiousness, Extraversion and Neuroticism, were identified as common personality traits predicting both the components of hope, i.e. agency and pathways. However, Conscientiousness was the strongest trait of the predictors, and (following a control for the effect of age and gender) explained significant amount of variance in agency and pathways scores. The results are meaningful, and are in line with the theoretical conceptions of the personality traits, along with the hypotheses of the current study. Thus, a factor in the findings regarding Conscientiousness may be that trait conscientiousness involves being task-goal oriented, and is thus directly related to the two dimensions of hope, which focus on goal attainment. Additionally, trait conscientiousness includes a number of characteristics associated with both agency and pathways thinking (i.e. persistency, focus, determination and purposefulness) to aid individuals in sustaining motivation during the goal attainment process, similar to agentic thinking. Likewise, Conscientiousness is characterized by being planful, a trait that enables an individual to plan new ways of action, should the more usual means of goal attainment be blocked.

As noted, the trait Neuroticism refers to the emotional instability of an individual, including characteristics such as anxiety, depression and insecurity. The literature suggests that anxiety and depression are negatively associated with both agency and pathways thinking, and it is thus unsurprising that Neuroticism negatively predicted for both components. On the other hand, Extraversion is conceptualized as a

social aspect of the personality, with studies demonstrating its association with a positive influence and cognition, and that Extraverts are more optimistic about the future, and less distractible than introverts (Eysenck, 1981). Likewise, trait agency and pathways include the perception that goals will be attained and distractions can be overcome. Both of these traits emphasize positive feelings regarding the attainment of desired goals.

Openness to Experience forms the trait that distinguishes between the components of hope, and was found to be a significant predictor of pathways thinking. This is meaningful in terms of the conceptualization of the trait. The trait Openness to Experience involves being creative and courageous in finding new ways, while pathways thinking relates to attitudes of not giving up and generating alternative means when a goal is blocked by impediments.

When it came to further personality traits, Agreeableness failed to explain a significant amount of variance in either agency or pathways scores, and therefore also failed to account for either of the hope dimensions. This finding is meaningful in terms of the theoretical background of the trait Agreeableness, which is associated with the characteristics of trustfulness, good-natured, cooperative, forgiving, soft-hearted, and tolerant, etc. Thus, conceptual similarity between Agreeableness and hope dimensions does not appear as strong as for other personality dimensions.

When it comes to the hierarchical multiple regression results for different facets of personality traits, three of the facets of Conscientiousness (e.g. Competence, Achievement Striving and Order) were found to be valid predictors for the trait of agency, while no relation to trait agency was identified in the facets of Neuroticism, Extraversion, Agreeableness or Openness to Experiences. The findings are meaningful and in line with the conceptual framework of the constructs, i.e. Competence, as a facet of Conscientiousness, refers to “belief in one’s own self-efficacy” (Konstabel et al., 2012). Similarly, agency is conceptualized as a perception of an individual as being capable of achieving his/her personal goals, and thus Competence forms a predictor of agency scores. The facet of Achievement Striving conveys attitudes of ambition, setting out high goals and working hard for goal achievement, while agency and pathways require positive thought processes that focus on the belief that goals can be achieved, and that it is possible to generate ways and means for goals to be achieved.

An unexpected finding of this current study concerns the trait Order. Theoretically, this trait conveys the concept of ‘personal organization’ and high scores

for the facet of the trait Order refer to a tendency to a love of cleanliness and of objects being in their 'right' place, along with working hard to achieve goals in a methodical manner (Konstabel et al., 2012). This study found an inverse relationship between the trait Order and trait agency. This finding is not consistent with the available literature, with previous studies highlighting a significant link between motivation and organization (e.g. Ryan, 1993).

The trait Excitement Seeking (Extraversion), Assertiveness (Extraversion), and Modesty (Agreeableness) were found to be valid predictors, with Excitement Seeking having the largest β value. The facet Excitement Seeking has a similar conceptualization to pathways thinking, i.e. focusing on the craving for new experiences and a feeling of excitement in the face of unknown situations. Likewise, pathways thinking refers to an individual's belief in his/her ability to manage issues requiring new approaches and experiences, while lacking any fear of unfamiliar goal blocks. In terms of the association with trait Assertiveness, the finding is meaningful, and is in line with the literature. The trait Assertiveness refers to an individual's tendency to freely express opinions and assert his/her rights. Recent studies suggest that Assertiveness is associated with a number of positive psychological characteristics, including self-esteem and psychological well-being (Sarkova et al., 2013) Furthermore, skills associated with pathways thinking (i.e. problem solving) were found to be significantly associated with Assertiveness (Parto, 2011).

A further unexpected finding of this current study is that the trait Modesty accounted for a significant amount of variance in pathways scores. The findings of the hierarchical multiple regressions demonstrated an inverse relationship between the trait Modesty and pathways thinking. Conceptually, the trait Modesty refers to a "tendency to play down one's own achievements and be humble" (Konstabel et al., 2012; Lord, 2007). This finding may result from the fact that individuals who underestimate their achievements have a lower perception of their ability to generate new and alternative methods of achieving goals in the face of impediments.

The current study thus offers a number of significant contributions to the literature concerning hope. One of the significant findings is that Conscientiousness was established as the strongest predictor for both agency and pathways thinking. Conceptually, Conscientiousness involves traits including persistence and purposefulness, while agentic thinking reflects an individual's perception of an ability to achieve his/her goals, as well as continuing to persevere during the goal attainment

process. At the same time, traits including being planful are also associated with pathways thinking. In addition, no previous study has attempted to describe the relationship between trait agency-pathways and facet levels of personality. This study outlines such a relationship.

Although this study offers an insight into the relationship between fine-grained personality facets and hope components, several limitations should be considered when interpreting the findings of the study. First, no causal inferences can be made as the findings of the study are correlational and cross-sectional. In order for causal inferences to be made, further longitudinal and experimental studies should be conducted. Second, although self-report assessment is typical in the literature in order to assess personality traits and trait hope, self-report assessment might be affected by social desirability issues. Finally, the study sample included only undergraduate and postgraduate university students from the School of Psychology of the University of Leicester. Thus, the generalisability of the findings to other samples and contexts are limited.

Nonetheless, this study has provided a number of significant findings, including a clear indication of the strong relationship between distinct personality traits and dimensions of hope. In conclusion, it appears that dimensions of hope (i.e. agency and pathways thinking) are associated with distinct personality traits. It is, therefore, more likely for an individual to possess: (1) a higher level of agency if they consider themselves as being characteristically competent, if they strive for achievement and is less occupied with order; (2) a higher level of pathways thinking if they seek excitement, are assertive and not so modest.

Chapter 4

Investigating the Association between Hope and Trait EI

4.1. Abstract

The aim of the current study was to document the relationship between trait agency/pathways and trait emotional intelligence, an integrative construct that combines salient emotion-related perceptions into one unified concept. Although trait emotional intelligence offers a wide range of emotion-related self-efficacies such as emotion regulation or stress management, to date, no study examined the relationship between hope components and factors of emotional intelligence. In order to address this limitation, current study was conducted among university students. Adult Dispositional Hope Scale (ADHS), short form of trait emotional intelligence questionnaire (TEIQue-SF) and short form of NEO PI-R (S5) was administered 143 university students. The results suggested that trait agency predicts a significant variance in the factor of well-being while trait pathways explained a significant variance in the factor of sociability beyond age, gender and personality traits. Consistent to findings of Chapter 3, pathways thinking demonstrated strong relationship with interpersonal traits unlike agency. Findings and implications were discussed.

4.2. Introduction

For many decades, intelligence was conceptualized merely as a measure of thinking in relation to cleverness, and IQ (intelligence quotient) was presented as a major predictor of multiple life outcomes (Sinha, 1972; Vineyard & Bailey, 1960). However, the weak predictive capacity of IQ in terms of social relations and ability to navigate daily problems has led scholars to consider the relevance of other measures of intelligence (e.g. Wagner, 1997).

Scholars have now posited that how some individuals perform in life relates not to IQ, but to emotional intelligence (EI) (Bar-On, 2006). EI refers to unique mental abilities that involve the processing of emotion-related information (Davies, Stankov, & Roberts, 1998), and is important since emotional sensitivity plays a pivotal role in human relations. A growing body of research supports this, demonstrating relations between EI and multiple important life outcomes including physical health (Bar-On, 2006), social interaction (Brackett & Mayer, 2003), academic performance and adoption of less deviant behaviour (Petrides, Frederickson, & Furnham, 2004), effective leadership (Palmer, Walls, Burgess, & Stough, 2001). Furthermore, studies present evidence that the construct is a more powerful predictor than IQ on important constructs, such as career success (de Haro Garcia & Castejon Costa, 2014) and perhaps surprisingly, academic performance (Ferrando et al., 2011).

Although often assumed a recent consideration, reference to emotion-related intelligence in the literature dates to Thorndike's social intelligence theory (1920), which considered the ability to effectively navigate and negotiate with the social environment (Honeywill, 2015), and was extended by Gardner's concept of personal intelligence (inter/intrapersonal), which introduced his theory of multiple intelligences (1983). In his definitive work, Gardner (1983) challenged the traditional view of intelligence as comprised of logical-mathematical and linguistic reasoning, suggesting the "capacities of those in the arts as fully cognitive, no less than the skills of mathematicians and scientists" (Gardner, 1999, p.28). He supported his ideas with research that evaluated both ordinary and gifted individuals with brain damage, revealing that the human mind is best explained and understood as "a series of relatively separate faculties", rather than as a single machine governing all systems (p.32). Based on his study and observations, he classified six forms of intelligence as follows: musical-rhythmic, visual-spatial, verbal-linguistic, logical-mathematical, bodily-kinaesthetic, naturalistic, existential, intrapersonal and interpersonal intelligence. Unlike

the other types identified, intra-interpersonal intelligence highlights the strong relationship between the ‘cognitive’ and ‘emotional’ domains. *Interpersonal intelligence* distinctively refers to one’s capacity to understand the motivations and intentions of others, and the ability to use this information to work effectively with other people, while *intrapersonal intelligence* relates to self-awareness of one’s thoughts and feelings and the capacity to apply this knowledge to develop the direction of one’s own life (p.43). In this regard, EI can be seen as the ability to synthesise emotion-related concepts (social/intrapersonal/interpersonal intelligence) into a single unified framework, with heightened concentration on the emotional domain rather than abilities (Bar-On, 2000; Salovey & Mayer, 1990).

Although academic studies introducing the construct of EI span no more than three decades, the construct is fast becoming one of the most researched in the field of psychology. Although the term “EI” had appeared a few times in the literature prior to the 1990s (Greenspan, 1989; Payne, 1986), Salovey and Mayer (1990) were the first to introduce and define the construct as the ability to monitor the feelings of oneself and others, differentiating one’s emotions, and using this information to guide thoughts and actions. However, the popularity of the concept following this research led to Goleman’s book entitled *Emotional Intelligence* (1995), which claims EI is a more powerful construct than IQ in terms of predicting an individual’s life outcomes.

Goleman’s (1995) text regarding the concept and scope of EI garnered widespread attention among researchers, and several definitions and conceptualizations were introduced to assist in understanding the construct. Based on these conceptualizations, numerous measures were designed to assess EI in the form of typical performance or maximal performance tests (e.g. EQ-i, Bar-On, 1997; WSCEIT, Mayer, 2002). Typical performance tests (self-report) assess how individuals tend to behave in general, while maximal performance tests measure how people behave when they expend maximum effort on a given occasion. Thus, although typical vs maximal performance tests of EI purported to assess the same construct, they were really measuring different concepts even when applying the same underlying model. Petrides and Furnham was the first to distinguish trait vs ability in reference to EI (Petrides, 2001; Petrides & Furnham, 2000a; Petrides & Furnham, 2000b). Their work distinguishes “ability EI” from “trait EI.” Ability EI is understood as a “*mental ability*” involving the processing of emotion-related information and then use of this data to direct actions, and should be measured using a maximal performance test (Salovey &

Mayer, 1990). By contrast, trait EI is considered a *personality trait* that is unrelated to cognitive abilities (Stankov & Crawford, 1997).

Comparing both types of EI, several important differences emerge between the two schools of thoughts. For example, ability EI reflects one's cognitive ability to understand, identify, and monitor one's and others' emotions, to distinguish between them, and to use this knowledge to guide thoughts and actions (Salovey & Mayer, 1990, p.189). Thus, ability EI is considered within the framework of intelligence, and assessment of the construct is performed using maximum performance tests encompassing an array of exercises and activities with emotional content (e.g. Mayer, 2002). Hence, assessment of ability EI is considered problematic, such that the subjective nature of emotions might preclude the development of an objective maximal performance test (Brody, 2004; Petrides, Pita, & Kokkinaki, 2007; Petrides, 2010). However, trait EI or emotional self-efficacy referring to self-perceptions of one's emotional capacities is assessed according to typical performance tests, such as self-report measures. In this regard, assessment of trait EI is transparent, since the construct is conceptualized according to self-perceived emotional abilities and dispositions that are compatible with self-report tests (Petrides et al., 2007).

Second, ability EI reflects actual capacity regarding emotional content, while trait EI emphasizes self-efficacy beliefs associated with one's emotional ability. The author of self-efficacy theory, Bandura (1977), suggested that self-efficacy is not a single, unified construct regarding one aspect of life, but that it consists of sub-constructs associated with different aspects of human functioning (Bandura, 2006). In this regard, trait EI (the trait emotional self-efficacy) is considered as a constellation of emotional self-perceptions, not a component of intelligence despite its epithet (Pérez, Petrides, & Furnham, 2005). However, it does encompass personal differences in awareness that inform the management of emotions, understanding, and the expression of emotions, which might otherwise be associated with personality traits.

Although different perspectives exist in reference to trait EI, the present work adopts the perspective put forward by TEI theory (Petrides & Furnham, 2000b), which defines trait EI as a "constellation of emotional perceptions located at lower level of personality hierarchies" (Petrides et al., 2007). One significant aspect of their theory is that TEI theory unifies the emotional-motivational aspects of personality under a single integrative construct. The model considers global trait EI at the top of the TEI hierarchy, comprising four emotion-related factors/traits (well-being, self-control,

emotionality, and sociability) at the lower level, and fifteen emotional-motivational facets/traits (e.g. adaptability, assertiveness, emotion appraisal). Facet levels of TEI represent typical patterns of feelings, thoughts, and behaviours, which relate to how we perceive, manage and regulate emotions.

The TEI model has received significant approval from researchers, because it brings together a considerable number of emotion-related factors into a single unified construct, and is more inclusive than alternative models (Di Fabio & Palazzeschi, 2015). Numerous studies have also established the incremental and criterion validity of trait EI, demonstrating links between constructs and important positive psychological characteristics. Strong associations were observed between socio-emotional competence (Frederickson, Petrides, & Simmonds, 2012), goal orientation (Spence, Oades, & Caputi, 2004), mental and physical health, general well-being (e.g. Martins, Ramalho, & Morin, 2010), happiness (Chamorro-Premuzic, Bennett, & Furnham, 2007), and some negative characteristics, such as occupational stress (Mikolajczak, Menil, & Luminet, 2007), depression (Downey et al., 2008), anxiety, and disruptive behaviour (Martins et al., 2010).

4.2.1. TEI and the Big-Five Personality Traits

As observed above, trait EI can be linked to other important constructs; one such that emerges across a number of studies is personality traits. Due to the fact that trait EI also addresses the emotional aspects of personality, it is unsurprising that investigations of the link between EI and personality have provoked considerable interest among researchers over recent decades. Numerous studies have demonstrated the significant relationship between EI measures and personality traits. Across these studies, neuroticism and extraversion were found to be among the strongest determinants for global EI scores, and this finding is line with EI theory, since both personality traits reflect the emotional aspects of personality (e.g. Vernon, Villani, Schermer, & Petrides, 2008).

While studies have revealed strong associations between trait EI and personality traits, as mentioned above, there has been growing debate concerning whether the construct of trait EI is redundant due to the number, and magnitude of associations between these constructs. However, studies about trait EI and personality categorise trait EI as a distinct construct integrated within mainstream models of personality. De Raad (2005), for instance, located trait EI is within the Abridged Personality

Circumplex. Additionally, a study by Petrides, Pita and Kokkinaki (2007) presented significant results suggesting trait EI is both unique (it can be isolated in personal space) and compound (it is partially determined by various personality traits), since it is located at lower level personality hierarchies (the construct EI is oblique, and not orthogonal to either the big-five or the giant three in factor analyses). Additionally, the hierarchical multiple regression results of their study support the distinctiveness of the construct, since trait EI could be said to predict several important outcomes over and above big-five personality traits. Thus, debate regarding trait EI is ongoing, suggesting that trait EI is not a redundant construct, but rather a distinct one that can be incorporated into higher order traits with the advantage of capacity to detail the emotional aspects of personality better than identification of the Big-Five personality traits (Petrides et al., 2007).

Behavioural genetic studies also support TEI theory and the feasibility of reconceptualising trait EI within existing personality trait models (e.g. Vernon et al., 2008). A considerable number of familial and twin studies suggest the genetic influences on global trait EI range from between 58% and 60% for familial and twin studies respectively, in support of the heritability of the construct (Vernon et al., 2008).

4.2.2. Hope and Trait Emotional Intelligence

As mentioned in Chapter 1, hope is considered as either emotion, cognition, or a construct equipped with both aspects. Although hope as an emotional concept is not mentioned less frequently in the literature than as a cognitive one, no study has yet documented whether trait hope and important emotional constructs such as emotion regulation, emotion management, etc. are related. Therefore, an investigation into the relationship between trait hope and the concept of EI as conceptualized in TEI theory will close the gap in the literature in several ways. First, no study has yet examined the link between trait hope and trait EI in dimensional level. Thus, examination of such a link would illuminate whether individuals' level of trait agency and pathways can be associated with their level of EI. Second, as mentioned previously, TEI theory unifies salient aspects of emotion-related personality traits into a single construct. Factors and facets of trait EI reflect one's disposition toward emotion-related abilities, such as emotional regulation, management of emotions and so on. Thus, examining factor relations with hope will illuminate whether one's perception of one's own goal-related capacities is implicated in level of emotion-related abilities. As mentioned, agency and

pathways reflects the individual's view of themselves, in terms of whether they can achieve their goals (agency) and generate routes to attain desired goals (pathways). Consequently, a study investigating the relationship between EI and hope might usefully answer the question of whether individuals' perceptions regarding their emotional capacity are associated with agency and pathways. Specifically, it will also assist in determining which aspects of EI are most associated with components of hope.

4.2.3. Research Questions

As noted above, a large number of studies are available linking trait EI to various additional constructs. Despite this, no researcher has yet attempted to examine the relationship between trait agency-trait pathways and trait emotional intelligence. In view of the theoretical framework and previous research discussed above, the current study seeks to understand whether the components of hope account for a significant level of variance in trait EI factor scores beyond that accounted for by age, gender and personality traits. In addition, to date, no study has investigated the relationship between trait EI and trait hope components. In this regard, the research questions this study attempts to answer are:

Research Question 1: Is there a relationship between hope components and trait EI factors?

Research Question 2: Which components of hope predict specific factors of trait EI beyond those of age, gender and the Big Five personality traits?

4.3. Method

4.3.1. Participants

The participants were 143 undergraduate and post graduate students from the University of Leicester (19 male and 124 female). The mean age of the sample was 19.99 (SD=2.46) years.

4.3.2. Measures

4.3.2.1. Adult Dispositional Hope Scale (Snyder et al., 1991). The Adult Dispositional Hope Scale (ADHS) is a 12-item self-report hope scale devised for adults aged 15 years and older. Four items in the test are distracters. Four items assess the agency component of hope (e.g. I energetically pursue my goals) and four items assess the pathways component (e.g. "I can think of many ways to get out of a jam"). Items are

scored based on an 8-point scale, with 1=Definitely false, to 8=Definitely true. The sum for agency and pathways subscales give a total hope score with the Cronbach alphas for the total score being .84 in the current study. In terms of the psychometric properties of the scale, previous studies have established good and acceptable levels of reliability for Cronbach's α coefficients for the total hope score of the measure, ranging from .74 to .80 for six different samples of undergraduate students and two different samples with mental health problems. Test-retest correlations revealed .80 and above over a ten week interval (Snyder et al., 1991).

4.3.2.2. TEIQue-SF(Petrides & Furnham, 2006). Among the other self-report trait EI questionnaires, TEIQue demonstrates better psychometric properties, providing greater incremental validity across studies (Di Fabio & Saklofske, 2014; Freudenthaler, Neubauer, Gabler, Scherl, & Rindermann, 2008; Gardner & Qualter, 2010). The short version of the questionnaire, TEIQue-SF, is a 30-item questionnaire designed to assess global trait EI, 4 factors measuring EI and 15 facets belonging to one of four factors (well-being, self-control, emotionality, sociability). The well-being factor is exemplified by items such as "On the whole, I am pleased with my life", while the factor Self-Control is tested by items such as "On the whole, I am able to deal with stress". Furthermore, the domain Emotionality is tested, with items such as "Expressing my emotions with words is not a problem for me", and the domain Sociability is examined through items such as "I can deal with people effectively." Participants respond to items on a 7-point Likert Scale, ranging from 1 (Strongly Disagree) to 7 (Strongly Agree), and the sum for the total item scores yield a global trait EI score. Previous studies revealed good and acceptable levels of reliability for Cronbach's α coefficients, i.e. .84 for global trait emotional intelligence, .83 for well-being, .72 for self-control, .74 for emotionality and .70 for sociability (Laborde, Allen, & Guillen, 2016). Table 8 lists the factors of TEI and presents a description for each factor, lists relevant facets for each factor, and present example items for relevant factors.

Table 8: Factors and relevant facets of TEIQue-SF

Factor Name	Facets	Example Items from the TEIQue-SF
Well-being	<ul style="list-style-type: none"> • Self-esteem • Trait Happiness • Trait Optimism 	<p>I feel that I have a number of good qualities (Self-esteem) (+)</p> <p>I generally do not find life enjoyable (Trait Happiness)(-)</p> <p>I generally believe that things will work out fine in my life (Trait Optimism) (+)</p>
Sociability	<ul style="list-style-type: none"> • Social awareness • Emotion management (Others) • Assertiveness 	<p>I would describe myself as a good negotiator (Social awareness) (+)</p> <p>I do not seem to have any power at all over other people's feelings (Emotion management-others) (-)</p> <p>I often find it difficult to stand up for my rights (Assertiveness -)</p>
Emotionality	<ul style="list-style-type: none"> • Emotion perception (self & others) • Emotion expression • Relationship skills • Empathy 	<p>I often pause and think about my emotions (Emotion perception) (+)</p> <p>Expressing my emotions with words is not a problem for me (+)</p> <p>I find it difficult to bond well even with those close to me(Relationship skills) (-)</p> <p>I often find it difficult to see things from another person's viewpoint (Empathy)(-)</p>
Self-control	<ul style="list-style-type: none"> • Emotion regulation (self) • Low impulsiveness • Stress management 	<p>I usually find it difficult to regulate my emotions (-)</p> <p>I tend to change my mind frequently (-)</p> <p>Other admire me for being relaxed (+)</p>

4.3.2.3. S5 (Short Five) (Konstabel et al., 2012). In the study, personality traits were assessed using the Short Five personality inventory, which is a 60-item inventory developed to measure the aspects of personality identified by NEO PI-R. S5 is a shorter measure than NEO PI-R, with high internal consistency for reliability coefficients (from .87 to .74 for the broad facets of the measure). Moreover, in previous studies it has been found to have good convergent and discriminant validity (Konstabel et al., 2012). The scale includes 60 items that assess five major dimensions of personality, and six sub-dimensions for each, providing 30 sub-dimensions of the Big Five Personality traits in total. The scale included the following dimensions of personality: neuroticism, extraversion, openness to experience, agreeableness and conscientiousness. There are two items used to measure each sub-dimension. One of these items is a negatively keyed item within each sub-dimension and one is a positively keyed item. For instance, the item measuring the trait “Neuroticism” and its lower-order facet “Anxiety” is exemplified by the question “I am often nervous, fearful, and anxious and I worry that something might go wrong”, as a positively keyed item, and “I am a calm person who does not worry much about what may go wrong” is a negatively keyed item. The response scale ranges from +3 (Completely agree) to -3 (Completely disagree) with “0” as the neutral position. The negative items are reverse coded and the two scores for the items regarding each lower-order facet were summed to find the scores for each facet. The scores for higher order domains, i.e. the big five personality traits such as neuroticism, were calculated by summing the scores for each of the lower-order facets. Cronbach’s α coefficients for the subscales of the measure demonstrated good reliability in previous studies: Neuroticism (.87-), Extraversion (.89), Openness to Experience (.78-), Agreeableness (.74), and Conscientiousness (.85) (Konstabel et al., 2012).

4.3.3 Procedure

The participants were recruited through EPR system. The EPR is a system available at the University of Leicester to benefit both researchers, undergraduates, and postgraduate students. Students receive additional credit for participating in studies, and researchers seek out students to enrol in studies. The final study sample consisted of 143 undergraduate and postgraduate students, all of whom consented to participate in the study. Consent forms were included on the first page of the electronic survey, and the participants completed the mentioned questionnaires via the EPR. The entire study took no longer than 20 minutes to complete. The study also received ethical approval from the University of Leicester's School of Psychology Ethics Board before commencement.

4.3.4 Data Analysis

The analysis was undertaken using SPSS version 22. Scores were calculated and a Pearson Product-Moment correlation analysis was used to examine the relationship between trait emotional intelligence and the hope components, trait agency and trait pathways. Hierarchical multiple regression analysis was also used to analyse the scores in order to determine whether agency and pathways predicted the variance in factors of trait emotional intelligence scores excluding the effect of age, gender and personality traits. In order to determine the independent effect of hope components on factors of trait emotional intelligence, the effects of demographic variables and personality traits were controlled since these variables were found to be correlated with factors of emotional intelligence and hope components (Greven, Chamorro-Premuzic, Arteché, & Furnham, 2008; Petrides & Furnham, 2000a; Petrides & Furnham, 2006). In Step 1, age and gender were entered into the models as demographic variables as it is recommended that these be included at the initial entry step (Cohen & Cohen, 1983). In Step 2, personality traits were included in the models because of the causal priority principle as global personality traits are considered to have an impact on hope and its components (Cohen & Cohen, 1983; Snyder, 2000, p.269). Finally, agency and pathways were entered into the regression models, as they are the variables of interest. Additionally, G Power Software was used to examine the adequacy of sample size for hierarchical multiple regression analyses. To perform regression analyses with a power of .80 with a medium effect size, power calculations required a minimum sample size of 107. The sample size of this study met this criterion.

4.4. Results

Table 9 demonstrates the descriptive statistics and internal reliability coefficients for age, hope dimensions (agency and pathways), factors of EI (well-being, self-control, emotionality, sociability), and the big five personality traits (neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness). As presented, Cronbach's α coefficients for all subscales were reportedly good and acceptable, ranging from .73 to .87.

