

The Psychology of Hope

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Summary

Hope is often argued to be a shield from despair and depression (Korner, 1970; Lazarus, 1999), a source of comfort in times of great uncertainty; a view shared by qualitative research (e.g., Bruininks & Malle, 2005), and colloquial language (e.g., “hold on to hope”). Despite the focus on hope’s benefits in times of uncertainty, in psychological literature hope’s most predominant research has been conceptualised as an expectancy measure, with hope more prominent with greater agentic beliefs about achieving success (Snyder et al., 1991). Conceptualised in this way, hope has produced results similar to other expectancy based measures (e.g., optimism, control beliefs, Aspinwall & Leaf, 2002), and consequently the unique nature of hope is not clear. I posit that hope must involve more than expectation, for if one expects to obtain a desired goal, what need is there to hope?

In this thesis I argue that hope is grounded in uncertainty; it is precisely the uncertainty of reaching a desired goal that engenders hope. The primary focus of the thesis is to investigate an alternative conceptualisation of hope that focuses on the unique role of hope under conditions of greater uncertainty, that is, when individuals perceive low levels of likelihood in obtaining their hoped-for goal. I propose that the unique nature of hope emerges when a desired goal has personal significance and the realisation of that goal is possible (but not necessarily expected). To highlight the uniqueness of hope, my secondary aim is to differentiate hope from expectancy-based concepts, with particular focus on hope’s oft-purported synonym: optimism. And finally, my tertiary aim is to investigate whether a hope conceptualised in possibility has any motivational benefits.

Overall, the findings in this thesis support this new conceptualisation of hope. When perceptions of likelihood were low, hope was rated significantly higher than optimism. However, the distinction between the constructs was not just in overall ratings, but also in their relationships with likelihood. While optimism shared a linear relationship

with likelihood or probability, for those more personally invested in the outcome hope shared a cubic relationship, with hope arising sharply in lower likelihood. Hope in lower likelihood was also positively associated with behaviour. For those more invested in the outcome, hope in possibility was associated with goal-consistent behaviour, greater persistence towards a goal despite negative feedback, and maintaining behaviour over time.

Together these findings provide important evidence in support of a hope conceptualisation not constrained by positive expectations. Rather than arising with the expectation of success, hope's unique nature is in lower likelihood for outcomes of personal significance.

Declaration

‘I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.’

..... Simon Matthew Bury

..... 21/12/2016

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Chapter 2

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Chapter 3

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CHAPTER 1: A New Hope - Possibility and Personal Investment

“Up with you beard, Durin’s son!” he said. “For thus is it spoken: Oft hope is born, when all is forlorn” — J.R.R. Tolkien, The Lord of the Rings

For such a small word *hope* has a breadth of use and meaning that belies its smaller stature; from a benign pleasantry (I hope you enjoy this thesis) to a desperate emotion clung to when success seems improbable. With its great potential for managing times of uncertainty, the latter connotation holds increasing interest for psychological researchers. This sentiment is clearly expressed in colloquial language; we ‘cling to hope’ or are ‘buoyed by hope’ (Averill, Catlin, & Chon, 1990); or in symbolic language such as the (less used) definition of hope as an inlet, small bay or haven (Breznitz, 1986); a hope that protects one from the storming seas. It is also reflected in its argued importance in sustaining one through the most desperate of times (Frankl, 1984), or rallying one towards a desirable possible future (Obama, 2009), or shielding one from despair or depression (Korner, 1970; Lazarus, 1999). Hope is what arises when we perceive that the odds of obtaining a cherished goal are not in our favour.

However, there is a disconnect here between how hope is suggested to be beneficial, that is, in situations of difficulty or adversity, and how it is treated in most predominant theories and research in the psychological literature. Predominant theories in psychology have conceptualised hope as reflecting positive beliefs and confidence about the achievability of a desired outcome (e.g., Snyder et al., 1991); and having operationalised hope accordingly, empirical findings indeed showed similar relationships and benefits for hope as for other constructs that reflect positive expectation, such as optimism (see Aspinwall & Leaf, 2002). Consequently, the unique nature and influence of hope is not clear.

In this thesis I present a psychological conceptualisation of hope that represents its unique nature and is more reflective of hope's colloquial usage in situations of low odds; and in doing so, I address Menninger's (1959) assertion from many years ago that "hope must be distinguished from expectation" (p. 484). Rather than an expectation, I argue hope's unique nature is in uncertainty; it is precisely the uncertainty of reaching a desired goal that causes one to hope. With a goal that one is personally invested in – that is, it is both desirable and of personal significance – I suggest that hope will arise with the mere possibility of obtainment. This thesis aims to propose and test a concept of hope based in possibility and differentiate it from expectancy-based constructs (in this instance optimism), and to investigate motivational properties (if any) of this new hope.

The Advantages of Hope

"We hope because without hope we must despair" (Lazarus, 1999, p. 674). With such strong arguments to the importance of hope, it is surprising that hope has not received more attention in the psychological literature. This is especially true when considering the coverage afforded hope's generally accepted antonym: *hopelessness*. However, hope has not always been viewed as a positive asset to an individual. Perhaps due to hope's affinity with uncertainty, it has often been considered an ill choice on which to base life decisions. Those who live in hope are seen as giving their life to illusion, to ignoring or denying the negative realities in which they live.

The Pandora's Box/Jar myth is a good example of this view. An angry Zeus created Pandora and sent her to earth with a jar full of evils as punishment for mankind. Upon opening the jar, Pandora released all evil and misfortune upon the world, but by the will of Zeus, the lid was closed and only hope remained in the jar (Hesiod, 2000). Although some have suggested that hope remains as a last refuge against human misfortune (Smith, 1983), others insist that it is unlikely that a 'good' would be included amongst a punishment from the archaic Greek gods, and that Hesiod himself warned against hope (e.g., suggesting it

leads to idleness); so, hope in this instance is likely an additional evil that Zeus was reluctant to release on humanity (see Verdenius, 1985). This view of inactivity or impassivity to the vagaries of life has caused others to see hope as a danger, such as Nietzsche (1994) who writes that hope is “the most evil of evils, because it prolongs man’s torment” (p. 28).

However, more generally hope is viewed positively, an asset to shield one from negative life events (Breznitz, 1986; Korner, 1970; Lazarus, 1999). Hope is seen to imbue one with a more positive outlook on life, and motivation to pursue life goals (Korner, 1970), it is seen as “the life instinct” battling against the effects of negative affect (Menninger, 1959, p. 486). Hope is also seen as an aspiration, a positive ideal that one should work towards. This is illustrated in Judaeo-Christian beliefs, which sees hope as central to Christian spirituality, “And now faith, hope and love abide these three...” (1 Corinthians 13:13).

Existing research broadly supports this positive view of hope. Within the medical and nursing literature – where research is predominantly qualitative in nature – hope is generally viewed as a positive asset for patients to have (Clayton et al., 2008; Folkman, 2010; Groopman, 2005). It is generally defined as a positive outlook to one’s own future (Sachs, Kolva, Pessin, Rosenfeld, & Breitbart, 2013), and is broad in its theoretical underpinning, including interpersonal, affective, cognitive, spiritual, and temporal elements (Miller & Powers, 1988; Sachs et al., 2013). The research focuses on levels of hope and coping amongst ill (often terminal) patients, and identifying strategies or interventions to foster or maintain hope (Elliott, 2005). Hope has been linked with better health outcomes post-surgery, increased compliance with rehabilitation (Kortte, Stevenson, Hosey, Castillo, & Wegener, 2012), and better quality of life for terminally ill patients (Chi, 2007).

Within psychology hope has been argued to be a benefit in athletics, academics, physical and mental health, and psychotherapy (Snyder, 2002). It has also been shown to lead to greater support for social change (Greenaway, Cichocka, van Veelen, Likki, & Branscombe, 2016), support for climate policy (Smith & Leiserowitz, 2014), support for policies and actions promoting peace (Cohen-Chen, Crisp, & Halperin, 2015, 2016; Cohen-Chen, Halperin, Crisp, & Gross, 2014), or to buffer individuals against negative feedback (Nelissen, 2017).

Others have argued for the importance of hope as an asset to combat despair and depression (Lazarus, 1999), as a form of coping mechanism (Breznitz, 1986; Korner, 1970), or as a factor in someone continuing treatment (Perley, Winget, & Placci, 1971). If hope is an important protective factor from despair and depression, and helps with coping in situations in which the future is very uncertain, it should be approached in this light. The present project will propose and test a conceptualisation of hope that is influenced by Miceli and Castelfranchi (2010) and other theorists (e.g., Lazarus, 1991, 1999), and is distinct from expectancy-based constructs. Hope is conceived as a positive emotional state engendered with a desirable goal of personal significance whose realisation is possible (but not necessarily expected). Before this view is examined more closely, previous theories and research will be explored in an effort to elucidate and differentiate this new approach.

Theoretical Conceptualisations of Hope

While I argue that hope is distinct from expectancy, hope research in psychology has long treated hope as an expectancy-based construct, for example Stotland (1969) provides an early work on hope. He sees hope as the level of *distortion* between expectation and desire, and the level of hopefulness as derived from the perceived probability of achieving a goal. He argues further that the definition of hope can be *integrated* with other approaches that use a concept of expectation. Stotland provides a broad range of clinical and experimental studies in support of his theory, but did not test it

directly. This conceptualisation of hope is similar to the dictionary definition of hope, “Expectation of something desired; a feeling of expectation and desire combined” (Oxford Dictionary), and that of other authors on hope (Erickson, Post, & Paige, 1975; Staats, 1989). Although these theories emphasise an element of uncertainty, the focus on *expectation* suggests a level of confidence that does not seem appropriate for *hope*. As Miceli and Castelfranchi (2010) argue, hope is less certain than an expectation; if one expects something to occur, they need not hope¹, they need only wait for it to occur, and will be surprised if it does not. Expectation suggests probability greater than chance, whereas I suggest hope requires only that the object of hope be possible. While one should work towards a hoped-for goal, or where no action is currently possible, act as if the goal can be obtained (Pettit, 2004) and be ready to act should the opportunity arise, hope is never the expectation that it will be obtained; it is merely the hope it will.

Expectation also underlies the predominant theory of hope in modern psychology studies. Similarly focused on goal attainment as Stotland (1969), Snyder et al.’s (1991) theory has an abundance of research espousing the benefit of hope in such areas as athletics, academics, physical and mental health and psychotherapy (for a review see Snyder, 2002). It has spawned a dispositional and state measure for adults and children, (Snyder et al., 1991; Snyder et al., 1997; Snyder et al., 1996), as well as a work hope (Juntunen & Wettersten, 2006) and an environment hope scale (Kerret, Orkibi, & Ronen, 2016). In Hope Theory (Snyder, 2000, 2002; Snyder et al., 1991) hope is primarily a cognition based construct, which comprises successful pathway thoughts (the ability to perceive pathways to goals) and successful agency thoughts (the perceived determination to utilise those pathways). Individuals, in this theory of hope, are more hopeful when they can perceive pathways to their goals, and recognise in themselves the personal ability to use these pathways. Emotions then play a secondary role in this theory, and are said to feed

¹ “But hope that is seen is no hope at all. Who hopes for what they already have?” (Romans 8:24)

back into strengthening agency and pathway thoughts. Snyder et al. (1991) argue that hope arises with the reduction of uncertainty, or more specifically, “the high-hope person’s analysis of sufficient agency and pathways in a given goal setting should lead to the perception of relatively high probability of goal attainment” (p.571). Hope then, it seems, is a sense of confidence in being able to achieve one’s goals. Some have questioned the discriminant validity of the hope construct in Hope Theory, suggesting it is very similar in theory and results to other well established psychological constructs, such as self-efficacy, optimism and control beliefs (Aspinwall & Leaf, 2002; Bryant & Cvengros, 2004; Peterson, 2000).

Additionally the egocentric focus on agency within Hope Theory has been described as too individualistic, as a disjoint model of agency which excludes the role of external agency (e.g., significant others, family, spiritual deity) common in more collectivist societies (Bernardo, 2010; Du & King, 2013), and as such Hope Theory has been extended to include an *internal* and *external* locus of hope (Bernardo, 2010). Despite the additions to the model, I do not see the focus on personal agency as merely a cultural bias. Even in Western culture, agency does not lie solely within the individual, for example we hope that surgery will go well or that our football team will win; we also have altruistic hopes for others (Averill et al., 1990; Bruininks & Malle, 2005; Howell & Buro, 2017) or in a collective agency (Bar-Tal, 2001; McGeer, 2004). Agency, although it can be an aspect of an assessment of hope, is not necessarily integral. Hope it seems arises when we are uncertain (Pettit, 2004) or recognise our sole inability to obtain our hoped-for outcome (McGeer, 2004), or even without the “belief in oneself to generate the outcome” (Tong, Lim, Fredrickson, & Chang, 2010, p. 1213). While agency may play a part in hope, it is more often when things feel out of our control that hope is employed as a strategy (Bruininks & Malle, 2005).

The focus on agency and internal locus of control in Hope Theory also ties in with its view of hope as personal resource and individual disposition, similar to an empirically tested version of Stotland's theory (Erickson et al., 1975). Although hope is defined as goal focused, both approaches view this as a general individualistic hopeful approach to all goals. While I concede that some people may be more inclined to turn to hope, or their circumstances are more often plagued by uncertainty, in this current approach I argue that personal investment in the goal has a greater impact on hope. Similarly, although future goal directed, Snyder's measures contain only one item that measures the future, and the other items measure previous experiences of successful agency and pathway thoughts. Tong et al. (2010) tested Hope Theory's dispositional and state measures against a measure with items containing the word 'hope', and found that only the agency thoughts items were related to hope across four studies. They, however, also suggest that the agency items (e.g., "My past experiences have prepared me well for my future"; Snyder et al., 1991, p. 585), rather than reflecting an individual agentic quality (as intended), reflect rather a general belief that goals can be attained (or have so in the past), which they believe fits more with other studies on hope (e.g., Bruininks & Malle, 2005) that suggest desired goals are attainable even if "personal resources are exhausted" (Tong et al., 2010, p. 1213). Although past success in using hope may encourage its further use as a strategy, I argue that the significance of the current goal will be a stronger determinant of hope.

While the tying of hope to positive expectation and confidence in one's agency has been a feature of the most prominent theory of hope, the present thesis will challenge this view. Likewise, Korner (1970) makes an early attempt to conceptualise a hope distinct from expectancy or anticipatory conceptualisations. Korner's approach to hope was influenced by his therapeutic work and has not been empirically tested. He views hope as purposeful (e.g., defence against despair, coping), making similar suggestions to the sustaining nature of hope and the consequences of its loss (e.g., devastating despair, death)

as Frankl (1984). Based around his clinical observations, Korner suggests hope contains an *affective component* and a *rationalising chain*. The affective component is the emotional significance of the hoped-for item to the individual. The rationalising chain is formed from “bits of reality accompanied by and held together by logic and reasoning”, and serves to protect the affective component from the “reality of living” (Korner, 1970, p. 137). The rational aspect requires one to calculate one’s chances, but can contain tenuous links, and if enough pressure is present can lead to ‘pseudo-logic’ to maintain the affective component. Rationality in this proposed approach needs only to exceed the possibility threshold; while something may not be probable, if it is rationally possible hope can emerge.

The role of hope as a form of coping for outcomes that are perceived as merely possible is in line with this current view, and is not limited to one author. Similar to Korner, Lazarus (1999) views hope as “the belief in the possibility of a favourable outcome” (p. 653), containing a cognitive factor, as well as an affective yearning. He (1999) argues that hope is an emotion and a vital resource against despair, a conceptualisation that was also driven by his clinical experience. This is why in his view hope is “not usually a positive state of mind” rather the “yearning for amelioration of a dreaded outcome” (Lazarus, 1991, p. 282). I would agree that hope often arises from negative situations, but think it is not limited to such times. However, Lazarus’s focus on the uncertainty of life, and hope’s role in sustaining the individual is congruent with this current view on hope. What he suggests as “modified subjectivism” is the tendency for individuals to make realistic assessments of their situation so as better to cope, but put a “favourable spin” on it to so as not to undermine hope, which ultimately protects one from despair. So long as one believes that it is possible a desired goal can materialize, then one hopes.

Rather than define hope from a clinical or theoretical view other authors have sourced a lay view through qualitative studies, with results similar to the approach being

argued in this thesis. In their large qualitative study Averill and colleagues (1990) presented a social constructionist view of hope. From their analysis they highlighted four ‘prototypic’ rules that govern hope; *prudential rules* have an emphasis on realism, and state that although hopes are by definition uncertain, the probability should not be unrealistically low; *moralistic rules* define that the object of hope should conform to personal and socially accepted values (this is what sets hope apart from simple wants and desires); *priority rules* represent that the object of hope should “touch upon a person’s vital interests”, and “take precedence over other wants and desires” (p. 33); and *action rules* imply that, when possible, hoppers should take ‘appropriate’ action to obtain their hoped-for object. Their research suggests how people view responsible hoping, the acceptable way in which to employ hope in everyday life. However, the ‘rules’ are seen more as general guiding principles or ideals than concrete rules, representing how one believes hope should be employed, not necessarily how one hopes; and indeed, Averill et al. suggest that such rules are “frequently violated” (p. 34). They report that individuals are often hopeful for outcomes well below probabilities prescribed by the prudential rule (e.g., lotto), and consequently in violation of the action rules due to low personal control. This suggests that although not considered appropriate, individuals hope for things that are of low likelihood, and with limited agency.

Another qualitative study by Bruininks and Malle (2005) directly measured a lay concept of hope and its relationship to other constructs. They found that hope was related to but distinct from wish, want or optimism. Hope arises in uncertain and even uncontrollable outcomes, and is seen as a ‘motivator’ keeping people engaged in the hoped-for outcome. Similar to Averill et al. (1990) hope was related to outcomes with higher importance to the individual, distinguishing it from *wish* which is more fleeting. Both of these studies have shown that although hope is related to but distinct from other

concepts, it is seen commonly as arising from uncertainty and for outcomes which are low on personal control and are significantly important to the hoper.

Overall hope is generally viewed in terms of uncertainty of a desired goal. However, a majority of research in psychology has approached hope in light of higher probability outcomes, or expectations. As argued, I see hope as arising in possibility. It is in severe uncertainty that one requires a shield against despair, or a form of coping, or some assurance that a personally significant desire can be obtained. How this new approach is conceptualised will be discussed in the next section.

Hope: Possibility and Personal Investment

Hope, I argue, is a psychological mechanism that allows individuals to continue on in times of difficulty and uncertainty, and to aspire to a more desirable future. In everyday language, the term hope is not precise; for example it is often used to express a wish or desire (e.g., I would hope so), or used in the ideological sense of “it is my hope”, rather than a goal focused, possible and meaningful hope. While hope can represent an objective assessment of hope (e.g., there is hope; Elliott & Olver, 2002, 2007), the present research focuses on the usages of hope whereby individuals are actively hoping. Similar to what Breznitz (1986) termed a ‘work of hoping’, hope is not a fleeting thought or a description of a cognitive state, but rather an “ongoing process” (p. 296). Hope is not a simple wish that things were different, nor is it a denial of the truth of some negative situation (Breznitz, 1986). Actively hoping does not imply a sense of personal agency, rather it suggests that individuals are the actor, they do the hoping and commit to a positive outlook.

Hope is also generally considered inherently future goal orientated; one cannot hope to change something in the past. Hoping for the past is the realm of wish or longing, which is not bound by reality. This is not always clear as one could hope that one passed an important exam, although the exam happened in the past, the hoped-for event, “passing

the exam”, is still to come. Hope in this sense can still have an adaptive function, although the student cannot influence the result of the exam, they can continue pursuing postgraduate positions in the hope that they have passed. However, a link to a future desire or want is a necessary prerequisite for hope (Downie, 1963).

In line with other authors (e.g., Korner, 1970; Lazarus, 1991, 1999), I believe hope requires some level of cognitive appraisal of the situation to assess the perceived likelihood of obtaining one’s desired goal. This assessment could include some of the pathway and agency thoughts outlined in Hope Theory (Snyder, 2002; Snyder et al., 1991). However, I conceive that agency is not limited to the hoper, or necessarily to one individual. When one requires surgery one can hope that the surgery goes well, placing the agency in the surgeon. A supporter of a football team can place the agency for a hoped-for win in the team itself (as well, perhaps, in themselves by barracking). For people who hope for the mitigation of climate change, they may place their hopes in a collective agency, each person doing their part (or government policy). Indeed, qualitative research has shown that people hope for outcomes that they cannot control (Averill et al., 1990; Bruininks & Malle, 2005).

An appraisal of the future outcome results in the two conditions in which hope is likely to play a role: the outcome is *possible* and contains some level of *personal investment* to the individual.

Possibility. Most authors on hope tend to agree that there should be an amount of uncertainty in obtaining the hoped-for object, but to differing degrees. As discussed earlier, some authors believe that hope is characterised by an expectation that a desired goal will be obtained (e.g., Erickson et al., 1975; Snyder et al., 1991; Stotland, 1969). In this regard I agree with Miceli and Castelfranchi (2010) that hope is less certain than an expectation. Expectation implies a belief that the hoped-for object *will* be obtained despite some uncertainty. Miceli and Castelfranchi (2010) argue that this is not the case, and that the

process of hoping is more related to *possibility* than the *probability* of expectation. If one has confidence or thinks it probable that something desired will occur, there is little need to hope, as one would simply wait for it to occur.

Downie (1963) also suggests that rather than expecting success one can hope even when one believes success is 'highly improbable'. Similarly, (Lazarus, 1999) suggests that hope requires only a belief that it is possible a desire can materialise. This is also in line with Aspinwall and Leaf (2002), who argue common expressions such as "one can only hope," "hoping against hope," and "holding out hope," suggest that "hope may be what people hold when the odds of success are slim" (p. 281).

Participants in Averill et al.'s (1990) study reported that hopes arise when the probability of an unlikely object increases or the probability of a certain object decreases. Although most participants thought that one should only hope for items that have just over 50% chance of attainment, this is again considered an ideal and can be put aside. That hope would arise when certainty decreases is contrary to Hope Theory (Snyder et al., 1991), and provides an interesting line of inquiry as to how hope affects psychological coping as likelihood of obtainment decreases (cf., Aspinwall & Leaf, 2002). I argue that there needs to be an element of reality in hope, but hope needs only to be greater than zero percent probability to develop. Miceli and Castelfranchi (2010) describe it as the "almighty power of possibility" (p. 260): it just takes the slightest positive sign of possibility for a hope to awaken or be rekindled. This is why hope has been described as hard to control (Averill et al., 1990), or as to arise despite efforts to the contrary (Miceli & Castelfranchi, 2010). Simply the belief that something is possible is enough for hope to develop.

Personal investment. Miceli and Castelfranchi (2010) suggest that possibility and desire or wish are all that are required for hope to develop; however, I argue that a hope requires more than simple desirability of the outcome in the sense of positive valence. Desires can wax and wane and one would not necessarily hope for every possible desire. I

argue that hope is stronger for a desired outcome if it has specific personal relevance to the individual or their sense of identity. Averill et al. (1990) reported that hope can arise when a person's 'appraisal' for a hoped-for object increases, arguing that hope should "touch on a person's vital interests" (p. 33). Others have also emphasised that one hopes for more important outcomes (Bruininks & Malle, 2005), or is stronger for objects that are of fundamental importance (Korner, 1970). Consider someone hoping that it does not rain on the weekend, as it would make a pleasant weekend. The person would likely have no real emotional investment in the outcome, and may not even remember the next day that they had had such hopes. This I would call a *frivolous hope*, it has both possibility and desire, but no real intrinsic value or relevance to the individual. However, should someone hope that it does not rain on the weekend, because they are getting married, this hope has real relevance to the individual, and I would suggest more of an effect on the hoper. This would be especially true if the outcome is consistent with, or a threat to, the hoper's sense of identity or sense of self². In other words, hope arises when a future desired outcome that has significant importance to the hoper, is possible (Figure 1.1).

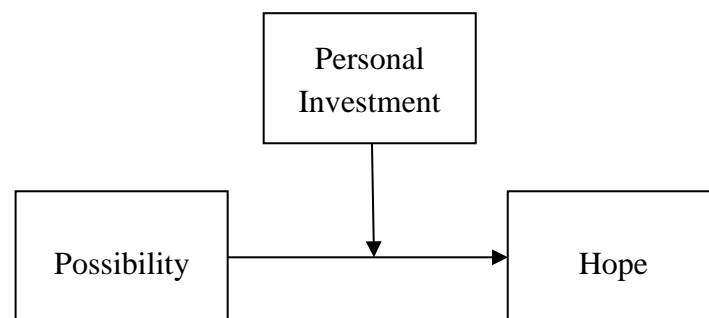


Figure 1.1. The proposed conceptualisation of hope.

It is in low likelihood or possibility, when one is most uncertain about success where hope is most needed to function as a shield to despair or depression, especially for outcomes that represent a significant important to the individual. At such times, when the

² Furthermore, so long as the hoped-for outcome still represents something of importance to the hoper, the outcome does not necessarily need to impact directly on the individual, which allows for altruistic hope (cf, Averill et al., 1990) or group/collective hopes (cf, Bar-Tal, 2001; McGeer, 2004).

outlook is most bleak that the need for hope to aid in coping and maintaining motivation is most evident.

Hope in Action: Motivation and Coping

As there is strong evidence suggesting that motivation is improved when we expect success, our actions to be effective, and our efforts to be rewarded (e.g., Bandura, 1997; Carver, Scheier, & Segerstrom, 2010; Fishbein & Ajzen, 1975), it is important to consider the motivational outcomes for a hope in possibility. Indeed Miceli and Castelfranchi (2010) note, a hope in possibility may have the potential for passivity in goal pursuit, by merely reducing the negative affect to better cope, but not leading to goal-directed behaviour. However they, and I, believe that hope generally functions as a motivator for action. While Lazarus (1991) suggests the specific action tendencies of hope are not as clear as they are with other emotions, he suggests that to “hope is to remain vigilant, mobilized and committed and not give up on the desired outcome” (p. 285). Similarly, Pettit (2004) suggests that hope should motivate the individual to pursue their hoped-for goal where this is possible, or where not, to behave in a positive manner as if those hopes will be realized. This behaving ‘as if’ does not mean one has more confidence in obtaining than is plausible, rather, one can focus on the possibility of success (Miceli & Castelfranchi, 2010) and conduct their life in a positive manner. Whether hope motivates behaviour by engaging the hoper with the outcome (Bruininks & Malle, 2005), or by activating the ‘motivation system’ to respond to stress (Korner, 1970), hope is seen as adaptive (Lazarus, 1991), an important resource for better coping (Breznitz, 1986; Korner, 1970).

It is the important nature of the goal to the individual, and hope’s ability to ease some of the burdens associated with the low likelihood of success, that promotes and protects motivation. Although research by Oettingen and colleagues (e.g., Oettingen, 1996, 2012; Oettingen & Mayer, 2002) has shown that positive fantasies of an ideal path to one’s

goal lead to a decline in motivation. Rather than an ideal path, Lazarus (1991) suggests people assess reality fairly accurately so as best to cope, and at such times hope functions as an emotion-focused coping process. Taken further, Folkman (2010) argues that it is hope's ability to hold two conflicting outlooks that makes it an important resource in times of uncertainty. She suggests hoppers hold a belief in the reality of the situation, which functions as problem-focused coping, allowing one to attend to the problem at hand; while also maintaining a hopeful outlook, which functions as an emotion-focused coping tool, managing anxiety and focusing more positively on what could be. Together this suggests that hope allows one to be sanguine in the face of negative odds, and work towards the hoped-for goal.

Taking into account that contrary to negative emotions, positive emotions are said to broaden one's attention and cognition (Fredrickson & Branigan, 2005), hope may allow one to better assess their current situation and options to pursue their hoped-for goal. Rather than becoming despondent and demotivated by the low chances of success, which may reduce those chances further, hope motivates one to make the most of that low likelihood (Pettit, 2004). While this may sound similar to the pathway thoughts suggested by Snyder et al. (1991), rather than pathway thoughts leading to hope, this approach suggests hope allows one to weather the storm (in a small bay or haven perhaps) of a negative reality, and better assess one's situation. Again, it is hope's freedom from likelihood estimates that suggests hope can better manage ups and downs of likelihood, or be rekindled cheaply (Miceli & Castelfranchi, 2010), and buffer motivation from negative feedback (Nelissen, 2017).

In summary, I argue that hope has distinct motivational force when the odds of success are low. Despite a relatively low perception of likelihood, I would expect hope to lead to behaviour consistent with achieving their hoped-for goal (where such behaviour is possible).

False Hope, Pure Hope and Hopelessness

While I argue that hope is grounded in uncertainty, a product of possibility rather than high expectation, it needs to be distinguished from sentiments when there is very little or virtually no expectation of success. Hope with little or no possibility of success is generally considered to be negative or maladaptive, it is seen as a form of denial or a *false hope*. My Grandfather told me a joke about a man who fell from a 100 story building, and hoped that he would survive the fall. As he passed a window on the 50th story someone yelled to him, “how is it going?”, to which the man replied, “fine so far.” The joke is supposed to highlight the absurdity and futility of hoping for a seemingly impossible outcome. But others have questioned the overall negative view of false hopes and suggest that there may be some psychological benefit, such as Epstein (1989, cited in Lazarus, 1999):

I have never quite understood what false hope is. All hope is "false" in the sense that what is hoped-for may not materialize. At the time of hoping one cannot know the outcome. If the hope serves to improve one's quality of life and does not cause one to avoid taking adaptive action when it is possible, nor be resentful when the hoped-for outcome does not materialize, then it is obviously desirable (Epstein, 1989, as cited in Lazarus, 1999, p. 655).

Given that a hope based in possibility, as suggested in the current hope conceptualisation, is likely to commonly violate the prudential rule of hope as proposed by Averill et al. (1990), it may at times be accused of being a false hope. Though it may not be considered prudent to have as low a threshold for hope as mere possibility, it is the role of researchers to investigate the true nature of phenomena and their benefits (if any), rather than add moralistic or prudential restrictions on the phenomena. While I do think sometimes hope may not be the most adaptive option, I agree with the sentiment expressed by Epstein above. This sentiment is mirrored in the medical literature: while some express caution in

raising hope, others suggest that so long as patients accept the reality of the situation, and act accordingly, hoping for a cure (for example) and staying positive, is better than the alternative (Clayton et al., 2008).

For a hope to be truly false or unrealistic it would require that the individual overestimates or distorts the possibility of obtaining the hoped-for goal. This is not entirely unheard of, as De Mello, MacInnis, and Stewart (2007) show; when a desirable goal is threatened people sometimes employ motivated reasoning whereby they attend to, and evaluate information with a self-serving, goal-affirming bias (e.g., reading more positive than negative articles to form a judgement). While this may not necessarily lead to a distortion of possibility and may support hope, it could also lead to an unrealistic hope and negative coping, such as attending only to positive signs that support the hope an abusive partner can change, rather than taking more adaptive steps. Alternatively, individuals could overestimate the likelihood of success similar to that seen in the unrealistic optimism literature (e.g., Shepperd, Waters, Weinstein, & Klein, 2015), however, there is some suggestion that such overestimations are generally modest in regard to objective standards, and tend to be corrected by reality, and are linked with better psychological adjustment and coping (Folkman, 2010; Taylor & Armor, 1996).

Korner (1970) suggests that in extreme cases, when given no other option, individuals may abandon reason and replace it with what he calls *pure hope* (e.g., “I know I’m right; I feel sure that will happen”; p. 137). For the man falling off the building, what cost is it to him to put aside possibility and to behave as though things will turn out? Although pure hope is unrealistic, in this sense, the psychological benefit is similar to that of a shield against despair. While the idea of *pure hope* is enticing, it seems to characterise more a *denial* of reality or represent a type of *faith* rather than hope per se.

There is of course another less desirable response to the recognition of limited or no perceived likelihood: hopelessness. While there is bound to be some negative affect in

response to unfulfilled desire, there seems to be a difference between having no hope and hopelessness, between having stopped hoping and having one's hopes frustrated. In line with the former, Lazarus (1999) suggests that the only time he believes one should give up something as hopeless is if it is a lost cause and the individual can focus instead on something more constructive, but suggests that this requires making a comparative evaluation of options, which is not easy. This seems to represent more a loss of hope, than hopelessness as it is commonly conceived. Again, this is suggested in the medical literature, which shows patients with terminal cancer at times change the focus of their hope to maintain hope and positivity (e.g., finding a cure, living longer than expected, good pain and symptom control; Clayton, Butow, Arnold, & Tattersall, 2005)³.

However, it could also be that there are no other options, or one is unwilling to give up the hope. In this case, the desire and longing for a personally significant desire is still present, but one loses the belief in possibility (Miceli & Castelfranchi, 2010). With this comes a sense a resignation that the alternative outcome is inevitable, and bereft of hope, a hopeless individual falls into despair (Lazarus, 1999). It is not quite clear how this fits with the predominant theory of hopelessness (Beck, Weissman, Lester, & Trexler, 1974) which suggests hopelessness is a "system of cognitive schemas whose common denomination is negative expectations about the future" (p. 864). Beck et al.'s approach seems more dispositional and similar to pessimism⁴, whereas hopelessness as discussed here seems focused on the loss of a specific personally significant hope. How these two fit together, and why some people choose to ignore impossibility and others succumb to it, would make an interesting avenue for enquiry. However, it is beyond the scope of this thesis which is focused on the development and motivation benefits of a hope in possibility.