Table 9: Descriptive statistics for age, measures of hope and TEI

	α	Mean	SD	Minimum	Maximum
Age	-	19.97	2.41	18	34
Agency	.76	23.28	4.07	11.	32
Pathways	.74	23.34	3.69	13	32
EI Wellbeing	.86	5.19	1.00	2.33	7
EI Self-control	.73	4.26	.96	1.83	6.67
EI Emotionality	.73	5.09	.88	2.63	6.88
EI Sociability	.74	4.78	.91	2.33	6.67
Neuroticism	.87	-7.83	11.94	-32	29
Extraversion	.88	10.20	11.55	-24	35
Openness To Experience	.79	14.797	9.94	-10	35
Agreeableness	.76	14.11	8.98	-10	35
Conscientiousness	.82	13.86	9.27	-15	36

4.4.1. Correlation Analyses

To examine the relationship between hope components and EI factors, a Pearson product-moment correlation analysis was performed, since the scores were normally distributed. Table 10 demonstrates the intercorrelations between the components of hope, trait EI factors, namely well-being, self-control, emotionality and sociability.

Table 10: Correlations between components of hope and EI measures

	Agency	Pathways	Wellbeing	Self-control	Emotionality	Sociability
Agency	1					
Pathways	.684**	1				
Wellbeing	.585**	.493**	1			
Self-control	.401**	.410**	.611**	1		
Emotionality	.420**	.311**	.608**	.257**	1	
Sociability	.390**	.519**	.489**	.435**	.404**	1

Note. ** $p < .01$.

Table 10 demonstrates the significant and positive correlations between agency and pathways, the components of hope, and trait EI factors. As presented, all of the measures for trait EI significantly and positively correlated with both dimensions. Among these measures, wellbeing revealed a larger effect size relative to agency, while sociability revealed pathways thinking.

4.4.2. Regression Analyses

Four three-step hierarchical multiple regression analyses were performed, with each factor of trait emotional intelligence being used as a dependent variable, while agency and pathways were given as independent variables in the regression models in order to identify the unique variance of hope components in predicting the factors of trait emotional intelligence.

Age and gender were entered into the models in Step 1, reflecting the strong correlation between EI and demographic variables (Petrides & Furnham, 2000a; Petrides & Furnham, 2006). Big five personality traits were added in Step 2 as personality traits have demonstrated statistically significant variance in terms of predicting trait Emotional Intelligence (Grevin et al., 2008). In Step 3, hope components were added into the models in order to highlight the unique variance by each component in the factors of trait emotional intelligence. Table 11 demonstrates the results of the hierarchical multiple regression analyses between hope components and factors of TEI, namely well-being, self-control, emotionality and sociability. In connection with each regression result, tests carried out to establish if the data has met the assumption of collinearity indicated tolerance levels for the measures are above than .10 and VIF values lower than 10, indicating that multicollinearity was not a concern (Kutner, Nachtsheim, Neter, & Li, 1996).

Table 11: Hierarchical multiple regression analysis for hope components and TEI measures

	Well-being				Self-Control			
	B	β	t	Sig	B	β	t	Sig
Step 1								
Age	0.07	0.16	1.95	0.054	0.02	0.04	0.46	0.642
Gender	-0.27	-0.09	-1.07	0.284	-0.55	-0.19	-2.32	0.022
Step 2								
Age	0.03	0.08	1.16	0.247	-0.01	-0.01	-0.19	0.846
Gender	-0.10	-0.03	-0.51	0.608	-0.23	-0.08	-1.19	0.236
Neuroticism	-0.03	-0.34	-4.73	0.000	-0.05	-0.62	-8.38	0.000
Extraversion	0.03	0.30	3.88	0.000	0.01	0.01	0.13	0.894
Openness	0.02	0.20	2.70	0.008	0.01	0.06	0.75	0.449
Agreeableness	0.01	0.02	0.32	0.742	-0.01	-0.09	-1.28	0.201
Conscientiousness	0.01	0.07	1.07	0.287	0.01	0.11	1.64	0.102
Step 3								
Age	0.03	0.07	1.13	0.259	-0.01	-0.02	-0.28	0.779
Gender	-0.05	-0.02	-0.24	0.808	-0.18	-0.06	-0.96	0.338
Neuroticism	-0.02	-0.28	-4.09	0.000	-0.05	-0.57	-7.70	0.000
Extraversion	0.02	0.20	2.64	0.009	-0.01	-0.04	-0.45	0.652
Openness	0.02	0.14	1.98	0.050	0.01	0.01	0.23	0.814
Agreeableness	0.01	0.07	1.04	0.298	-0.01	-0.06	-0.87	0.381
Conscientiousness	-0.01	-0.03	-0.41	0.682	0.01	0.06	0.86	0.389
Agency	0.08	0.31	3.43	0.001	0.03	0.13	1.35	0.178
Pathways	0.02	0.08	0.93	0.353	0.02	0.09	0.98	0.329
	Emotionality				Sociability			
	B	β	t	Sig	B	β	t	Sig
Step 1								
Age	0.07	0.20	2.28	0.024	0.11	0.29	3.59	0.000
Gender	0.25	0.09	1.11	0.269	-0.54	-0.20	-2.46	0.015
Step 2								
Age	0.04	0.11	1.50	0.135	0.07	0.20	2.79	0.006
Gender	0.24	0.09	1.22	0.224	-0.35	-0.13	-1.77	0.078
Neuroticism	-0.01	-0.11	-1.36	0.175	-0.02	-0.22	-2.79	0.006
Extraversion	0.02	0.28	3.27	0.001	0.03	0.31	3.75	0.000
Openness	0.02	0.20	2.33	0.021	0.01	0.05	0.58	0.561
Agreeableness	0.01	0.13	1.62	0.107	-0.03	-0.27	-3.53	0.001
Conscientiousness	0.01	0.09	1.25	0.214	0.02	0.17	2.34	0.021
Step 3								
Age	0.04	0.11	1.45	0.149	0.07	0.18	2.81	0.006
Gender	0.28	0.11	1.44	0.150	-0.20	-0.07	-1.10	0.272
Neuroticism	-0.01	-0.07	-0.80	0.422	-0.01	-0.12	-1.65	0.100
Extraversion	0.02	0.22	2.49	0.014	0.03	0.32	3.90	0.000
Openness	0.01	0.15	1.80	0.074	-0.01	-0.03	-0.39	0.695
Agreeableness	0.02	0.16	2.04	0.043	-0.02	-0.21	-2.92	0.004
Conscientiousness	0.01	0.03	0.41	0.678	0.01	0.13	1.88	0.062
Agency	0.04	0.17	1.62	0.107	-0.03	-0.12	-1.19	0.234
Pathways	0.02	0.08	0.81	0.415	0.10	0.41	4.44	0.000

Table 11 demonstrates the results of the hierarchical multiple regression analysis for each factor of trait emotional intelligence, namely, well-being, self-control, emotionality, and sociability. For each regression analysis, age, gender and personality traits were included in the models in order to control their effects as the variables are statistically significant in predicting trait emotional intelligence. In Step 1, age and gender were included in the models predicting the factors of trait emotional intelligence (Well-being, $F[2,139]=2.53$, $r=.18$, $r^2=.03$, $\text{adj. } r^2=.02$, $p>.05$; Self-Control, $F[2,139]=2.83$, $r=.20$, $r^2=.03$, $\text{adj. } r^2=.02$, $p>.05$; Emotionality, $F[2,139]=3.16$, $r=.20$, $r^2=.04$, $\text{adj. } r^2=.02$, $p<.05$; Sociability, $F[2,139]=9.78$, $r=.35$, $r^2=.12$, $\text{adj. } r^2=.11$, $p<.001$). As presented in the table, age uniquely contributed to the explanation of Emotionality ($\beta=.20$, $p<.05$) while gender caused the same effect for Self-Control ($\beta=-.19$, $p<.05$). Sociability was the only factor of trait emotional intelligence that both age and gender were accounted for a significant amount of variance in the explanation of the factor (age, $\beta=.29$, $p<.001$; gender, $\beta=-.20$, $p<.05$).

In Step 2, inclusion of the five personality traits caused a statistically significant change in R^2 for the factors of trait emotional intelligence and various personality traits explained the 43% of the variance in Well-being ($\Delta R^2=.43$, $\Delta F[5,134]=21.28$, $p<.001$), 41 % in Self Control ($\Delta R^2=.41$, $\Delta F[5,134]=19.7$, $p<.001$), 28 % in Emotionality ($\Delta R^2=.28$, $\Delta F[5,134]=11.22$, $p<.001$), and 26 % in Sociability ($\Delta R^2=.26$, $\Delta F[5,134]=14.42$, $p<.001$). As previously explained, various personality traits explained a statistically significant variance in the explanation of dimensions of trait emotional intelligence. For instance, lower Neuroticism accounts for a unique variance in the Well-being ($\beta=-.34$, $p\leq.001$), Self-Control ($\beta=-.62$, $p\leq.001$) and Sociability ($\beta=-.22$, $p\leq.01$) factors of trait emotional intelligence while higher Extraversion explains a significant variance in predicting Well-being ($\beta=.30$, $p\leq.001$), Emotionality ($\beta=.28$, $p\leq.001$) and Sociability ($\beta=.31$, $p\leq.001$). Additionally, higher Openness predicts a unique variance in Well-being ($\beta=.20$, $p\leq.01$) and Emotionality ($\beta=.20$, $p\leq.05$), while higher Agreeableness ($\beta=-.27$, $p\leq.001$) and Conscientiousness ($\beta=.17$, $p\leq.05$) accounts for significant variance only in the factor of Sociability.

In Step 3, agency and pathways were included in the models in order to determine whether hope components uniquely contributed to the explanation of variance in predicting dimensions of trait emotional intelligence. In the final models, inclusion of agency and pathways demonstrated a significant change in R^2 in factors of trait emotional intelligence as both hope components together explained 9 % of the

variance in Well-being ($\Delta R^2=.09$, $\Delta F[2,132]=13.34$, $p<.001$); 3 % in Self-Control ($\Delta R^2=.03$, $\Delta F[2,132]=3.56$ $p<.05$; 4 % in Emotionality, $\Delta R^2=.04$, $\Delta F[2,132]=3.97$ $p<.05$; 9 % in Sociability, $\Delta R^2=.09$, $\Delta F[2,132]=11.81$ $p<.001$). As the table shows, agency accounted for the significant variance in Well-being ($\beta=.31$, $p \leq .001$) only, while pathways was the predictor for the factor of Sociability ($\beta=.41$, $p <.001$) only.

4.5. Discussion

This is the first study to document the significant relationship between hope, its components and trait Emotional Intelligence (EI). Regarding the correlational analysis, all factors of EI, namely, Well-being, Self-control, Emotionality and Sociability were found to be significantly and positively associated with both agency and pathways thinking. Among the factors comprising EI, well-being revealed a larger effect size when conflated with agency thinking, while Sociability was revealed to have the strongest association with pathways thinking.

The important findings of the study were derived from the regression analyses. Hierarchical multiple regression analyses revealed that agency predicted a significant variance in Well-Being. Essentially, this finding is not surprising as it is well known that an individual's positive future thinking regarding goal attainment (agency) is associated with better well-being (MacLeod & Conway, 2007). Previous studies have also revealed the stronger relationship between agency and subjective well-being when compared to the pathways thinking (Burrow, O'Dell, & Hill, 2010; Lu & Hsu, 2013; Shenaar-Golan, 2017). Furthermore, this finding is consistent with the theoretical conceptualization of the Well-Being factor of trait emotional intelligence and the relevant literature. Theoretically, the factor of Well-Being refers to a general sense of well-being regarding past achievements and future expectations (Goekcen, Furnham, Mavroveli, & Petrides, 2014). In terms of operationalisation of the factor, Well-Being is composed of *trait self-esteem*, *trait happiness* and *trait optimism*. Conceptually, *trait optimism* reflects positive expectations for the future in terms of life outcomes (Komlosi, 2014). Similarly, the agency component of hope reflects the positive expectation for the future that goals can be achieved regardless of impediments (Snyder et al., 2006). Thus, both of the concepts are based on the assumption that desired outcomes will be achieved. Additionally, *trait happiness* refers to the general level of life satisfaction and contentment with the present while *trait self-esteem* refers to confidence regarding one's level of self-respect (Komlosi, 2014). As the results have

demonstrated, one's belief that identified goals will be achieved contributes to one's current level of feelings of cheerfulness, joy and contentment (happiness), one's positive outlook towards the future (optimism) and one's self-respect and confidence (self-esteem). The relevant literature also supports these findings, demonstrating the positive and significant link between agency and such positive psychological characteristics. For instance, one study by Kashdan and colleagues (2002) demonstrated that self-esteem was predicted only by the agency component of hope, while pathways was not a significant predictor for the construct. Other studies have also reported that agency revealed a larger shared variance with optimism (Wong & Lim, 2009) and dimensions of self-esteem compared to the pathways thinking (Ferrari, Stevens, Legler, & Jason, 2012). In sum, the literature and the findings of this study point out that the agency component of hope might be a stronger contributor to the positive psychological characteristics that make up well-being.

In terms of the second component of hope, pathways thinking was found to be a significant predictor for the sociability factor of trait emotional intelligence in the findings of the hierarchical multiple regressions analyses. This finding aligns with that reported in Chapter 3, which highlighted the strong link between pathways thinking and interpersonal traits. As observed in Chapter 3, agentic thinking associated with the facets of conscientiousness such as competence, achievement striving and order. However, pathways thinking revealed strong associations according to the facets of two different yet interpersonal higher order personality traits, namely Extraversion and Agreeableness. As a factor of emotional intelligence, sociability refers to the capacity to socialise and communicate with others (Sahin, Ozer, & Deniz, 2016). In terms of operationalisation, trait sociability is composed of *trait assertiveness*, *emotion management*, and *social awareness* (Cooper & Petrides, 2010). *Trait assertiveness* refers to the degree to which one stands up for one's rights and, interestingly, the same trait was found to be strongly associated with pathways thinking in the findings of Chapter 3. Consistent findings across different samples highlight the importance of the relationship between trait assertiveness and pathways thinking. On the other hand, *social awareness (social competence)* refers to the capacity to feel comfortable within the social context while *emotion management* conveys the capacity to manage other people's emotional states (Cooper & Petrides, 2010). Individuals who have strong social awareness skills are able to adapt better to different situations as they are more aware of the requirement of different conditions. In this regard, this study's findings demonstrate

that individuals who have the capacity to generate alternative means to meet the desired goals when the original routes are blocked are also better able to adapt to different situations. In terms of conceptualisations, it is plausible that people who have the ability to find a new route when there is a blockage are also better able to adapt to the requirement of the different conditions without giving up. Conceptually, emotion management of others conveys one's ability to get people to act in a way that helps one achieve an identified goal (Austin & Vahle, 2016). Likewise, pathways thinking refers to an individual's ability to access means that enable them to attain the desired goals (Snyder, McDermott, Cook, & Rapoff, 2002). In this regard, the findings demonstrate that individuals perceive that goals are attainable by a number of plausible routes through emotion management of others.

Surprisingly, neither agency nor pathways thinking were found to be significant predictors of the factors of self-control and emotionality. In the operationalization of a factor, self-control consists of facets such as emotional regulation, stress management, and low impulsiveness, while emotionality includes emotional perception, emotional expression, relationship skills, and empathy. Although zero-order correlations were significant, the results of the hierarchical multiple regression analysis demonstrated that factors of self-control and emotionality were not predicted uniquely by either agency or pathways. Thus, current results demonstrate that some aspects of EI, such as emotion regulation, emotion perception, or emotion expression do not provide a significant amount of shared variance in terms of agency or pathways scores.

Although this study offers noble findings in terms of understanding the specific link between hope components and factors of emotional intelligence, some limitations of the study should be considered. For instance, the research design of the study is cross-sectional and, thus, causal relationship cannot be inferred. Specifically, longitudinal and experimental designs are needed in order for a causal relationship to be claimed. Second, although the power analyses demonstrated that the sample size is adequate, the participants were restricted to University of Leicester undergraduate and post-graduate psychology students, thus, potentially, limiting the generalisability of the findings. Third, although self-report questionnaires are typically used to assess hope and trait emotional intelligence in the literature, self-desirability issues might have impacted the responses given in the study.

Nonetheless, the findings of the current study are important in terms of understanding the role of hope components as contributors to vital concepts, such as

well-being (optimism, self-esteem happiness) and social traits. Although these findings do not infer any causal relationship, the findings of this study suggest that individuals' beliefs that goals can be achieved has an important role to play in their well-being while pathways thinking has the same impact on social traits. The traits of optimism, happiness and self-esteem are highly researched concepts in the literature as they are related to pivotal positive life outcomes. Thus, further research may investigate the mechanism behind the relationship between these traits and trait agency. Additionally, the findings of this study and Chapter 3 in this thesis documented the unexpected relationship between pathways thinking and social traits, such as facets of Extraversion, Agreeableness and Sociability. The findings are surprising and promising as no theoretical similarity exists between the concepts. Essentially, hope and its relationship with social relationship was documented in the literature (e.g. Kirst, Zerger, Harris, Plenert, & Stergiopoulos, 2014). Yet, current findings might reflect that pathways thinking is social aspect of hope and responsible for such relationship.

In conclusion, current study reveals the crucial relationship between hope components and factors of trait emotional intelligence. The findings of this study are significant for a number of reasons. First, the analysis establishes a relationship between hope components and EI, which is significant as no previous attempts to examine such a relationship could be found in the literature. Second, the results of the study expand our understanding of hope by establishing that agency or pathways might be responsible for the relationship between hope and emotional concepts instead of global hope itself. Third, the findings of the study confirm the hypothesized strong link between pathways thinking and sociability-related traits noted in Chapter 3. This finding is important to understand the different nature of pathways thinking, as agentic thinking did not reveal any link with social traits in this or previous studies. Further studies might help to understand the mechanism underlying this link. Furthermore, this study advances understanding of hope and its dimensions, in terms of the differing relationships and interactions with the domains of EI.

Chapter 5

Exploring the Association between Hope and Psychological Well-being

5.1. Abstract

Hope has been considered as an indicator of well-being and its relationship with other aspects of well-being was documented from the perspective of hedonic wellness such as subjective well-being. Yet, no study examined whether hope components, as enduring personality characteristics are associated with eudaimonic indicators of wellness, such as psychological well-being. Present study intended to address this limitation and investigated whether trait agency/trait pathways are associated with eudaimonic aspects of Ryff's psychological well-being beyond the effect of age, gender, personality traits, and indicators of subjective well-being. Adult Dispositional Hope Scale (ADHS), Ryff's psychological well-being scale (SPWB), short form of NEO PI-R (S5), PANAS and satisfaction with life scale (SWLS) were administered 198 university students. The results suggest that trait agency explains a significant variance in Environmental Mastery and Self-Acceptance while pathways thinking contributed to the explanation of both Autonomy and Personal Growth beyond descriptive variables, personality traits, positive/negative affect and life satisfaction. Findings and implications were discussed.

5.2. Introduction

For decades, well-being has been thought of as the absence of mental illness, rather than the presence of positive functioning. In addition, the literature on well-being has placed considerable focus on anxiety and depression (Ryff, 1995). However, positive functioning is not less evident in well-being than living without human suffering. Recently, two streams of research, namely those looking at subjective and psychological well-being, have attempted to understand well-being in terms of positive functioning. These two ways of understanding well-being result from the fact that there are two distinct philosophical interpretations of well-being. Subjective well-being has its roots in a hedonic approach, which focuses on current states of happiness, the attainment of pleasure and avoidance of pain, and includes constructs such as positive affect, life satisfaction, happiness, and quality of life (Ryan & Deci, 2001). On the other hand, psychological well-being has its origins in the eudaimonic approach, which promotes striving for excellence, finding meaning, and reaching one's true potential. This approach encompasses characteristics such as purpose in life, self-acceptance, personal growth, environmental mastery, positive relations with others, and autonomy (Ryan & Deci, 2001).

Early research that investigates well-being from the perspective of positive psychological functioning, rather than the absence of psychiatric diagnosis, made use of constructs that can be considered part of the hedonic traditions, and considered well-being to be the reflection of one's current state of positive feelings. Thus, these studies only focused on those constructs that are concerned with subjective and hedonic wellness, such as happiness, life satisfaction, or positive affect. One early example of research into subjective well-being is Bradburn's classic work (1969). Bradburn was concerned with how ordinary people cope with daily challenges that affect the pursuit of their life goals, and with their psychological reactions to stress and daily strains. He conceptualized affect as referring to pleasant or unpleasant moods and emotions, and defined high well-being as the predominance of positive over negative affect (p. 9). Likewise, Myer and Diener described well-being as the presence of positive affect and the absence of negative affect (1995, p. 11). Diener and Suh (1997) also viewed well-being in terms of positive and negative affect, but also defined it as the cognitive evaluation of satisfaction with life. Similarly, other proponents of subjective well-being considered well-being to be an individual's current state of positive feelings, such as

happiness (Pollard & Lee, 2003), or their positive cognitive evaluation of life satisfaction (Seligman, 2004).

Unlike the hedonic tradition, the eudaimonic tradition does not consider the current state of positive feelings (e.g. positive affect, happiness) to be the main goal of the life, but rather the product of a well-lived life. Ryff, one of the pioneers of eudaimonic well-being, challenged the idea that the absence of mental illnesses, or the presence of current subjective and positive feelings, is not enough to describe well-being. On the contrary, she claims that psychological attempts to overcome life challenges, such as finding meaning in life, having aims and goals, and realizing one's own talents, also reflect positive functioning. This has been named *psychological well-being* (Ryff, 2014). Prior to Ryff's work, the concept of psychological well-being and its measurements were not well established. Due to the absence of theoretical rationale regarding psychological well-being, studies of well-being mostly focused on constructs that are related to subjective well-being, such as life satisfaction or happiness. Nevertheless, Ryff suggested that reducing well-being to just a few constructs and neglecting the eudaimonic aspect of well-being will limit our understanding of the concept of well-being. Thus, she integrated six key components of well-being that were taken from various theories of positive psychology constructs. In doing so, Ryff followed the construct-oriented approach to personality assessment (Ryff, 2014). Ryff's measure of well-being included the following six dimensions: environmental mastery, personal growth, self-acceptance, autonomy, positive relations with others and purpose in life. Table 13 demonstrates such dimensions and example items from the Ryff's psychological well-being scale (SPWB).

Table 12: Dimensions of Ryff's psychological well-being model and relevant example items from SPWB

Dimension Name	Description	Example Items from the SPWB
Environmental Mastery	ability to handle complex situations within the environment.	In general, I feel I am in charge of the situation in which I live (+) The demands of everyday life often get me down (-)
Personal Growth	sense of continuing growth, personal development, openness to new experiences and interest in increasing one's knowledge	For me, life has been a continuous process of learning, changing and growth (+) I gave up trying to make a big improvements or changes in my life a long time ago (-)
Self-Acceptance	positive attitudes toward oneself, accepting one's strengths and limitations, and having positive attitudes toward one's past	When I look at the story of my life, I am pleased with how things have turned out (+) In many ways, I feel disappointed about my achievements in life (-)
Autonomy	acting according to their own convictions, independence, self-determination, individualization	I have confidence in my opinions, even if they are contrary to the general consensus (+) I tend to be influenced by people with strong opinions (-)
Positive Relations with Others	warm, trustworthy, and rewarding relations with other people, empathetic, and capability of affection and intimacy	People would describe me as a giving person, willing to share my time with others (+) Maintaining close relationships has been difficult and frustrating for me (-)
Purpose in Life	possessing goals, aims and objectives in life, and finding meaning in both the past and the present	Some people wander aimlessly through life, but I am not one of them (+) I sometimes feel as if I've done all there is to do in life (-)

Autonomy refers to the extent to which individuals are able to act according to their own convictions. Conceptually, autonomy includes attributes such as independence, self-determination, individualization, and internal regulation of behaviour (Čančer & Žižek, 2015). Individuals with higher levels of autonomy are more independent, and tend to act on the basis of their own evaluations, rather than in response to social pressure (Ryff & Keyes, 1995). Environmental mastery refers to an individual's ability to handle complex situations within the environment. People with high level of environmental mastery perceive themselves as having the competence to make effective use of the opportunities available to them, and to choose or create an environment that is congruent to their needs and goals (Ryff & Keyes, 1995). Self-acceptance is viewed as a core characteristic of positive functioning in life (Čančer & Žižek, 2015). The dimension of self-acceptance refers not only to possessing positive attitudes toward oneself, but also to accepting one's strengths and limitations, and having positive attitudes toward one's past (Ryff & Keyes, 1995; Ryff, 1995). Personal growth refers to a sense of continuing growth and personal development and involves openness to new experiences and having an interest in increasing one's knowledge (Ryff, 1989; Ryff, 1995). The dimension of positive relations with others reflects warm, trustworthy, and rewarding relations with other people. Individuals with high levels in this dimension are more empathetic, show more concern for the well-being of others, and are capable of affection and intimacy (Ryff & Keyes, 1995). Purpose in life is considered a key component of eudaimonic well-being (Boylan & Ryff, 2015); it is related to the belief that life has both purpose and meaning (Ryff, 1995). An individual who has a high level of purpose in life is one who has goals, aims and objectives in life, and can find meaning in both the past and the present (Ryff & Keyes, 1995).

5.2.1. Dispositional nature of psychological well-being

Since one of the aspects of psychological well-being encompasses striving for excellence and reaching one's highest potential, it is not mistaken to view those aspects as long-term and trait-like concepts. The literature also supports the idea that psychological well-being is a relatively stable and heritable construct. A considerable amount of research has revealed that, although life events can cause short or long-term changes in well-being, the construct demonstrates a dispositional characteristic. For instance, in one of the cross-twin, cross-time studies, Keyes et al. (Keyes, Myers, & Kendler, 2010) found that psychological well-being is affected by moderate to

substantial heritability factors. Moreover, their study revealed that mental well-being in general (psychological, emotional, and social) is governed by a single higher-order latent variable. Another twin study conducted by Gigantesco et al. (2011), which also used Ryff's 18-item psychological well-being scale, found similar results, thus demonstrating that heritability factors have a strong impact on psychological well-being. Likewise, a study by Archontaki, Lewis, and Bates confirmed the results of prior studies and supported the idea that there is a significant genetic influence on all scales of psychological well-being (Archontaki, Lewis, & Bates, 2013). However, this study could not find any environmental influences on eudaimonic traits. In sum, the results of three cross-time, cross-twin studies consistently support the view that psychological well-being is highly heritable, and is relatively stable due to its genetically influenced nature. Thus, it can be concluded that, although life events cause fluctuations over time, psychological well-being is a relatively stable trait that is characteristic of the individual.

5.2.2. Hope and Psychological Well-being

As noted above, psychological well-being, with all of its aspects, is a trait-like construct and related to each aspect of human life. Thus, it is likely to also have a relationship with hope. In the literature, several studies attempted to understand the relationship between hope and well-being by assessing distress and depression (Rawdin, Evans, & Rabow, 2013). Others investigated the relationship between hope and the aspects of subjective well-being, such as life satisfaction (Marques, Lopez, & Mitchell, 2013) and positive affect (Rego et al., 2012). These studies clearly demonstrate the importance of current subjective positive feelings for hopeful thinking. However, one would expect there to be a strong link between hope and an individual's ability to strive for excellence and reach their full potential. Surprisingly, only one study has attempted to examine the association between hope and aspects of eudaimonic well-being, such as psychological well-being (Hasnain et al., 2014). This study, however, limited its investigation to the relationship between global hope and global psychological well-being, ignoring the contribution of the hope components to the dimensions of psychological well-being (Hasnain et al., 2014). This study differs from previous study in several ways. For instance, this study examines the relationship between specific components of hope (agency-pathways) and eudaimonic traits of well-being rather than the combined total score of hope as in study (Hasnain et al., 2014). Secondly, this study

documents the unique contribution of specific hope components in psychological well-being by controlling covariate variables that are strongly related to hope, such as personality traits, age, gender, and aspects of subjective well-being. Personality traits and aspects of subjective well-being are trait-like constructs that are related to both agency and pathways thinking and psychological well-being. Without controlling these variables, it would be difficult to understand the unique contribution that trait agency and trait pathways make to eudaimonic traits.