³ It could also be that rather than change the focus of their hope, that if a hope has been previously dashed, individuals may fear or try not to hope (Stotland, 1969). But this is not to say they are hopeless per se, rather that hope still arises despite individual effort not to invest in that hope (Miceli & Castelfranchi, 2010).

⁴ Indeed the title of their paper lends some credence to this theory of noun misappropriation; "The measurement of pessimism: the hopelessness scale." (Beck et al., 1974)

Indeed, while hope can be and needs to be distinguished from other psychological response when the odds of success are low or virtually absent, such differentiations from false hope, pure hope or hopelessness will *not* be the focus of this thesis.

Hope versus Optimism

The focus of this thesis will be on emancipating hope as a construct distinct from positive expectations; for this, hope will be contrasted with the expectancy-based construct optimism. As hope and optimism are both future orientated positive constructs, it is not surprising that they are often used interchangeably in psychological literature, sometimes hope is used when discussing optimism (Beck et al., 1974; Massey, Simmons, & Armor, 2011), and sometimes items addressing optimism are used to measure hope (Hornsey & Fielding, 2016; Saguy & Halperin, 2014). However, in my view hope is distinct from optimism.

Dispositional optimism is most common in psychological literature and is conceived in probability, as an individual's general expectation of positive future outcomes (Carver et al., 2010; Scheier & Carver, 1985). Snyder (2002) suggests that Scheier and Carver's optimism and the dispositional expectancy-based Hope Theory are both "cognitive and aimed at explaining behaviour across situations" (p. 257), but differ because, while pathway and agency thoughts are implicit in both, Scheier and Carver's (1985) theory of dispositional optimism is more agency-focused whereas there is equal emphasis on the two in Hope Theory. Furthermore Snyder distinguishes hope as influencing emotion (both positive and negative), whereas optimism is embedded in Scheier and Carver's theory of self-regulation. I would suggest that while this nuanced differentiation of Hope Theory and optimism is interesting, it still presents a hope divorced from everyday usage, not only in its relationship to likelihood, but in the sense that hope is more commonly conceived of as an emotion, and optimism is not (Bruininks & Malle, 2005).

Beyond Hope Theory, hope has been argued to focus on specific events, whereas optimism focuses on more general positive beliefs of success (Bryant & Cvenegros, 2004; Lazarus, 1999); but theoretical approaches to optimism are not limited to general expectancy models. An approach more focused on specific expectations about positive outcomes, sometimes termed “little-optimism” (Peterson, 2000), will be the focus in this thesis as a contrast to hope. Such optimism functions in line with one’s expectation that an outcome will be obtained (Reimann, Nenkov, MacInnis, & Morrin, 2014), or, put simply, the greater one’s perceived likelihood of success the greater the optimism. In a similar vein, Averill et al. (1990) suggest that one should not hope for outcomes that are either “too unlikely or virtually assured”, but by contrast optimism “may increase linearly with the probability of attainment” (p. 95).

Beyond perceptions of likelihood, Pettit (2004) offers a view that the distinction between hope and optimism is that optimism is a “spontaneous, perhaps unconscious habit of belief formation” whereas hope is an “intentionally sustained, essentially avowable response” (Pettit, 2004, p. 159). In line with Miceli and Castelfranchi (2010), I am not convinced by the ‘spontaneous’ and ‘intentional’ distinction between the two constructs. As Miceli and Castelfranchi (2010) elegantly put it, “hope may arise spontaneously, even despite one’s conscious efforts to stifle it” (p. 262).

Bruininks and Malle (2005) suggest hope is distinct from optimism as it more commonly concerns outcomes that offer less personal control, or as Menninger (1959) suggests that optimism focuses more on the self, whereas hope is more ‘self-less’. Additionally, although there is some evidence to suggest that desire seems to influence individual’s optimism (Massey et al., 2011), hope is shown to be qualitatively different from optimism as it represents more important outcomes (Bruininks & Malle, 2005). Similarly, Lazarus (1999) argues that optimism is lacking the elements of yearning and

uncertainty that are “embodied” in hope. It is the uncertainty where I see hope’s greatest divergence from optimism.

As argued earlier, hope is based in uncertainty, in possibility rather than probability. While optimism requires one to have a positive expectation of an outcome, hope does not. For example, a supporter of a bottom tier football team playing a top tier team would be less than optimistic that their team will win the game, but they still may be hopeful that they will, or a “pessimist who hopes” (Lazarus, 1999, p. 673). This is because the supporter is aware that anything is possible on a football field, even if it is not very probable. And for a supporter who is heavily invested in their team winning, this hope that their team beats the odds should be more pronounced.

Summary and Overview

To summarise, in the present thesis I aim to elucidate the unique nature of hope, and differentiate it from expectancy constructs; in this instance, optimism. I suggest that hope plays a pivotal role in lower likelihood, and is engendered with outcomes in which one is personally invested and whose attainment is perceived as possible (but not necessarily expected). This will be investigated across various hoped-for outcomes, and in terms of various theoretically derived differentiations of hope from optimism. It will be suggested that for those more invested in the outcome hope will share a cubic relationship with perceived likelihood, where a linear relationship will be present for optimism (Chapters 2 & 3); that hope will be related more to perceptions of possibility and optimism to probability (Chapter 3) and that hope will endure over time contrary to optimism (Chapter 6). The nature of hope and optimism’s relationship to perceptions of likelihood will also be confirmed with experimental manipulations of likelihood (Chapters 4 & 5). Furthermore, I will investigate whether hope in lower likelihood leads to goal directed behaviour (Chapter 3), to greater persistence despite negative feedback (Chapter 5), and greater behaviour across time (Chapter 6).

In Chapter 2 I investigate whether hope plays a greater role than optimism in lower likelihood when the outcome is possible, and propose and test a cubic relationship between hope and perceptions of likelihood. Results showed that hope was rated higher than optimism in lower likelihood, whereas in higher likelihood the distinction between the two was not evident. Furthermore, whilst optimism shared a linear relationship with likelihood, for those more personally invested in the outcome hope shared a cubic relationship with likelihood; hope arose sharply in lower likelihood before levelling off and arising with the linear trend of optimism. This shows that hope indeed plays a greater role in lower likelihood, when success is a mere possibility.

In Chapter 3 I investigate further the cubic nature of hope, and expand further the discrete influence of possibility and probability on hope and optimism, and whether hope in lower likelihood leads to goal consistent behaviour. Results confirmed first the cubic nature of hope for a highly invested sample, with hope in lower likelihood leading to goal directed behaviour. Furthermore, results show that for those more invested in the outcome hope was related to possibility, but not probability, and optimism to probability but not possibility. Additionally, the interaction of possibility and personal investment led to greater behaviour via hope.

Chapter 4 aims to clarify interesting findings from Chapters 2 and 3, namely the convergence of hope and optimism at higher levels of likelihood when measured on continuous measures. Across three likelihood conditions (low, moderate, high) participants were forced to choose between hope and optimism (and neither hope nor optimism). Results suggested that when both constructs were measured on continuous measures, hope and optimism were rated similarly at higher levels of likelihood, but when forced to choose optimism was more likely to be chosen in high likelihood than hope, and hope more likely than optimism in lower likelihood.

In Chapter 5 I investigate whether hope in possibility results in individuals persisting longer to achieve a hoped-for goal, despite negative feedback. Furthermore, I attempted to manipulate likelihood (0%, 20%, 80%) and personal investment (high & low) in an effort to replicate experimentally the quick rise of hope in possibility for those more invested in the outcome. Results suggested that hope in lower likelihood was related to persistence despite negative feedback, with some evidence that this was more pronounced for those more personally invested in the outcome.

Chapter 6 takes a different approach to hope, and investigates if there is any enduring quality to hope, if hope supports behaviour over time. Results supported the enduring nature of hope in the face of challenges and uncertainty; unlike optimism, for individuals more invested in the outcome hope did not decline over time, and was associated with higher goal-consistent behaviour. Finally in Chapter 7 I will integrate the findings and discuss hope in terms of its unique nature, its distinctiveness from expectancy-based outcomes, and its motivational properties.

CHAPTER 2: Giving Hope a Sporting Chance: Hope as Distinct from Optimism

When Events Are Possible but Not Probable

Colloquially hope is often championed as something to be held on to or sought after, though at times also derided as a vice of fools. Generally researchers and clinicians argue the former, that hope holds great value for those who experience it, be it a shield for despair or as an asset for tougher times. However, in the psychological literature the nature and function of hope, as distinct from other related constructs such as optimism or self-efficacy, remains unclear. Hope is often conflated with concepts such as self-efficacy or optimism that imply a positive expectancy, and that are also commonly said to have similar benefits as associated with hope. How then is hope distinct from these other constructs? We posit that hope must involve more than expectation, for if one expects to obtain a desired goal, what need is there to hope? The current research provides evidence of an alternative conceptualisation of hope that focuses on the unique role of hope under conditions of greater uncertainty, that is, when individuals perceive low levels of likelihood in obtaining their hoped-for goal. We propose that the uniqueness of hope emerges when a desired goal has personal significance and the realisation of that goal is possible (but not necessarily expected). Whereas optimism will rise linearly with perceived likelihood of an outcome, hope will rise more quickly in conditions of lower likelihood if there is a high level of personal investment in the outcome, before becoming indistinguishable from optimism as the outcome becomes more certain.

The Benefits of Hope

Notwithstanding some warnings about the dangers of hope, such as Nietzsche (1994) who writes that hope is “the most evil of evils, because it prolongs man’s torment (p. 28)”, hope is generally perceived as positive. In modern psychological research hope has been argued to be a benefit in athletics, academics, physical and mental health, and psychotherapy (Snyder, 2002). Other theorists have argued for the importance of hope

as an asset to combat despair and depression (Lazarus, 1999), as a form of coping mechanism (Breznitz, 1986; Korner, 1970), or as a factor in someone continuing treatment (Perley et al., 1971). It is commonly argued that in moments of uncertainty, hope buffers one against setbacks (e.g., Nelissen, 2017) or motivates one towards hoped-for goals. However, there is a disconnect here between how hope is suggested to be beneficial, that is, in situations of difficulty or adversity, and current conceptualisations of hope where hope is used almost synonymously with positive expectation or optimism.

Hope versus Expectancy

In the literature hope is commonly simply conflated with optimism (e.g., Massey et al., 2011), or hope's more dominant conceptualisations are often similar in theory and research to expectancy based constructs (e.g., self-efficacy, optimism). Early works of hope make clear the role of expectation in hope (Erickson et al., 1975; Staats, 1989; Stotland, 1969). In his prominent early work on hope, Stotland (1969) argues that the level of hopefulness is derived from the level of expectation, or more specifically, the perceived probability of achieving a goal. He goes further to suggest that the definition of hope can be *integrated* with approaches that use a concept of expectation.

Similarly, expectation plays an important role in Snyder et al.'s (1991) Hope Theory, conceptualised as the combination of both *pathway thoughts* (the ability to perceive pathways to goals) and successful *agency thoughts* (the perceived determination to utilise those pathways). Hope arises with the reduction of uncertainty; more specifically, "the high-hope person's analysis of sufficient agency and pathways in a given goal setting should lead to the perception of relatively high probability of goal attainment" (Snyder et al., 1991, p. 571). Hope's supposed positive linear relationship with one's perceived ability to achieve one's goals has raised questions of the concept's discriminant validity from other constructs, such as self-efficacy, optimism and control beliefs (Aspinwall & Leaf, 2002; Bryant & Cvengros, 2004).

Additionally the sole focus on individual agency within Hope Theory seems divorced from more common uses of hope. Individuals often hope for things beyond their control; for example we hope that surgery will go well or that our football team will win. We also have altruistic hopes for others (Averill et al., 1990) or in a collective agency (Bar-Tal, 2001; McGeer, 2004). Although attempts have been made to broaden Hope Theory to include external agency (e.g., significant others, family, spiritual deity; Bernardo, 2010; Du & King, 2013), the focus on agency ignores the possibility that hoped-for outcomes are not always controllable (Averill et al., 1990; Bruininks & Malle, 2005); and hope becomes more a measure of one's expectation of efficacy. What hope then does hope have of not becoming a mere derivative of expectancy based concepts? What is unique and distinct about hope?

Hope under Conditions of Possibility, not Probability

While hope shares many common characteristics of other goal oriented constructs, such as goal focus and future orientation, a positive expectation of success suggests a level of confidence that does not seem appropriate for hope. In line with the theoretical analysis by Miceli and Castelfranchi (2010) in particular, we propose an alternate conceptualisation that highlights the uniqueness of hope, and differentiates it from expectancy-based constructs (e.g., Hope Theory, optimism; see also Nelissen, 2017). Hope, we argue, is grounded in uncertainty; it is exactly the uncertainty of obtainment that causes one to hope. While other hope theories discuss uncertainty, the focus on expectations, and the implied relationship between higher hope and increased probability, seems incongruent with general uses of hope. As Aspinwall and Leaf (2002) argue, common expressions such as "one can only hope," "hoping against hope," and "holding out hope," suggest that hope may be what people hold when the odds of success are slim or when the means to goal attainment are outside their control" (p. 281).

Qualitative research suggests that hope arises for outcomes that are relatively uncertain or uncontrollable (Bruininks & Malle, 2005). Hope can therefore be distinguished from efficacy and optimism, in that a sense of agency is not integral to hope, and hope involves less of an expectation or positive prediction, but rather applies when outcomes are more uncertain (Miceli & Castelfranchi, 2010; Nelissen, 2017; Pettit, 2004). This is not to suggest that individuals ignore or overestimate their chances of success; rather, hope arises in recognition of the uncertainty of reaching their goal. Hope does not presume that uncertain outcomes are probable (which would make hope unnecessary and superfluous), but rather merely possible yet invested with desire (Miceli & Castelfranchi, 2010). As Miceli and Castelfranchi argue, it is the perceived possibility of achieving one's hoped for goal that evokes a sense of hope in individuals. With the "almighty power of possibility", just the merest perception of possibility of obtainment can engender a sense of hope in an individual (Miceli & Castelfranchi, 2010, p. 260). A concept of hope that is divorced from expectation allows researchers to consider the role of hope arising in low probability, or as the probability of success diminishes (Aspinwall & Leaf, 2002).

Although we argue that hope is less confident than an expectation of success, the first important factor for hope to arise is some perceived *possibility* of success. We adopt the definition of possibility described in Miceli and Castelfranchi (2010); an outcome is *possible* once it departs from impossibility (>0% likelihood of occurrence) and becomes *probable* as it passes the threshold of chance. Impossible outcomes are the realm of *wish*, which have no basis in reality (Bruininks & Malle, 2005), or of *false hopes* which are considered maladaptive (Korner, 1970). Hope is also not merely a prospective 'what if', or positive fantasy (Oettingen & Mayer, 2002); hope recognises past outcomes and the probability of success, and is thus reality-bound even if it focuses on mere possibility. However, possibilities can cover a large range of goals or outcomes in one's daily life, not

all of which engender hope. In addition to a possibility of success, we argue that hope requires *personal investment* from the individual.

Hope and the Importance of Personal Investment

In addition to the importance of possibility, some researchers have suggested hope only arises for a desired outcome. Miceli and Castelfranchi (2010) suggest that hope is a combination of possibility and desire. The desirability of a goal is an important factor of hope. However, beyond simple desirability of the outcome in the sense of positive valence, we believe that hope will be stronger if the outcome also has personal significance to the individual. It is a distinction between hoping that the weather will be nice on the weekend, because it would be nice for a picnic (Bruininks & Malle, 2005), and hoping for good weather because of one's wedding that weekend. The first hope is desirable but is also more frivolous; it likely has no enduring influence on the individual. However, the second hope would have real significance to the individual, and likely more psychological importance. A desirable goal, that touches "on a person's vital interest" (Averill et al., 1990, p. 33) or is of fundamental importance to the hoper (Korner, 1970), will cause the individual to invest more personal resources to hope.

With a personal investment in an outcome, we would expect hope to develop with a mere possibility of goal obtainment. As argued earlier, the rise of hope in possibility does not suggest ignorance or overestimation of likelihood of success, but rather that strong personal investment in the outcome places greater importance on any possibility of success. A similar preference for, or investment in, possibility is also known from decision research, where it is suggested that when strong emotions are present during the decision making process, people are more likely to focus on the *possibility* rather than probability (Bruininks & Malle, 2005; Loewenstein, Weber, Hsee, & Welch, 2001). Whether hope is itself an emotion or arises as a result of strong emotion is not always clear in the literature (Lazarus, 1991), however the possibility of achieving a goal steeped in personal investment

is bound to involve strong emotions. This parallel points to another distinction between hope and expectation-based outcomes, namely that hope's relationship with likelihood is non-linear.

Research on decision under uncertainty and risk has consistently shown that people overweight small probabilities and underweight large probabilities (Tversky & Kahneman, 1992). A diminishing sensitivity to probability has been suggested as an explanation for the inverse s-curve seen under this probability weighting function (Tversky & Kahneman, 1992). Alternatively, Brandstätter, Kühberger, and Schneider (2002) propose a cognitive-emotional account for this effect, namely that expected elation increases the attractiveness of lower probability wins, and that expected disappointment decreases the attractiveness of high probability wins. That emotion has an impact on people's weighting of probabilities is further evident in a study by Rottenstreich and Hsee (2001). They found that for affect-rich outcomes participants were "more sensitive to departures from impossibility and certainty" (p. 188) than for affect-poor outcomes. For more desirable outcomes the resultant inverse s-curve on probability showed a higher weighting in low probability which they named hope, and higher weighting in high probability which they named fear. We expect a similar relationship to develop for hoped-for objects that are high in personal investment (see Figure 2.1): hope will arise early in low probability, then become indistinct from expectation or optimism as the likelihood of attainment becomes more probable. For people invested in the desire that an object will obtain, the slightest departure from impossibility will be enough to engender hope within the individual.

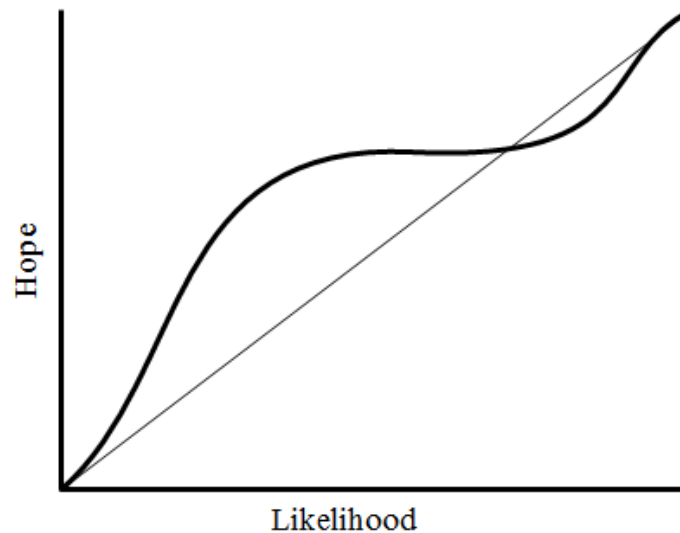


Figure 2.1. Hypothesised hope by likelihood cubic relationship for highly invested participants.

Current Project: Examining the Cubic Function of Hope

The current project aims to examine the uniqueness of hope, as distinct from optimism, particularly under conditions of some possibility but low probability. As discussed, we expect those who are more invested in the outcome to show a cubic relationship between likelihood and hope: their hopes will rise faster than likelihood at lower levels of likelihood, then level off, and rise again to form a linear relationship with likelihood at higher levels. Through an investigation of the shape of their function based on personal investment and possibility, we plan to differentiate hope from expectancy-based constructs, specifically optimism. As hope and optimism are both future orientated positive constructs, it is not surprising that they are often used interchangeably in psychological literature (Massey et al., 2011). However, we expect to see two major divergences between hope and optimism, in their relations to outcome likelihood and personal investment. Despite a focus on *positive* outcomes, optimism has been found to be qualitatively different from want or desire (Bruininks & Malle, 2005). Although there is some suggestion that desire has a positive influence on optimistic predictions (Massey et al., 2011), we believe that one's personal investment will differentiate hope from optimism in lower ranges of

probability. Thus, the first divergence is that for hope the shape of its function will depend on the level of personal investment and desire, but not so for optimism. With sufficient personal investment, hope will respond distinctively at lower levels of outcome likelihood (i.e., at mere possibility), whereas optimism will function as an expectation estimate. Optimism, we suggest, requires one to have a positive expectation of an outcome, hope does not. Thus, the second divergence is that for optimism the relation to likelihood will be strictly linear, whereas for hope it will symptomatically accelerate at low levels of likelihood. For example, a supporter of a bottom-tier football team playing a top-tier team would be less than optimistic that their team will win the game, but they still may be hopeful that they will, or a “pessimist who hopes” (Lazarus, 1999, p. 673). This is because the supporter is aware that anything is possible on a football field, even if it is not very probable. And for a supporter who is heavily invested in their team winning, this hope that their team beats the odds should be more pronounced. We present two studies that examine this cubic function of hope, Study 2.1 in the context of a football game, and in Study 2.2 in the context of a state government election.

Study 2.1

Following on from the suggestion that hope is a mixture of possibility and personal investment, environments whereupon these elements naturally arise in varying degrees were considered for our research. Football is a suitable and accessible context. Supporters are likely varied in the degree to which their team is important to them and their sense of identity. A win represents a desirable goal and will be more significant to those who identify more with their team. Games where a bottom-tier team (positioned in the bottom third of the league ladder) is playing a top-tier team (positioned in the upper third of the league ladder) allows the observation of a group of supporters who would tend to be less than confident about their team winning the match. Of course both teams have the possibility of winning, but going on past performance bottom-tier team supporters should

be plagued by greater uncertainty whereas top-tier team supporters should rate their team's chances higher. Top-tier team supporters would be more optimistic about their team winning than bottom-tier team supporters, therefore not needing to invest in hope (more than optimism). In contrast, the bottom-tier team supporters (assuming a desire to see their team win) will invest in hope (more than optimism). Although both supporter groups were included, our focus was on the bottom-tier supporters in order to explore hope under conditions of greater uncertainty of positive outcomes. Facing such uncertainty bottom-tier supporters who are highly invested in the outcome will be more sensitive to mere possibility of success and show a steeper increase in hope when possibility rises (before hope levels off and then aligns with likelihood).

Our research question requires that the measurement of hope (and optimism) is free from any a-priori researcher-defined theoretical considerations or connotations, as these might obviously prejudice the results and the shape of the observed function. Hence, hope⁵ and optimism⁶ were measured directly through single items recruiting those labels, leaving it up to the respondents how they understand these. Clearly respondents may have quite differing views of both hope and optimism, and this might well contribute to noise in the results. Yet, for a fair test of our predictions we had to accept this, and if there is

⁵ In line with other writers' warning against making data fit a pre-defined definition of hope (Tong et al., 2010), we will investigate how hope fits individuals' actual usage of the term. However, the term hope is not precise; for example it is often used to express a wish or desire (e.g., I would hope so), or used in the ideological sense of "it is my hope", rather than a goal focused, possible and meaningful hope. While hope can represent an objective assessment of hope (e.g., there is hope), this research focuses on the usages of hope whereby individuals are actively hoping. Actively hoping does not imply a sense of personal agency, in fact this research aims to show hope's role when agency is limited, rather it suggests that individuals are the actor, they do the hoping and commit to a positive outlook. This is most typically represented in phrases such as "I am hopeful that..." or "I have hope that...", which were therefore used in the present research. Also, while the hoped-for outcome can include the "amelioration of a dreaded outcome" (Lazarus, 1991, p. 282, e.g., I am hopeful X does not occur), this paper focuses on positive goals (promotion goals; Higgins, 1997).

⁶ We focus on a goal specific optimism, or what Peterson (2000) terms little optimism. Little optimism reflects a specific positive expectation of a future outcome, whereas big optimism refers to more general expectations, in line with dispositional measures of optimism (Carver et al., 2010; Scheier & Carver, 1985). Though argued as being separate but related constructs (Peterson, 2000), which has some support in the literature (Gyurcsik & Brawley, 2001; Kluepfer, Little, & Degroot, 2009), little optimisms focus on specific outcomes and development through idiosyncratic experiences (Peterson, 2000), making it more appropriate for the specific outcomes in the current research.

psychological validity to our conceptualization of hope, this should show through all the noise. We predicted that:

1. Ratings of optimism will be linearly related to the perceived likelihood of winning.
2. Ratings of hope will be curvilinearly related to perceived likelihood of winning, in particular when personal investment is high: specifically, at lower levels of likelihood, hope will accelerate quickly as the possibility is small but increasing, before decelerating at greater levels of probability and then aligning with likelihood levels.

Method

Participants

Participants were 109 football supporters aged 18 to 86 ($M = 48.77$, $SD = 14.12$), 33 female, 69 male and 7 with no recorded gender. Participants were approached before the start of play at four South Australian National Football League (SANFL) games. Of those 66 identified themselves as supporting a bottom-tier side. Another 43 participants who identified themselves as supporting a top-tier side were not included in our main analyses, but considered here for some preliminary comparisons.

Procedure

Researchers attended four SANFL games at the home ground of bottom-tier teams who were playing top-tier teams. Top versus bottom-tier games were chosen in order to observe hope in individuals working in lower levels of perceived likelihood; presumably a bottom-tier side would be less certain of success against a well performing side. Participants were approached before the start of play by researchers to take part in the study. Upon verbal consent participants were presented the questionnaire.

Materials

The questionnaire was designed to be brief, as participants approached at the game might be disinclined to complete a long questionnaire. Initial questions recorded

demographic data (e.g., age, gender), and were followed by questions pertaining to the participants' allegiance in the game, how long they had supported this team, and how often they attended games.

Other variables were measured with 7-point Likert scales, with the exception of likelihood (see below). *Personal investment* referred to the degree to which the participant found the goal both desirable and personally significant. This measure was represented by two questions devised to measure personal significance of supporting their team ("Is being a supporter of your team an important part of who you are?", "How strongly do you identify with other supporters of your team?"; 1 = *Not at all important*, 7 = *It is very important*), and three questions measuring desirability of a win ("How much do you want your team to win this game?", "How important is it to you that your team wins today?", "How devastated would you be if your team loses today?"; (1 = *I do not care whether my team wins or loses*, 7 = *I desperately want my team to win*). A principal component analysis (PCA) with orthogonal rotation on the 5 items yielded a single component with eigenvalues over Kaiser's criterion of 1 and explaining 65.66% of the variance, on which all items loaded substantially ($> .73$). The scree plot also clearly showed an inflection justifying one component. The five items were averaged to obtain scale scores ($\alpha = .86$).

Participants were then asked to rate how well their team and the opposition team had performed this season. These questions had no bearing on the proposed analysis, but were provided in an effort to try and ground the participants in the reality of the current season, and their team's performance (1 = *Not well at all*, 7 = *Really well*). Next, *likelihood* was measured with an 11-point scale with ratings in 10% increments from 0% to 100% (Note: for greater economy, likelihood in the following pages refers to the participants' perceived likelihood). Participants were asked to rate their team's likelihood of winning the current game. *Optimism* was measured directly with one question: "How optimistic are you that your team will win?" (1 = *Not at all optimistic*, 7 = *Really optimistic*). And finally,

hope was also measured directly with one question: “How hopeful are you that your team will win?” (1 = *Not at all hopeful*, 7 = *Really hopeful*).

Results and Discussion

As anticipated, on average top-tier supporters rated their team’s likelihood of winning higher than bottom-tier supporters (Table 2.1) and were surprisingly more invested in the outcome⁷. Top-tier supporters also rated optimism and hope higher than the bottom-tier supporters.

Table 2.1

Means and Standard Deviations and Independent t-tests (Study 2.1)

	Top-tier		Bottom-tier		<i>t(df)</i>	95% CI	Cohen’s <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Likelihood	85.35	13.34	31.67	20.87	16.38 (107) ^{***}	47.19:60.18	3.17
Optimism	5.95	1.36	2.98	1.50	10.45 (107) ^{***}	2.41:3.53	2.02
Hope	6.30	1.06	4.82	1.86	5.31 (105.4) ^{***}	0.93:2.04	1.03
Investment	5.59	1.00	4.77	1.43	3.52 (106.39) ^{**}	0.36:1.28	0.68

* $p < .05$, ** $p < .01$, *** $p < .001$

That top-tier supporters were both more optimistic and hopeful was not surprising considering their considerably greater perceived likelihood of success (83.8% rated likelihood $\geq 80\%$). What was of greater interest was whether optimism was differentiated from hope between tier groups depending on their perceived level of likelihood, specifically whether hope would play a greater role than optimism in lower levels and be indistinguishable at higher levels of perceived likelihood. A mixed-model analysis of variance was conducted to assess the impact of tier level on supporters’ ratings of hope and optimism. There was a significant main effect of tier level on ratings of hope and

⁷ As all games were at the home ground of the bottom tier side, the difference in personal investment could be due to more dedicated fans traveling to the opponent’s home ground.

optimism, $F(1, 107) = 79.07, p < .001, \eta_p^2 = .43$. Separate analyses for the two measures showed that top-tier supporters gave higher ratings than bottom-tier supporters on both optimism, $F(1, 107) = 109.17, p < .001, \eta_p^2 = .51$, mean difference = 2.97, 95% CI = [2.41, 3.53], and hope, $F(1, 107) = 22.65, p < .001, \eta_p^2 = .18$, mean difference = 1.48, 95% CI = [0.87, 2.10]. There was however a significant interaction between tier level and ratings of hope and optimism, $F(1, 107) = 20.96, p < .001, \eta_p^2 = .16$. As predicted, there was no significant difference between the top-tier supporters' ratings of hope and optimism, $F(1, 107) = 1.91, p = .17, \eta_p^2 = .02$, mean difference = 0.35, 95% CI = [-0.85, 0.15], but bottom-tier supporters ratings of hope were significantly higher than for optimism, $F(1, 107) = 81.03, p < .001, \eta_p^2 = .43$, mean difference = 1.83, 95% CI = [1.43, 2.24]. This suggests that as presumed the bottom-tier supporters had a greater investment in hope, whereas for the top-tier supporters there was no distinguishable difference between hope and optimism (see Figure 2.2).

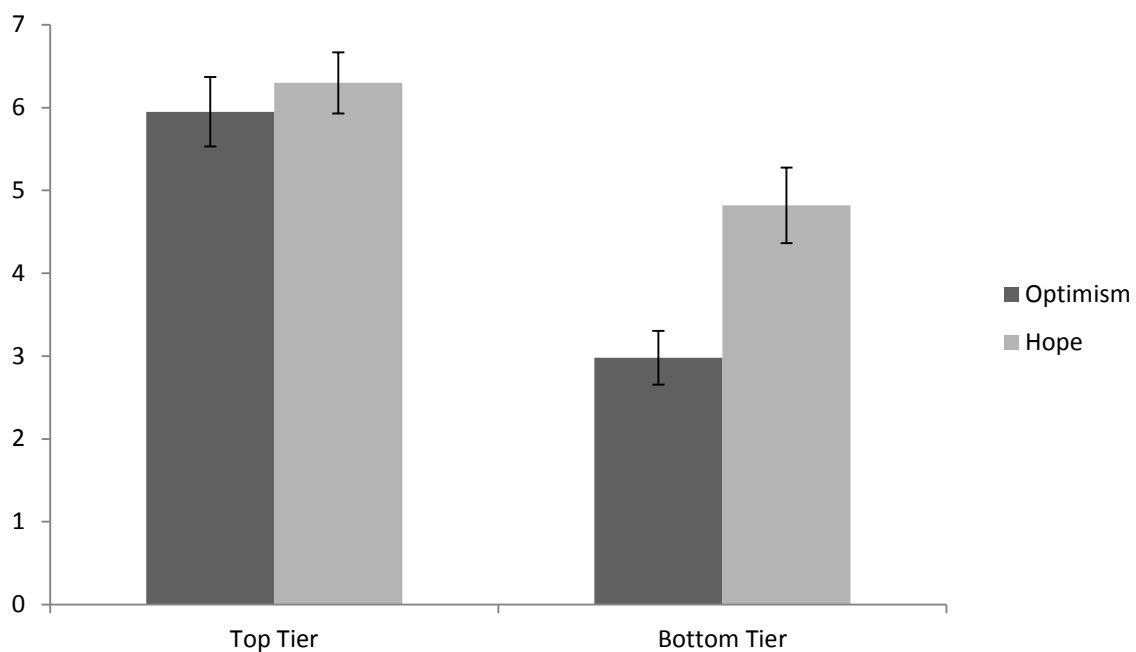


Figure 2.2. Mean differences with 95% CI error bars (Study 2.1).

Further, we calculated the difference between hope and optimism and treated it as an outcome variable in a regression analysis. The hope-optimism differential was

significantly related to the teams' tier level, with lower-tier team supporters showing a greater differential than top-tier supporters, $B = 0.74$, $p < .001$, 95% CI = [0.42, 1.06]; but when entering likelihood into the regression, this effect was reduced to non-significance, $B = 0.31$, $p = .28$, 95% CI = [-0.25, 0.87]. Bootstrapping methods (Hayes, 2013) showed that the indirect effect of tier-level on the hope-optimism differential via likelihood was significant, $B = 0.44$, 95% CI = [0.00, 0.84]. Bottom-tier supporters tended towards greater hope than optimism because of their lower likelihood perceptions, hence greater uncertainty of success; in contrast, having more confidence in their team's success top-tier supporters showed no difference between hope and optimism.