Essentially, the unique relationship between hope components and dimensions of psychological well-being is worth investigating for several reasons. Firstly, dimensions of psychological well-being and the components of hope demonstrate relative stability and a trait-like nature. As noted, the theory that there are genetic variations in psychological well-being was supported by several studies in the literature (Keyes et al., 2010). Similarly, the components of hope are considered to be stable and trait-like concepts (e.g., Valle, Huebner, & Suldo, 2006). Examining the relationship between these constructs might improve our understanding of hope and its components in terms of trait perspective. As has been highlighted in previous chapters, substantial correlations were found between hope and two highly heritable and trait-like constructs, namely personality and emotional intelligence.

Secondly, the fact that the two constructs have similar components and are theoretically similar means that further research is required in order to understand the potential link between hope and psychological well-being. For instance, in Snyder's Hope Theory (2000), the first requirement for an individual to be considered as hopeful is to possess a life goal. As such, dimensions of psychological well-being, namely purpose in life and personal growth, reflect the importance of setting goals, having purposes (purpose in life), recognizing one's true potential for achieving life goals, and not being scared of changes or new experiences (personal growth). These eudaimonic traits may associate to hope as they are related to set important life goals. Additionally, aspects of psychological well-being appear to be related to specific components of hope. For instance, environmental mastery involves adapting the environment to one's needs and goals, and taking opportunity of the environment to achieve life goals. This would appear to be related to the pathways component of hope, as it involves generating new ways of reaching desired goals. In summary, the link between hope and psychological

well-being appears to be worthy of further examination: this is the aim of the current study.

5.2.3. Aims and Research Questions

The current study has two aims. Firstly, it seeks to understand the extent to which agency and pathways are related to the belief that one can build warm, trustworthy and rewarding relationships with others (Positive Relation with Others), create an environment that is conducive to achieving one's needs and goals (Environmental Mastery), increase one's knowledge (Personal Growth), have a positive attitude toward one's self (Self-Acceptance), have goals, aims and objectives in life (Purpose in Life), and act according to one's own convictions (Autonomy). The second aim is to understand which specific hope component is most implicated in the domains psychological well-being.

Research question 1: What are the psychological well-being dimensions that are most related to trait agency and trait pathways?

Research question 2: Which specific hope component is most implicated in the domains of psychological well-being?

5.3. Method

5.3.1. Participants

The participants were 198 undergraduate and post graduate students from the University of Leicester (61 males, 137 females). The mean age of the sample was 19.62 (SD=2.53) years.

5.3.2. Measures

5.3.2.1. Adult Dispositional Hope scale (Snyder et al., 1991). The Adult Dispositional Hope Scale (ADHS) is a 12-item self-report hope scale that was developed for use with adults aged 15 and above. The test includes four distracters. Four items assess the agency component of hope (e.g. "I energetically pursue my goals") and four items assess the pathways component of (e.g. "I can think of many ways to get out of a jam"). Items are scored using an 8-point scale, ranging from 1=definitely false to 8=definitely true. The sum of the agency and pathways subscales gives a total hope score, with Cronbach alphas for the total score of .84.

5.3.2.2. SPWB (Ryff & Keyes, 1995). Psychological well-being was assessed with a SPWB scale that was developed by Ryff and Keyes (1995). The scale includes

18 items that measure each of the following six dimensions: self-acceptance (e.g. “I like most aspects of my personality”), positive relations with others (“I have not experienced many trusting or warm relations with others”), purpose in life (e.g. “Some people wander through life aimlessly, but I am not one of them”), autonomy (e.g. “I tend to be influenced by people with strong opinions”), environmental mastery (e.g. “I am quite good at managing the many responsibilities of my daily life”) and personal growth (e.g. “I gave up trying to make big improvements or changes in my life a long ago”). Each dimension is assessed using three items that are either positively or negatively keyed. After reversing the negatively keyed items, the sum of the items gives a score for the associated dimension. Although different scales to measure psychological well-being have been developed based on Ryff’s model, the 18-item scale is the most frequently used measure. In terms of psychometric properties of the scale, previous studies established acceptable levels of reliability for Cronbach’s α coefficients for the dimensions of psychological well-being ranging .60 to .75 (Li, Kao, & Wu, 2015).

5.3.2.3. SWLS (Diener, Emmons, Larsen, & Griffin, 1985). Satisfaction with life is a unidimensional construct that falls under the umbrella of subjective well-being. The SWLS consists of five items that measure life satisfaction (e.g. “If I could live my life over, I would change almost nothing”). Responses are given using a 7-point Likert scale (1= strongly disagree, 7= strongly agree). The sum of the item scores results in a total score for satisfaction with life. Regarding psychometric properties of the questionnaire, literature provided acceptable level of internal consistency reliability with a Cronbach α of .77 in previous studies (Shi, Zhang, & Miao, 2016).

5.3.2.4. PANAS (Watson, Clark, & Tellegen, 1988). PANAS is a 20-item scale that was developed to measure positive and negative affect (10 PA and 10 NA). The scale requires participants to rate the extent to which they have experienced the listed emotions or feelings during last week. Participants respond to the items using a 5-point Likert scale (1= very slightly, 5= extremely). The positive affect subscale consists of emotions or feelings, such as feeling inspired, determined, or attentive. The negative affect subscale is comprised of adjectives, such as irritable, ashamed, and guilty. With regard to psychometric properties of the scale, previous studies reported acceptable levels of internal consistency reliability with a Cronbach’s α of .74 (PA) and .79 (NA) (Suslow & Donges, 2017).

5.3.2.4. S5 (Short Five) (Konstabel et al., 2012). In the study, personality traits were assessed using the Short Five personality inventory, which is a 60-item inventory

developed to measure the aspects of personality identified by NEO PI-R. S5 is a shorter measure than NEO PI-R, with high internal consistency for reliability coefficients (from .87 to .74 for the broad facets of the measure). Moreover, in previous studies it has been found to have good convergent and discriminant validity (Konstabel et al., 2012). The scale includes 60 items that assess five major dimensions of personality, and six sub-dimensions for each, providing 30 sub-dimensions of the Big Five Personality traits in total. The scale included the following dimensions of personality: neuroticism, extraversion, openness to experience, agreeableness and conscientiousness. There are two items used to measure each sub-dimension. One of these items is a negatively keyed item within each sub-dimension and one is a positively keyed item. For instance, the item measuring the trait “Neuroticism” and its lower-order facet “Anxiety” is exemplified by the question “I am often nervous, fearful, and anxious and I worry that something might go wrong”, as a positively keyed item, and “I am a calm person who does not worry much about what may go wrong” is a negatively keyed item. The response scale ranges from +3 (Completely agree) to -3 (Completely disagree) with “0” as the neutral position. The negative items are reverse coded and the two scores for the items regarding each lower-order facet were summed to find the scores for each facet. The scores for higher order domains, i.e. the big five personality traits such as neuroticism, were calculated by summing the scores for each of the lower-order facets. Cronbach’s α coefficients for the subscales of the measure demonstrated good reliability in previous studies: Neuroticism (.87-), Extraversion (.89), Openness to Experience (.78-), Agreeableness (.74), and Conscientiousness (.85) (Konstabel et al., 2012).

5.3.3. Procedure

The participants were recruited through EPR system. The EPR is a system available at the University of Leicester to benefit both researchers, undergraduates, and postgraduate students. Students receive additional credit for participating in studies, and researchers seek out students to enrol in studies. The final study sample consisted of 198 undergraduate and postgraduate students, all of whom consented to participate in the study. Consent forms were included on the first page of the electronic survey, and the participants completed the mentioned questionnaires via the EPR. The entire study took no longer than 30 minutes to complete. The study also received ethical approval from the University of Leicester's School of Psychology Ethics Board before commencement.

5.3.4 Data Analysis

The analysis was undertaken using SPSS version 22. Scores were calculated, and a Pearson Product-Moment correlation analysis was used to examine the relationship between dimensions of psychological well-being and the hope components, trait agency and pathways. Hierarchical multiple regression analysis was also used to analyse the scores in order to determine whether agency and pathways predicted the variance in psychological well-being dimension scores excluding the effect of age, gender, personality traits and indicators of subjective well-being. In order to determine the independent effect of hope components on psychological well-being dimensions, the effects of demographic variables, personality traits and subjective well-being variables were controlled since these variables were found to be correlated with psychological well-being and hope components (Park & Jeong, 2015; Ryff & Keyes, 1995; Salami, 2011). In Step 1, age and gender were entered into the models as demographic variables as it is recommended that these be included at the initial entry step (Cohen & Cohen, 1983). In step 2, personality traits were included in the models because of the causal priority principle as global personality traits accounts for a significant variance in subjective well-being variables (Anglim & Grant, 2016). In step 3, indicators of subjective well-being were entered in the regression models before the variables of interest were included into the equation. Finally, agency and pathways were entered in the regression models, as they are the variables of interest. Additionally, G Power Software was used to examine the adequacy of sample size for hierarchical multiple regression analyses. To perform regression analyses with a power of .80 with a medium effect size, power calculations required a minimum sample size of 107. The sample size of this study met this criterion.

5.4. Results

Table 13 shows the mean, standard deviation, minimum and maximum values, and internal consistency coefficients for the measures used in the hope and psychological well-being subscales.

Table 13: Descriptive Statistics of age, hope components and psychological well-being

	Mean	SD	Minimum	Maximum	α
Age	19.62	2.53	18	35	-
Agency	23.58	4.57	8	32	.79
Pathways	23.02	4.02	13	32	.76
Autonomy	12.58	2.61	6	18	.60
Environmental Mastery	12.41	2.68	6	18	.66
Personal Growth	14.75	2.36	7	18	.63
Positive R with Others	13.61	3.17	3	18	.65
Purpose in Life	14.15	2.65	7	18	.50
Self-Acceptance	12.95	3.22	4	18	.80

5.4.1. Correlation Analyses

Pearson product-moment correlation analysis was performed in order to investigate the relationship between hope components and the subscales of psychological well-being since the scores were normally distributed. Table 14 shows the correlation analyses between hope components and the subscales of psychological wellbeing.

Table 14: Pearson correlation results between hope components and subscales of psychological well-being

	Agency	Pathways	AU	EM	PG	PRO	PI	SA
Agency	1							
Pathways	.622**	1						
AU	.336**	.433**	1					
EM	.653**	.539**	.443**	1				
PG	.503**	.511**	.315**	.417**	1			
PRO	.331**	.238**	.074	.426**	.296**	1		
PI	.333**	.221**	.148*	.277**	.472**	.224**	1	
SA	.648**	.426**	.298**	.636**	.467**	.433**	.332**	1

Note. AU= Autonomy; EM= Environmental Mastery; PG= Personal Growth; PR= Positive Relation with Others; PI= Purpose in Life; SA= Self-Acceptance, * $p < .05$, ** $p < .01$.

The findings indicate that there is a significant positive correlation between all of the subscales and both of the components of hope (i.e. agency and pathways).

Environmental Mastery was found to have the highest correlation with both of the components. With regard to the components of hope, Environmental Mastery and Self-acceptance demonstrated strong correlation with agency while Personal Growth demonstrated a moderate correlation. Weak, yet significant, correlations were found between agency and the dimensions of Purpose in Life, Positive Relations with Others, and Autonomy. With regards to pathways thinking, Environmental Mastery, Personal Growth, Self-Acceptance and Autonomy moderately correlated with pathways, while Positive Relations with Others and Purpose in Life demonstrated weak but significant correlations. Furthermore, the results revealed that agency has a higher correlation with the subscales of psychological well-being than pathways thinking.

5.4.2. Regression Analyses

Six four-step hierarchical multiple regression analyses were performed, with each dimensions of psychological well-being used as dependent variable, while agency and pathways were given as independent variables in the regression models in order to identify the unique variance of hope components in predicting the dimensions of psychological well-being.

Age and gender were entered into the model in Step 1, reflecting the strong correlation between psychological well-being and demographic variables (Ryff & Keyes, 1995). Big five personality traits were added in Step 2 as personality traits have demonstrated statistically significant variance in terms of predicting psychological well-being (Salami, 2011). In step 3, variables demonstrating subjective well-being, namely positive affect, negative affect and life satisfaction were added into the models since these variables shared significant variance with psychological well-being (Park & Jeong, 2015). In Step 4, hope components were added into the models in order to highlight the unique variance by each component in the dimensions of psychological well-being. Table 15 demonstrates the results of the hierarchical multiple regression analyses between hope components and dimensions of psychological well-being, namely Environmental Mastery, Self-Acceptance, Autonomy, Personal Growth, Positive Relations with Others and Purpose in Life. In connection with each regression result, tests carried out to establish if the data has met the assumption of collinearity indicated tolerance levels for the measures are above than .10 and VIF values lower than 10 indicating that multicollinearity was not a concern (Kutner, Nachtsheim, Neter, & Li, 1996).

Table 15 Regression analyses between hope components and dimensions of PWB

	Environmental Mastery				Self-Acceptance			
	B	β	t	Sig	B	β	t	Sig
Step 1								
Age	-0.04	-0.04	-0.47	0.638	0.02	0.01	0.17	0.865
Gender	-0.82	-0.14	-1.94	0.054	-0.53	-0.08	-1.04	0.300
Step 2								
Age	-0.09	-0.08	-1.57	0.119	-0.05	-0.04	-0.65	0.515
Gender	-0.29	-0.05	-0.96	0.338	-0.01	0.00	-0.01	0.988
Neuroticism	-0.11	-0.56	-9.18	0.000	-0.11	-0.43	-6.78	0.000
Extraversion	0.03	0.10	1.69	0.092	0.07	0.23	3.58	0.000
Openness	0.02	0.06	1.03	0.305	0.03	0.09	1.36	0.174
Agreeableness	-0.02	-0.06	-0.94	0.348	0.03	0.08	1.25	0.211
Conscientious	0.06	0.23	3.91	0.000	0.06	0.19	3.06	0.003
Step 3								
Age	-0.04	-0.03	-0.71	0.481	0.07	0.05	1.11	0.267
Gender	-0.17	-0.03	-0.62	0.535	0.01	0.00	0.02	0.983
Neuroticism	-0.06	-0.31	-4.58	0.000	-0.04	-0.16	-2.51	0.013
Extraversion	-0.03	-0.11	-1.71	0.089	0.00	0.01	0.14	0.891
Openness	0.02	0.08	1.49	0.137	0.03	0.09	1.71	0.088
Agreeableness	-0.03	-0.10	-1.72	0.087	0.01	0.03	0.55	0.582
Conscientious	0.03	0.12	2.27	0.024	0.03	0.09	1.63	0.104
PA	0.10	0.27	4.64	0.000	0.06	0.14	2.48	0.014
NA	-0.08	-0.25	-3.94	0.000	-0.05	-0.13	-2.06	0.041
SWLS	0.08	0.19	3.15	0.002	0.23	0.48	8.01	0.000
Step 4								
Age	-0.05	-0.04	-0.94	0.349	0.06	0.05	0.99	0.322
Gender	-0.11	-0.02	-0.42	0.676	0.00	0.00	-0.01	0.994
Neuroticism	-0.07	-0.32	-4.85	0.000	-0.05	-0.19	-2.99	0.003
Extraversion	-0.03	-0.13	-2.13	0.034	0.00	-0.01	-0.15	0.878
Openness	0.01	0.05	0.91	0.366	0.03	0.09	1.68	0.094
Agreeableness	-0.02	-0.07	-1.29	0.199	0.02	0.05	0.86	0.390
Conscientious	0.02	0.06	1.14	0.258	0.01	0.05	0.87	0.387
PA	0.07	0.19	3.14	0.002	0.04	0.09	1.53	0.127
NA	-0.07	-0.19	-3.12	0.002	-0.04	-0.09	-1.44	0.150
SWLS	0.05	0.12	1.91	0.058	0.20	0.42	6.74	0.000
Agency	0.13	0.22	2.97	0.003	0.15	0.22	2.99	0.003
Pathways	0.07	0.10	1.66	0.098	-0.06	-0.07	-1.21	0.229

Note. PA= Positive Affect, NA=Negative Affect, SWLS=Life Satisfaction.

	Autonomy				Personal Growth			
	B	β	t	Sig	B	β	t	Sig
Step 1								
Age	0.06	0.06	0.85	0.395	0.05	0.05	0.70	0.482
Gender	-0.97	-0.17	-2.35	0.020	-0.78	-0.16	-2.15	0.033
Step 2								
Age	0.05	0.05	0.71	0.477	0.02	0.02	0.40	0.689
Gender	-0.50	-0.09	-1.30	0.197	-0.34	-0.07	-1.16	0.248
Neuroticism	-0.06	-0.28	-3.62	0.000	-0.02	-0.12	-1.77	0.078
Extraversion	0.00	0.01	0.18	0.856	0.03	0.15	2.25	0.025
Openness	0.05	0.20	2.60	0.010	0.08	0.35	5.16	0.000
Agreeableness	-0.04	-0.14	-1.86	0.065	0.01	0.04	0.65	0.516
Conscientious	0.05	0.21	2.84	0.005	0.06	0.28	4.30	0.000
Step 3								
Age	0.04	0.04	0.59	0.558	0.03	0.03	0.54	0.591
Gender	-0.47	-0.08	-1.20	0.231	-0.31	-0.06	-1.05	0.293
Neuroticism	-0.06	-0.28	-2.80	0.006	-0.01	-0.08	-0.95	0.343
Extraversion	0.00	0.01	0.10	0.922	0.02	0.08	1.01	0.312
Openness	0.05	0.21	2.61	0.010	0.08	0.35	5.09	0.000
Agreeableness	-0.04	-0.14	-1.76	0.080	0.01	0.05	0.75	0.453
Conscientious	0.05	0.21	2.61	0.010	0.05	0.23	3.42	0.001
PA	0.01	0.04	0.49	0.625	0.04	0.14	1.83	0.068
NA	-0.01	-0.03	-0.38	0.708	0.00	0.00	-0.02	0.988
SWLS	-0.02	-0.06	-0.64	0.526	0.02	0.06	0.83	0.409
Step 4								
Age	0.04	0.04	0.53	0.594	0.02	0.03	0.44	0.662
Gender	-0.36	-0.06	-0.94	0.347	-0.23	-0.05	-0.81	0.420
Neuroticism	-0.05	-0.24	-2.46	0.015	-0.01	-0.06	-0.77	0.443
Extraversion	0.00	0.00	0.04	0.971	0.01	0.07	0.87	0.384
Openness	0.04	0.15	1.97	0.050	0.07	0.30	4.48	0.000
Agreeableness	-0.04	-0.13	-1.58	0.115	0.02	0.07	1.09	0.279
Conscientious	0.04	0.17	2.12	0.036	0.04	0.18	2.67	0.008
PA	-0.01	-0.01	-0.16	0.870	0.02	0.06	0.85	0.395
NA	0.00	0.00	-0.05	0.962	0.01	0.04	0.52	0.603
SWLS	-0.03	-0.08	-0.88	0.382	0.01	0.02	0.21	0.834
Agency	0.00	-0.01	-0.05	0.960	0.05	0.09	1.00	0.317
Pathways	0.18	0.28	3.21	0.002	0.12	0.20	2.73	0.007

Note. PA= Positive Affect, NA=Negative Affect, SWLS=Life Satisfaction.

	Positive Relations				Purpose in Life			
	B	β	t	Sig	B	β	t	Sig
Step 1								
Age	0.05	0.04	0.55	0.580	0.02	0.02	0.21	0.830
Gender	-0.61	-0.09	-1.22	0.222	-0.55	-0.10	-1.33	0.185
Step 2								
Age	0.02	0.01	0.23	0.821	-0.03	-0.03	-0.44	0.659
Gender	-0.57	-0.08	-1.39	0.166	-0.16	-0.03	-0.44	0.663
Neuroticism	-0.03	-0.13	-1.86	0.065	0.01	0.03	0.40	0.691
Extraversion	0.15	0.51	7.30	0.000	0.00	0.01	0.09	0.930
Openness	-0.05	-0.15	-2.18	0.031	0.03	0.13	1.73	0.086
Agreeableness	0.09	0.25	3.62	0.000	-0.02	-0.06	-0.78	0.439
Conscientious	0.01	0.04	0.61	0.542	0.13	0.53	7.49	0.000
Step 3								
Age	0.07	0.06	0.90	0.368	-0.02	-0.02	-0.26	0.798
Gender	-0.52	-0.08	-1.30	0.196	-0.20	-0.03	-0.53	0.595
Neuroticism	0.01	0.04	0.49	0.622	0.00	0.02	0.26	0.795
Extraversion	0.12	0.41	5.34	0.000	0.00	-0.01	-0.09	0.925
Openness	-0.04	-0.13	-1.97	0.050	0.03	0.12	1.59	0.115
Agreeableness	0.07	0.21	2.96	0.003	-0.02	-0.05	-0.69	0.488
Conscientious	0.00	0.00	0.06	0.951	0.13	0.52	6.99	0.000
PA	0.02	0.05	0.70	0.482	-0.01	-0.01	-0.18	0.857
NA	-0.07	-0.18	-2.25	0.026	0.02	0.07	0.80	0.423
SWLS	0.07	0.16	2.08	0.039	0.04	0.10	1.22	0.226
Step 4								
Age	0.07	0.06	0.95	0.342	-0.02	-0.02	-0.30	0.761
Gender	-0.56	-0.08	-1.41	0.161	-0.20	-0.03	-0.54	0.591
Neuroticism	0.01	0.04	0.42	0.677	0.00	0.01	0.09	0.930
Extraversion	0.12	0.42	5.40	0.000	0.00	-0.02	-0.20	0.844
Openness	-0.04	-0.12	-1.66	0.098	0.03	0.12	1.54	0.126
Agreeableness	0.07	0.20	2.81	0.006	-0.01	-0.04	-0.58	0.562
Conscientious	0.01	0.03	0.37	0.712	0.12	0.50	6.44	0.000
PA	0.04	0.08	1.07	0.288	-0.01	-0.04	-0.47	0.640
NA	-0.08	-0.20	-2.43	0.016	0.03	0.09	0.99	0.321
SWLS	0.09	0.18	2.23	0.027	0.03	0.07	0.81	0.422
Agency	-0.03	-0.05	-0.49	0.627	0.06	0.11	1.05	0.296
Pathways	-0.07	-0.08	-1.09	0.277	-0.02	-0.03	-0.41	0.683

Note. PA= Positive Affect, NA=Negative Affect, SWLS=Life Satisfaction.

Table 15 demonstrates the results of the hierarchical multiple regression analyses for each dimension of psychological wellbeing, namely Environmental Mastery, Self-Acceptance, Autonomy, Personal Growth, Positive Relations with Others and Purpose in Life. For each regression analysis, age, gender, personality traits and indicators of subjective well-being were included in the models in order to control their effects as the variables are statistically significant in predicting psychological well-being. In step 1, age and gender were included in the models in terms of predicting the dimensions of psychological well-being (Environmental Mastery, $F[3,186]=1.62$, $r=.16$, $r^2=.03$, $\text{adj. } r^2=.01$, $p>.05$; Self-Acceptance, $F[3,186]=.37$, $r=.08$, $r^2=.01$, $\text{adj. } r^2=.01$, $p>.05$; Autonomy, $F[3,186]=2.04$, $r=.18$, $r^2=.03$, $\text{adj. } r^2=.02$, $p>.05$; Personal Growth, $F[3,186]=1.70$, $r=.16$, $r^2=.03$, $\text{adj. } r^2=.01$, $p>.05$; Positive Relations, $F[3,186]=1.21$, $r=.14$, $r^2=.02$, $\text{adj. } r^2=.01$, $p>.05$; Purpose in Life, $F[3,186]=1.53$, $r=.15$, $r^2=.02$, $\text{adj. } r^2=.01$, $p>.05$). As presented in the table, gender uniquely contributed to the explanation of Autonomy ($\beta=-.17$, $p<.05$) and Personal Growth ($\beta=-.16$, $p<.05$). Interestingly, both of the dimensions were predicted by pathways component of hope. In contrast, age did not cause the same effect for any of the dimensions.

In step 2, inclusion of the five personality traits caused a statistically significant change in R^2 for the dimensions of psychological well-being and various personality traits explained the 50% of the variance in Environmental Mastery ($\Delta R^2=.50$, $\Delta F[5,181]=38.65$, $p<.001$), 48 % in Self-Acceptance ($\Delta R^2=.48$, $\Delta F[5,181]=34.35$, $p<.001$), 20 % in Autonomy ($\Delta R^2=.20$, $\Delta F[5,181]=9.30$, $p<.001$), and 40 % in Personal Growth ($\Delta R^2=.40$, $\Delta F[5,181]=24.81$, $p<.001$), and 38 % in Positive Relations ($\Delta R^2=.38$, $\Delta F[5,181]=22.68$, $p<.001$), and 28 % in Purpose In Life ($\Delta R^2=.28$, $\Delta F[5,181]=14.80$, $p<.001$). As previously explained, various personality traits explained a statistically significant variance in the explanation of dimensions of psychological well-being. For instance, lower Neuroticism accounts for a unique variance in Environmental Mastery ($\beta=-.56$, $p\leq.001$), Self-Acceptance ($\beta=-.43$, $p\leq.001$) and Autonomy ($\beta=-.28$, $p\leq.01$) dimensions of psychological well-being while higher Extraversion explains significant variance in predicting Self-Acceptance ($\beta=.23$, $p\leq.001$), Personal Growth ($\beta=.15$, $p<.05$) and Positive Relations ($\beta=.51$, $p\leq.001$). Additionally, higher Openness predicts a unique variance in Autonomy ($\beta=.20$, $p\leq.01$), Personal Growth ($\beta=.35$, $p\leq.001$), and Positive Relations ($\beta=-.15$, $p<.05$) while higher Agreeableness predicts Positive Relations ($\beta=.25$, $p\leq.001$). In addition,

Conscientiousness accounts for significant variance in the dimension of Environmental Mastery ($\beta = .23, p \leq .001$), in Self-Acceptance ($\beta = .19, p < .01$), in Autonomy ($\beta = .21, p < .01$), in Personal Growth ($\beta = .28, p \leq .001$) and Purpose in Life ($\beta = .53, p \leq .001$).

In step 3, indicators of subjective well-being were included in the models, namely Positive Affect, Negative Affect and Life Satisfaction. In the third models, inclusion of subjective well-being indicators demonstrated a significant change in R^2 in the dimensions of psychological well-being and these three subjective well-being indicators explained 11 % of the variance in Environmental Mastery ($\Delta R^2 = .11, \Delta F[3,178] = 18.37, p < .001$), 17 % in Self-Acceptance ($\Delta R^2 = .17, \Delta F[3,178] = 30.55, p < .001$), 03 % in Autonomy ($\Delta R^2 = .003, \Delta F[3,178] = .20, p > .05$), and 1 % in Personal Growth ($\Delta R^2 = .01, \Delta F[3,178] = 1.69, p > .05$), and 3 % in Positive Relations ($\Delta R^2 = .03, \Delta F[3,178] = 3.92, p \leq .01$), and 7 % in Purpose In Life ($\Delta R^2 = .007, \Delta F[3,178] = .64, p > .05$). As presented in Table 15, indicators of subjective well-being were unique predictors for the dimensions of psychological well-being. For instance, higher Positive Affect accounts significant variance in predicting Environmental Mastery ($\beta = .23, p \leq .001$), Self-Acceptance ($\beta = .19, p < .01$), while lower Negative Affect explains a unique variance in Environmental Mastery ($\beta = -.25, p \leq .001$), Self-Acceptance ($\beta = -.13, p < .05$) and Positive Relations ($\beta = -.18, p < .05$). Additionally, higher Life Satisfaction predicts a unique variance in Environmental Mastery ($\beta = .19, p < .01$), Self-Acceptance ($\beta = .48, p \leq .001$), and Positive Relations ($\beta = .16, p < .05$).

In step 4, agency and pathways were included in the models in order to determine whether hope components uniquely contributed to the explanation of variance in predicting dimensions of psychological well-being. In the final models, inclusion of agency and pathways demonstrated a significant change in R^2 in dimensions of psychological well-being as both hope components together explained 3 % of the variance in Environmental Mastery ($\Delta R^2 = .03, \Delta F[2,176] = 9.48, p < .001$), 2 % in Self-Acceptance ($\Delta R^2 = .20, \Delta F[2,176] = 4.49, p < .05$), 5 % in Autonomy ($\Delta R^2 = .05, \Delta F[2,176] = 6.13, p < .05$), and 4 % in Personal Growth ($\Delta R^2 = .04, \Delta F[2,176] = 6.48, p < .05$), and 7 % in Positive Relations ($\Delta R^2 = .007, \Delta F[2,176] = 1.12, p > .05$), and 4 % in Purpose In Life ($\Delta R^2 = .004, \Delta F[2,176] = .55, p > .05$). As Table 15 presented, agency accounted for the significant variance in Environmental Mastery ($\beta = .22, p < .01$) and Self-Acceptance ($\beta = .22, p < .01$) while pathways was the predictor for Autonomy ($\beta = .28, p < .01$) and Personal Growth ($\beta = .20, p < .01$).

5.5. Discussion

The present study documents the strong association between agency and pathways thinking and one of the important indicators of well-being, namely psychological well-being. Correlational analyses demonstrated that all of the domains of psychological well-being are linked to both agency and pathways thinking. For both of the components, Environmental Mastery was found to have the greatest effect, whereas Positive Relations with Others had the least effect in agentic thinking, and Purpose in Life had the least effect in pathways thinking. The important findings of the study are derived from the regression analyses. In this regard, hierarchical multiple regression analyses revealed that agency scores significantly predict Environmental Mastery and Self-Acceptance after controlling for age, gender, personality traits, positive and negative affect and life satisfaction, respectively. In terms of Environmental Mastery, one explanation for the findings might be that individuals' perceptions of their own capabilities of attaining their goals (agency) may lead them to perceive themselves as being competent enough to make effective use of the opportunities within the environment available to them (Ryff & Keyes, 1995). Furthermore, Stotland (1969) believed that hopefulness might help individuals to increase their control over their environments. As a result, he recommended engendering hopefulness in mental health patients.

The results of the regression analysis also showed that agency is a valid predictor for the Self-Acceptance dimension of psychological well-being. As noted, agency refers to an individual's belief in their ability to achieve a desired goal. Likewise, Self-Acceptance as one of the central characteristics for positive psychological functioning refers to individuals' positive attitudes towards themselves, their acceptance of their strengths and limitations, and positive attitudes towards their experiences (Ryff & Keyes, 1995). Thus, one explanation for the presence of the strong association between the constructs might be that individuals with a high level of belief in their ability to achieve their goals (agency) also have positive attitudes toward themselves, their strength and weaknesses and their past experiences (Self-Acceptance). Secondly, people who believe in their ability to achieve a desired goal might also acknowledge their strengths and limitations. Thus, they may set realistic goals for themselves and will themselves perceive that their goals are attainable.

With regard to the regression analyses for the second component of hope, pathways thinking was found to be a valid predictor for both Autonomy and Personal Growth. Autonomy includes characteristics such as being independent, not being affected by social pressure and fear, and individualization and pathways thinking refers the perceived ability to generate means when the original route towards the desired goal is no longer available (Ryff & Keyes, 1995; Snyder et al., 1991). The findings show that people who believe that they can achieve their goals by planning ways to overcome obstacles (pathways thinking) also perceive themselves to be independent and have a higher tendency to act according to their convictions (autonomy). Essentially, this finding is in line with the literature. Previous research also found that increased active planning, which refers to one's organisation of one's own thoughts and actions in order to attain an identified goal, is associated with increased autonomy (Carrasco, Campbell, López, Poblete, & García-Mas, 2013). One interpretation for the finding might be that both of the constructs require similar characteristics in their traits. For instance, ability to find alternative and original ways to reach the desired goal when faced with a goal blockage might require a more internal locus of control, freedom from social norms and fears and indicates that there is less need for social approval, as autonomous individuals demonstrate (Ryff & Singer, 2008).

On the other hand, individuals who score highly in the domain of Personal Growth have a better sense of realisation of their true potential and see themselves as being adaptable, open to new experiences and not scared of new challenges (Ryff, 1995). As such, individuals who have high level of pathways thinking are also open to new means and view challenges as a chance to reach their highest potential (Snyder et al., 1997). In all likelihood, people who are open to new experiences are willing to try alternative ways when they encounter impediments to achieving their goals. Hence, it is not surprising that personal growth is associated with the pathways component of hope.

The findings also revealed that purpose in life and positive relations with others were not predicted by any of the components of hope, even though a significant and positive association exists for both of the dimensions. Essentially, these findings are surprising as both the concept of hope and of purpose in life refers to having aims, goals and purposes in life. On the other hand, it was expected that pathways thinking be a valid predictor for positive relations as two previous studies have confirmed the strong association between the concepts. One interpretation for the findings might be that a confounding variable is involved in the insignificant shared variance between the

variables since a number of covariates were controlled in the hierarchical multiple regression analyses.

Although this study offers an insight with regard to hope components and psychological well-being, several limitations should be considered while interpreting the findings of the study. First, no causal inferences can be made as the findings of the study are correlational and cross-sectional. In order for causal inferences to be made, further longitudinal and experimental studies should be conducted. Second, although self-report assessment is typical in the literature in order to examine the trait hope and psychological well-being, social desirability issues might affect self-report assessment. Finally, the study sample included only the undergraduate and postgraduate university students from the School of Psychology of the University of Leicester. Thus, generalisability of the findings to other samples and contexts is limited.

Nonetheless, the findings of the study might have significant theoretical implications on understanding the unique contribution of trait agency and trait pathways in the specific eudaimonic traits of well-being. As the findings demonstrate, agency contributes to the psychological well-being dimensions of Environmental Mastery and Self-Acceptance while pathways thinking significantly explains Autonomy and Personal Growth.

Chapter 6

Hope with Cognitive Aspects

6.1. Abstract

This short chapter establishes hope as a cognitive construct and discusses its possible relationship to the core and well-established constructs in cognitive psychology, namely executive functions. As detailed in Chapter 1, this thesis will investigate the emotional and cognitive correlates of trait agency and trait pathways. In this chapter, the possible cognitive correlate of hope components will be discussed as a basis upon which to construct executive functions. Herein, cognitive hope, and its relationship with executive functions will be introduced to provide a broad framework to describe the relationship between the components of hope and executive functions.

6.2 Cognitive Hope

As has been mentioned previously, the literature discusses the various models and theories relating to hope. One feature that differentiates the models from one another is the whether they consider hope to be an emotion or a cognition. Emotional hope theories implicitly convey the passive nature of the hoper in the hoping process, since emotions are automatic responses to situations (Elliott, 2004). Conversely, cognitive theories highlight the agentic properties of hoping, as cognitions imply thinking, processing or evaluating. Among those cognitive theories, Snyder's theory has attracted wider scientific attention; Snyder conceptualized hope as goal-directed thinking that enables individuals to achieve their identified goals (Snyder et al., 1991). He mentions two cognitive sets that make it possible for goals to be reached: agentic thinking is the motivational side of thinking, whereas pathways thinking generates routes toward the desired goal. In this context, hope, with both of its cognitive dimensions, is no longer merely an automatic response to situations, but rather becomes an active process that helps goal attainment.

Among others, Snyder is considered the proponent of the cognitive-based school of hope. To Snyder, human beings are primarily future-oriented. Thus, most of our cognitive energy is spent striving for our personally desired goals. To reach our goals, our brain revises them, produces mental energy to pursue them, and generates routes toward them. Snyder labels all of those goal-related thoughts as *hope*. He explains that the hopeful thinking/hoping process begins with an abstract mental representation of the future. Individuals envision that personally desirable states of affairs will occur in the future. Snyder considered these imaginary states of affairs as *goals* (Snyder et al., 2006).

Within psychology, it is thought that the purpose of cognitive processes is to allow short or long-term goals to be reached. For Snyder, goals are the most important aspect of his Hope Theory, as he believes that hope is built on personal and valued goals. When individuals set goals, hopeful thinking involves shaping and organizing present behaviours to achieve these future desirable outcomes. In sum, Snyder specifies that the cognitive process of hope starts with developing a goal and producing thoughts that organize behaviours so as to increase the possibility of attaining the goal (Snyder et al., 2006).

As a cognitive construct, hope is related to other cognitive concepts as well. The literature also provides evidence in support of the existence of a strong link between

hope and various other cognitive constructs, such as coping (Herth, 1989; Irving, Snyder, & Crowson, 1998), optimism (Bruininks & Malle, 2005), and self-efficacy (Magaletta & Oliver, 1999). Moreover, hopeful thinking helps to improve subjective adjustment, as it encourages adaptive coping with uncertainty (Rand, 2009) and improves individuals' problem-solving ability (Chang, 1998). Evidently, the construct hope is related to cognitive systems and might involve in some of the cognitive processes. In order to understand the role of hope within cognitive systems, the relationship between well-established cognitive constructs and hope should be investigated.

6.3. Hope and Executive Functions

Snyder conceptualized hope as goal-directed thinking in which individuals perceive themselves to have the capacity to generate ways of achieving their desired goals (pathways thinking) and to motivate themselves to generate these means (agency) (Snyder et al., 1991). In addition, he conceptualizes hope as the mental activities that help people to achieve the desired future states of affairs, such as listing the goals, revising them, generating the mental energy to pursue them (agency), and producing workable routes towards the goals (pathways) (Snyder et al., 2006). Thus, hopeful thinking, with its two cognitive components, involves in various cognitive activities. In this regard, there is a high probability that the cognitive sets of agency and pathways thinking function alongside several other cognitive processes. Conceptually, agentic thinking produces the mental energy and plays an important role in sustaining motivation during the initiation and maintenance of goal-directed thinking (Snyder, 2000). Although agency is the cognitive-motivational aspect of hope, several other cognitive processes might be involved in, or might work alongside, agentic thinking. For example, sustaining motivation requires a sustained focus on goal pursuits and the inhibition of goal-irrelevant thoughts and behaviors. Thus, attentional control and inhibition, amongst other factors, might be needed to continually produce the mental energy for goal achievement. On the other hand, pathways thinking describes the process of thinking about workable routes towards reaching valued goals, and requires cognitive processes, such as evaluating resources, identifying solutions, planning to produce workable routes towards the desired goal, implementing plans, inhibiting goal-irrelevant situations, and having cognitive flexibility, or being able to shift to another route when obstacles to achieving the goal are encountered, or when the original plan is

no longer efficient (Snyder et al., 1991).

The literature states that the cognitive processes mentioned above are *executive functions*, which are governed by the frontal area of the brain, specifically the prefrontal cortex (Diamond, 2013). Executive functions include a wide range of higher-order cognitive processes, including motivational drive, problem solving, strategic planning, inhibition, working memory, and cognitive flexibility. These functions enable individuals to self-regulate complex cognitive activities and give goal-directed responses to daily challenges or new situations (Hughes & Graham, 2002). Thus, these functions facilitate the attainment of future goals, as they allow individuals to plan (strategic planning), to organize the actions needed to reach the goal (organization), to sustain their attention on goal-relevant tasks (selective attention), to monitor and update information (updating), to shift flexibly between different tasks (shifting), and to inhibit any goal-irrelevant behaviours in the course of goal achievement (inhibition).

A considerable number of studies on various age groups have been conducted, in a range of different settings (Robbins, 1996; Shallice, 1988), in order to support the notion that executive functions are non-unitary, independent functions. Miyake et al. (2000), for example, highlighted the non-unitary nature, separability, and independence of the executive functions in their study, which had a sample of one hundred and thirty-seven college students. The participants performed a set of simple experimental tasks that are associated with the following executive functions that are frequently mentioned in the literature: “shifting”, “updating”, and “inhibition”. Confirmatory factor analysis revealed that the three targeted executive functions are moderately interrelated, but are clearly separable. Lehto (2003) et al. also provided evidence in support of the separability of executive functions in their longitudinal study on children aged 8-13 years. By following similar methods, they found moderate correlations between the three executive functions of “working memory”, “inhibition” and “shifting”, and concluded that these executive functions were separable. Thus, literature concludes the existence of distinct executive functions that serve to carry distinct goal-directed behaviors.

Given that executive functions are the cognitive helping tools that help us to elicit goal-directed behaviours, there is an obvious theoretical and phenomenological overlap between positive psychological constructs such as hope and executive functions. Indeed, recent research has begun to shed light on how these positive psychological constructs may relate to executive functions. In a study of 154 college

students, the positive psychological characteristics of gratitude, satisfaction with life, and forgiveness, and their association with executive functions, were examined (Miley & Spinella, 2006). Participants completed a self-report measure of executive functions (EFI, Spinella, 2005) and a number of positive psychology scales. The authors reported that executive functions are positively associated with the positive psychological constructs of gratitude and satisfaction with life. The study highlighted the possible role of executive functions in supporting positive psychological characteristics. Kruger (2011) replicated and extended Miley and Spinella's (2006) study by including two additional positive psychological constructs, namely optimism and hope. In a sample of 113 university students, participants responded to the Executive Function Index and associated measures for positive psychological constructs. Many of the findings of Miley and Spinella's (2005) research were replicated in the study, which also found that hope and optimism are associated with executive functions. The study is significant because it found that hope, among other positive psychology constructs, provides a unique contribution to the explanation of the variance in executive functioning as a whole.

As has been demonstrated, executive functions are associated with positive psychological characteristics, and specifically, with hope. Kruger's study (2011) pointed out the unique relationship between hope and executive functions. However, to date, no research has investigated the specific executive functions that are most closely related to hope and its dimensions. This is the purpose of Studies 4, 5, 6 and 7. Therefore, the following chapter will begin by examining the potential link between hope and self-report executive functions.

Chapter 7

Investigating the Relationship between Hope and Self-report Executive Functions

7.1. Abstract

This study replicates and extends previous studies in order to identify the executive functions that are most related to agency and pathways thinking. 244 university students were assessed using the Adult Dispositional Hope Scale (ADHS) and Executive Function Index (EFI). The hierarchical multiple regression analyses revealed that agency scores independently predicted a significant variance in the executive functions of Motivational Drive, Empathy, Organization and Strategic Planning while pathways thinking only predicted Strategic Planning scores. Agency was found to have the most significant impact on Motivational Drive, while pathways thinking was found to be the hope component that was most associated with Strategic Planning. The study discusses the potential reasons behind these results.

7.2. Introduction

Executive functioning refers to an array of higher order cognitive capacities that control and regulate various cognitive, emotional and behavioural processes in order to carry out goal-directed and future-oriented behaviours (Burgess & Simons, 2005; Stuss, 2011). There is a general consensus in the literature that these cognitive abilities are vital in autonomous and purposive behaviours. Essentially, the term *executive functioning* emerged in the literature when it was observed that patients with frontal lobe damage demonstrated an inability to manage and integrate external and internal stimuli (Jurado & Rosselli, 2007). Thus, the concept of executive functioning emerged tied to the cognitive abilities that are associated with the frontal lobe area which are responsible for the integration of the internal/external stimuli and for giving goal-directed responses to the stimuli.

Various models have been proposed to describe the nature and the unity/diversity of executive functioning. Atkinson (1971), for example, proposed a model that explains how environmental information is processed that comprised three components: perception, buffering and retrieval. In their Supervisory Attentional Model of executive function, Norman and Shallice (1980) suggested two types of human functioning in terms of programming and regulation of action: contention scheduling and supervisory attentional system. Contention scheduling refers to routine and overlearned behaviours while the supervisory attentional system emerges in novel and non-routine tasks. Miyake (2000) focused on the diversity of executive functions and identified three core, basic executive functions, namely, *updating*, *inhibition* and *cognitive flexibility*. Jurado and Rosselli (2007) identified four pivotal components of executive function: goal formation, planning, executing goal-directed plans and effective performance.

Given the various models proposed in the literature, executive functioning is now considered to be a multicomponent concept. More than thirty different executive functions have been identified in the literature including planning, set shifting, inhibition and working memory (Barkley, 2012). These functions are vital in individuals' day-to-day life as they enable them to shift flexibly between tasks (shifting), store task-relevant information in memory (working memory) and inhibit task-irrelevant behaviours (inhibition) and planning in order to carry out goal-oriented behaviours (Friedman & Miyake, 2016; Lezak, 1995).

Research has found that executive functions are linked to the governing of day-to-day functioning. This has been assessed through questionnaires and objective

cognitive performance tests/neuropsychological batteries. Some studies, however, have demonstrated that objective cognitive performance tests have failed to identify the executive functioning in day-to-day activities and provide poor ecological validity (Burgess, Alderman, Evans, Emslie, & Wilson, 1998). Additionally, Miyake et al. (2000) argued that performance tests might not be measuring the targeted executive functions accurately due to the “task-impurity” problem (Burgess, 1997). Task impurity refers to the difficulty of assessing one particular executive function while another executive function or cognitive ability is also governing the task. For instance, the Stroop test measures the executive function of inhibition control. The results of this particular test are determined by the speed of recognition of the name of a colour written in ink of a colour that is not denoted by the name. There might be other cognitive abilities in play that decrease or increase the speed of the task and affect the task duration. Thus, executive function questionnaires may be better able to capture the use of executive functions in daily activities as such questionnaires use self-report information to find out how individuals perceive their use of executive functions in daily life (Gelonch, Garolera, Valls, Rosselló, & Pifarré, 2016). As seen, the uses of cognitive performance tests and questionnaires differ as the former measure the performance based abilities of executive functions while the latter assess their application in daily life. Furthermore, cognitive performance tests were developed to test clinical populations and are not suited for the assessment of executive functions of healthy individuals (Buchanan, 2016). Executive function questionnaires, on the other hand, are better suited for use with the general population as they assess the executive functions used in daily activities (Gelonch et al., 2016).

7.2.1. Hope and Executive Functions

Executive functions are key cognitive processes that play an important role in controlling and regulating lower order cognitive and non-executive processes. They are governed by the frontal lobe of the brain, specifically the prefrontal cortex. This area of the brain is especially known for its ability to connect various other regions of the brain, indicating involvement in several cognitive, emotional and behavioural processes. As functions that are governed by the frontal lobe, executive functions have a potential link with an array of negative and positive brain processes.

As a positive psychological construct, hope is one of the important constructs in which executive functions might play a vital role. As with executive functioning, the

construct of hope is related to goal-directed thinking and is conceptualized as a cognitive construct. Its components and its relationship with other cognitive constructs, such as self-efficacy and optimism, have been well-documented (e.g. Feldman & Kubota, 2015). Executive functioning is one of the core, robust, widely researched and well-documented cognitive constructs that has been researched in connection with negative psychological constructs (e.g. Prouteau et al., 2015). Only a few studies have looked at whether positive psychological constructs are associated with executive functioning (Kruger, 2011; Miley & Spinella, 2006). Among those studies, Kruger's (2011) study is significant in terms of examining the relationship between hope and executive functioning. Taking a sample of 113 university students, Kruger (2011) examined whether any of the five positive psychological constructs (hope, forgiveness, optimism, satisfaction with life, and gratitude) are associated with self-report executive functions, namely Motivational Drive, Impulse Control, Empathy, Organization and Strategic Planning. He found that Organization, Strategic Planning and Empathy were significantly and positively related to total hope scores and agency scores; Organization and Strategic Planning were related to pathways scores. Additionally, the study revealed that, out of the five positive psychology characteristics, hope provided the largest contribution to the explanation of the executive function as a whole. This highlights the need for further investigation in this area.

Furthermore, there is an obvious conceptual convergence between the constructs. As noted above, executive functions are cognitive abilities that control and regulate various cognitive, emotional and behavioural processes in order to carry goal-directed behaviours. As such, Snyder and colleagues (1991) conceptualized hope as goal-directed thinking and suggested that hope consists of two cognitive constructs, namely agency and pathways. Agency is the motivational side of hope, while pathways is the perceived ability for re-planning when the goal is blocked by obstacles. Thus, as cognitive sets, agentic or pathways thinking might therefore be involved in some of the processes of executive functions. For instance, Motivational Drive refers to behavioural drive, activity level and interest in novelty (Spinella, 2005). As such, agentic thinking is the component that initiates goal-directed thinking and maintains the motivation for pursuit of the desired goal (Snyder, 2000). Thus, there is a good chance that agency might involve in the Motivational Drive process while pathways thinking involve in producing ways to reach the desired goal. Similarly, as higher order executive functions, Strategic Planning and Organization break the goals into subgoals, generate strategies

and sub-strategies, carry out sequencing and multitasking, and execute plans to carry out goal-directed behaviours. Hence, both executive functions may be linked to pathways thinking. A number of studies have highlighted the possible link between hope and executive functions. For instance, Kruger's study (2011) drew attention to this possible link by demonstrating the unique contribution of hope on executive functioning among other crucial positive psychological constructs. He found strong correlations between components of hope and specific executive functions. This study replicates and extends Kruger's (2011) study by performing a regression analysis to examine whether components of hope predict any of the self-report executive functions.

7.2.2. The Study's Hypotheses

This study seeks to identify the specific executive functions that are most related to agency and pathways thinking. As noted above, only one of the reviewed studies highlighted the important relationship between hope and executive functioning, despite the obvious theoretical overlap. Kruger (2011) pointed out that, out of the five positive psychological characteristics, hope is the strongest predictor when it comes to predicting total EFI scores. However, Kruger (2011) did not examine the relationship between specific executive functions and hope components. This study, therefore, set out to understand the association between agency-pathways and aspects of executive functioning.

In this study, the Executive Function Index (EFI) is used to assess self-report executive functions as EFI outweighs other self-reporting measures for a number of reasons, the main two being, first that EFI is a multidimensional measure that assesses five aspects of executive functioning; and second, EFI was developed to assess aspects of executive functioning among healthy adults whereas most executive function tests were developed to assess executive functioning within the clinical population. Thus, EFI is an appropriate tool for this study to use to measure executive functions since the target population is made up of healthy and highly educated university students.

7.2.3. Research Questions

Research Question 1: Are agency and pathway related to self-report executive functions?

Research Question 2: Do the results of this study replicate Kruger's (2011) findings?

Research Question 3: What are the most related specific self-report executive functions for agency and pathways thinking?

7.3. Method

7.3.1. Participants

The participants were 244 undergraduate and post graduate students from the University of Leicester (35 males, 209 females). The mean age of the sample was 19.90 (SD=3.20) years.

7.3.2. Measures

7.3.2.1. Adult Dispositional Hope Scale (Snyder et al., 1991). The Adult Dispositional Hope Scale (ADHS) is a 12-item self-report hope scale developed for adults aged 15 and older. Items number 3, 5, 7, 11 are distractors in the test. Four items assess the agency component of hope (e.g. “I energetically pursue my goals”) and four items assess the pathways component of hope (e.g. “I can think of many ways to get out of a jam”). Items are scored based on an 8-point scale with 1=Definitely false to 8=Definitely true. The sum of agency and pathways subscales gives a total hope score for which the Cronbach alpha score for the study was .84.

7.3.2.2. The Executive Function Index (EFI; Spinella, 2005). The EFI is a self-report executive function questionnaire consisting of 27 items, scored on 5-point Likert scale. Each item taps into one of the five subscales of executive functions, namely, Motivational Drive, Impulse Control, Empathy, Organization and Strategic Planning. Motivational Drive refers to behavioural drive, activity level, and interest in novelty and is addressed with items such as “I have a lot of enthusiasm to do things”. Impulse Control reflects self-inhibition, risk taking and social conduct and is addressed with items such as “I take risks, sometimes for fun.” Empathy addresses concern for the wellbeing of others, prosocial behaviours and cooperative attitude and is addressed with the items such as “I have a lot of concern for the wellbeing of other people.” Organization involves multitasking, sequencing and working memory and is addressed with items such as “I have trouble when doing two things at once, multitasking.” Finally, Strategic Planning refers to thinking ahead, using strategies and planning and is addressed with items such as “I try to plan for the future.” Participants respond to each item on a 5-point scale ranging from 1= not at all to 5= very much. Subscale scores are obtained by summing the ratings value of the items belonging to the subscales and the total score is obtained through the sum of the five subscales. Higher scores indicate

better executive functioning, while lower scores indicate poor functioning. The EFI demonstrated good psychometric features with a good internal consistency ($\alpha=.82$), convergent validity, and reliability of subscales (ranging from $\alpha = .55$ to $.74$) (Spinella, 2005).

7.3.3. Procedure

The study procedure received ethical approval from the University of Leicester's School of Psychology Ethics Board and study was advertised through EPR in University of Leicester. EPR is the system that the University of Leicester provides for the benefit of both researchers and participants (undergraduate and postgraduate students). Students are awarded extra credit for participating in studies, and researchers select students to enrol in their studies. Participants signed a consent form agreeing to participate in the study prior to proceeding with the electronic survey. The consent form contained information regarding the nature of the study and an assurance of anonymity in the collection of the data. Participants were also made aware of their right to withdraw from the study, both during and after participation, and informed on how the data would be stored in coded form, how to obtain the results of the study if they wished and the intended use, period of storage and eventual disposal method of the data. The entire questionnaire took no more than 15 minutes.

7.3.4. Data analysis

The analysis was undertaken using SPSS version 22. Scores were calculated and a Pearson Product-Moment correlation analysis was used to examine the relationship between executive functions and the hope components, agency and pathways. Hierarchical multiple regression analysis was also used to analyse the scores in order to determine whether agency and pathways predicted the variance in specific executive function scores excluding the effect of age and gender. In order to determine the independent effect of hope components on specific executive functions, the effects of demographic variables were controlled since these variables were found to be correlated with executive functions and hope components (Spinella, 2005). In step 1, age and gender were entered in the models as demographic variables are recommended to be included in initial step entry (Cohen & Cohen, 1983). In step 2, agency and pathways were entered into the regression models, as they are the variables of interest. Additionally, G Power Software was used to examine the adequacy of sample size for hierarchical multiple regression analyses. To perform regression analyses with a power

of .80 with a medium effect size, power calculations required a minimum sample size of 107. The sample size of this study met this criterion.