Table 2.2

Correlations between Main Variables for Bottom-Tier Team Supporters (Study 2.1)

	1	2	3
1 – Likelihood			
2 – Optimism	.82***		
3 – Hope	.49***	.46***	
4 - Investment	.12	.21	.14

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

The present research aimed to demonstrate the differences between hope and optimism, highlighted under uncertainty, and we therefore focused on bottom-tier team supporters. Bottom-tier supporters were in a position of uncertainty, as premised by their inferior league standing as well as indicated by their average likelihood rating of about 32% (note, their likelihood estimates still covered the whole range from 0% to 90%). As argued in Hypotheses 1 and 2, we anticipated that the distinct psychological meaning of hope compared with optimism would be indicated by their differential relationships with likelihood perceptions. Table 2.2 shows the correlations between the main variables. Optimism shared a strong significant relationship with likelihood, as did hope to a lesser

degree. Interestingly one's level of personal investment was not related to either hope or optimism.

It was predicted that optimism would be simply linearly related to likelihood, but for those invested in the outcome hope would share a cubic relationship with perceived likelihood. Hierarchical regression was employed to explore the possible linear/curvilinear relationships of both hope and optimism with likelihood, and the influence of personal investment on these relationships. In line with recommendations by Aiken and West (1991; see also West, Aiken, Wu, & Taylor, 2007) all the independent variables were centred prior to calculating the power and interaction terms. In the first step the dependent variable (hope/optimism) was regressed onto likelihood and personal investment to test the linear relationship, and both quadratic and cubic effects of likelihood. In the second step the linear, quadratic and cubic terms of likelihood in interaction with personal investment were entered into the model. Consistent with predictions, for optimism the linear effect of likelihood was the only significant relationship in all steps of the analysis, $\beta = .80, p < .001$. Optimism seems to function as an estimate of participants' perceived likelihood of success.

For hope it was predicted that the relationship with likelihood would be moderated by personal investment: when personal investment is high, hope would share a cubic relationship with likelihood. Table 2.3 shows the result of the regression analysis. Only the cubic likelihood by personal investment interaction term remained significant once all variables were entered into the model ($\beta = .71, p = .02$). To probe this effect further, the simple and curvilinear effects were tested at high and low levels (+1 and -1 standard deviations) of personal investment; following Aiken and West (1991) the regression model was re-run after the moderator was transformed down and up by 1 standard deviation, respectively. At lower levels the simple curvilinear effects were not significant (quadratic $\beta = .08, p = .81$; cubic $\beta = -.44, p = .38$) but the linear relationship was ($\beta = .70, p = .04$), whereas at higher levels of personal investment both the quadratic ($\beta = -.57, p = .04$) and

cubic effects ($\beta = 1.44, p = .02$) for likelihood were significant. This suggests that likelihood shares a cubic relationship with hope, and that this cubic effect is more pronounced the more important the outcome is to the individual.

Table 2.3

Hierarchical Regression for Hope as Dependent Variable (Study 2.1)

	<i>B</i>	<i>SE_B</i>	β	ΔR^2	<i>F Change</i>	<i>df</i>
Step 1				.26	5.38	4,61
(Constant)	5.03	.28				
Investment	.12	.15	.09			
Likelihood	.03	.02	.34			
Likelihood ²	-.001	.001	-.24			
Likelihood ³	1.84E-5	.00	.35			
Step 2				.07	1.92	3,58
(Constant)	5.00	.27				
Investment	.26	.2	.20			
Likelihood	.02	.02	.26			
Likelihood ²	-.001	.001	-.23			
Likelihood ³	2.67E-5	.00	.50			
Likelihood \times Investment	-.03	.02	-.44			
Likelihood ² \times Investment	-.001	.00	-.34			
Likelihood ³ \times Investment	3.48E-5	.00	.71*			

Note: * $p < .05$, ** $p < .01$, *** $p < .001$.

To test whether this curvilinear relationship at high levels of investment was indeed unique to hope and significantly different from optimism's relationship with likelihood, we conducted a further analysis with optimism and hope as a repeated measure (coded -1 vs. +1). We used Linear Mixed Models in SPSS, which allowed us to represent the repeated

measure as a Level 1, within-subject variable, whose interactions with the Level 2 variable likelihood (the linear, quadratic and cubic terms) were tested at high levels of investment (+1SD). All three interactions were significant; the within-subject factor's interaction with the linear likelihood term, $B = -0.04$, 95% CI = [-0.08, -0.01], with the quadratic term, $B = -0.001$, 95% CI = [-0.002, -0.0001], and with the cubic term, $B = 0.00005$, 95% CI = [0.00001, 0.00008]. Further probing replicated the regression results already reported above, but based on the significant interaction effects we can now indeed conclude that optimism had a more linear relationship with likelihood than hope did, whereas hope had a more cubic (and inverse-quadratic) relationship with likelihood than optimism did.

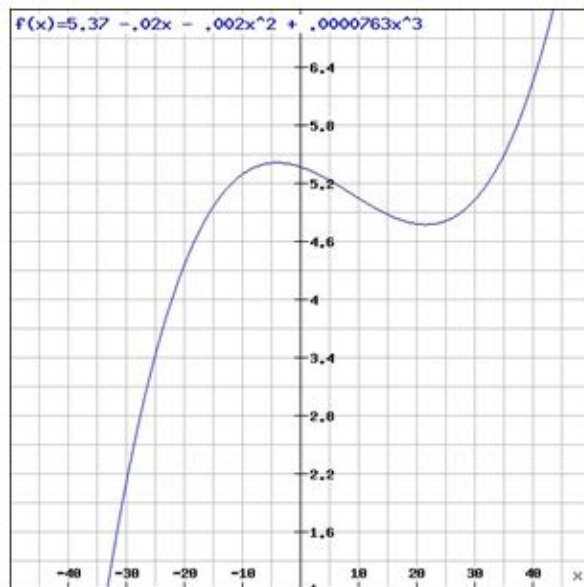


Figure 2.3. Cubic function of hope (Y axis) and the centred likelihood (X axis) at upper levels of personal investment (+1SD) (Study 2.1).

Figure 2.3 provides a visual representation of the cubic relationship between hope and likelihood; hope accelerates quickly in lower likelihood, or in possibility, before levelling off and then rising again in the higher levels of likelihood. To sum up, Study 2.1 provided support for a distinctive hope function that differentiates it from expectancy-driven constructs like optimism, in line with our theoretical conceptualization.

Study 2.2

Study 2.2 was designed to replicate the cubic findings of Study 2.1 in a different social context. In line with the theory that the importance of hope arises in lower probability for something that is desirable and personally significant, a new context was sought where there would be variability in these areas. The 2014 South Australian State Election provided such an opportunity. Politics is an area that is important to some people more than others, and the desirability of one's local candidate has greater significance to some than others. Additionally, as experts predicted that the results of the election were too close to call, it presented a suitable opportunity to investigate hope at lower likelihood within a broader sample.

In the state of South Australia, the Government governs according to the Westminster system, which consists of two houses of government. In this study the focus was on the lower house, the South Australian House of Assembly, which consists of 47 members taken from single-member constituencies. Candidates from political parties and independent candidates stand in each electorate, with citizens required to vote for a local candidate in their electorate. The party with a majority of members voted to the lower house forms government, and the leader of the party becomes premier. Although an argument could be made that people vote with the leader of their favoured party in mind, rather than the local member, the fact that independent members get voted into parliament highlights that for many individuals the local candidate is of real importance. For this study participants were directed to think about the local candidate they would like to win in their own electorate. How representative the candidate is of the participant's ideals and interests, and how strongly the participant identifies with the candidate, would be indicative of the significance of this particular candidate to the participant.

Method

Participants

Participants were 79 eligible voters aged 19 to 68 ($M = 38.01$, $SD = 13.51$), consisting of 45 females and 34 males. Participation was voluntary and participants did not receive any material reward for their time.

Procedure

Unlike the direct recruitment employed in Study 2.1, voters chose to volunteer to participate by accessing an advertisement asking for volunteers that was placed on both social media and a community classifieds website three weeks before the South Australian State Election and remained online until the morning of the election. The advertisement provided the participants with some initial information about the study and a link to an online survey.

Materials

An initial check was used to ensure participants were voting residents of South Australia, and demographic data was collected (e.g., age, gender). Participants were directed to think about the candidate they wanted to win the seat in their local electorate, and then were asked to select what party that candidate represented.

Study 2.2 followed a similar format to Study 2.1. Variables were measured with 7-point Likert scales, with the exception of likelihood (see below). *Personal investment* was again measured to tap into individuals' desire to see a certain outcome and the personal significance the issue has for them (Cronbach's $\alpha = .89$). Similar to Study 2.1 but adapted to the new context with two additional items to enhance reliability, seven items tapped the desirability and personal significance of a certain candidate winning (e.g., "How strongly do you desire that your local candidate wins your local seat?", "How strongly do you identify with your local candidate?"; "How well do you believe your local candidate represents your interests?"; 1 = *Not at all*, 7 = *Very much*).

Likelihood was measured with a slider ranging from 0% to 100% likelihood that the favoured candidate would win a seat. Participants moved the slider to their estimated likelihood rating. *Optimism* was measured directly with one question: “How optimistic are you that your candidate will win your local seat?” (1 = *Not at all optimistic*, 7 = *Really optimistic*). *Hope* was also measured directly with one question: “Do you have hope that your candidate will win your local seat?” (1 = *Not at all hopeful*, 7 = *Really hopeful*).

Political Persuasion was measured to provide information about the political leaning of the sample. It was measured with one question “How would you describe your political persuasion?” and was rated on a 7-point scale, 1 = *Left Wing (Socialist)*, 4 = *Centre*, 7 = *Right Wing (Conservative)*. Finally, participants were asked a question to gauge whether they were dedicated to one party, or whether they were swing voters. “Do you always vote for the same party?”

Results and Discussion

The sample was predominantly left of centre politically ($M = 3.20$, $SD = 1.31$) and were more often swing voters ($n = 50$) than party faithful ($n = 29$). Table 2.4 shows the means, standard deviations and correlations for the main variables in the second study. With no clear favourite in the lead-up to the elections, it is not surprising that participant ratings of likelihood of success were in the lower levels of perceived likelihood. This it seems resulted in a higher rating of hope than optimism, similar to the bottom-tier supporters in Study 2.1. Optimism and hope both shared a very similar positive relationship with likelihood as they did in the first study. Personal investment again shared a significant relationship with optimism, however unlike Study 2.1 personal investment had a strong linear relationship with hope.

In line with Study 2.1 hierarchical regression was employed to test for curvilinear relationships between hope (and optimism) with likelihood, and the influence of personal

investment on these relationships. All variables were entered into the model in the same order as in Study 2.1.

Table 2.4

Mean and Standard Deviation and Correlations of the Main Variables (Study 2.2)

	<i>M</i>	<i>SD</i>	1	2	3
1. Likelihood	42.71	28.50			
2. Optimism	3.48	1.83	.81***		
3. Hope	4.53	1.77	.42***	.60***	
4. Investment	4.77	1.22	.08	.32**	.69***

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

As predicted, optimism shared a significant linear relationship with likelihood, $\beta = 1.02$, $p < .001$, in the first step; there was also a weaker significant linear relationship with personal investment, $\beta = .26$, $p < .001$. Importantly, no other higher-order terms reached significance; not the quadratic or cubic terms of likelihood, or any interactions with personal investment.

As in Study 2.1, it was predicted that the relationship between hope and likelihood would be moderated by personal investment: when personal investment is high, hope shares a cubic relationship with likelihood. Table 2.5 shows the result of the regression analysis. Similar to Study 2.1, an interaction of personal investment with the cubic term of perceived likelihood was significant once all variables were entered into the model ($\beta = .38$, $p = .04$), suggesting that the cubic interaction is the best fit for the data. Note that unlike Study 2.1, personal investment had a significantly positive relationship with hope in both steps of the analysis.

Probing techniques were again used to further explore the cubic relationship at high and low levels (+1 and -1 standard deviations) of personal investment. At lower levels the simple curvilinear effects were not significant (quadratic $\beta = -.10$, $p = .38$; cubic $\beta = -.14$, p

= .62), and unlike the first study neither was the linear likelihood relationship ($\beta = .43, p = .14$). At higher levels of personal investment the simple quadratic effect was not significant ($\beta = -.25, p = .07$), however the simple cubic effect ($\beta = .79, p = .01$) was significant. This replicates the findings in Study 2.1 that likelihood shares a cubic relationship with hope, and that this cubic effect is more pronounced the more important the outcome is to the individual.

Table 2.5

Hierarchical Regression for Hope as Dependent Variable (Study 2.2)

	<i>B</i>	<i>SE_B</i>	β	ΔR^2	<i>F Change</i>	<i>df</i>
Step 1				.61	29.00	4,74
(Constant)	4.78	.18				
Investment	.96	.11	.64***			
Likelihood	.02	.01	.25			
Likelihood ²	-3.5E-4	.0002	-.16			
Likelihood ³	6.367E-6	.00	.19			
Step 2				.04	2.48	3,71
(Constant)	4.79	.18				
Investment	1.04	.14	.70***			
Likelihood	.01	.01	.19			
Likelihood ²	-3.74E-4	.0002	-.18*			
Likelihood ³	1.104E-5	.00	.33			
Likelihood \times Investment	-.01	.01	-.20			
Likelihood ² \times Investment	-1.3E-4	.00	-.09			
Likelihood ³ \times Investment	1.30E-5	.00	.38*			

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

We used again Linear Mixed Models, with optimism and hope represented as a repeated measure (-1, +1), to test whether this curvilinear relationship at high levels of investment (+1SD) was indeed unique to hope and significantly different from optimism's relationship with likelihood. Consistent with Study 2.1, the within-subject factor had significant interactions with all three likelihood terms; the linear likelihood term, $B = -0.03$, 95% CI = [-0.05, -0.01], the quadratic term, $B = -0.0004$, 95% CI = [-0.0007, -0.00004], and, marginal at $p = .051$, the cubic term, $B = 0.00001$, 95% CI = [-0.00000008, 0.00002]. Further probing replicated the regression results already reported above, but based on the significant interaction effects we can conclude that optimism had a more linear relationship with likelihood than hope did, whereas hope had a more cubic relationship with likelihood than optimism did.



Figure 2.4. Cubic function of hope (Y axis) and the centred likelihood (X axis) in upper levels of personal investment (+1SD) (Study 2.2).

Figure 2.4 shows a visual representation of the cubic relationship between likelihood and hope at high levels of personal investment. Similar to Study 2.1, there is an acceleration in hope when a win for the favoured political candidate is an increasing

possibility, whereas it levels off with increasing probability before hope picks up again with high likelihood of winning.

General Discussion

The results from the two studies support our conceptualisation of a hope that can be differentiated from optimism, and is not constrained by positive expectations. Participants in our studies placed a greater investment in hope in times of greater uncertainty, when success was a mere possibility. In Study 2.1, football supporters of the bottom-tier sides, despite being generally pessimistic about their team's chances for success, proved to be hopeful pessimists. They rated hope higher than optimism, showing the importance of hope when the desired outcome is less likely to be obtained. For top-tier supporters, more assured of success, there was no distinguishable difference between ratings of hope and optimism, and mediation analysis showed this was due to the greater perceived likelihood of their team winning. This would suggest that at higher levels of likelihood the distinction between hope and optimism disappears, as with increased expectation hope loses its unique meaning.⁸ In contrast, for bottom-tier supporters, by acknowledging the low likelihood of success, hope becomes distinct from both optimism and expectation.

The distinction between hope and optimism was not limited to overall ratings of the two constructs, but also apparent for the nature of the relationship they shared with likelihood. For bottom-tier supporters and voters, optimism shared a positive linear relationship with likelihood in both studies, as predicted. Optimism, it appears, reflects a rational perception of probabilities. Of course, this does not mean that individuals are necessarily reasonable and unbiased in the perception of those probabilities in the first place. That said, it may be noted that for both bottom-tier football supporters in Study 2.1 and voters in Study 2.2, perceptions of likelihood of success were not significantly

⁸ Anecdotally, top-tier supporters often seemed bemused by the hope/optimism questions, arguing that hope and optimism were the same thing.

correlated with personal investment, $r_s = .12$ and $.01$, respectively. In other words, wishful thinking did not seem to affect perceptions of likelihood. Alternatively, it is possible that individuals feel more optimistic than the likelihood of success would objectively warrant. While such feelings appear to be a strict function of likelihood, individuals may 'add a constant' to arrive at higher levels of optimism (Massey et al., 2011). Note that, in Study 2.2 at least, personal investment showed a positive linear relationship with optimism.

In contrast, the results for hope supported our hypothesis that for those more invested in the hoped-for outcome, hope would not merely share a linear relationship with likelihood but rather a curvilinear, inverse s-shaped relationship. Participants cognisant of the low probability of success for their personally significant desire still invested in hope regardless of their perceived low chances. This saw hope rise early at lower levels of possibility before levelling off and rising again at higher levels of probability.