7.4. Results

Statistical analyses were performed using SPSS software version 20. First, bivariate correlations were computed to determine the association between the components of hope and each EFI subscale. Additionally, hierarchical multiple regression analyses were performed to investigate the components of hope in terms of predicting specific executive functions.

Cronbach's alpha statistics for the dimensions of ADHS and EFI mostly indicated a good and acceptable reliability in sample scores ($\alpha_{ADHS} = .854$, $\alpha_{EFI} = .642$). However, for Strategic Planning and Impulse Control dimensions, internal consistency coefficients revealed poor reliability. Additionally, multicollinearity results showed no collinearity between executive functions. The mean scores and standard deviations for each variable are demonstrated in Table 16.

Table 16: Mean scores and standard deviations of the dimensions of hope and EFI

	Minimum	Maximum	Mean	SD	α
Agency	8	41	23.75	4.53	.80
Pathways	11	32	23.02	4.09	.78
MD	4	20	13.48	2.90	.61
IC	6	25	16.45	3.48	.57
EM	14	30	25.16	3.46	.73
ORG	8	25	16.69	3.57	.74
SP	13	3	23.37	3.86	.55

Note. MD= Motivational Drive; IC=Impulse Control; EM=Empathy; ORG= Organization; SP= Strategic Planning

7.4.1. Correlation Analyses

As the sample demonstrated normal distribution, Pearson product-moment correlation analysis was conducted between the components of hope (agency and pathways) and the five executive functions in order to determine the association between constructs.

Table 17: Intercorrelations between components of hope and executive functions

	Agency	Pathways	MD	IC	EM	ORG	SP
Agency	1						
Pathways	.589**	1					
MD	.475**	.354**	1				
IC	.051	-.018	-.058	1			
EM	.269**	.205**	.301**	.045	1		
ORG	.338**	.249**	.288**	.362**	.070	1	
SP	.323**	.345**	.208**	.149*	.231**	.282**	1

Note. MD= Motivational Drive; IC=Impulse Control; EM=Empathy; ORG= Organization; SP= Strategic Planning * $p < .05$. ** $p < .01$.

The results are presented in Table 17. As evident in the table, there was significant positive association between both the agency and pathways components of hope and four of the executive functions, namely: Motivational Drive, Empathy, Organization and Strategic Planning. The executive function of Motivational Drive demonstrated the strongest association with agentic thinking, followed by Organization, Strategic Planning, and Empathy, respectively. For pathways thinking, Motivational Drive was also the strongest correlate, followed by Strategic Planning, Organization, and Empathy, respectively. No significant correlation was found between Impulse Control and either pathways or agency.

7.4.2. Regression Analyses

Five two-step hierarchical multiple regression analyses were performed, with each dimensions of EFI used as dependent variable while agency and pathways were given as independent variables in the regression models in order to examine the unique contribution of agency and pathways thinking in each executive function.

Age and gender were entered in the models in Step 1, reflecting the strong correlation between executive functions and demographic variables (Spinella, 2005). In Step 2, hope components were added in the models in order to understand the unique variance by each component in the dimensions of Executive Function Index (EFI). Table 20 demonstrates the results of the hierarchical multiple regression analyses between hope components and dimensions of EFI, namely Motivational Drive,

Empathy, Impulse Control, Organization and Strategic Planning. In connection with each regression result, tests carried out to establish if the data has met the assumption of collinearity indicated tolerance levels for the measures are above than .10 and VIF values lower than 10 referring to multicollinearity was not a concern (Kutner, Nachtsheim, Neter, & Li, 1996).



Table 18: Summary of hierarchical multiple regression analysis for Hope
 Components and dimensions of EFI

Motivational Drive					Empathy			
	B	β	t	Sig	B	β	t	Sig
Step 1								
Age	0.08	0.09	1.45	0.147	0.07	0.07	1.02	0.310
Gender	-0.48	-0.06	-0.88	0.377	1.06	0.11	1.63	0.105
Step 2								
Age	0.05	0.06	1.03	0.303	0.05	0.04	0.71	0.476
Gender	-0.35	-0.04	-0.72	0.470	1.17	0.12	1.85	0.065
Agency	0.26	0.41	5.84	0.000	0.17	0.22	2.88	0.004
Pathways	0.07	0.10	1.46	0.145	0.07	0.08	1.06	0.292
Impulse Control								
			B	β	t	Sig		
Step 1								
Age			0.202	0.186	3.002	0.003		
Gender			2.609	0.257	4.152	0.000		
Step 2								
Age			0.202	0.186	2.984	0.003		
Gender			2.573	0.254	4.069	0.000		
Agency			-0.050	-0.059	-0.766	0.445		
Pathways			0.061	0.079	1.033	0.302		
Organization					Strategic Planning			
	B	β	t	Sig	B	β	t	Sig
Step 1								
Age	0.19	0.17	2.71	0.007	0.01	0.00	0.08	0.939
Gender	0.82	0.08	1.23	0.221	0.20	0.02	0.27	0.789
Step 2								
Age	0.17	0.15	2.45	0.015	-0.03	-0.03	-0.45	0.652
Gender	0.93	0.09	1.48	0.140	0.46	0.04	0.68	0.500
Agency	0.23	0.29	3.86	0.000	0.15	0.18	2.44	0.016
Pathways	0.07	0.07	1.00	0.319	0.23	0.24	3.27	0.001

Table 18 demonstrates the results of the hierarchical multiple regression analyses for each dimension of Executive Function Index, namely Motivational Drive, Empathy, Impulse Control, Organization and Strategic Planning. For each of the regression analysis, age and gender were included in the models in order to control their effects as the variables are statistically significant in predicting executive functioning (Spinella, 2005). In step 1, age and gender were included in the models in predicting the dimensions of executive functioning (Motivational Drive, $F[2,239]=1.60$, $r=.11$, $r^2=.01$, adj. $r^2=.01$, $p>.05$; Empathy, $F[2,239]=1.70$, $r=.12$, $r^2=.01$, adj. $r^2=.01$, $p>.05$; Impulse Control, $F[2,239]=11.98$, $r=.30$, $r^2=.10$, adj. $r^2=.08$, $p<.05$; Organization, $F[2,239]=4.12$, $r=.18$, $r^2=.03$, adj. $r^2=.02$, $p<.05$; Strategic Planning, $F[2,239]=.04$, $r=.02$, $r^2=.01$, adj. $r^2=.01$, $p>.05$). As presented in the table, age uniquely contributed to the explanation of Impulse Control ($\beta=.19$, $p<.05$) and Organization ($\beta=-.17$, $p<.05$) while gender predicted only the dimension of Impulse Control ($\beta=.26$, $p<.001$).

In step 2, agency and pathways were entered in the models in order to examine whether hope components uniquely contributed to the explanation of variance in predicting dimensions of executive functioning. In the final models, inclusion of agency and pathways demonstrated a significant change in R^2 in dimensions of executive functioning as both hope components together explained 23 % of the variance in Motivational Drive ($\Delta R^2=.23$, $\Delta F[2,237]=35.34$, $p<.001$), 8 % in Empathy ($\Delta R^2=.08$, $\Delta F[2,237]=9.90$, $p<.001$), 0.4 % in Impulse Control ($\Delta R^2=.004$, $\Delta F[2,237]=.55$, $p>.05$), and 11 % in Organization ($\Delta R^2=.11$, $\Delta F[2,237]=15.56$, $p<.001$), and 14 % in Strategic Planning ($\Delta R^2=.14$, $\Delta F[2,237]=35.34$, $p<.001$). As the table presented, agency accounted for the significant variance in Motivational Drive ($\beta=.41$, $p<.001$), Empathy ($\beta=.22$, $p<.01$), Organization ($\beta=.29$, $p<.001$) and Strategic Planning ($\beta=.18$, $p<.05$) while pathways was the predictor for Strategic Planning ($\beta=.24$, $p\leq.001$).

7.5. Discussion

In order to expand on Kruger's (2011) findings regarding the association between hope and executive functioning, this study examined the relationship between five self-report executive functions and hope components, agency and pathways to identify the specific executive functions that are most related to agency and pathways thinking among university students. Using a sample of 244 university students, the study explored and documented the expected positive association between Motivational Drive, Empathy, Organization, Strategic Planning and Impulse Control with both the

agency and pathways thinking components. The results of this study are generally consistent with those of previous studies (Kruger, 2011), with some key differences. In terms of the correlation analysis results regarding agency, this study's findings replicated Kruger's (2011) study in reporting a significant and positive relation with Organization, Strategic Planning. However, this study identified two additional executive functions that are related, namely Motivational Drive and Empathy. Although Motivational Drive was not found to be correlated with either agency or pathways thinking in Kruger's (2011) study, this study's results indicate that, out of all the executive functions studied, Motivational Drive had the largest impact on both of the components. The results of this study also support Kruger's (2011) findings on pathways thinking by demonstrating a significant and positive correlation with Organization, Strategic Planning and Empathy; but, unlike in Kruger's (2011) study, Motivational Drive was found to be related.

In line with the findings in the literature, the results highlighted an important relationship between components of hope and specific self-report executive functions. For instance, the agency component of hope was significantly correlated with Motivational Drive, Empathy, Organization, and Strategic Planning. Likewise, hierarchical multiple regression analyses results revealed that the agency scores explained a statistically significant variance in the same executive functions, namely Motivational Drive, Empathy, Strategic Planning and Organization. One interpretation for this result is that Snyder and colleagues (1991) conceptualized agency as the motivational component of hope. Likewise, Motivational Drive addresses behavioural drive, activity level, and interest in novelty (Spinella, 2005). Hence, it is unsurprising that Motivational Drive and agency appeared to have positive and significant associations. In terms of Empathy, the findings reveal that individuals who have increased level of motivation for the attainment of identified goals (agency) also demonstrate higher levels of Empathy. Essentially, the results may appear contradictory as agency appears to be a self-centered concept that targets the achievement of one's own desired goal while executive function of Empathy reflects concern for the well-being of others, prosocial behaviour and cooperative attitude (Spinella, 2005). Yet, Snyder (2002) suggests that a person's identified goals may not be limited to personal gain but may also include helping others. On the other hand, the executive functions of Planning and Organization enables individuals to carry out goal directed behaviors by anticipating consequences, using strategies and multitasking. The results of this study

demonstrated that participants who reported higher agentic thinking also reported better planning and organization skills. This finding is also in line with previous studies that show the importance of planning on motivation for goal achievement (Carraro & Gaudreau, 2011). Similarly, the executive function of Organization includes functions such as multitasking, sequencing and working memory (Spinella, 2005). Thus, the results of this study demonstrate that individuals who are better at multitasking and sequencing and have a better working memory also have a higher motivation for the initiation and maintenance of goal pursuits and have a higher motivation for goal achievement.

Regarding the second component of hope, pathways thinking was significantly associated with four of the five executive functions, namely, Motivational Drive, Empathy, Organization and Strategic Planning in the correlational analysis. More importantly, hierarchical multiple regression analysis demonstrated that pathways thinking independently predicted a significant variance in the Strategic Planning scores. Executive function of Planning is considered a higher order executive function as planning includes various other cognitive processes and basic executive functions, such as working memory, inhibition and shifting in its processes (Zelazo, Carter, Reznick, & Frye, 1997). Thus, it is crucial that pathways thinking is predictive in planning processes. Additionally, there is a phenomenological overlap between the construct and the pathways component of hope. Conceptually, Strategic Planning refers to the ability to think ahead, plan and use strategies in order to achieve daily or noble goals (Spinella, 2005). As such, pathways thinking refers to an individual's capacity to find ways to reach the desired goal (Snyder et al., 1991). Thus, it is unsurprising that individuals who report having better planning skills will also be good at finding ways to get to their desired goals.

Impulse Control was not associated with either the pathways or the agency components of hope. This result is consistent with Kruger's (2011) findings. Kruger (2011) also found that the executive function of Impulse Control did not correlate with the total hope score or the agency and pathways components of hope. One possible reason for this result may be that Impulse Control refers to self-inhibition, social conduct and risk taking (Spinella, 2005). Yet, agency and pathways are more relevant to motivation in terms of producing new and novel ways and strategies to get to the desired goal rather than in terms of suppressing inappropriate responses.

In this study, hierarchical multiple regression analysis yielded important

findings as it expanded upon the information given in Kruger's study (2011). Hierarchical multiple regression results demonstrated that agency has a crucial impact on the executive functions of Motivational Drive, Empathy, Organization and Strategic Planning, while pathways thinking has the same effect on Strategic Planning, indicating that further investigation is required on the relationship between such executive functions and hope components. The generalisability of the results is limited since the sample only included university students and causal relationship cannot be inferred as the study is cross-sectional.

Finally, these results highlight the importance of agency on Motivational Drive, Empathy, Organization and Strategic Planning and of pathways thinking on the Strategic Planning of university students. Thus, improving motivation for initiation and maintenance of the goals (agency) and ability to generate routes towards them (pathways) might aid university students in terms of their cognitive abilities. Given that hope is a better predictor for academic achievement than intelligence and personality traits among university students (Maltby et al, 2010), the importance of this study is obvious. Further studies to confirm whether these relationships also occur with objective tasks of executive functions would be helpful since objective tasks are the gold standard when it comes to assessing EFs (Buchanan, 2016). Thus, these findings lead to the next study which explores whether the relationship between hope and the executive functions suggested by the self-report studies is evident in the participants' behavioral responses on objective cognitive tasks of executive function. In this regard, the following study will examine the relationship between hope components and the objective measure of Strategic Planning as this specific executive function was found to be associated with both agency and pathways thinking.

Chapter 8

Association between Hope and Strategic Planning Scores with Objective Measure of TOL-R

8.1. Abstract

Planning is considered to be a higher order prototypical executive function that enables individuals to plan ahead for the consequences of future actions. Theoretical convergence between pathways thinking and self-report planning abilities led previous studies to examine the relationship between constructs. Furthermore, the findings of Chapter 7 also documented that both agency and pathways thinking are associated with self-report strategic planning scores. No study has as yet examined this relationship with objective measures. The aim of this chapter is to examine whether this relationship is confirmed by an objective measure of planning, namely, the Tower of London-Revised (TOL-R). Thus, the Adult Dispositional Hope scale and TOL-R were administered 49 university students. The results of the correlation analysis demonstrated no significant association between agency/ pathways and actual performance on TOL-R. Hence, an additional study was conducted and a self-report Executive Function Index (EFI) and TOL-R were administered 39 university students with the aim of understanding whether the self-report measure of executive functioning (EFI) and its relevant dimension to planning is associated with actual performance on TOL-R. No significant correlation was obtained using this measure. This chapter puts forward possible explanations for the results obtained.

8.2. Introduction

Executive functions are core cognitive processes that enable individuals to achieve successful goal-directed behaviours. Although it is still debatable whether executive functions are unitary or multicomponent constructs, some research suggests that by nature they are equipped with both, the evidences being the existence of various specific executive functions that are responsible for distinct executive processes (Lehto et al., 2003; Miyake et al., 2000). For instance, Miyake (2000) conducted studies and produced empirical evidence to show that there are three core and basic executive functions: inhibition, updating and shifting (cognitive flexibility). Later research expanded on these studies and included second-level, higher order, complex executive functions such as reasoning, verbal fluency, sequencing, coordination and planning under executive functioning (Diamond, 2013; Erickson, 2011; Romine & Reynolds, 2005).

Planning is conceptualized as being one of these higher level executive functions and is described as being the cognitive ability which organizes behaviours to attain a specified goal which can be broken down into subgoals (Luria, 1978). In literature, conceptualizations, definitions and categories of planning vary. For instance, Das and Misra (2014) distinguish between different levels of planning as follows: activity planning, action planning and operation planning. At the first planning level, activity planning refers to one's realization of one's life goals and purposes, while action planning is concerned with achieving particular goals. Finally, at the last level, operation planning is concerned with the tactics and solutions used to achieve the identified goal (Cai, Georgiou, Wen, & Das, 2015). In other theories, planning comprises two phases: (1) formulating the strategy to act upon and (2) implementing the substrategies in a particular order (Zelazo et al., 1997). According to Grafman (1989) and Shallice (1982), the planning process includes accommodative and assimilative functions. Accommodative functions help individuals to devise possible strategies within a given environmental context to achieve the goal while assimilative functions enable them to apply those strategies.

Irrespective of the variations in the definition and conceptualization of planning in models and theories, the literature supports the importance of the executive function of planning as a higher level executive function. For instance, several studies demonstrated that the planning process contributes considerably to goal-directed behaviours and several important and basic executive functions, including working

memory, response inhibition, and shifting, play an important role during the planning process (Zelazo et al., 1997).

Given the identification of planning as a higher level and crucial component of the executive function in the literature, several measures have been designed to assess planning abilities using self-report and objective tasks. Although these measures purported to assess the same construct, several studies on executive functions have demonstrated that self-report measure scores are unrelated to performance on objective tasks (e.g. Buchanan, 2016). In this regard, the literature suggests that self-report measures are more suited to personality variables and objective tasks are the gold standard for assessing executive functions (Buchanan, 2016; Schiehser et al., 2011).

The literature mentions two types of objective tasks used to assess the executive function of planning: high-structure and low-structure tasks. High structure planning tasks have clear rules such as a goal starting point, move limit or a desired configuration such as those found in tower problems (Tower of London, Tower of Hanoi). On the other hand, low structure tasks such as the Zoo Map Test (BADS; Wilson et al. 1996) have ambiguous rules and lack relevant information regarding the task (Valls-Serrano, Verdejo-García, & Caracuel, 2016). Highly structured tower tasks are considered as being the gold standard when it comes to examining planning abilities (Goel, 2010). Among the tower tasks, the Tower of London (TOL; Shallice, 1982) is the prototypical and most widely administered task to assess prefrontal functioning, particularly strategic planning (Burgess, 1997). The task was developed to assess the executive function of planning in non-routine situations. It requires participants to rearrange the position of objects such as balls or disks on three pegs, rods or piles according to a given configuration. Although some of the rules differ across different versions of TOL, such as the move limit, time limit or peg capacity, all of the versions share the same restriction, that is, that only one disk or ball can be moved at one time. Shallice (1982, p.204) suggested that TOL outweighs other existing planning tests having the feature of “graded difficulty.” Additionally, several studies have shown how effective TOL is when it comes to measuring problem-solving and, specifically, planning abilities in both healthy populations (Kaller et al., 2016) and in clinical populations such as pediatric patients (Anderson, Anderson, & Lajoie, 1996) and patients suffering from neurological conditions such as traumatic brain injury and stroke (Andrews, Halford, Chappell, Maujean, & Shum, 2014), Parkinson’s disease (Pfeiffer, Løkkegaard, Zoetmulder, Friberg, & Werdelin, 2014), Alzheimer’s disease (Franceschi et al., 2007), mild

cognitive impairment (Rainville, Lepage, Gauthier, Kergoat, & Belleville, 2012) and psychiatric disorders (Sullivan, Riccio, & Castillo, 2009).

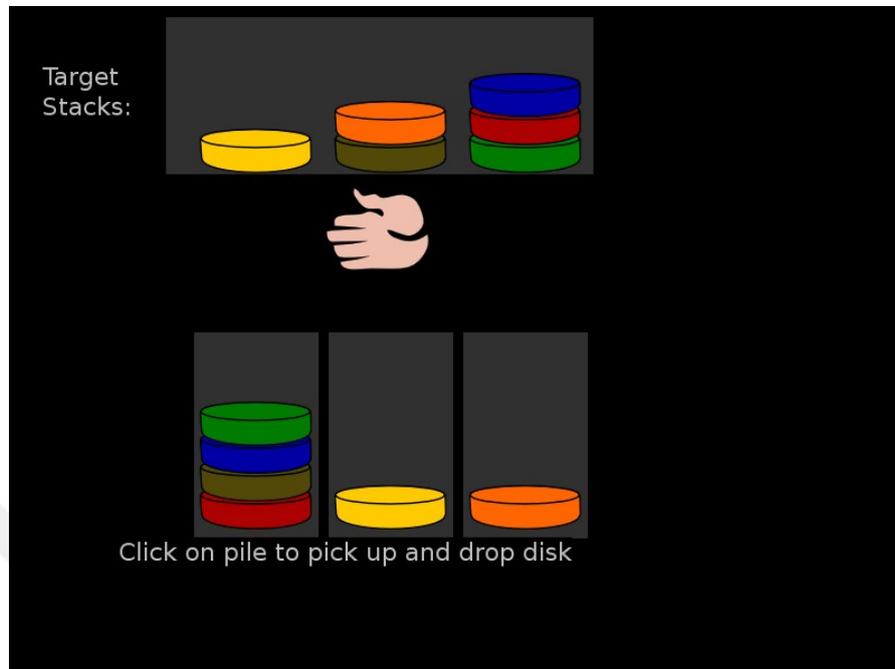


Figure 5: Typical version of Tower of London (PEBL; Mueller, 2011b)

In Tower of London tasks, participants rearrange a set of balls to achieve a particular configuration that necessitates activity sequences to reach the final goal state. Since successful performance of this task is based on the correct execution of a predetermined set of step sequences, TOL tasks are used to measure the executive function of planning, although it was originally developed to measure frontal lobe function. The first Tower of London measure was devised for patients with frontal lobe lesions. It was equipped with simple features as it was developed to assess non-healthy samples (Shallice, 1982) and so was not adequate for use with a healthy population. To overcome this issue, many different versions of TOL were devised (Culbertson & Zillmer, 2001; Fimbel, Lauzon, & Rainville, 2009; Phillips, 1999). Some of the new versions did not differ significantly while others introduced major changes in the tasks such as including a different peg capacity, time limit, and move limit. Schnirman and colleagues (Schnirman, Welsh, & Retzlaff, 1998) made considerable changes to the first TOL. First, they revised and increased the low reliability of Shallice's version of the TOL and named this new version "TOL-R (Tower of London-Revised)" (Humes,

Welsh, Retzlaff, & Cookson, 1997). Second, they included a larger number of problems (30) to increase the task's reliability in comparison with Shallice's version (12). The changes led to TOL-R demonstrating better internal consistency, achieving coefficients such as Cronbach's alpha coefficient of .70s and test-retest reliability coefficient of .70 across different studies and correlated with performance on various other executive function tests (Schnirman et al., 1998; Welsh & Huizinga, 2001; Zook, Welsh, & Ewing, 2006).

TOL-R works on the optimal solution model, that is, trials in the task are required to be solved within a minimum number of possible moves and the difficulty is manipulated by increasing the minimum number of moves required to achieve the goal. Easier trials require fewer moves while harder trials need more detailed sub-goal planning and inhibition of incorrect moves. In easier trials, the solution is obvious. In harder trials, participants are required to handle two challenges in order to rearrange the piles using the least number of the moves. The first challenge in the task includes removing an obstacle disk that blocks the way to the desired configuration and placing it in the appropriate position. The second challenge encompasses realizing "misleading conditions." Misleading conditions appear as obvious solutions for the configuration yet mislead participants into moving the disk to the wrong place. One wrong movement made while removing an obstacle or following misleading conditions leads to an incomplete trial, although the remaining movement rights or time are reserved. Thus, the task requires participants to plan each of their moves before attempting to move the disks and assesses planning abilities on the basis of the number of complete trials.

In addition to its psychometric and contextual benefits, TOL-R encompasses important advantages over other Tower of London tasks such as time limitation, move limit (number of moves restriction), different pile capacity, and complexity of trials. These advantages make the Tower of London-R an appropriate objective measure of planning ability for non-clinical, healthy and highly educated individuals. Other versions are not complex enough to use with university students. Furthermore, the literature suggests that a Tower of London task should necessitate at least four or more steps (minimum number of moves required to solve the problem) to ensure the required difficulty level for adult participants (Asato, Sweeney, & Luna, 2006). Thus, TOL-R meets the criteria of reliable assessment and could be used to assess planning abilities of members of the non-clinical and highly educated population such as university students. To sum up, TOL-R is the most appropriate objective measure of the executive function

of planning to use with university students out of the ten different versions of Tower of London and other planning measures.

8.2.1. Hope components and Executive Function of Planning

Executive functions are core cognitive processes that are associated with the prefrontal cortex; this region of the brain is responsible for forming goals, generating plans of actions for achieving these goals, selecting the necessary skills to implement the plan, and using the skills in a hierarchical order (Goldberg, 2002). Thus, executive functions are considered to play a pivotal role in carrying out goal-directed behaviours. Planning is conceptualized as a subdomain of an executive function that is involved in the formation and execution of goal-directed plans, the cognitive or behavioural organization of activity sequences and goal-directed behavior.

In their Supervisory Attentional model of executive function, Norman and Shallice (1980) mentioned two types of human functioning in terms of programming and regulation of action: contention scheduling and the supervisory attentional system. Contention scheduling is involved in routine and overlearned behaviours while the supervisory attentional system emerges in novel and non-routine tasks. The executive function of planning is one of the abilities that is responsible for non-routine situations. Based on their model, Norman and Shallice (1980) suggested that planning is a process that enables individuals to attain a goal when no existing schema is sufficient. The process of hope, the formation of goals and the production of paths towards the desired goal requires new and non-routine responses. In this context, Kruger (2011) supported the relationship between hope and self-report planning. Yet, the most shared theoretical convergence occurs between the executive function of planning and the pathways thinking component of hope. Specifically, pathways thinking is conceptualized on the basis of two characteristics: producing routes toward the desired goal or generating new means when the original route is no longer efficient and working (Snyder et al., 1991). Furthermore, pathways thinking reflects perceived planning to attain the desired goals. For Snyder (2002), low-hope people do not demonstrate strong pathways thinking and their planned route to their desired goal is not well-articulated. Likewise, among other core and crucial executive functions, planning is the executive function that enables individuals to produce step sequences in order to attain their goal (Burgess, Veitch, de Lacy Costello, & Shallice, 2000). Additionally, Chapter 7 of this thesis also supports the significant and positive link between pathways thinking and self-report planning.

Although conceptual similarity is obvious, no study has as yet examined the association between hope components and the executive function of planning with objective tasks until this date. Given that pathways thinking requires generating a plan to achieve the identified goal or produce alternative ways to reach the goal, the executive function of planning should be associated with pathways thinking.

8.2.2. The Hypothesis and Research Questions

This study examines the relationship between hope components and the actual performance of planning using the Tower of London- Revised task. No study was found in the literature that examined the relationship between the objective performances of planning and hope components. Yet, preliminary evidence reported in Chapter 7 demonstrated that four executive functions (Motivational Drive, Empathy, Organization and Planning) are significantly and positively related with both agency and pathways. However, the results rely on self-report measures which, as the literature suggests, may not reflect the actual performance of executive functions (Buchanan, 2016; Schiehser et al., 2011). Hence, the executive function of planning and its association with hope components will be examined with a widely used objective measure, the Tower of London-Revised. In this study, the executive function of planning will be examined among other functions (Motivational Drive, Empathy and Organization) since planning is considered to be one of the higher order, centralized executive functions. In this regard, it was hypothesized that the level of accuracy on the Tower of London-R correlate positively and significantly with agency and pathways thinking.

Research Question 1: Is there any relationship between agency-pathways and executive function of planning on TOL-R?