These results suggest that hope is distinct from optimism under some conditions. Although participants who were invested in the outcome had higher hope with higher perceived likelihood of success similar to predictions of other hope conceptualisations (Snyder et al., 1991; Stotland, 1969), this overlooks arguably the most crucial and distinct aspects of hope. When personally invested in the outcome, it takes just a perception of a possibility of success for hope to arise. Hope is not a mere derivative of expectation or confidence in obtaining one's hoped for goal, rather, hope may be what individuals turn to when the prospect of obtaining their personally significant desire is unclear. As the invested participants became more confident in success, their hope scores aligned more with likelihood and followed a similar trajectory to that of optimism. It is at these high levels of likelihood that the more assured top-tier football team supporters showed optimism to be indistinct from hope. This suggests that hope's true and unique nature is in the realm of possibility, when individuals are dealing with greater uncertainty.

What do these findings further suggest about the nature and function of hope? Hope may arise when likelihood seems low simply because that is when it is needed the most. Whether it arises from a conscious decision (Pettit, 2004), or of its own accord (Miceli & Castelfranchi, 2010), is not clear from this data. It is also unclear whether hope arises when a significant goal departs from impossibility into possibility, or whether hope dies grudgingly when the likelihood of success diminishes, or both. Is there any difference or advantage of a burgeoning hope in budding possibility, compared to hanging on to hope as one's personally significant desire becomes less likely to obtain? Due to the correlational nature of this current study, it is not possible to answer these questions. Manipulating likelihood and personal investment in an experimental paradigm could be an avenue for future research, and would elucidate questions raised in this area.

What is clear in this current research is the importance possibility plays for an outcome one is personally invested in. The need for hope goes beyond a simple desire as positive valence (Miceli & Castelfranchi, 2010), because it represents something of real personal significance to the hoper (Averill et al., 1990; Korner, 1970). For participants in these studies, it was when a goal of real importance to the individual and their sense of identity was confronted with low likelihood of obtainment that hope became important. This appears in line with Pettit (2004) who argues that hope often "represents the only way of retaining our identity and selfhood and not losing ourselves to the turmoil of brute, disheartening fact" (p. 161). When something central to one's self and sense of identity is under threat of not obtaining, one holds on to hope to help manage this uncertainty. It is well established that individuals generally do not tolerate uncertainty well (Hogg, 2012; van den Bos & Lind, 2002), with research highlighting the link between uncertainty and psychopathology (Gentes & Ruscio, 2011). When confronted with only a mere possibility of obtaining such a significant goal, hope preserves one's sense of self, and allows one to continue in the face of disappointment (Miceli & Castelfranchi, 2010; Nelissen, 2017),

because to do otherwise would be akin to giving up on one's self. In this way hope represents the coping and shield from despair and depression it is often argued to be (Breznitz, 1986; Korner, 1970; Lazarus, 1999).

If the unique influence of hope is in greater uncertainty, as this research suggests, future research should investigate hope in this realm. Although causal conclusions cannot be drawn from this current research, the benefits (or dangers) of hope in lower likelihood provide an exciting avenue for future research. In line with the general view on hope, we believe hope to be a boon to those fortunate enough to possess it. Maintaining hope in the face of uncertainty around a goal of great significance to the individual is likely to have positive psychological consequences. As Miceli and Castelfranchi (2010) noted, hope may have the potential for passivity in perusing goals, however they, and we, believe that hope generally functions as a motivator for action. As the current studies show, hope is not ignoring or overstating the likelihood of success, it just "sticks to the belief of possibility" (Miceli & Castelfranchi, 2010, p. 268). Rather than becoming despondent and demotivated by the low chances of success, which may reduce those chances further, hope motivates one to make the most of that low likelihood (Pettit, 2004). Recent research by Nelissen (2017) has provided some evidence in support of this, with hope, but not expectancy, tempering the effects of negative feedback on goal progress. We would argue that this happens even when one recognises the limit of one's agency, as hope focuses one's energies to the future goal (McGeer, 2004), because to do otherwise would be to abandon something that is central to one's sense of self and identity. For the bottom-tier football supporters, hope may have helped provide motivation to attend and watch their beloved team, despite being pessimistic about their team achieving success (and for 2 out of the 4 games, their hope was rewarded with a win!).

These studies were particularly focused on hope in situations over which one has minimal control. In one sense this is important, as it shows hope arises even in the absence

of personal efficacy or agency. Although football supporters may endorse beliefs that barracking for one's team helps spur them on to victory, or voters may believe a sense of community and collective agency can influence an election outcome, there was no real sense of personal agency within the current research. However it is possible these relationships may look different when the individual can personally influence the outcome. Future research can examine hope as an outcome of possibility and personal investment under conditions over which one may have some control, however we would expect that these predictions of agency and self-efficacy would impact on an individual's perceived likelihood of achieving the desired goal. If the goal is of real significance to the individual, and possible, we might expect hope to rise with possibility regardless of perceived control. The psychological and motivational benefits of hope would still be the same, only the nature of the consequential actions may change. Hope should motivate individuals to their hoped for goal, and where no action is currently possible, it should allow one to act as if the goal can be obtained (Pettit, 2004) and be ready to act should the opportunity arise.

In this study optimism and hope questions were presented in the same order in each study. As participants were asked about optimism immediately followed by hope this might have indicated to them that the investigator sees these as different and expects them to answer differently. Future research could vary the order of hope and optimism between-subjects to test whether the conceptual differences can be confirmed even if the terms are not implicitly contrasted with one another. Additionally, in Study 2.1 participants were asked to rate their own and opponent's team performance before rating perceived likelihood, with results as would be expected (perceived likelihood correlated positively with their own teams performance, $r = .77, p < .001$, and negatively with the opposition's performance, $r = -.65, p < .001$). However, due to the nature of an election (e.g., new candidates or independents with no prior performance) similar measures were not

appropriate in Study 2.2. Despite the difference in procedure, the results for likelihood with hope and optimism were similar between studies.

Future research could further clarify the role of hope (if any) for those not invested in the outcome. Although there was a suggestion of a linear relationship between hope and likelihood at low personal investment in the data, the moderation of this relationship was not significant in either study. It could be that hope loses its unique meaning in low personal investment, and hope functions as an estimation of chance; however the data were not clear on this point. We also do not know why there was a positive linear relationship between personal investment and both optimism and hope in Study 2.2, but not Study 2.1. It could be that rather than being approached as in Study 2.1, voters self-selected themselves to participate in the study, which may already suggest greater investment in the outcome, or simply that politics represents a greater significance to the individual.

This current research rescues hope from being a mere derivative of expectation, and places hope in its colloquial element, as a potential resource in times of great uncertainty, when individuals perceive low levels of likelihood of obtaining their hoped-for goal. The implications from these findings suggest that the role and function of hope have been underestimated and misattributed in prior research. Hope is not merely a measure of one's confidence in achieving one's goal, rather it arises in lower likelihood, and may bolster individuals who see little chance of success (Nelissen, 2017). There is an opportunity in future research to test the effects of likelihood and personal investment on hope, and to investigate the impact such a hope has on psychological outcomes (e.g., motivation, persistence, well-being), highlighting the unique influence of hope, and making hope more hopeful again.

CHAPTER 3: Hopeful Action Against the Odds: Hope as a Motivator of Action Against Climate Change

"Now at this last we must take a hard road, a road unforeseen. There lies our hope, if hope it be. To walk into peril – to Mordor. We must send the Ring to the Fire." Tolkien (Lord of the Rings, p. 359)

There is an abundance of research that links motivation to positive expectations. Research suggests that motivation is improved when we expect success, our actions to be effective, and our efforts to be rewarded (e.g., Bandura, 1997; Carver et al., 2010; Fishbein & Ajzen, 1975). However, like the epic journey described in Tolkien's novel, there are situations in life when we have to attempt difficult things, when the odds do not seem to be in our favour, when success is not guaranteed or necessarily expected, or when our own actions alone may not bring about success. One such example on a global scale is the battle against climate change. Research suggests that climate change presents a serious risk across a range of environmental and social factors, and that anthropogenic greenhouse gas emissions are predominately responsible (Pachauri, Meyer, & Core Writing Team, 2015). Although it is generally recognised that individual action and policy support are required to mitigate climate change, the scope of the problem and the limits of personal efficacy appear to be barriers (amongst others) to climate mitigating behaviour (Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007). In the face of perceived unfavourable odds of success, what helps individuals develop and maintain motivation and action? This current research suggests that *hope* plays an important role in engendering goal consistent behaviour, particularly when the hoper perceives low likelihood of success.

Motivation by Expectancy

It seems perfectly reasonable that humans would work towards a goal when buoyed by the expectation that their actions will be rewarded (Becker, 1976; Fishbein & Ajzen,

1975). Certainly research provides strong evidence linking expectancy measures to motivation and performance, be it self or group-efficacy (Bandura, 1997), generalised expectations (Carver et al., 2010) or specific expectations (Oettingen, 2012). Encompassed in this research are expectancy-based hope conceptualisations (e.g., Snyder et al., 1991; Stotland, 1969), which suggest the reduction of uncertainty engenders hope. Such conceptualisations have shown hope to be a benefit in many areas, such as athletics, academics, physical and mental health (Snyder, 2002), or continuing treatment (Perley et al., 1971). Together this research suggests a logical human nature, where individuals are motivated to work towards those goals that they believe they will be successful in achieving.

While the general robustness of the relationship between expectancy-based conceptualisations and motivation is not in doubt, it is clear that individuals do not act solely when the odds are favourable. People battle it out against a clearly stronger sporting opponent, or run a liberal political campaign in a traditionally conservative electorate, or undergo extremely painful medical treatments for aggressive cancer despite a minute rate of survival (Groopman, 2005). At such times, what is it that promotes or maintains motivation when the individual does not perceive a high likelihood of success?

Hope in Possibility

We suggest that hope may function as a distinct motivator for goal consistent action, particularly when the odds of success are low. This proposition becomes slightly problematic when considering the evidence for an expectancy-based hope concept discussed above. However we would argue that a conceptualisation of hope which increases with the hoper's perceived confidence of success and sense of personal agency for arriving at success (e.g., Snyder et al., 1991; Stotland, 1969) is not reflective of the everyday usage of hope. In common parlance we hold onto hope, hope against (all) hope, and suggest one can only hope. Hope is born in the uncertainty of success (Lazarus, 1991),

or for outcomes that are relatively uncontrollable (Bruininks & Malle, 2005), and seems misplaced or superfluous if triumph is expected. But beyond being inconsistent with everyday usage, hope conceptualisations that focus on expectation and personal agency produce results similar to other expectation-based outcomes (e.g., optimism, self-efficacy; Aspinwall & Leaf, 2002), and thus the unique nature of hope and its motivational properties are unclear.

More recently, however, some researchers have argued that hope plays a unique role in lower likelihood, when success is possible but not probable (Bury, Wenzel, & Woodyatt, 2016a; Miceli & Castelfranchi, 2010; Nelissen, 2017). For a desirable goal the mere *possibility* of success engenders hope (Miceli & Castelfranchi, 2010), especially if the outcome is of personal significance to the individual and/or their sense of identity (Bury et al., 2016a). Research by Bury et al. (2016a) showed that while optimism (as a measure of expectancy) shared a linear relationship with perceived likelihood of success, for individuals more *personally invested* in the hoped-for outcome, hope shared a cubic relationship with the perceived likelihood of success. Hope rose sharply in lower likelihood before levelling off, and aligning with the linear trend for optimism. In fact, for those most confident of success, there was no difference between overall ratings of hope and optimism, whereas those less certain of success tended towards significantly greater ratings of hope than optimism. This research is consistent with the view that the confluence of high *personal investment* and perceived *possibility* of success leads one to hope.

Hope as Motivation for Action Against the Odds

If hope's true nature arises in lower likelihood, does such hope lead to behaviour consistent with achieving that goal? Or does it lead to passivity in perusing goals - as expectancy research would suggest? Lazarus (1991, 1999) suggests that hope as a discrete emotion arises after appraisals of unfavourable but not hopeless conditions for a desirable future, but that unlike other emotions (e.g., anger), the action tendencies of hope are not

clear. Recent research does suggest that feelings of hopefulness can have a motivational benefit, such as leading to greater efforts in social change (Greenaway et al., 2016), or mediating the relationship between perceptions that the world is changing and the future malleable, and concessions towards peace in intractable conflicts (Cohen-Chen et al., 2015). The notion that the future is malleable we believe suggests a possibility, a possibility in which one can imbue hope. But what allows hoppers to make the most of a low likelihood of success?

Hope, and the positive affect associated with it, allows hoppers to make the most positive assessment of the mere possibility of success (Miceli & Castelfranchi, 2010). This does not suggest ignoring or overestimating the odds, with such idealised positive fantasies being shown to reduce motivation (Oettingen, 1996; Oettingen & Mayer, 2002), rather hope “brings reality into sharp focus” (Groopman, 2005, p. 198), and we believe allows the individual to invest in the possibility of success. Although Lazarus (1991, 1999) suggests the action tendencies of hope are unclear, he argues that hope functions as a coping tool, and dispels “negative emotional tendencies” (Lazarus, 1991, p. 283) associated with unfavourable odds. Similarly, Pettit (2004) argues that hope may buffer the individual against the negative affect and demotivation associated with the low likelihood of success, which would reduce the likelihood further. Instead hope allows recognition of the *opportunity* presented by possibility (Chadwick, 2015), which may galvanise individuals to action (Korner, 1970), allowing them to make the most of low chances of success (Pettit, 2004). We believe this will occur either in recognition of the low likelihood of success, or as research suggests, by tempering the effects of negative feedback on motivation (Nelissen, 2017).

A positive focus on the possibility of success allows the hoper to act in a way consistent with their hoped-for goal “as if” the outcome will come about (Pettit, 2004). Miceli and Castelfranchi (2010) suggest that hoppers reason that “as long as the negative

evidence available is insufficient (to obtain full certainty)” that they “hope (and act) for the better” (p. 268). Even when recognising the limitations of agency, hope focuses energy to the future, allowing one to “lean into the future ready to act” (McGeer, 2004, p. 104), because to behave otherwise would be to abandon a goal significant to one’s self or sense of identity.

We argue that hope’s unique motivational contribution is in lower likelihood. For those more personally invested in the outcome, a recognition of the possibility of achieving their hoped-for goal leads to an increase in hope, which serves as a shield against the negative affect associated with that low likelihood of success, allowing the hoper to make the most positive appraisal of those odds, and act.

The Current Research – Mitigating Climate Change

This research aims to investigate further the unique nature of hope in lower likelihood, and its potential motivational benefits in the context of climate change action. Mitigating climate change relies on individuals to act in a way consistent with reducing carbon emissions, both individually (e.g., reducing electricity consumption) and collectively (e.g., supporting appropriate governmental policies; see van Zomeren, 2014). Research into hope’s positive influence on climate mitigation behaviours are few, with some contrary evidence. Some results suggest that rather than a hope that denies the seriousness of climate change, hopes in more constructive means to reduce climate change were linked to mitigation behaviours amongst adolescents (Ojala, 2015). In a similar vein, hope and concern about a changing climate were both linked to pro-environmental behaviour amongst children (Stevenson & Peterson, 2015), suggesting hope may be grounded in the (uncertain) reality of the situation. There is also some evidence that the introduction of efficacy information can increase climate-related political participation via hope (in some conditions; Feldman & Hart, 2016), and that feelings of hope predict support for climate policies when individuals are asked to rate their emotions in regards to

the changing climate (Smith & Leiserowitz, 2014). Contrastingly some studies have shown that despite achieving an increase in hope with either hopeful (Chadwick, 2015) or optimistic (Hornsey & Fielding, 2016) climate messages, this hope did not translate into an increase in climate mitigating behaviour.

We suggest that if personally invested in the outcome, it will take only the perceived possibility that human action will mitigate the effects of climate change for hope to develop, which will lead the individual to act in a way consistent with mitigating climate change, despite the low odds. With research suggesting widespread scepticism about the effectiveness of individual action against climate action (e.g., drop in the pool, Lorenzoni et al., 2007), acting ‘as if’ within a group context suggests some belief, or hope, that others are working in concert with your own actions, especially if there is little immediate evidence that such action is taking place.

We present two studies, set in Australia, that aim to investigate whether a hope for an uncertain outcome will lead to goal consistent behaviour in a climate change context.

Study 3.1

Study 3.1 investigated two hoped-for outcomes, a hope that a) our actions as Australians will help reduce the rate of climate change (*Outcome 1*) and b) Australia will meet its commitment to reduce carbon emissions by a minimum of 5% by 2020 (*Outcome 2*), with the expectation that results will be similar across both outcomes. We predict that:

1. Ratings of optimism will be linearly related to the perceived likelihood of achieving the desired outcome.
2. Ratings of hope will be curvilinearly related to perceived likelihood of achieving the hoped-for outcome, in particular when personal investment is high: specifically, at lower levels of likelihood, hope will accelerate quickly as the possibility is small but increasing, before decelerating at greater levels of probability and then aligning with likelihood levels (i.e., hope is a cubic function of likelihood).