Research Question 2: Is there any relationship between agency-pathways and accuracy of the different levels of TOL-R?

8.3. Method for Study 5

8.3.1. Participants

Participants were 49 undergraduate and post graduate students from University of Leicester (21 males, 28 females). The mean age of the sample was 22.17 (SD=4.66) years.

8.3.2. Measures

8.3.2.1. Adult Dispositional Hope Scale (Snyder et al., 1991). ADHS is 12-item self-report questionnaire scored on an 8-point Likert Scale (1-8). Items 3, 5, 7, 11 are distractors in the test. Items 2, 9, 10, 12 assess agentic thinking (e.g. “I energetically pursue my goals”) and the sum of the items results in the agency subscale score. Items 1, 4, 6, 8 measure pathways thinking (e.g. “I can think of many ways to get out of a jam”) and the summation of the scores of the items produces the pathways subscale score. The total hope score (which ranges from 8 to 64) is obtained by summing the two subscales. Higher total scores yield higher levels of hope while lower scores demonstrate lower hope levels. In terms of the psychometric properties of the scale, previous studies have established good and acceptable levels of reliability for Cronbach’s α coefficients for the total hope score of the measure, ranging from .74 to .80 for six different samples of undergraduate students and two different samples with mental health problems. Test-retest correlations revealed .80 and above over a ten week interval (Snyder et al., 1991).

8.3.2.2. Tower of London-Revised (Schnirman et al., 1998). The Tower of London-R task requires participants to transform a pile of disks from their original configuration to a predetermined configuration demonstrated at the top of the screen. A typical rule of all TOL tasks is that participants can only move the disks at the top of the piles and move one disk at a time. Each of the three piles has limited disk capacity, for instance the first pile can hold all three disks, the second pile holds up to two disks and the last one fits only one disk. To move a disk, participants click on the disk they want to move, the disk will go to the hand and then they click the pile that they want to place the disk on and the disk will be placed on the pile they clicked. They are given a limited time for each trial (2 minutes) and a limited number of moves for each problem (which differs for each trial based on the complexity of the problem). If the participant cannot solve the problem within the allocated time or move limit, the next problem will automatically appear, which results in a failure in terms of the previous trial.

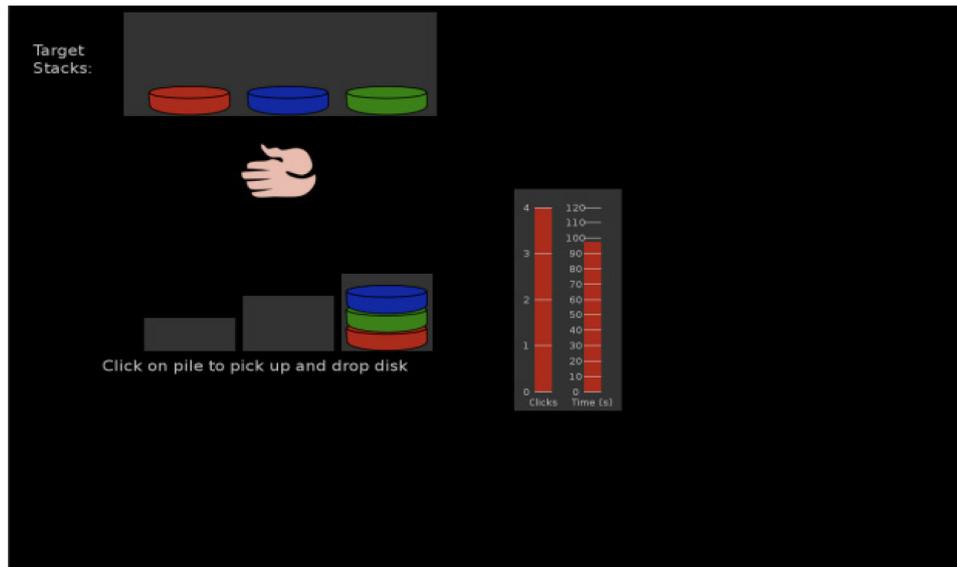


Figure 6: Screenshot from PEBL TOL-R

Figure 6 demonstrates the screenshot of the first trial of TOL-R. Participants move the different colored-disks at the bottom to produce the predetermined configuration at the top of the screen. As seen, there are three piles to place the disks in and each pile has a different capacity (1,2,3). The four-point scale appearing on the right indicates that the participant must complete the trial in four moves and the scale next to it indicates the time remaining. Participants are awarded one point if the trial is completed within these restrictions. Incomplete trials result in 0 points.

In terms of the outcome variable, TOL-R provides two types of measure, namely, accuracy and performance time. Performance in the task is determined by the percentage of trials completed within two minutes. Since each participant is allocated the same amount of time, the only outcome measure in the task is accuracy.

8.3.3. Procedure

The study procedure received ethical approval from the University of Leicester's School of Psychology Ethics Board. The students enrolled in the study through EPR and got credit for their participation. The consent form contained information on the nature of the study, an assurance of anonymity, information on the right to withdraw from the study both during and after participation and information on how the data would be stored in a coded form, how to obtain the results of the study if required and the intended use, period of storage, and eventual disposal of the data. After gathering the consent forms, the TOL-R (Schnirman et al., 1998) and Adult Dispositional Hope Scale were administered the participants in the order mentioned (Snyder et al., 1991). The

study took approximately 30-35 minutes: ADHS (5-7 minutes) and TOL-R (25-30 minutes).

8.3.4. Data Analysis

The analysis was undertaken using SPSS version 22. Scores were calculated, and a Pearson Product-Moment correlation analysis was used to examine the relationship between executive function of Planning and the hope components, agency and pathways.

8.4 Results for Study 5

Table 19 provides the mean scores and standard deviations for agency, pathways and TOL performance scores for this study and for previous studies conducted using college students (Day et al., 2010; Zook et al., 2006). As shown in the table, mean scores for current and previous studies are considerably different. In order to examine whether this difference is statistically significant, an independent sample t-test was performed with SPSS. Table 19 also demonstrates the t-statistics for the variables comparing for current and previous studies.

Table 19: Mean Scores and Standard Deviations of variables and t-statistics for current and previous studies

	Current Study		Previous Studies		t-statistics		
	Mean	SD	Mean	SD	t	df	Sig
Agency	22.95	4.83	18.85	7.7	3.47	176	.001
Pathways	23.02	4.30	17.44	6.9	5.28	176	.001
TOL-R	18.29	5.03	23.11	3.92	-4.73	82	.001

Note. Tasks abbreviated as follows: TOL= Performance on Tower of London; df=degrees of freedom.

As Table 19 demonstrates, agency, pathways and TOL-R scores were significantly different in the current and previous studies. For instance, participants reported higher agency and pathways scores for current study while previous studies reported lower scores for TOL-R scores. In order to understand the relationship, bivariate correlations were conducted to determine the association between the components of hope and the accuracy measures of the Tower of London-R. Pearson's correlation analyses were performed since the scores were normally distributed. Table 20 shows the correlation analyses for agency, pathways and the executive function of planning. The results indicate that there is a non-significant relationship between the components of hope and planning.

Table 20: Correlation results for agency, pathways and TOL-R

	Agency	Pathways	TOL-R
Agency	1		
Pathways	.690**	1	
TOL-R	-.050	.030	1

Note. TOL-R= Performance on TOL-R scores $p^{**} < .001$

In order to examine the difficulty levels and their relation to the components of hope, correlational analyses were conducted between the variables. The first ten trials are based on 4-move lengths, the second ten on 5-move length, and the last 9 on 6-move lengths, and one trial on 7-move lengths. The correlation between agency and pathways components and performance for each type of move-length was calculated. Since the scores for all the variables demonstrated a normal distribution, Pearson's correlation analysis was conducted.

Table 21: Intercorrelations between hope components and performance on different move lengths

	Agency	Pathways	Four-move	Five-move	Six-move
Agency	1				
Pathways	.690**	1			
Four-move	-.028	-.020	1		
Five-move	-.121	-.010	.391**	1	
Six-move	.003	.014	.439**	.463**	1

Note. $p^{**} < .001$

As seen in Table 21, no significant correlations were found between the dimensions of hope and performance at each of the difficulty levels of TOL. Additionally, in order to determine the degree to which the performance on the test was influenced by move lengths, a repeated measures ANOVA analysis was conducted. There was a statistically significant difference between difficulty levels on test performance as determined by repeated measures ANOVA, $F_{(2, 144)} = 10.33$, $p < .001$. A Bonferroni test revealed that participants performed significantly better on four-move difficulty levels ($M = 71.84$) than five-move ($M = 54.29$) and six-move levels ($M = 55.84$). There was no statistically significant difference between five-move and six-move level performances.



Additional Study

Study 6 Investigation of the Relationship between EFI and TOL-R

The results of the correlation analysis regarding the Tower of London-Revised task and hope components were reported above. As the findings demonstrate, no relationship was found to exist between the measures. Yet, in Chapter 7, the self-report executive function test (EFI) revealed that self-report planning is related to both agency and pathways thinking. On the contrary, the results reported in this chapter show that there is no association between actual performances on the objective task of planning and hope components. Thus, an additional study was conducted to investigate whether a self-report EFI test and performance on an objective planning task is correlated.

8.5. Method for Study 6

8.5.1. Participants

The participants were 39 (15 males and 24 females) undergraduate and postgraduate students from University of Leicester.

8.5.2. Measures

8.5.2.1. EFI. The scale was used to measure the self-report executive functions reported in Chapter 7 above. EFI is 27-item self-report executive function questionnaire that is based on a 5-point Likert scale. The questionnaire measures five self-report executive functions, namely, Motivational Drive, Empathy, Inhibition, Control, Organization and Strategic Planning. Out of the five executive functions, only the scores relating to Strategic Planning were calculated as this is the only relevant dimension.

8.5.2.2. Tower of London-R. As mentioned above, the Tower of London task measures actual performance of the executive function of planning.

8.5.3. Procedure

Participants were recruited through the EPR system at the University of Leicester. After securing study approval from the University of Leicester's School of Psychology Ethics Board, this study was advertised through the EPR which is a University of Leicester system that allows researchers to find participants and enables students to earn extra course credit for their participation in studies. The consent form contained information on the nature of the study, an assurance of anonymity, information on the right to withdraw from the study both during and after participation

and information on how the data would be stored in a coded form, how to obtain the results of the study if required and the intended use, period of storage, and eventual disposal of the data. After gathering the consent forms, the TOL-R (Schnirman et al., 1998) and Executive Function Index (EFI) (Spinella, 2005) were administered the participants in the order mentioned in a quiet room in the Psychology building. Administration of the tests took approximately 35-40 minutes: TOL-R (25-30 minutes) and EFI (5-10 minutes).

8.5.4. Data Analysis

The analysis was undertaken using SPSS version 22. Scores were calculated, and a Pearson Product-Moment correlation analysis was used to examine the relationship between executive function of Planning and the hope components, agency and pathways.

8.6. Results for Study 6

As the scores were normally distributed, Pearson's product-moment correlation analyses were performed. Table 22 demonstrates the intercorrelations between the measures and mean and standard deviation of the measures.

Table 22: Intercorrelations of performance on TOL-R, total EFI score and Strategic Planning dimension of EFI, Mean and Standard Deviation of the scores.

	TOL	EFI	EFI-SP	Mean	SD
TOL	1			17.97	5.06
EFI	.005	1		91.63	10.61
EFI-SP	.117	.435**	1	24.39	3.85

Note. TOL= Performance on Tower of London, EFI= Self-report Executive Function Index, EFI-SP= Strategic planning dimension of EFI test.

As the results demonstrate, no relationship was found between actual performance on TOL-R and either the total score of the self-report EFI test or its domain of Strategic Planning. Thus, the self-report EFI and its dimension regarding planning was not found to be related to the objective task of planning.

8.7. Discussion

This study mainly aimed to examine the relationship between hope and one of the crucial and centralized executive functions, planning, with TOL-R. In this study, it was hypothesized that performance on objective measures of planning (TOL-R) would be significantly and positively correlated with both the agency and pathways component. Although Chapter 7 identified a strong link between self-report strategic planning and both of the hope components, the objective measure did not verify the results and no significant correlation was found between the constructs. The results of this study are not consistent with either Kruger's (2011) results or the results reported in Chapter 7 of this thesis which are the only existing studies that investigate the relationship between hope and the executive function of planning. In both studies, self-report planning was found to be significantly and positively related to hope components. Yet, the same effect was not found in the actual performance on the objective task of planning in Study 5 in this thesis. Although null results should be interpreted cautiously, it is possible to interpret the results of a non-significant relationship between the constructs on the basis of very low effect sizes. This might suggest that the executive function of planning is not related to hope. As a second hypothesis, it was expected that a significant relationship between the hope components and performance on different difficulty levels of TOL would be found. In terms of correlational analysis between the difficulty levels of planning and hope components, no significant correlation was found between the constructs. This might suggest that agency or pathways does not demonstrate any association with situations that require a high, middle or low level of planning ability.

Surprisingly, the findings of Chapter 7 that examined the relationship between hope components and self-report EF measures were not confirmed by this study. In Chapter 7, the Strategic Planning scores were significantly predicted by both agency and pathways thinking. In this study, no relationship was evident between the measures. The literature mentions that self-report EF tests do not demonstrate association with objective executive functions tasks (Buchanan, 2016). Thus, Study 6 was conducted in order to understand whether the self-report EFI and its planning dimension is correlated with TOL-R. Yet, no association was found between the measures, as the results of Study 5 demonstrate. One potential explanation for obtaining significant findings with self-report measures but non-significant results with objective tasks might be that self-report EF tests might be attributable to personality variables, but not to the actual

performance of executive functions (Buchanan, 2016). Thus, the self-report test results will be discarded and further studies of this thesis will use the findings of the objective measures of executive functioning.

Comparison of the means and standard deviations for this study and previous studies showed that this study obtained higher mean scores for hope components and lower TOL performance scores when compared to previous scores obtained. Additionally, repeated measures ANOVA results demonstrated that participants performed better on the four-move level than the five-move and six-move levels. No difference was found between five and six-move difficulty levels. This finding is concordant with the findings of previous research (Zook et al., 2006). One possible explanation for the result is that five and six-move levels are more difficult to carry out due to the higher demand to remember each planned step in working memory while executing the plan. Hence, participants are likely to perform better on the easiest problems (four-move) than the more difficult problems (five-move and six-move) because of the working memory demands. Yet, no significant difference was found between five-move and six-move levels. This is attributable to the configuration cues in six-move level problems which may lessen the demand for working memory compared to the five-move levels (Zook et al., 2006).

As mentioned in the introduction, planning is considered to be one of the higher order executive functions and cognitive processes in which various other executive functions are involved. For instance, this process requires multiple administration of basic EFs such as the retaining of information regarding activity sequences and strategies on workspace (working memory) or inhibition of goal-irrelevant strategies (inhibition) (Asato et al., 2006). Thus, it is hard to interpret whether the non-significant relationship result is attributable merely to planning or whether other basic executive functions have also affected the results. Hence in the next chapter, the relationship of hope components and basic executive functions will be examined in order to elaborate on the findings.

There may be a few limitations in this study. First, administering more than one measure for each variable might have strengthened the results of the study. The executive function of planning was assessed with one measure, which is the TOL-R. The inclusion of several other cognitive performance tests would have established whether the results were valid across different tests. Second, the majority of the participants were undergraduate and postgraduate students at the University of

Leicester. Thus, it can be said that the results might have been affected by the nature of the sample. In future studies, it is recommended that the sample include participants from different populations.

In conclusion, hope appears to have no significant relationship with the executive function of planning. The findings of this study are important in terms of examining objective scores of planning and association with hope. The literature and Chapter 7 of this thesis suggest that self-report planning and hope are related. Yet, actual performance on objective test revealed the opposite. In Chapter 9, three centralized and crucial executive functions, namely, working memory, inhibition and shifting will be examined.

As aforementioned, the thesis plan included using the findings of the self-report executive function (Chapter 7) and re-examining these findings with actual performance on objective executive tasks in this chapter and Chapter 7. Yet, Study 6 reported in this chapter revealed that actual performance of planning is not related to either the total EFI or, more importantly, to the strategic planning domain of EFI. Thus, the findings of Chapter 7 will be disregarded. In the next chapter, three core and basic executive functions and their relationship with hope will be examined.

Chapter 9

Investigating the Association between Hope and Executive Functions with Objective Tests

9.1. Abstract

Links have been recently established between hope and executive functions with self-report tests. Yet, no studies have examined whether actual performance in executive tasks is related to the construct hope. The current study examined performance in three core and important executive functions, namely working memory, inhibition and shifting and their relationship with the components of hope. In terms of objective tasks, Corsi Block-Tapping Task (working memory), Stroop Task (inhibition), and Switcher Task (shifting) were administered 100 university students. Results of correlation analyses revealed no statistically significant relationship between targeted executive functions and the components of hope, agency and pathways. Possible explanations were discussed.

9.2. Introduction

Executive functions (EF) are one of the crucial core concepts in understanding complex cognitive processes and key abilities in the development of goal-oriented behaviours. Although their importance is evident in contributing to the complex processes, much of the knowledge regarding EF is controversial in the literature. For instance, one of the important questions raised with regard to understanding executive functions undoubtedly involves whether these functions are reflections of one unitary central executive or separate yet interdependent abilities. In this regard, Baddeley (1986) and Norman and Shallice (1980) proposed unitary models suggesting that there is a common and unifying mechanism that characterizes frontal lobe functions and executive functioning. Yet, two lines of evidence demonstrate the non-unitary nature of executive functioning. First, clinical observations of frontal lobe patients reveal that these patients do not perform similarly in different executive tasks. Studies have also suggested that patients who failed in the Tower of London Task might pass the Wisconsin Card Sorting Task (e.g. Godefroy, Cabaret, Petit-Chenal, Pruvo, & Rousseaux, 1999). Second, individual difference studies consistently document the low intercorrelations or non-significant relationships among the measures of executive function tests. Based on the notion that executive functions are non-unitary and separable, various specific executive functions were introduced in the literature.

Although various models of executive functions exist, there is a general consensus that there are three core executive functions: working memory (updating), inhibition control and cognitive flexibility (Miyake et al., 2000). In their study, Miyake et al. suggested that these are the basic executive functions that are separable, and differing levels of these functions are required in complex frontal lobe functions and cognitive tasks. Conceptually, working memory refers to a temporary place which holds information in order that executive functions can process this goal-relevant context, and monitors and codes new information if necessary (Lehto et al., 2003). Inhibition control, on the other hand, refers to the ability that enables individuals to inhibit goal-irrelevant, automatic and pre-potent responses. Finally, shifting involves changing mental sets or tasks in multiple task situations (Miyake et al., 2000).

Working memory is considered to be the cornerstone of cognitive processes and complex goal-directed behaviours (Just & Carpenter, 1992). This key executive function supports the thought system by sustaining information temporarily (Baddeley, 2003). Although there is a consensus surrounding the definition of working memory,

theories and conceptualizations vary in terms of explaining the construct and its unitary or non-unitary nature, role and capacity, relationship with long-term or attentional systems, and so on. One of the crucial debates is whether working memory is identical to short-term memory (STM) or an activated portion of long-term memory (LTM). Studies with amnesic patients demonstrated that such patients could perform working memory tasks well even though they have problems with either long-term or short-term memory. In terms of its non-unitary nature, Baddeley's multidimensional model (A. D. Baddeley & Hitch, 1974) attracted attention; it suggested that working memory consisted of one attentional control system (central executive) and three slave systems, namely phonological loop, visuo-spatial sketchpad and episodic buffer. The central executive is the attentional aspect of working memory and it controls and monitors the processing of information. The phonological loop holds speech-based information while the visuo-spatial sketchpad stores and processes visual and spatial information about an object, such as its appearance and location.

Inhibition control is the cognitive ability to suppress deliberately pre-potent, autonomic, dominant and task-irrelevant stimuli or behavioural responses when required (Miyake et al., 2000). Similar to other executive functions, it is debated whether inhibition control is a one-factor or multidimensional construct. In fact, well-accepted theories have suggested that it is a two-factor construct consisting of motor response inhibition and interference control (Schachar et al., 2007). Motor response inhibition simply refers to inhibiting automatic motor responses while interference control refers to the cognitive control that prevents the interference of competing goal-relevant and irrelevant responses. Of these, interference control appears to have a connection with the construct "hope". Hope is conceptualized as goal-directed thinking and Snyder and colleagues (1991) suggested that higher hope individuals are more likely to achieve their daily or noble goals. Similarly, interference control enables individuals to select the appropriate response that will lead to goal attainment by suppressing inappropriate responses. Theoretically, it is plausible to expect a positive and significant relationship between hope and interference control.

Shifting, also referred to as "mental set shifting", "cognitive flexibility", "attention switching" or "task switching", is one of the important executive functions that helps to maintain goal-directed behaviours by alternating different response sets (Kramer et al., 2007). Task switching involves switching between multiple tasks and

mental sets, and enables individuals to shift attention from one task to another in order to adjust to new situations.

9.2.1. Hope and three core executive functions

Executive functions are crucial cognitive abilities that are governed by the frontal lobe of the brain which has the ability to connect to almost all other areas of the brain, referring the important role of these functions in differing brain processes (Buchsbaum, 2004). In support of this, Fuster (2001) demonstrated how the prefrontal cortex connects to the limbic system and sensory-motor regions. As governed by frontal lobe abilities, executive functions have access to various and vital cognitive, emotional or behavioural systems which highlights the potential relationship between executive functions and various domains.

Not only are they distinguished functions of the frontal lobe, but executive functions are also specifically responsible for goal-directed behaviours. These key cognitive processes governs conscious and effortful goal-directed responses with planning, sequencing, monitoring, inhibition or shifting (Miyake et al., 2000; Salthouse, Atkinson, & Berish, 2003). In relation to goal-directed thinking and enabling individuals to pursue their goals via two cognitive components, the relationship between hope and executive functions becomes of interest.

In general, the construct of hope demonstrates conceptual similarity with the concept of executive functioning. However, this is not limited to the general characteristics of both constructs. Specific executive functions also appear to display some convergence with both hope and its components. For instance, Serino et al. (2006, p. 30) highlighted the importance of working memory, especially in the first phase of goal-directed behaviour, as they argued that it enables individuals to select the most suitable strategies among alternatives in order to achieve a task. As previously explained, pathways thinking assists the production of routes towards desired goals or alternative ways when the original routes are blocked. In this sense, there may be a link with the pathways component of hope. In addition, some of the models distinguish working memory from executive functioning, suggesting that the former provides a workspace to hold goal-related information temporarily in order that the latter can perform operations on the back of this information (Connor, MacKay, & White, 2000). A majority of researchers agree that it is the function that simultaneously stores and processes the information while performing a cognitive task and is responsible for

contributing to various complex cognitions, including learning, comprehension and reasoning (e.g. Miyake & Shah, 1999). Thus, working memory, with its subdomains, enables individuals to store and process goal-relevant information and allows them to achieve their academic, daily or noble goals. In this way, as an executive function, it is one of the best candidates for being related to hope. Second, working memory is one of the most centralized executive functions in the relevant literature; it has received intensive research attention due to its important role in different complex cognitive tasks. Hence, it is research-worthy to examine its relationship with hope.

Similarly, examination of the relationship between performance in inhibition tasks and hope also appears to be of value. As mentioned, inhibition refers to disengaging autonomic and goal-irrelevant responses and behaviours. From the perspective of hope theory, it is impossible to consider that an individual pursues his/her goals without disengaging goal-irrelevant responses or behaviours (Snyder, 2000). Finally, in accordance with theoretical similarities, the executive function of shifting has a potential relationship with pathways thinking. Shifting refers to an individual alternating between mental sets or responses in multiple task situations (Miyake et al., 2000). Individuals who are high in inhibition can switch to alternate responses easier than people who are not. As described by Snyder, one of the characteristics of high pathways thinking people is that they can easily alternate between routes when the original route is no longer available or efficient (Irving et al., 1998; Snyder, 2000). As this suggests, individuals ought to switch flexibly to an alternative route in pursuit of the desired goal when the original path is not efficient. In this regard, it is clear that pathways thinking and shifting should be related.

9.2.2. Current study

The present study aims to investigate the association between actual performance in different executive functions and the components of hope, agency and pathways. As outlined in Chapter 7, the literature highlights the significant link and theoretical overlap between hope and self-report executive functions. Moreover, Chapter 7 points out that hope components are specifically implicated in some self-report executive functions (in Chapter 7, self-report inhibition was not found to be significantly correlated to hope dimensions. Nevertheless, due to the importance of inhibition among executive functions, it will be re-examined with one of the commonly administered objective tests of inhibition). Yet, objective executive tasks are the golden

standard of executive functions (Buchanan, 2016) and better suited to assessing those (Schiehser et al., 2011). Thus, in the current study, the link between “working memory”, “inhibition”, “shifting” and hope were examined with objective executive tests. These three core and interrelated executive functions were selected for various reasons. First, the literature highlights that three of the executive functions are relatively basic and considered to be less complex compared to executive functions such as planning. Varying levels of these basic functions are required in different frontal lobe activities or cognitive processes (Miyake et al., 2000). In addition, examination of basic executive functions is also more reliable. For instance, the higher level of executive functions brings task-impurity problems that refer the possibility of involving other executive functions or cognitive abilities in the executive processes of interest (Burgess, 1997). Therefore, three targeted executive functions in this study will yield clearer results for interpretation since they are precisely defined in the literature and easy to measure due to task-impurity problems (Miyake et al., 2000).

9.2.3. Research Questions

Research Question 1: Is there any relationship between agency-pathways and the executive function of working memory based on the performance on Corsi Block-Tapping Task?

Research Question 2: Is there any relationship between agency-pathways and the executive function of inhibition based on the performance on Stroop Task?

Research Question 3: Is there any relationship between agency-pathways and the executive function of shifting based on the performance on Switcher Task?

9.3. Method

9.3.1. Participants

Participants were 100 undergraduate and post graduate students from University of Leicester (27 males, 73 females). The mean age of the sample was 20.85 (SD=4.24) years.

9.3.2. Measures

9.3.2.1. Adult Dispositional Hope Scale. 12-item self-report hope questionnaire.

9.3.2.2. Corsi Block-Tapping Test. This test was used to assess the executive function of working memory in several studies (e.g. Kessels, Van Zandvoort, Postma, Kappelle, & De Haan, 2000).