3. Hope will mediate the cubic relationship between the perceived likelihood that climate change can be mitigated and climate action.
4. The indirect relation between cubic likelihood and climate action (via hope) will be moderated by personal investment, such that the indirect effect will be more pronounced for those more invested in the outcome than those less invested.

Method

Participants

Participants were 155 Australian residents aged 18 to 69 ($M = 34.28$, $SD = 13.18$), consisting of 90 females and 65 males. Participation was voluntary and participants did not receive any material reward for their time.

Procedure

Advertisements were placed on both social media and a community classifieds website in November 2013⁹ asking for volunteers to take part in a study about ‘attitudes to climate change’, and they remained online for three months. The advertisement provided the participants with some initial information about the study and a link to an online survey.

Materials

Upon accessing the study participants were provided with a letter introducing the researchers and information about the study. As some of the questions focused on Australian policy, an initial check confirmed participants were Australian permanent residents, and demographic data were collected (e.g., age, gender). Participants were then provided with the following information:

“There is strong scientific consensus that the Earth’s climate is changing, that our planet is globally warming, and that human activities are in large part responsible

⁹ This study was conducted before the conservative Abbott Government came into power and implemented changes to Australian climate policies, changes that were seen by many as not sufficient enough to meet climate mitigation expectations.

for this. In particular humans' heavy reliance on fossil fuels has caused a steep increase in CO₂ in the atmosphere in recent decades, which is one of the so-called greenhouse gases considered a key factor in global warming. The Australian government made a commitment to reducing carbon emissions by 5 per cent from 2000 levels by 2020.

We are interested in your views on this issue."

All variables were measured with 7-point Likert scales, with the exception of likelihood (see below).

Check items. Two items measured participant's beliefs about climate change (1 = *not at all*, 7 = *absolutely*); "Do you believe that our climate is changing?" "Do you believe that human activity is at least in part responsible for climate change?" As this study is premised upon participants' hope that humankind can mitigate climate change, participants who scored 1 on either of these questions were excluded from the study. Seven individuals indicated that they did not believe in a changing climate and a further two individuals indicated that humankind were not at all responsible for climate change; these participants were consequently excluded.

Personal investment. *Personal investment* referred to the degree to which the participant found the goal both desirable and personally significant. *Personal significance* represents how important the outcome is to the individual and their sense of identity. In this instance a measure of environmental identity created by (Hinds & Sparks, 2008) was employed ("I see myself as someone who empathises with the natural environment", "For me, engaging with the natural environment gives me a greater sense of who I am", "I identify with the natural environment"; 1 = *not at all*, 7 = *very much*). *Desirability* of mitigating climate change was measured with three questions ("How much do you wish climate change could be halted?", "How much do you desire the conservation of our natural world as it is?", "How much do you wish the world would do something to counter

climate change?”). A principal component analysis (PCA) yielded a strong first factor (explaining 52.51% of the variance), on which all items loaded substantially ($> .57$). While Kaiser’s criterion of eigenvalues greater than 1 suggested two components (79.75% of the variance), on which personal significance and desirability items loaded respectively ($> .64$, following orthogonal rotation), due to theoretical considerations and to be consistent with previous research (Bury et al., 2016a), as well as given the fact that analyses for personal significance and desirability separately produced similar results, the six items were combined and averaged to obtain scale scores ($\alpha = .81$), with higher scores indicating higher investment.

Perceived likelihood. *Likelihood* of Outcome 1 was measured with a slider ranging from 0% to 100% likelihood answering the question “What are the chances that our actions as Australians will help reduce the rate of climate change?” Participants moved the slider to their perceived likelihood rating.

Optimism. Optimism of Outcome 1 was measured directly with one question: “How optimistic are you that our actions as Australians will help reduce the rate of climate change?” (1 = *not at all optimistic*, 7 = *really optimistic*).

Hope. Participants were randomly allocated to either hope as an adjective (for Outcome 1: “How hopeful are you that our actions as Australians will help reduce the rate of climate change?”; 1 = *not at all hopeful*, 7 = *really hopeful*) or hope as a noun (“Do you have hope that our actions as...”, 1 = *not at all*, 7 = *very much*) condition. This was to investigate whether the linguistic characteristic of the hope question varied the outcome, but this was not the case, with scores and outcomes very similar across all analyses. To check that there were indeed no significant differences between groups, the two hope conditions were dummy coded and treated as a between-subject factor across the proposed analyses; as there were no significant interactions between the hope conditions and independent variables, the two conditions were combined to form one hope measure.

Participants were then provided with additional likelihood, optimism and hope questions in an identical fashion as above, addressing Outcome 2 that “Australia will meet its commitment to reduce carbon emissions by a minimum of 5% by 2020?”

Climate action. Finally, participants rated their willingness to act in a way consistent with efforts to mitigate climate change both individually and collectively. *Climate action* ($\alpha = .86$) was measured with 6 items, (e.g., “Are you in favour of a system in Australia that puts a price on carbon?”; “Do you support a renewable energy target in Australia?”; “Do you want taxes to be spent on the promotion of clean energies in Australia?” “If you were/are a home-owner, would you be willing to invest \$10,000 in solar roof-top panels?”; “Would you be willing to change your life-style to cut down on using electricity and driving by at least 50%?”; “Would you be willing to pay more for energy if it is primarily sourced from renewable sources?”; 1 = *not at all*, 7 = *very much*), with items averaged to provide a single score, and higher scores indicating higher levels of climate action. Principal component analysis (PCA) with orthogonal rotation on the 6 items yielded one component with eigenvalues over Kaiser’s criterion of 1 and explaining 60.1% of the variance, on which all items loaded substantially ($> .68$).

Results and Discussion

Table 3.1 contains the means and standard deviations of the main variables. Overall, for both Outcome 1 and 2, ratings of perceived likelihood were low, and ratings of both hope and optimism were similar. In line with previous findings (Bury et al., 2016a), with likelihood of success being considered rather low for either outcome, participants rated hope higher than optimism in both Outcome 1, $t(146) = 9.88, p < .001, M_{\text{diff}} = 1.26$, 95% CI [1.01;1.51], and Outcome 2, $t(145) = 10.32, p < .001, M_{\text{diff}} = 1.42$, 95% CI [1.15;1.69].

Ratings of personal investment were quite high with little variance¹⁰, suggesting that mitigating climate change was an important goal to most participants. Not surprisingly then, participants willingness to act in a way consistent with mitigating climate change was also rated highly.

Table 3.1

Mean and Standard Deviation and Correlations of the Main Variables (Study 3.1)

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Likelihood1	34.56	29.83							
2. Optimism1	3.33	1.82	.71***						
3. Hope1	4.59	2.00	.59***	.68***					
4. Likelihood2	31.03	25.51	.31***	.40***	.34***				
5. Optimism2	3.09	1.55	.27**	.47***	.38***	.83***			
6. Hope2	4.23	1.93	.40***	.48***	.67***	.59***	.63***		
7. Investment	5.79	1.01	.24**	.33***	.37***	.11	.16	.18	
8. Climate Action	5.49	1.34	.31***	.36***	.54***	.10	.18*	.36***	.63***

Note: Alphanumericals at the end of item labels indicate they refer to Outcome 1 and 2, respectively. * $p < .05$, ** $p < .01$, *** $p < .001$

For both outcomes there were significant positive correlations between perceived likelihood and both hope and optimism, with a stronger relationship for optimism than hope in both instances (Table 3.1). Personal investment was positively related to both hope and optimism for Outcome 1, but this was not the case for Outcome 2. Similarly, and unlike previous research (Bury et al., 2016a), for Outcome 1, personal investment was positively related to perceived likelihood, but this was not the case for Outcome 2. For both outcomes hope was more strongly correlated to climate action than was optimism,

¹⁰ High ratings of personal investment may be due to the nature of recruiting, with only those concerned about climate change choosing to participate.

though the effect was stronger for both in Outcome 1. Climate action was strongly positively correlated with investment.

A hierarchical regression was employed to test the curvilinear relationship of perceived likelihood and hope (and optimism), and the influence of personal investment on that relationship. In line with recommendations by Aiken and West (1991) all the independent variables were centred before creating curvilinear and interaction terms. In the first step the dependent variable (hope/optimism) was regressed onto likelihood and personal investment to test the linear relationship, and both quadratic and cubic effects of likelihood. In the second step the linear, quadratic and cubic terms of likelihood in interaction with personal investment were entered into the model. To obtain the true standardised score for the two curvilinear terms, all variables were converted to z-scores, then cubic and quadratic variables were created and the analyses were re-run to provide standardised scores.

For Outcome 1 optimism shared a significant linear relationship with investment $\beta = .15, p = .014$, and as predicted, only the linear relationship between likelihood and optimism was significant at either step of the analysis, $\beta = .59, p < .001$ (consistent with Hypothesis 1).

In regards to hope, an interaction between investment and cubic likelihood on hope was predicted (Hypothesis 2). The data indeed showed hope having a cubic relationship with likelihood, but the interaction was not supported. In the first step of the regression, linear, quadratic and *cubic* likelihood all shared a significant relationship with hope. Additionally, investment also shared a significant linear relationship with hope (Table 3.2). In the second step all simple effects remained significant, but none of the interaction terms were significant in the analysis. In fact, there were no significant interactions with investment for any analysis in Study 3.1.

Table 3.2

Hierarchical Regression for Hope as Dependent Variable (Study 3.1)

	Outcome 1			Outcome 2		
	<i>B</i>	<i>SE_B</i>	β	<i>B</i>	<i>SE_B</i>	β
Step 1	$\Delta R^2 = .43, \Delta F(4, 142) = 27.06^{***}$			$\Delta R^2 = .37, \Delta F(4, 141) = 20.22^{***}$		
(Constant)	5.10	.22		5.04	.22	
Investment	.41**	.13	.21	.37**	.13	.19
Likelihood	.03**	.01	.41	.03**	.01	.37
Likelihood ²	-.001**	.00	-.36	-.001**	.00	-.36
Likelihood ³	1.25E-5*	.00	.17	1.72E-5*	.00	.15
Step 2	$\Delta R^2 = .01, \Delta F(3, 139) = .08$			$\Delta R^2 = .02, \Delta F(3, 138) = 0.18$		
(Constant)	5.07	.22		5.03	.22	
Investment	.50*	.19	.25	.46 ^a	.24	.24
Likelihood	.02*	.01	.36	.03**	.01	.39
Likelihood ²	-.001**	.00	-.37	-.001**	.00	-.35
Likelihood ³	1.53E-5*	.00	.20	1.62E-5*	.00	.14
Likelihood × Investment	.01	.01	.18	-.01	.01	-.09
Likelihood ² × Investment	-7.62E-7	.00	-3.4E-4	-2.33E-4	.00	-.08
Likelihood ³ × Investment	-6.99E-6	.00	-.10	6.21E-6	.00	.05

Note: * $p < .05$, ** $p < .01$, *** $p < .001$, ^a $p = .054$

For Outcome 2, only the linear relationship between likelihood and optimism was significant in both steps of the analysis, $\beta = .75, p < .001$. This result is consistent with previous research (Bury et al., 2016a), suggesting that optimism is a reflection of the

individual's assessment of likelihood. In regards to hope, in the first step there was a significant relationship between personal investment, linear, quadratic and *cubic* likelihood with hope (Table 3.2). In the second step these relationships remained significant. Similar to Outcome 1, and contrary to predictions, there was no significant interaction with personal investment.

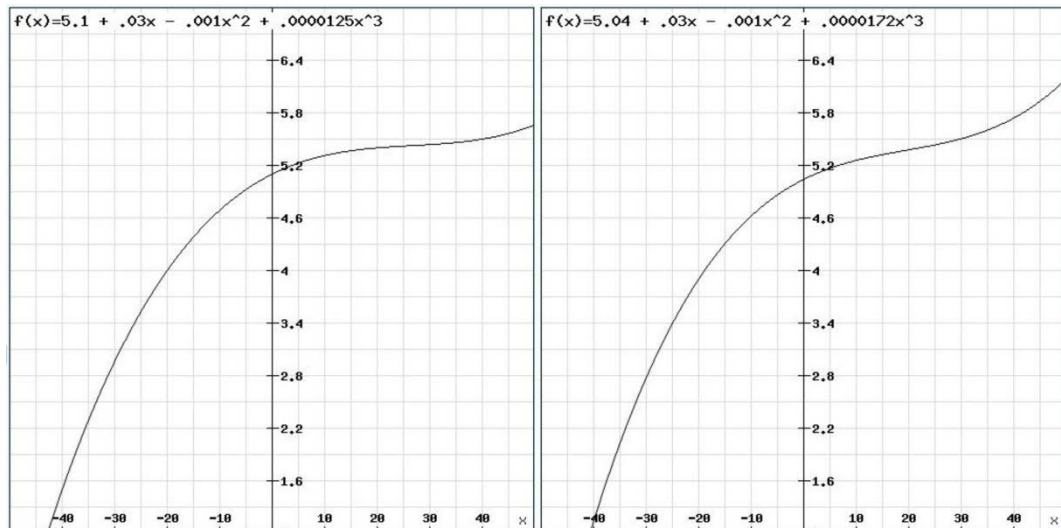


Figure 3.1: Hope (Y axis) as a cubic function of likelihood (X axis; centred) for Outcome 1 (figure on the left) and Outcome 2 (figure on the right)

Regression results for both outcomes suggest a cubic relationship between participant's perceptions of likelihood and hope (Figure 3.1). However, this relationship was not moderated by personal investment. One explanation for this result could be the high ratings of personal investment, with little variation, in this study. The complete sample could be considered a highly invested group. Consistent with previous research (Bury et al., 2016a), hope accelerates at lower levels of likelihood.

What is of interest now is whether hope serves a behavioural function in lower likelihood. It was hypothesised that hope would mediate the cubic relationship between perceived likelihood and climate action (Hypothesis 3), suggesting that hope in lower likelihood would allow hopers to focus on the possibility of success, and behave according to this belief. It was also predicted that this indirect effect would vary depending on the

Table 3.3

Hierarchical Regression with Climate Action as Dependent Variable (Study 3.1)

	Outcome 1			Outcome 2		
	<i>B</i>	<i>SE_B</i>	β	<i>B</i>	<i>SE_B</i>	β
Step 1	$\Delta R^2 = .47, \Delta F(4, 142) = 31.48^{***}$			$\Delta R^2 = .40, \Delta F(4, 142) = 23.14^{***}$		
(Constant)	5.91	.14		5.57	.15	
Investment	.73	.09	.55 ^{***}	.82	.09	.62 ^{***}
Likelihood	-3.59E-4	.01	-.01	-.002	.01	-.03
Likelihood ²	-.001	.00	-.46 ^{***}	-1.96E-4	.00	-.10
Likelihood ³	1.12E-5	.00	.22 ^{**}	3.95E-6	.00	.05
Step 2	$\Delta R^2 = .06, \Delta F(1, 141) = 17.58^{***}$			$\Delta R^2 = .06, \Delta F(1, 141) = 14.29^{***}$		
(Constant)	5.80	.14		5.46	.14	
Investment	.64	.08	.48 ^{***}	.75	.09	.56 ^{***}
Likelihood	-.006	.01	-.14	-.01	.01	-.14
Likelihood ²	-.001	.00	-.34 ^{**}	1.88E-5	.00	.01
Likelihood ³	8.5E-6	.00	.17 [*]	4.31E-5	.00	.01
Hope	.22	.05	.32 ^{***}	.20	.06	.29 ^{***}

Note: * $p < .05$, ** $p < .01$, *** $p < .001$.

personal investment in the hoped-for outcome (Hypothesis 4). However, as there was a cubic relationship with hope regardless of investment, and there were no significant interactions for hope (or climate action) as the dependent variable, only the simple mediation analysis will be considered here. Hierarchical regressions with climate change action as the dependent variable showed significant relationships with investment and linear, quadratic and cubic likelihood for Outcome 1, but only investment for Outcome 2 (Table 3.3). For both outcomes hope had a significant effect when entered in the model at Step 2, suggesting a potential for mediation. There was no significant relationship for

optimism when entered into the model at Step 2 for Outcome 1 ($\beta = .05, p = .550$) and Outcome 2 ($\beta = .17, p = .146$).

To investigate the indirect effects of cubic likelihood on climate action via hope, bootstrapping techniques were employed, using the Process macro for SPSS (Hayes, 2013) with 1000 bootstraps, bias corrected (BC) confidence intervals, and standardised variables. Climate action was entered as the dependent variable and cubic likelihood as the independent variable, with hope as the proposed mediator, and linear and quadratic likelihood, and personal investment controlled as covariates.