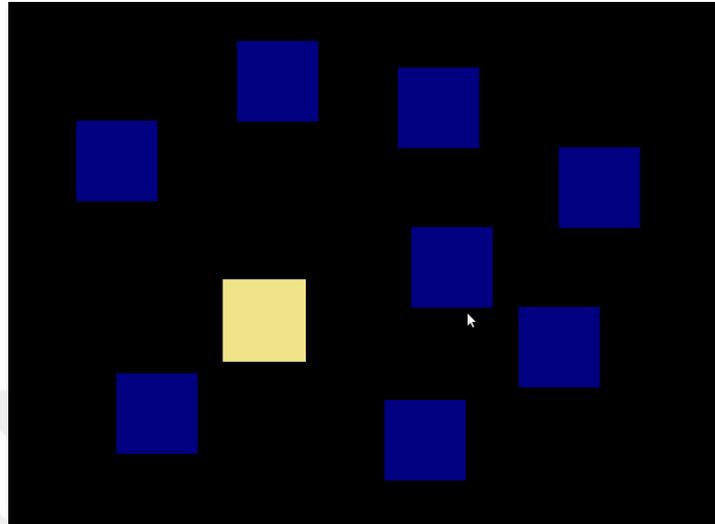


Figure 7: Screenshot from the PEBL Corsi Block-Tapping Test

The PEBL Corsi Block-Tapping Test (Mueller, 2011a) includes nine identical blocks that flash up on the screen in a sequence. At the simplest level, two blocks flash up in an order and the participant is required to remember the sequence and click on the blocks in the exact order. The test ends when the participant fails to remember the correct sequence. The test provides different measures for assessing working memory. The measurement of “Block Span” and “Total Score” will be used for this study since previous literature has recommended analysing these scores. Block Span is simply the number of cubes in the sequence that a participant could remember before the test ended. Total Score is the multiplication of the Block Span score and the total correct trials, which is considered to give more information about the participant’s working memory ability.

9.3.2.3. Stroop Task. The Stroop Test targets the comparison of a participant’s performance in a task in which they need to use a new strategy instead of a habitual response. The task measures the executive function of “inhibition”.

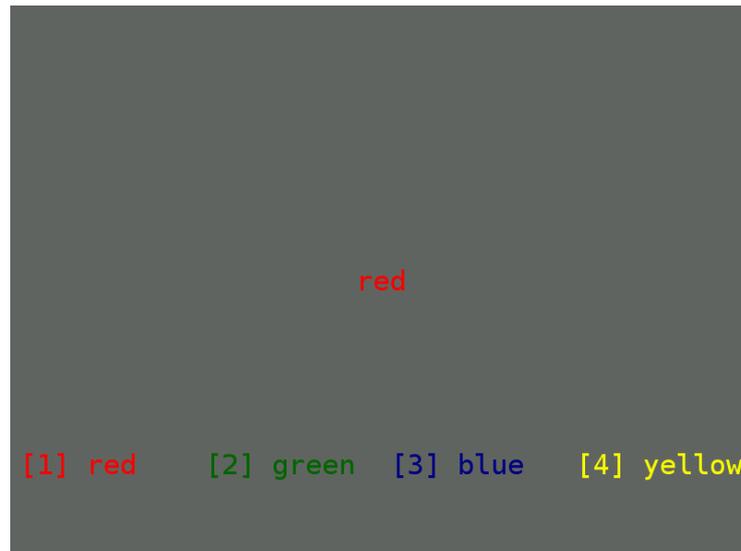


Figure 8: Screenshot from the PEBL Stroop Test

In the computerized administration of the Stroop Test, a Stroop Colour Word Task was selected for the study since the literature has suggested that “interference control” is assessed by this version (e.g. Van Mourik, Oosterlaan, & Sergeant, 2005). In this test, each time, one of three types of word appears on the screen: congruent words, incongruent words and neutral words. Congruent words are those where the word and ink colour do not conflict with each other, such as “Red”, “Blue”, “Green” and “Yellow”. Incongruent words are those where the word and ink colour conflict with each other, such as “Red” or “Yellow”. Neutral words are regular words which are not the name of one of the colours, such as “Hard” or “Easy”. The participants are instructed to click one of the numbers – “1” is associated with red, “2” with blue, “3” with green and “4” with yellow – and the task requires them to disregard the word but instead select the ink colour and click on the relevant number. The paradigm behind the Stroop Task is that it will assess the participants’ inhibition abilities based on their success in respect of the incongruent words which requires ignoring the word but selecting the ink colour. The outcome measure in the Stroop Colour Word Test is “Stroop interference” which is calculated by subtracting the response time for the congruent word from the response time for the incongruent word ($RT_{\text{Ing}} - RT_{\text{Cong}}$) and incongruent word errors ($\text{Error}_{\text{Ing}}$). A higher score on Stroop interference and errors equates to poorer inhibition ability.

9.3.2.4. Switcher Task. The literature has evidenced that switching between different and competing tasks is costly in terms of accuracy, response time or both. A

typical task-switching test involves employing various types of switching paradigms in order to assess the executive function of shifting. These include the alternating runs paradigm in which individuals ought to switch based on a fixed order (Rogers & Monsell, 1995), and the cued task-switching paradigm where participants are simultaneously presented with an instructional cue and no order information (Meiran, 1996). Within these experimental manipulations, participants have to suppress the previous task set and adopt the new set in switching trials compared to the repeat trials (Rogers & Monsell, 1995). Thus, a “switch cost” emerges, which is the decline in response time and accuracy, and this reveals information regarding the participants’ level in terms of switching.

The PEBL Switcher Task is one of the tools which measures switching cost. In this task, there are ten objects on the screen and each object is composed of a letter, colour and shape. In addition, each object matches only one single other object based on the criteria of letter, colour or shape. As the task begins, the computer circles one of the objects automatically and one criterion – a letter, colour or shape – is specified at the top of the screen. Then, the participants are required to select the matching object based on the specified criterion. Once the participants have selected the correct matching object, another criterion is specified and they should “switch” their mental sets and choose the correct object that matches the new criterion.

In order to build repeat and switch trials, there are three different subtasks within the Switcher Task. The first subtask measures the participants’ shifting ability with two different cues and ten objects in a fixed order. For instance, the cues are presented in the order of “Shape, Colour, Shape, Colour...”. The second subtask also represents a repeat test but with the difference of including three cues. Similar to the first task, three cues are presented in a fixed order, such as “Letter, Colour, Shape, Letter, Colour, Shape...”. As a switch trial, the third task presents the cues randomly with no fixed order, such as “Colour, Letter, Colour, Shape, Letter...”.

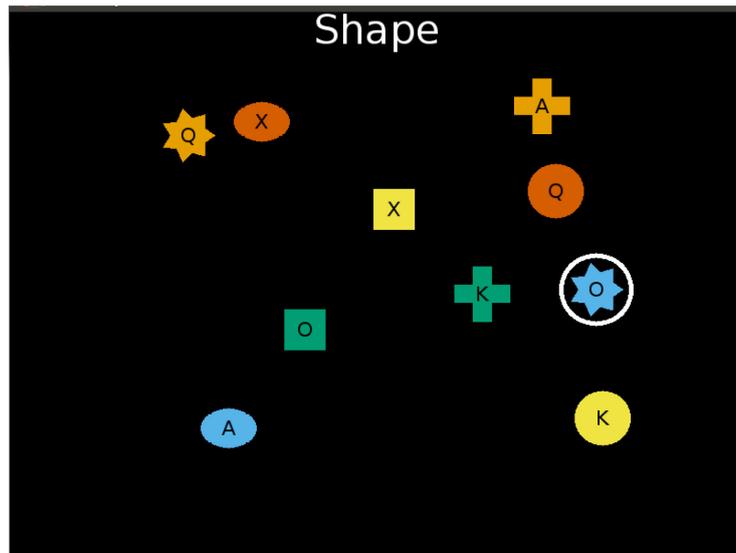


Figure 9: Screenshot from the Switcher Test (Mueller, 2012)

A participant's level of shifting is calculated based on either their response time and/or accuracy (errors). A longer response time or more errors indicates a low level of shifting ability. Thus, it is expected that the study will reveal an inverse relationship between hope and the measures of the Switcher Task.

9.3.3. Procedure

The study was advertised through the EPR online system and the participants were recruited from undergraduate and postgraduate psychology students. The computerized tests used in the study were selected from PEBL software (licensed under GPL). PEBL software allows users to create their own experiments or use various ready-made experimental measures relevant or irrelevant to executive functions. A Corsi Block-Tapping Test (working memory) and Stroop Test (inhibition) and Switcher Task (shifting) were selected from the software and administered the participants in the abovementioned order.

The testing took place in a quiet room at the University of Leicester. The order of test administration was constant as follows: Corsi Block-Tapping Task (working memory), Stroop (inhibition control) and Switcher (shifting). All the tests were administered in an experiment room which housed a desk supporting two 15-inch laptops on which PEBL software was installed. The computerized and self-report tests took approximately half an hour for each participant to complete

9.3.4. Data Analysis

The analysis was undertaken using SPSS version 22. Scores were calculated, and a Pearson Product-Moment correlation analysis was used to examine the relationship between executive functions and the hope components, agency and pathways.

9.4. Results

Table 23 demonstrates the mean scores and standard deviations for agency, pathways, the Corsi Block-Tapping Test, the Stroop Test for the current study and for previous studies that were conducted among college students (Day et al., 2010; Kessels et al., 2000; Wolf et al., 2014). As shown in the table, mean scores for current and previous studies are considerably different for some of the variables. In order to examine whether this difference is statistically significant, an independent sample t-test was performed with SPSS. Table 23 also demonstrates the t-statistics for the variables comparing for current and previous studies.

Table 23: Mean Scores and Standard Deviations of variables and t-statistics for current and previous studies

	Current Study		Previous Studies		t-statistics		
	Mean	SD	Mean	SD	t	df	Sig
Agency	24.13	4.09	18.85	7.7	6.21	227	.001
Pathways	25.00	7.69	17.44	6.9	7.82	227	.001
Block Span	6.31	1.34	6.2	1.3	.53	168	.59
Total Score	59.00	23.54	55.7	20.3	.95	168	.34
Interference	87.52	72.91	89.15	57.48	-.08	111	.94

Note. Block Span and Total score are measures of Corsi Task; Interference is measure of Stroop Task

As observed in Table 23, agency and pathways scores were significantly different in the current and previous studies. For instance, participants reported higher agency and pathways scores for current study compared to the previous studies. However, scores for the measures of Corsi Block Tapping Task and Stroop Task did not demonstrate statistically significant difference.

9.4.1. Stroop Test Data Analyses

Table 24 demonstrates the mean, standard deviation, minimum and maximum scores for two outcome measures of Stroop test, namely incongruency errors (number of errors for incongruency words) and interference (time difference between incongruency and congruency words).

Table 24: Descriptive Statistics for Stroop measures

	Mean	SD	Minimum	Maximum
Incong Errors	7.17	4.30	1.00	22.00
Interference	87.52	72.91	-68.40	370.14

Note. Incong Errors= Incongruency errors

In order to determine the reliability and validity of the test on the sample, interference scores from previous studies were reviewed. The mean scores and standard deviations of the current study and previous studies were found to be similar (Table 26, interference). In addition, the mean scores of the response times for each group were calculated. In the Stroop Test, there are three types of stimuli: “incongruent words”, “neutral words” and “congruent words”. For the test, it is hypothesized that the response time for incongruent words would be longer than for neutral words, with a similar result for neutral words over congruent words ($RT_{CONG} < RT_{NEUT} < RT_{INC}$). The mean scores of the response times for the three groups were found to be as expected ($M_{INC} = 879.85$, $M_{NEUT} = 792.33$, $M_{CONG} = 746.46$). Therefore, in order to determine whether the differences between the mean scores were significant, Repeated Measures ANOVA was performed. The analyses demonstrated significant differences between the three groups: $F_{(1.5, 154.8)} = 194.4$, $p < .001$, $\eta_p^2 = .65$. A Post Hoc Bonferroni Test on the significant main effect of stimuli types showed that in terms of processing speed (response time), the participants were slower for incongruent ($M_{INC} = 879.85$) words than for neutral words ($M_{NEUT} = 792.33$), and for neutral words than for congruent words ($M_{CONG} = 746.46$). The Stroop Test was expected to obtain the stimuli response times in the following way: $RT_{CONG} < RT_{NEUT} < RT_{INC}$. The findings confirm this direction. Thus, it can be concluded that the Stroop effect was observed. Moreover, the magnitude of interference (the Stroop effect) was calculated by $RT_{INC} - RT_{CONG}$ and high levels of interference refer to the poor level of inhibition on behalf of the participant.

The Stroop Test provides two types of outcome measures: response time and errors for incongruent words. The interference measure is considered to be the main outcome measure and is calculated by $(RT_{Inc} - RT_{Cong})$ (Maltby, Day, Pinto, Hogan, & Wood, 2013). Thus, the interference scores were calculated based on the response time scores. Since data is not normally distributed for Stroop errors, Spearman's correlation analysis was performed to examine the relationship between hope dimensions and Stroop measures. Table 25 illustrates the correlation results.

Table 25: Correlation results between components of hope and measures of Stroop

	Agency	Pathways	RTinc	ERinc	Interference
Agency	1				
Pathways	.328**	1			
RTinc	0.76	0.39	1		
ERinc	-.088	-.156	.310**	1	
Interference	.055	-.016	.512**	.253*	1

Note: RTinc= response time for incongruent words; ERinc= incongruent words errors; $p^* < .05$ $p^{**} < .01$

Table 25 depicts the correlation results between the agency and pathways components and Stroop measures. As seen, no significant relationship was found between hope dimensions and incongruent word errors and Stroop interference.

9.4.2. Corsi Block-Tapping Test Data Analysis

Table 26 demonstrates the mean, standard deviation, minimum and maximum scores for two outcome measures of Corsi Block-Tapping Task, namely Block Span (number of cubes in the sequence that a participant could remember before the test ended) and Total Score (multiplication of the Block Span score and the total correct trials).

Table 26: Descriptive statistics for Block Span and Total Score in the Corsi Block-Tapping Test

	Mean	SD	Minimum	Maximum
Block Span	6.31	1.34	3.00	9.00
Total Score	59.00	23.54	12.00	126.00

In order to examine the relationship between hope and working memory, Pearson product-moment correlation analysis was conducted on the agency and pathways scores and the Corsi Block-Tapping Test measures. Table 27 highlights the correlation results between the measures.

Table 27: Correlation results between hope components and measures of Corsi Task

	Agency	Pathways	Block Span	Total Score
Agency	1			
Pathways	.328**	1		
Block Span	.008	.082	1	
Total Score	-.023	.039	.957**	1

Note: Block Span and Total Score are the outcome measures for the Corsi Block-Tapping Test $p^{**} < .01$

As observed in Table 27, no significant correlation was found between the dimensions of hope and the Corsi Block-Tapping measures. Additionally, intercorrelations between hope components and measures of working memory task is very low in effect size. On contrary, as shown above, measures of Corsi Block Tapping Task, namely block span and total score revealed substantial correlations.

9.4.3. Switcher Task Data Analysis

Table 28 demonstrates mean, standard deviation, minimum and maximum scores for outcome measures of Switcher Task, namely accuracy (number of errors) and performance time. As the task has three difficulty levels and one total score (sum of three difficulty levels) for both accuracy and performance time, eight scores were presented as outcome measures.

Table 28: Descriptive Statistics from the Switcher Task

	Mean	SD	Minimum	Maximum
2-Cues Fixed-Order Errors	0.70	1.289	0.00	7.33
3-Cues Fixed-Order Errors	0.58	0.74	0.00	3.67
3-Cues Random-Order Errors	0.73	2.18	0.00	21
2-Cues Fixed PerfTime	28899.21	6095.06	18688	50512.33
3-Cues Fixed PerfTime	28114.07	5549.48	19391.33	45207
3-Cues Random PerfTime	27916.19	6013.38	19274	59125.33
Total Errors	0.67	0.95	0.00	7
Total Performance Time	28309.82	5125.26	19507.33	42169.22

Note: 2-Cues Fixed-Order Errors= Number of errors in the tasks in which 2 stimuli appears in a fixed order; 3-Cues Fixed-Order Errors= = Number of errors in the tasks in which 3 stimuli appears in a fixed order; 3-Cues Random-Order Errors= Number of errors in the tasks in which 3 stimuli appears in a random order; 2-Cues Fixed PerfTime= Performance time in the tasks in which 2 stimuli appears in a fixed order; 3-Cues Fixed PerfTime= Performance time in the tasks in which 3 stimuli appears in a fixed order; 3-Cues Random PerfTime= Performance time in the tasks in which 3 stimuli appears in a random order.

Table 29: Intercorrelations between the components of hope and the Switcher Task

	Agency	Pathways	2-Cues Fixed Error	3-Cues Fixed Error	3-Cues Random Error	2-Cues Fixed Perf Time	3-Cues Fixed Perf Time	3-Cues Random Perf Time	Total Error	Total Perf Time
Agency	1									
Pathways	.532**	1								
2-Cues Fixed Error	-0.091	0.077	1							
3-Cues Fixed Error	-0.004	0.102	.345**	1						
3-Cues Random Error	-0.026	-0.084	0.042	0.076	1					
2-Cues Fixed Perf Time	0.017	0.126	.439**	0.136	0.032	1				
3-Cues Fixed Perf Time	0.087	0.158	0.117	.216*	0.000	.709**	1			
3-Cues Random Perf Time	0.032	-0.034	0.098	0.008	.565**	.588**	.618**	1		
Total Errors	-0.062	-0.003	.574**	.476**	.805**	.259**	0.109	.479**	1	
Total Perf Time	0.051	0.094	.255**	0.135	.234*	.882**	.884**	.847**	.329**	1

Note: 2-Cues Fixed-Order Errors= Number of errors in the tasks in which 2 stimuli appears in a fixed order; 3-Cues Fixed-Order Errors= = Number of errors in the tasks in which 3 stimuli appears in a fixed order; 3-Cues Random-Order Errors= Number of errors in the tasks in which 3 stimuli appears in a random order; 2-Cues Fixed PerfTime= Performance time in the tasks in which 2 stimuli appears in a fixed order; 3-Cues Fixed PerfTime= Performance time in the tasks in which 3 stimuli appears in a fixed order; 3-Cues Random PerfTime= Performance time in the tasks in which 3 stimuli appears in a random order, ** p<.001. * p<.05.

As Table 29 demonstrates, no correlation was found between the components of hope and the measures in the Switcher Task. Moreover, in order to determine the degree to which difficulty levels influenced the performance in the test, repeated measures ANOVA analysis was conducted. There was not a statistically significant difference between difficulty levels in terms of errors or performance times, as determined by repeated measures ANOVA, $F_{(2, 305)} = 10.33$, $p > .05$. A Tukey post-hoc test revealed that the participants did not perform significantly different on the 2-cues fixed ($M = .709$), 3-cues fixed ($M = .585$) and 3-cues random levels ($M = .73$) in terms of errors (consider that the mean for the number of errors is less than 1 error). Similarly, in terms of performance times (in milliseconds), the Tukey post-hoc test revealed that the participants did not perform significantly different on the 2-cues fixed ($M = 28889$), 3-cues fixed ($M = 28114$) and 3-cues random levels ($M = 27916$). As these results demonstrate, performance times decrease from level 1 to level 3, as expected, although no significant difference occurs. Nevertheless, this effect was not observed in terms of number of errors.

9.5. Discussion

This chapter reports on a cross-sectional study that examined the relationship between the components of hope and three core and well-researched executive functions: working memory, inhibition and mental set shifting. In the present study, it was hypothesized that working memory and pathways would be positively and significantly correlated. Yet, the findings demonstrate no significant relationship between these components although effect size is larger and positive with pathways thinking. Second, it was hypothesized that Stroop interference and incongruent errors would be negatively and significantly correlated with both agency and pathways scores since a longer response time and a high number of errors demonstrate poorer levels of inhibition. Although a negative correlation was obtained between the measures, no significant correlation was found. This result is consistent with both Kruger's (2011) study and Study 4 which indicates no significant association between hope and self-report inhibition. Third, shifting and pathways thinking were hypothesized to have a significant and positive correlation since Snyder (1991) suggested that one of the most important characteristics of people with high pathways thinking is that they can switch to other routes and alternative paths when the original route is no longer available. Yet, no association was found between these constructs.

Reliability of the Stroop and Switcher Tasks was calculated and the Stroop effect was observed among the sample. Regarding the Switcher Task, no significant difference in terms of performance was found between the 2-cues fixed, 3-cues fixed and 3-cues random levels, thereby suggesting that the participants did not find it more difficult to switch from the fixed-ordered stimuli to the random stimuli. Thus, the findings must be considered cautiously.

Although such null results should be interpreted with caution, one possibility is that hope is not related to these examined executive functions. One of the support for this interpretation might be the findings of Study 5. The results of this previous study in this thesis also demonstrate a non-significant correlation between the Tower of London Test and hope components. Another possible explanation for the non-significant results could be that neuropsychological batteries and cognitive performance tasks were generally devised for clinical populations. Thus, the employed objective measures may not be sensitive enough to assess normal range variability within highly functioning individuals such as university students (Buchanan, 2016).

The findings of this study are important in terms of presenting the first-ever result regarding the relationship between the components of hope and three basic executive functions that contribute to different cognitive processes. Combining the findings in Chapter 8 with the current chapter's findings, and considering the very low effect size between measures of hope and the Tower of London Test (planning), the Corsi Block-Tapping Task (working memory), the Stroop Test (inhibition) and the Switcher Test (shifting), it is more likely that hope and the examined executive functions are not related among non-clinical, healthy, university participants. On the other hand, hope and executive functioning may result in a significant relationship among neurologically impaired individuals (Buchanan, 2016).

It is important to highlight that such results are based on a restricted sample of university students, mostly undergraduate or postgraduate students. Therefore, the results are not completely generalizable to all cognitively diverse or varying age groups, such as cognitively impaired individuals, elderly participants, young children or non-university students. Despite all the reported possible limitations in terms of generalizability, there is a good chance that non-significant relationships emerge across all samples between hope and the targeted executive functions, considering the large sample of the current study and the similar patterns with the Tower of London Test, the Corsi Block-Tapping Task, the Stroop Test and the Switcher Test. It could also be the

case that different executive functions than the ones reported here may demonstrate a significant relationship with agency and pathways.

This study is important in various ways. First, the literature does not provide any information regarding the relationship between actual performance in executive functioning and either positive psychological characteristics or hope. This is a big gap in the research that needs to be filled. The literature only gently taps the question of whether self-report executive functioning demonstrates a link with positive psychological constructs (Miley & Spinella, 2006; Watson, 2013) or hope (Kruger, 2011). Chapters 8 and 9 document some information regarding such relationships.



Chapter 10

General Discussion

10.1. Abstract

This chapter reviews findings from seven studies, discussing the implications of each with regard to understanding the correlates of trait agency and trait pathways. Section 10.3 summarizes findings from studies 1-3 (Chapter 3-5), discussing the insight they provide into trait agency and trait pathways relative to personality, emotional intelligence (EI), psychological well-being, longer term emotion-related variables. Additionally, Section 10.3 summarizes the findings of studies 4, 5, 6, and 7 (Chapters 7-9), and discusses the implications with regard to understanding the relationship between trait agency-trait pathways and an array of self-report and objective measures of executive functions (EF), which are crucial constructs in terms of cognitive psychology. Section 10.4 discusses the future direction of this research, then Section 10.5 presents the limitations of the studies conducted, and finally section 10.6 outlines the conclusion.

10.2. Overview

This thesis was designed to explore the emotional and cognitive correlates of trait agency and trait pathways by examining trait-like, longer term concepts, and their relationship to agency and pathways among university students. Although literature pertaining to hope integrates a considerable number of studies intended to examine the outcomes associated with individual differences in terms of hope, the current thesis is unique in investigating the emotional and cognitive correlates of agency and pathways thinking, rather than global hope itself. In terms of emotional correlates, this thesis poses biologically determined, robust, well-established constructs in terms of personality and individual differences literature, namely the Big Five personality traits (Costa & MacCrae, 1992), emotional intelligence (Petrides & Furnham, 2000b), and psychological well-being (Ryff & Keyes, 1995). In terms of cognitive correlates, the studies target EF, which is one of the core robust concepts of interest in cognitive psychology, distinctively documenting the relationship between components of hope and specific EFs on both self-reporting and objective assessment. Thus, this thesis contributes to the literature in this area by extensively evaluating the model of hope and by examining the contributions of agency and pathways thinking on biologically based personality and individual differences that comprise variables of relatively stable emotional and cognitive concepts. The findings expand the literature in terms of the correlates of agency/pathways among university students, and provide information that contributes to the understanding of components of hope by examining diverse possible emotional and cognitive variables, thereby making a useful contribution to the literature, which rarely regards the components separately. This chapter provides a detailed analysis of the findings concerning both emotional and cognitive concepts separately, and discusses their implications for theory and practice.

10.3. Summary of the Findings and Implications

This section provides a summary of the findings for conducted studies to understand the relationship between the components of hope and a range of trait-like emotional and cognitive constructs. Figure 10 presents a comprehensive model to clarify the interactions between agency/pathways and several emotional concepts. The figure provides the overall results from each chapter of the current thesis, and highlights the most relevant findings concerning the relationship between trait agency-trait pathways and the dimensions of three emotional concepts: personality, EI, and psychological well-being. As EF was not demonstrated as having a statistically significant relationship with hope, these findings were excluded from the figure. In the figure, the numbers presented reflect the beta weights, showing the magnitude of the dimension with explaining by the hope components ($p^* < .05$, $p^{**} < .01$, $p^{***} < .001$)

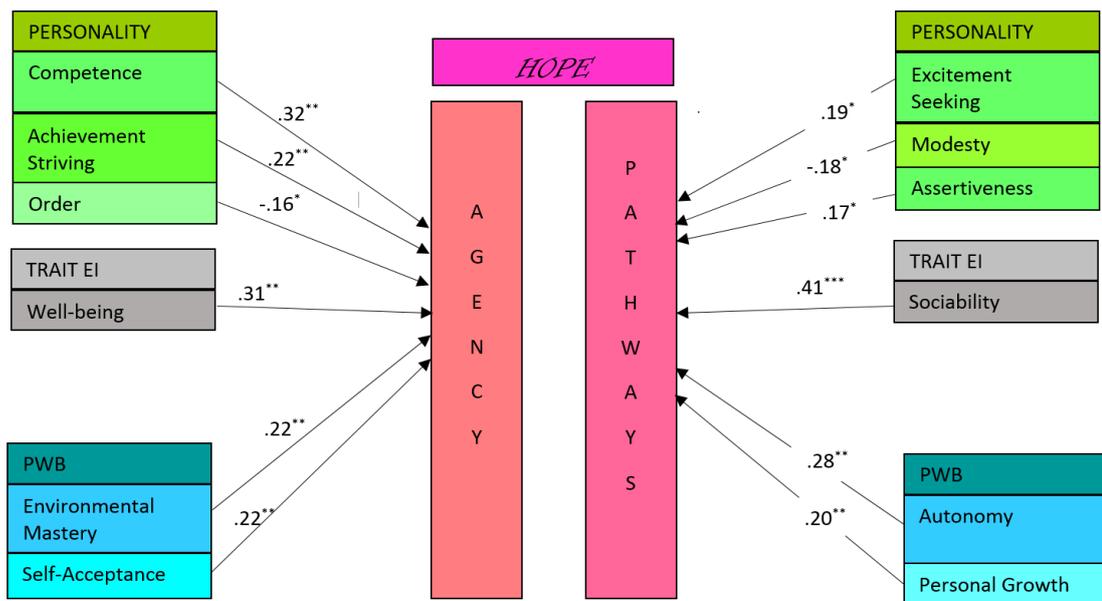


Figure 10: Dimensions of personality, emotional intelligence and psychological well-being that are associated to agency and pathways scores.

10.3.1. Summary of Findings regarding Emotional Constructs

Study 1 (Chapter 3) sets out an initial study to investigate whether agency and pathways are separately associated with factor level and facet level of personality traits. The results from Study 1 revealed that agency and pathways are related at both the

factor and facet levels. In terms of the factor level, the findings demonstrated high levels of agency associated with increased levels of Extraversion, Conscientiousness, Openness to Experience, Agreeableness, and reduced levels of Neuroticism. In terms of facet level traits, agency correlated with all facets, excluding Openness to Fantasy, Openness to Values, Altruism, Compliance and Deliberation. Among the facets with which agency correlated, Competence was found to be the strongest correlate in terms of effect size, while Openness to Feelings was the weakest significant correlate. The strength of this thesis lies in regression analyses; hierarchical multiple regression analyses were performed, revealing that the personality traits of Conscientiousness, Extraversion and Neuroticism respectively explained a significant proportion of the variance emerging within agentic thinking. The results for the hierarchical multiple regression analysis also demonstrated that only the facets of Conscientiousness, namely Competence, Achievement Striving, and Order (inversely) explained the significant level of variance within agentic thinking excluding the effects of age and gender, respectively. In terms of pathways thinking, a Pearson Product-Moment correlation analysis revealed that high levels of pathways thinking are associated with increased levels of Extraversion, Conscientiousness, Openness to Experience, Agreeableness, and reduced levels of Neuroticism. Additionally, pathways thinking correlated with all personality trait facets, excluding Openness to Values and Compliance. Interestingly, Assertiveness was found to have the greatest effect size of all the facets, while Gregariousness was found to have the weakest effect, although it was nevertheless significantly correlated with pathways thinking. The hierarchical multiple regression analysis results also demonstrated that Conscientiousness, Openness to Experience, Neuroticism and Extraversion respectively explain a significant quantity of variance within pathways thinking, when excluding the effects of age and gender. A hierarchical multiple regression analysis focusing on facets of personality traits also revealed that Excitement Seeking, Assertiveness, and Modesty (inversely) all exert significant amounts of variance within pathways thinking.

One of the robust findings of Study 1 demonstrated that the facet Competence (Conscientiousness) accounted for the maximum level of variance in terms of predicting agency, outweighing the Big Five and highlighting the benefits of focusing on fine-grained aspects of personality. Meanwhile, this effect did not inform pathways thinking, as the beta weights of separate global traits outweighed the influence of personality facets. Overall, according to the results obtained in regression, agency is only correlated

with the motivational global trait of personality, i.e. Conscientiousness, as pathways thinking is associated with interpersonal aspects of personality that include Extraversion and Agreeableness. Furthermore, as expected and consistent with the literature, facets of personality traits accounted for a greater amount of variance when compared to the global traits of personality describing both agency and pathways scores by explaining the significant amount of variance at facet levels (agency=44 % pathways=42 %) and the medium amount of variance at global trait levels (agency= 34.5 % pathways=29 %).

Study 2 (Chapter 4) outlines the first study, which examined the relationship between agency-pathways and factors associated with EI. Correlation analyses regarding agency and factors of EI demonstrated that greater levels of agency are associated with higher factors of well-being, self-control, emotionality, and sociability. Of the factors of EI, intercorrelations between trait agency-pathways and well-being revealed the largest effect size. Hierarchical multiple regression analysis results suggested that trait agency was the only component contributing to a unique variance in the emotional intelligence factor of Well-Being, even after controlling for the effects of age, gender and personality traits. Intercorrelations between pathways and emotional intelligence scores revealed higher levels of pathways are associated with higher levels of well-being, self-control, emotionality and sociability. In terms of effect size, sociability was the strongest correlate for pathways thinking among the factors associated with EI. Furthermore, the results of the hierarchical multiple regression analyses revealed that trait pathways explained a significant amount of the variance within the factors of Sociability, when excluding the effects of age, gender and personality traits.

Study 3 (Chapter 5) was the first study conducted to investigate the association between agency-pathways and the indicators associated with Ryff's measure of psychological well-being. In terms of correlational analysis, all the dimensions of psychological well-being were associated with agentic thinking. Among these dimensions, environmental mastery was the strongest correlate of agency, while positive relationships with others was the weakest. The results of the hierarchical multiple regression analysis demonstrated that agency explain the unique variance within the psychological well-being dimension of Environmental Mastery and Self-Acceptance when controlling for the effects of age, gender, personality traits, positive-negative affect and the life satisfaction. In terms of pathways thinking, Pearson product-moment correlation analysis results revealed all dimensions of psychological well-being

were associated with pathways thinking. Similar to agency, Environmental Mastery was the strongest correlate of pathways thinking, while Purpose in Life was the weakest. The hierarchical multiple regression analysis results suggest that the pathways dimension of hope share significant amounts of variance with the psychological well-being dimensions of Autonomy and Personal Growth, when excluding the effects of age, gender, personality traits, positive-negative affect and satisfaction with life.

Considering studies 1-3, one of the crucial findings regarding emotional concepts and hope, trait agency and trait pathways demonstrated incremental validity above age, gender and more importantly personality traits in the prediction of EI and psychological well-being. In studies 2 and 3, key findings were provided, while the influence of personality was controlled for. Substantial correlations were found between components of hope and the dimensions of EI and Psychological Well-being.

In summary, Chapters 3-5 demonstrated a positive and significant relationship between trait agency-trait pathways and longer term emotional constructs; namely, personality, EI, and psychological well-being.

10.3.2. Theoretical Implications Regarding Emotional Constructs

This section discusses the theoretical implications proceeding from the findings documented in this thesis. With regard to the relationship between trait agency/pathways and three emotional variables, strong associations were found between the components of hope and longer term emotional constructs; namely, personality, EI and psychological well-being. A crucial finding to emerge, was that hope pathways, but not hope agency, can be consistently associated with social aspects of personality traits, as documented in chapters 3 and 4. For instance, trait pathways, but not agency, and the two facets of Extraversion (Excitement Seeking and Assertiveness), and the single facet of Agreeableness (Modesty) shared a significant proportion of the variance.

Conceptually, global traits of Extraversion and Agreeableness are deemed intrinsically interpersonal, although all traits incorporate some interpersonal implications (McCrae & Costa, 1989). Distinctively, both the traits directly determine an individual's preferences in terms of quantity of social stimulation, and quality of interpersonal relationship. Similarly, in chapter 4, although trait agency accounted for a unique variance in factor of Well-being scores, pathways thinking explained a significant variance in Sociability factor of EI. Essentially, the conceptualization of pathways thinking does not represent relationships with interpersonal traits in terms of

theoretical background, as it is theorized as a self-perceived capacity to generate routes towards a desired goal. Thus, consistent demonstration of the relationship between interpersonal traits and pathways across the two different samples reported in Studies 1-2 is both surprising and promising. Nevertheless, several additional studies support the current findings.

For instance, several studies have indicated the presence of a strong relationship between hope and perceived social support, although no information has been provided to confirm whether this effect is attributable to pathways thinking, agency, or interactions between both (Barnum et al., 1998b; Irving, Telfer, & Blake, 1997). Additionally, in his book *“Psychology of Hope”*, Snyder (1994) discusses the extent to which optimistic thinking influences interpersonal relationships, consequently promoting hope (Snyder, 1994), once more, however, no conceptualization was provided to explain the components responsible for hope. Although the literature includes no studies detailing the components of hope, drawing on factors associated with interpersonal relations, the findings reported in Chapters 3 and 4 demonstrated that pathways thinking consistently reflect the interpersonal aspects of hope as a construct.

Another important finding regarding pathways thinking concerns the relationship with the trait assertiveness although no theoretical pattern of convergence arose relative to pathways thinking and assertiveness. Meanwhile, the literature does not contain any supporting or opposing studies explaining the relationship between assertiveness and hope pathways thinking and goal achievement, which makes the findings difficult to interpret, although more valuable. Nevertheless, one study by Elliott, Godshall, Herrick, Witty, and Spruell (1991) documented that self-appraisal of effective problem solving abilities can be associated with high levels of assertiveness.

As previously observed, pathways thinking entails a process of self-appraisal regarding one's capacity to support alternative routes when blocked (Snyder et al., 1991). Thus, the findings of the current thesis are surprising. One interpretation of this finding might be that assertiveness is a personality characteristic built upon the ability to express one's complete and genuine feelings and the right to defend one's rights and opinions, while sustaining satisfying and meaningful interpersonal relationships (Bekker, Croon, van Balkom, & Vermeë, 2008). As with other facets of Extraversion, individuals with high levels of assertiveness are action oriented, which is related to the more action oriented aspect of hope, namely pathways thinking. Another consideration when interpreting is to establish whether assertiveness might afford a sense of control

over one's own environment, due to the skills associated with defending one's rights, expressing feelings genuinely and completely, and being able to ask a favour and receive help, in return developing self-referential thoughts regarding one's capacity to generate a route towards desired goals.

On the issue of agency, the findings of Chapters 3 and 4 imply that agency is the component of hope most strongly associated with the motivational and intrapersonal aspects informing individual differences. For instance, agency can be explained only by facets of Conscientiousness, which is unsurprising, since the trait is considered a "will do" aspect of personality (Gottfredson, 2002, p.37). Conceptually, Achievement Striving affords "self-centred" motivation as a basis for success (Weiner, 1994). Considering that the study sample was composed of university students, these findings are predictable. In the framework of EI, agency predicted a significant amount of the variance in the factor of well-being. Essentially, well-being factor of trait EI is composed of intrapersonal facets such as trait Self-esteem (Austin & Vahle, 2016). Consistent with the findings of Chapter 3, trait agency again associates with intrapersonal aspect of trait emotional intelligence, namely well-being. For indicators of psychological well-being, Self-acceptance implies recognition of one's own strengths, limitations, and past reflecting the intrapersonal aspect of psychological well-being. In this regard, perhaps one of the most important contributions of this thesis is that documents the intrapersonal nature of agency, and interpersonal correlates of pathways thinking.

10.3.3. Practical Implications regarding Emotional Constructs

Due to the scarcity of research relating to the differing nature of agency and pathways thinking, issues regarding hope remain unsolved; this thesis will therefore provide beneficial implications for practice. Moreover, in addition to contributing to the literature regarding hope, by providing information pertaining to the relationship between hope components and emotional constructs, and presenting a comprehensive model of hope in relation to variables brought about by individual differences, the results of this thesis offers crucial implications for practice. As suggested by the literature, successful hope interventions were employed to instil or improve hope among children (Edwards & Lopez, 2000), adolescents (Pedrotto, 2000), college students (Feldman & Dreher, 2012), and individuals from a variety of age groups.

Interventions to deliver hope mostly focus on strategies such as goal formation, and attempt to effect improvements to self-referential beliefs regarding goals (agency), and routes generating thinking about how one can attain a goal (pathways). Although these interventions achieve to increase hope levels among participants for several months, follow up findings demonstrate that ultimately individuals' level of hope typically returns to its original level. Generally, the phases of interventions reflect the explicit components of hope. However, there are some implicit characteristics of hopeful thinking that might influence longer term hopefulness such as interpersonal traits determining the amount and quality of interpersonal relationships. In support of this, one study by Wilson et al. (2010) reported that a structured hope intervention demonstrated no success among elderly individuals with depression, failing to either reduce depressive symptoms or increase the participants' level of hope. Nevertheless, a significant reduction in depressive symptoms and increased levels of hope scores (although non-significant) were reported within a control group that was only provided weekly friendly meetings. In this regard, the findings of this thesis might be incorporated to provide interventions associated with hope, delivering longer term success in terms of individuals' hope levels.

Second, a considerable number of studies have documented the association between hope and crucial life outcomes among university students. For instance, in a significant study, Day, Hanson, Maltby, Proctor, and Wood (2010) found that hope is a more accurate predictor of academic achievement among university students than any other variable, including intelligence. Several other studies have cited the positive influence of hopeful thinking on outcomes for students' lives, including reducing academic procrastination (Alexander & Onwuegbuzie, 2007), enhancing subjective well-being (Demirli, Türkmen, & Arik, 2015), effective adjustment (Du & King, 2013), potential entrepreneurship (Staniewski & Awruk, 2016), and engaging in healthy behaviours (Berg, Ritschel, Swan, An, & Ahluwalia, 2011) to name only a few.

Thus, previous studies have offered evidence, similar to that reported here, that hope plays a role in students' lives. Given the importance of the contribution of interpersonal traits and especially assertiveness in hope, specifically pathways thinking, universities and colleges might usefully take steps to provide events and programmes to enhance social interactions and workshops to instil and improve trait assertiveness among students. Although the underlying mechanism is not clear, it evidence shows assertiveness is crucial for pathways thinking. Third, in response to the demonstration

of the robust relationship between pathways thinking and social traits in this thesis, counselling services in universities might usefully focus on instilling or improving pathways thinking by concentrating on developing on the social aspects of students' lives, in order to maximize students' levels of hope, to enable them to cope with their problems.

10.3.4. Summary of Findings regarding Executive Functions (EFs)

This section summarizes the findings of studies 4-6, which were conducted to understand the relationship between the components of hope and executive functions. Study 4 replicated and extended Kruger's study (2011), and examined the relationship between hope components and self-report EF, using the Executive Function Index (EFI), and similar results were found. The findings revealed that higher levels of agency is associated with higher levels of Motivational Drive, Empathy, Organization and Planning while same effect was found between pathways thinking and Planning. Specifically, Motivational Drive revealed as the strongest correlate for agentic thinking, while Planning was the strongest self-report EF for pathways thinking. Inhibition appeared to have no association with either component.

The self-report planning demonstrated a strong association with both components of hope, and Study 5 was conducted to examine whether such a relationship occurs with the objective measure of Planning, Tower of London-Revised (TOL-R). No association was found between performance on the TOL-R and either of the hope dimensions (agency and pathways). Thus, Study 6 attempted to examine whether there was a relationship between self-report EFI measure and objective measure of Planning (TOL-R). Subsequently, no significant relationship was found between TOL-R and either the total score for EFI or the domain of Strategic Planning on EFI. Hence, it was concluded that the findings of the self-report EF measures might not reflect actual performance as objective measures.

As a higher order EF, planning revealed no association with hope, and so Study 7 was conducted, becoming the first study to investigate the relationship between agency-pathways and three core basic EFs: Working Memory, Inhibition, and Shifting. No significant association was identified between the dimensions of hope (agency, pathways) and performance using the Corsi Block-Tapping Test (Working Memory), the Stroop Task (Inhibition), or the Switcher Task (Shifting).

In summary, studies 4-7 documented the relationship between agency-pathways thinking and crucial EFs. Examinations of self-report EFs revealed both positive and significant correlations between agency and pathways with Planning, Empathy, Motivational Drive and Organization. However, studies with objective measures found statistically non-significant relationships between the components of hope and the performance of Planning, Working memory and Inhibition Control and Shifting.

10.3.5. Theoretical Implications regarding Executive Functions (EFs)

This section discusses the implications of the findings of Studies 4-7 as a means to understand the correlates of agency-pathways, in relation to EFs. When presenting their Hope Theory, Snyder et al. (1991) argued that hope and its components are cognitive in nature. Although this suggestion of the cognitive nature of hope captivated the attention of scholars, research examining the relationship between hope and other cognitive constructs has been elusive. For instance, hope was found to be associated with other cognitive constructs, such as self-efficacy (Lackaye, Margalit, Ziv, & Ziman, 2006) optimism (Van Allen et al., 2016), and coping (Germann et al., 2015). Furthermore, Kruger (2011) identified robust associations between hope and the core constructs of cognitive psychology, namely Executive functioning. However, no studies were conducted to investigate the cognitive aspects of hope with neuropsychological batteries or computerized cognitive assessment tools. When assessing Executive functioning, the literature suggests employing multiple methods, such as self-report measures, objective tasks and observations, to establish the ecological validity of assessment (Meyer et al., 2001). Ecological validity refers to the extent to which assessment of Executive functioning reflects performance in daily life. On this topic, one of the strengths of this thesis is that it effectively documents the relationship between Executive functioning and hope components using both self-report and objective measures, both of which will deliver studies with ecological validity.

The findings of the EF studies in this thesis demonstrated that self-reporting of EFs relates to components of hope. Indeed, equivalent associations could not be found using performance-based tests. Essentially, conflicting results between self-report and objective EF measures are not new to the literature. Several other studies have documented contradictory findings when employing methods intended to assess EFs (Barkley & Fischer, 2011; Buchanan, 2016; Laws, Patel, & Tyson, 2008). Although self-report measures deliver value in terms of assessing daily experiences of EFs,

especially among nonclinical individuals, providing ecological validity for the instruments used, the extent to which these measures objectively tap measurable EFs are debatable. On this issue, a study by Buchanan (2016) suggested the results for self-report EF measures are more highly correlated to personality variables than to the actual performance of EFs. This is in line with this thesis' findings, since self-report Motivational Drive and motivational facets of personality (Conscientiousness) were found to relate to agentic thinking.

In terms of the findings for EF objective measures, no association was found between components attribute to hope and planning, working memory, inhibition, or shifting. According to the APA (American Psychological Association), all non-significant results should be interpreted tentatively, ideally using effect sizes when interpreting them. Based on the advice of the APA, for the null results obtained, this thesis conclude that very small effect sizes across three different EF studies with objective measures might suggest it is unlikely that hope, as a cognitive construct, relates to Executive functioning, at least relative to the four mentioned in this thesis. As Snyder suggests, hope related thinking involves appraising oneself to determine whether it is possible to achieve desired goals (agency) by defining routes towards them (pathways thinking). Although EFs are key cognitive tools in terms of goal-directed behaviours and hopeful thinking is also critical to goal attainment, so called EF might not play a role in the process of hopeful thinking. For instance, planning might contribute to the planning processes when striving to achieve a specified goal, yet it might not contribute to generalized self-appraisals regarding whether one can achieve one's goal (agency) and perceived capacity to produce approaches (pathways thinking). Overall, the results from studies 4-7 suggest links between trait agency-trait pathways are unlikely to be significant in well-educated individuals.

Another possible explanation for the non-significant findings obtained might be because the batteries of neuropsychological and cognitive performance tasks were generally devised for use with clinical populations. Thus, objective measures of EF might not be sufficiently sensitive enough to assess the variations within the normal range when evaluating highly functioning individuals, such as university students (Buchanan, 2016). The literature documents that neuropsychological batteries or computerized cognitive tests are not always sensitive to the executive problems nonclinical individuals' experience. For instance, Chan (2001) conducted a study with a Chinese sample with an objective measure of EF; this was not sufficiently sensitive to

demonstrate the daily executive problems of healthy individuals, although a self-report questionnaire instrument (DEX) was.

Thus, evidence presented in this thesis supports the view that self-report EF questionnaires might not be suitable proxies for measuring EF, as they merely reflect personality variables.

10.4. Proposals for Future Studies

The findings of the current thesis prompted new questions pertaining to the nature of the relationship between trait agency/trait pathways and personality, EI, and psychological well-being, as well as the non-significant relationship with target EFs. Potential future studies could further extend this research by providing answers to these new questions. This section outlines the proposals for potential future studies.

10.4.1. Trait Pathways and Interpersonal Traits

In terms of emotional concepts, the findings of this thesis demonstrated that the pathways component of hope is consistently associated with interpersonal traits under the umbrella of personality and EI, unlike agency. Furthermore, this effect was found to influence the findings of two different samples. Essentially, previous studies have supported the idea that hope is positively correlated with social support (Esteves, Scoloveno, Mahat, Yarcheski, & Scoloveno, 2013), and perceived social support (Barnum, Snyder, Rapoff, Mani, & Thompson, 1998a; Edwards, Ong, & Lopez, 2007; Heaven & Ciarrochi, 2007). In one study, Gibson (1999) found social support predicted most of the variance in terms of hope among patients, interpreting this association as stemming either from interactive power or common factors underlying this association. Although these studies identified the relationship between hope and social support, no study has yet investigated whether this effect relates to global hope, or one of the components of hope, agency, or pathways. Thus, future studies might usefully focus on illuminating the underlying mechanisms behind the consistent association informing trait pathways and interpersonal traits, within the overarching categories of personality and EI.

Another crucial finding pertains to trait assertiveness, which demonstrated a strong association with pathways thinking. Considering no theoretical similarity exists between assertiveness and pathways thinking, this finding is worthy of further

investigation. Although previous studies have documented the relationship between perceived problem solving abilities and assertiveness (Elliott, Godshall, Herrick, Witty, & Spruell, 1991), no studies have to date investigated the links between assertiveness and hope pathways; thus, future studies might usefully elaborate the psychological mechanism underlying this association.

10.4.2. Hope Components and Executive Functioning (EF)

In terms of the cognitive aspects of hope, the findings from the studies in this thesis failed to identify statistically significant relationships between the targeted EFs and agency/pathways among university students, when employing objective measures of planning, working memory, inhibition and shifting. The literature reveals an association between self-report EFs and positive psychological characteristics (Miley & Spinella, 2006), specifically hope (Kruger, 2011). However, no published studies have yet examined this relationship in maximal performance conditions. Thus, the findings of this thesis are essential to document such a relationship. Certainly, although small effect sizes demonstrate the low-possibility of a relationship between trait agency-trait pathways and Executive functioning, the cognitive aspects of components of hope remains inconclusive. Thus, further empirical research is necessary to understand the cognitive nature of agency and pathways relative to EFs. In order to achieve this, the proposed recommendations are as follows. First, studies in this thesis related to only four EFs (planning, working memory, inhibition and shifting) measured with TOL-R, Corsi Block-Tapping Task, Stroop Task, and Switcher Task. Although the so called EFs are considered to be crucial core EFs, which play important roles in other executive or cognitive processes, it is reasonable to assume that the construct hope might relate to other EFs or that significant associations might be found when engaging in different objective tasks. Thus, it is recommended that future studies could be undertaken to investigate the association with different EFs or different objective tasks. Third, studies pertaining to the EFs only recruited university students as participants, a highly educated and nonclinical population. Meanwhile, neuropsychological batteries, or computerized cognitive tasks might not be sufficiently sensitive to detect the subtle differences present when measuring EF among nonclinical populations, since they are not generally designed for this purpose (Buchanan, 2016). Hence, future studies might examine this relationship between different populations, deliberately including clinical groups.

10.4.3. Multiple Other Correlates of Hope Components

The present thesis contributes to the literature regarding hope by providing a comprehensive model of agency and pathways thinking among university students. In order to illuminate the emotional aspects of hope, the traits most frequently associated with it were investigated under the framework of personality, EI and psychological well-being. In addition, the cognitive nature of the components of hope were studied in relation to Executive functioning, and no association found between the constructs. To advance the studies in this thesis, a need for additional research designed to examine multiple other correlates of trait agency and trait pathways among university students is of important. This will provide a fuller understanding of hope components to further literature about hope.

10.5. Limitations

Although the limitations of the studies were discussed in their relevant chapter, this section also discusses the overall limitations pertaining to the studies in general. One of the limitation of the studies in this thesis might include the missing variables in terms of exploring other ideas regarding emotional and cognitive trait-like concepts. Essentially, this thesis explored the constructs that were considered the important emotional and cognitive variables to trait agency and trait pathways. Yet, as with any existing research, an array of the potential variables that might be related to hope were not included in this thesis. One example to these variables might be examining the relationship between trait agency/trait pathways and positive emotional traits/dispositional positive emotions such as joy, contentment, and “epistemological” positive emotions that are considered as facilitating responses to opportunities in the environment such as awe and amusement (Shiota, Campos, Keltner, & Hertenstein, 2004). As noted previously, emotional dispositions are considered as the products of previous goal experiences and inform, facilitate or detriment future goal pursuits in return (Snyder, 2000, p.12). In this regard, positive emotional sets will disposition individuals to seek more goal achievement pursuits. Essentially, this thesis examined dispositional positive emotions with the facet of Positive Emotions under the broad level of Extraversion and regression analysis revealed that facet Positive Emotion could not explain unique variance in either of the hope components. Moreover, the exemplified items describing the facet merely mentions happiness and joy in terms of positive emotional dispositions. In this regard, it is difficult to understand the

relationship between specific positive emotional dispositions and hope components. Thus, the relationship between specific positive emotional dispositions and trait agency/trait pathways remains inconclusive. Hence, future studies might attempt to elaborate such issues. On the other hand, this thesis examined the relationship between trait agency/trait pathways and negative emotional traits through the facets of Neuroticism such as trait anxiety, trait anger/hostility, trait depression and etc. Regression analysis demonstrated none of the facets of Neuroticism explained unique variance in neither of the hope components. Yet, there are various other dispositional negative emotions identified by different other measures that might be related to trait agency and trait pathways. Future studies might consider to include other dispositional negative emotions such as sadness, fear or grief through employing various other measures (e.g. Davis & Panksepp, 2011).

Another limitations of this research is that the studies' participants were all either undergraduate or post-graduate students from the University of Leicester, which might therefore have restricted the generalizability of the results. Second, it is commonly accepted that this group of people are highly educated with higher intelligence and competence. Additionally, there were no clinically low hope scores present in the samples.

To overcome the above problem, individuals with high levels of hopelessness could be included in future studies, i.e. clinical population. In this way, objective EF measures could be obtained to reveal the subtle differences in EF scores. However, conducting a study with clinical population is difficult for a few reasons. First, ethical approval to reach clinical population takes considerable time depending on the nature of the study and it takes longer time when any research involves in participants who are vulnerable or lacking capacity such as depressed individuals. Additionally, researchers who deal with clinical patients are required to take various training before accessing the populations that lengthens the time to even start collecting data. However, the time required for completing PhD did not allow for such studies to be conducted.

Another issue related to the sample is that the model presented detailing the hope components represents the most frequently related traits and indicators defining both agency and pathways for university students. It is possible that different models would emerge if targeting other populations. For instance, this model based on a study with clinical populations might include specific executive functions in the model. Thus,

it could be of considerable value to conduct studies including participants from different backgrounds in order to improve generalizability.

Finally, the studies presented in the current thesis employed a cross-sectional design to understand the correlates of agency and pathways thinking. Further studies should investigate these findings within a longitudinal design framework, to establish whether the findings can deliver causal inferences.

10.6. Conclusions

The aim of this thesis was to improve understanding of the correlates of agency and pathways thinking relative to longer-term emotional and cognitive constructs. The studies reported on in this thesis failed to identify a relationship between trait agency-trait pathways and EF, one of the core and crucial constructs in cognitive psychology. However, a non-relation between hope components and the targeted EFs cannot be conclusively asserted although the small effect sizes between the variables suggest a low possibility of any correlation between variables. Additionally, the studies presented here found a consistent relationship between trait pathways and social aspects, and trait agency and motivational-intrapersonal aspects of personality and EI. Overall, these studies have heightened our understanding regarding trait agency and trait pathways in relation to their cognitive and emotional aspects. For instance, they reflect that hope is a blended construct comprised of both cognitive and emotional individual differences variables. Considering the non-significant relationship, and small effect sizes between the components and executive functioning across the three objectively measured studies, hope is considered to be more strongly related to emotional personality traits than cognitive traits such as EF.

To conclude, this thesis demonstrated that trait agency is strongly linked to motivational-intrapersonal traits, while trait pathways are more related to interpersonal traits within the framework of personality, emotional intelligence and psychological well-being. In terms of its cognitive framework, this thesis found no statistically significant relationship between trait agency-trait pathways and the target executive functions, when using objective measures. Although null results should be interpreted cautiously, very low and similar effect sizes across the three different samples suggest it is unlikely there is a relationship between trait agency-trait pathways and executive functions targeted.

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