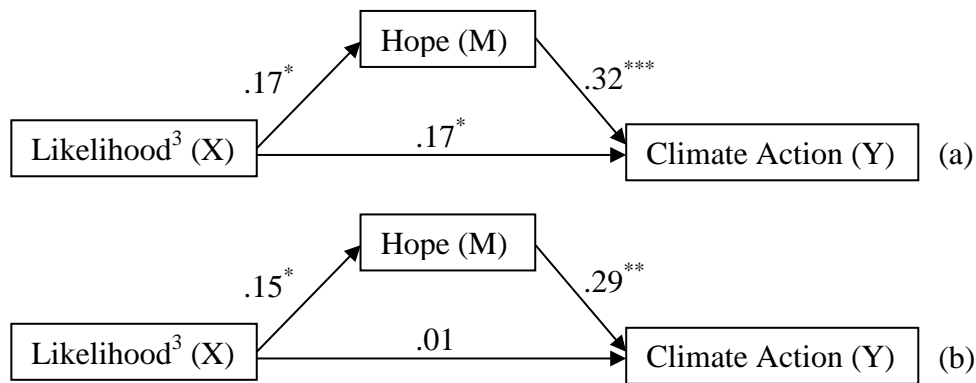


Figure 3.2: Indirect effect of cubic likelihood on climate action via hope for Outcome 1 (a) and Outcome 2 (b)

Analysis of Outcome 1 showed a significant direct ($\beta = 0.17, p = .022$) and total effect of cubic likelihood ($\beta = 0.22, p = .004$) on climate action. For hope, as predicted, both the relationship between cubic likelihood and hope, and the relationship between hope and climate action were significant (Figure 3.2a), as too was the indirect effect, $\beta = .05$, BC $CI_{95\%} = [.01; .12]$. These results suggest that climate action shares a cubic relationship with perceived likelihood, and that hope (partially) mediates this relationship.

For Outcome 2, the direct ($\beta = .01, p = .93$) and total effect ($\beta = .05, p = .46$) of cubic likelihood on climate action were not significant. However, as Shrout and Bolger

(2002) argue, a total effect is not a necessary precondition for the consideration and testing of indirect effects (see also, Hayes, 2009; Preacher & Hayes, 2008). As with Outcome 1, the relationships between cubic likelihood and hope, and between hope and climate action were significant (Figure 3.2b), as too was the indirect effect, $\beta = .04$, BC CI_{95%} = [.01; .10]. These results are consistent with the argument that hope leads to action consistent with the hoped-for goal when one perceives a low likelihood of success, although we clearly cannot make causal inferences from correlational data.

Study 3.2

Study 3.2 aimed to expand on the results of Study 3.1, differing in two key areas. First, the method of recruitment was less self-selecting than Study 3.1, which aimed to reduce some of the ceiling effects of personal investment. Second, rather than the participants providing assessment of perceived likelihood they were asked to rate how possible and probable they found the hoped-for outcome. As discussed above, Miceli and Castelfranchi (2010) argue that while hope arises with the possibility of success, optimism is engendered with the probability of success, which is supported with hope's sharp rise and greater ratings in lower likelihood compared to that of optimism in Study 3.1 (and in Bury et al., 2016a). Study 3.2 aims to further clarify this distinction, and the psychological role that the recognition of possibility plays in eliciting hope, especially for outcomes in which individuals are more invested. Therefore it is predicted that:

1. Ratings of optimism will be linearly related to ratings of probability.
2. Ratings of hope will be linearly related to ratings of possibility, but this relationship will be moderated by participants' investment in the outcome.
3. Hope will mediate the relationship between the perceived possibility that climate change can be mitigated and climate action.

4. The indirect relation between possibility and climate action (via hope) will be moderated by personal investment, such that the indirect effect will be more pronounced for those more invested in the outcome than those less invested.

Method

Participants

Participants were 377 Australian residents aged 17 to 65 ($M = 37.15$, $SD = 16.13$), consisting of 263 females and 114 males. Of these, 145 participants were first-year psychology students who participated for course credit and 232 participants were recruited by SurveyMonkey and received some financial compensation for participation.

Participation was voluntary and anonymous.

Materials

Study 3.2 used an identical introduction to the study (e.g., information sheets, demographic data, blurb regarding scientific consensus on climate change), and with exclusion questions and criteria that match Study 3.1. Utilising these criteria led to 53 participants being excluded from the study. All variables were measured with 7-point Likert scales.

Personal investment. *Personal investment* was again represented through the combination of *personal significance*, measured with the environmental identity measure by Hinds and Sparks (2008), and the *desirability* of mitigating climate change, which was measured with five similar questions to Study 3.1. A principal component analysis (PCA) with orthogonal rotation on the 8 items yielded a strong first factor (explaining 64.57% of the variance) on which all items loaded substantially ($> .82$). While Kaiser's criterion of eigenvalues greater than 1 suggested two component (81.89% of the variance), again, due to theoretical considerations, and with separate analysis producing similar results, the eight items were combined and averaged to obtain scale scores ($\alpha = .92$), with higher scores indicating higher personal investment.

Possibility and probability, hope and optimism. In the present study we focused on one outcome only, namely whether Australians' actions would help mitigate climate change (similar to Outcome 1 in Study 3.1). Participants' beliefs around the possibility and probability of Australians mitigating climate change were measured on two separate items; "Is it POSSIBLE/PROBABLE that our actions as Australians will help to mitigate climate change?". *Optimism* was measured directly with one question: "How optimistic are you that our actions as Australians will help reduce the rate of climate change?". *Hope* was measured directly with one question: "How hopeful are you that our actions as Australians will help mitigate climate change?"

Participants again rated their willingness to act in a way consistent with efforts to mitigate climate change both individually and collectively. Climate Action ($\alpha = .88$) was measured with 7 items, with an extra question added to take into account the government's (at the time) controversial "carbon tax" (e.g., "Do you support the Australian government's carbon tax?"), with items averaged to provide a single score, and higher scores indicating higher levels of collective action. Principal component analysis (PCA) with orthogonal rotation on the 7 items yielded one component with eigenvalues over Kaiser's criterion of 1 and explaining 59.55% of the variance, on which all items loaded substantially ($> .78$).

Results and Discussion

Means and standard deviations, and correlations can be found in Table 3.4. Overall participants considered it more possible than probable that climate change could be mitigated, $t(323) = 7.50, p < .001, M_{\text{diff}} = 0.44, 95\% \text{ CI } [0.32;0.55]$, and were again more hopeful than optimistic, $t(323) = 9.12, p < .001, M_{\text{diff}} = 0.63, 95\% \text{ CI } [0.50;0.77]$. Not surprisingly, possibility and probability shared a strong positive relationship, as too did hope and optimism. Optimism and hope shared a similar relationship with possibility, but optimism was more strongly correlated with probability than hope. Please note that in the following regression analyses Tolerance statistics ($> .25$) and Condition Indices (< 11)

indicated that multicollinearity was not a problem. All standard errors of regression estimates also appeared normal.

Table 3.4

Mean and Standard Deviation and Correlations of the Main Variables (Study 3.2)

	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Possibility	4.99	1.65					
2. Probability	4.56	1.75	.81***				
3. Optimism	4.40	1.62	.65***	.74***			
4. Hope	5.03	1.65	.67***	.64***	.71***		
5. Investment	5.31	1.17	.46***	.40***	.37***	.48***	
6. Climate Action	4.53	1.39	.55***	.47***	.44***	.51***	.60***

Note: * $p < .05$, ** $p < .01$, *** $p < .001$, $N = 324$

Two separate hierarchical regressions were used to test the hypotheses that optimism would be linearly related to probability of mitigating climate change, and that particularly for those more invested in the outcome, possibility would be linearly related to hope. Possibility, probability and personal investment were entered in Step 1 of the model, with possibility and probability by personal investment interaction terms entered in Step 2. Table 3.5 shows that as predicted, only a linear relationship between optimism and probability was significant at either step of the analyses.

For hope, in the first step, possibility, probability and investment were significantly related to hope. As predicted, there was a significant positive interaction between possibility and investment on hope, however there was also a significant negative interaction between probability and investment on hope.

Table 3.5

Hierarchical Regression for Hope and Optimism as Dependent Variable (Study 3.2)

	Hope			Optimism		
	<i>B</i>	<i>SE_B</i>	β	<i>B</i>	<i>SE_B</i>	β
Step 1	$\Delta R^2 = .52, \Delta F(3,320) = 113.20^{***}$			$\Delta R^2 = .56, \Delta F(3,320) = 135.45^{***}$		
(Constant)	5.03	.06		4.40	.06	
Possibility	.36	.07	.36 ^{***}	.10	.06	.10
Probability	.26	.06	.28 ^{***}	.58	.06	.63 ^{***}
Investment	.29	.06	.21 ^{***}	.10	.06	.07
Step 2	$\Delta R^2 = .01, \Delta F(2,318) = 3.98^*$			$\Delta R^2 = .002, \Delta F(2,318) = 0.66$		
(Constant)	5.05	.07		4.43	.07	
Possibility	.30	.07	.30 ^{***}	.10	.07	.10
Probability	.32	.07	.34 ^{***}	.58	.06	.63 ^{***}
Investment	.29	.06	.21 ^{***}	.09	.06	.07
Possibility \times Investment	.12	.06	.15 [*]	-.04	.06	-.05
Probability \times Investment	-.16	.06	-.20 ^{**}	.01	.06	.01

Note: * $p < .05$, ** $p < .01$, *** $p < .001$.

To investigate the nature of these interactions, the simple effects were tested at high and low levels (+1 and -1 standard deviations) of personal investment; following Aiken and West (1991) the regression model was re-run after the moderator was transformed down and up by 1 standard deviation, respectively. In line with predictions, for those more highly invested in the outcome, perception of possibility ($\beta = .45, p < .001$), but not probability ($\beta = .14, p = .080$), was significantly linearly related to hope. Contrastingly, for participants less invested in the outcome, probability ($\beta = .54, p < .001$), but not possibility ($\beta = .16, p = .138$), was related to hope. For those more invested in the outcome, a focus on

the possibility of success was related to hope, as predicted. For those less invested in the outcome, it seems that hope functions similarly to optimism.

Table 3.6

Hierarchical Regression with Climate Action as the Dependent Variable with Hope as Proposed Mediator (Study 3.2)

	<i>B</i>	<i>SE_B</i>	β
Step 1	$\Delta R^2 = .46, \Delta F(3,320) = 89.06^{***}$		
(Constant)	4.53	.06	
Possibility	.28	.06	.33 ^{***}
Probability	.02	.06	.03
Investment	.52	.06	.44 ^{***}
Step 2	$\Delta R^2 = .02, \Delta F(2,318) = 4.58^*$		
(Constant)	4.51	.06	
Possibility	.24	.06	.28 ^{***}
Probability	.07	.06	.10
Investment	.53	.06	.45 ^{***}
Possibility \times Investment	.16	.05	.22 ^{**}
Probability \times Investment	-.14	.05	-.21 ^{**}
Step 3	$\Delta R^2 = .01, \Delta F(1,317) = 3.86^a$		
(Constant)	4.02	.26	
Possibility	.21	.06	.25 ^{**}
Probability	.04	.06	.05
Investment	.50	.06	.42 ^{***}
Possibility \times Investment	.14	.05	.20 ^{**}
Probability \times Investment	-.13	.05	-.19 [*]
Hope	.10	.05	.12 ^a

Note: ^{*} $p < .05$, ^{**} $p < .01$, ^{***} $p < .001$, ^a $p = .050$

A hierarchical regression was run to investigate whether hope mediated the relationship between possibility and climate action, and if this indirect effect was moderated by personal investment. As optimism was not affected by any interaction, it did not qualify for any mediated moderation or moderated mediation, so analyses focused on hope. Table 3.6 shows the introduction of variables into the model, with hope entered in the last step as proposed mediator. Results suggest that possibility, investment and both possibility and probability in interaction with investment shared a significant relationship with climate action, and hope as potential mediator was also significantly related to climate action.

Hayes' (2013) Process macro was used to investigate the proposed conditional indirect effects. We already established that the relationship between possibility and hope was moderated by personal investment (see Table 3.6). As the interaction between possibility and investment on climate action was also significant, Model 8 was used to test the moderation of both the indirect effect of possibility on climate action via hope, and the direct effect of possibility on climate action. Possibility was entered into the model as the independent variable, with hope as the mediator, personal investment as a proposed moderator, and probability and the probability by investment interaction term entered as controls. All variables were standardised before being entered into the model.

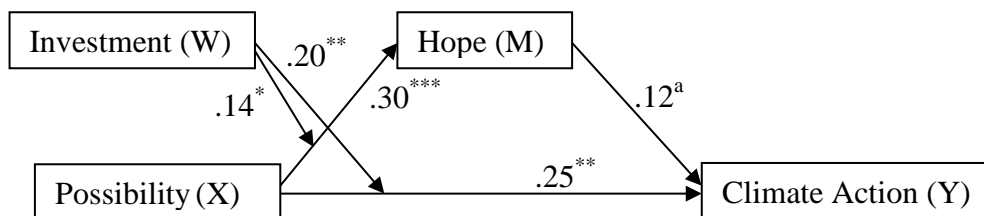


Figure 3.3. Results of the moderated mediation analysis. Note: * $p < .05$, ** $p < .01$, *** $p < .001$,
^a $p = .050$

Figure 3.3 shows the results of the overall moderated mediation analysis, with all the paths of the model significant, as too was the moderating effect of investment on the

relationships between both possibility and hope, and possibility and climate action. The direct relationship between possibility and climate action was significant at higher levels, but not at lower levels, of personal investment (Table 3.7). The indirect effect of the interaction of possibility and investment on climate action via hope was significant, $\beta = .017$, BC CI_{95%} = [.0001; .06], and as predicted, the conditional indirect effect of possibility was stronger, and significant only, at higher levels of personal investment (Table 3.7). While we cannot infer causality from these data, the results are *consistent* with the idea that perceived possibility leads individuals more invested in the outcome of mitigating climate change to have hope and, therefore, support action consistent with this end.

Table 3.7

Conditional Direct and Indirect Effects at Different Levels of Personal Investment (Study 3.2)

Conditional direct effect of possibility on climate action at values of investment				
Investment	Direct Effect	SE	<i>p</i>	95% CI
-1 SD (-1.00)	.05	.11	.667	[-.17; .27]
Mean (.00)	.25	.08	.001	[.10; .40]
+1 SD (1.00)	.45	.10	<.001	[.25; .64]
Conditional indirect effect of possibility on climate action (via hope) at values of investment				
Investment	Indirect Effect	Boot SE	BC 95% CI	
-1 SD (-1.00)	.018	.019	[-.005; .08]	
Mean (.00)	.035	.023	[.002; .10]	
+1 SD (1.00)	.052	.033	[.003; .14]	

Note: BC = bias corrected; 1000 bootstrap samples, Standardised Coefficients

General Discussion

As rational actors we would be more likely to engage in collective action when we know what to do and we can be confident that our actions will be effective in achieving our

goals. But when it is less than clear that our goals can be achieved, when we are uncertain that our actions will be effective, what will motivate us then? The answer may be: hope. Together the two studies presented here provide evidence in support of the motivational benefits of hope, particularly when the odds are perceived as not being in one's favour. Hope arose steeply in lower likelihood, or when the participant perceived the possibility rather than probability of success; and through this hope participants were willing to act in a way consistent with their hoped-for goal – mitigating climate change. Furthermore, in one of the two studies at least, the more personally invested in the outcome the participants were, the stronger the effect of possibility on hope and, through hope, on support for climate action. Hope, it seems, serves a specific motivational function in lower likelihood, when individuals perceive a mere possibility of success.

That hope serves a function in lower likelihood was confirmed in Study 3.1, with hope sharing a cubic relationship with perceived likelihood, for an overall highly personally invested sample, aligning with previous research (Bury et al., 2016a). Hope played a greater role in emerging possibility before levelling off and arising again in higher likelihood as predicted, whilst optimism as a measure of expectancy showed a linear trend with perceived likelihood. Study 3.2 extended these results and further supported the underlying theory, suggesting that a focus on the possibility rather than the probability of success is a key psychological underpinning of hope (Miceli & Castelfranchi, 2010). As predicted, while optimism developed with greater probability, for those more personally invested in the outcome hope correlated with possibility, but not probability. With a goal of greater personal significance, the recognition of the possibility of success alone seems to engender hope.

Contrastingly, those less invested in the outcome in Study 3.2 treated hope similar to optimism, arising with the probability of success. This result is comparable to the linear rather than cubic likelihood relationship with hope for low invested football supporters in

Bury et al.'s (2016a) study. In both instances hope seems indistinct from optimism at lower levels of personal investment. This suggests that when not particularly invested in the outcome individuals may assess hope and optimism similarly, as a mere perception of likelihood or expectancy. Whereas when the goal is of considerable importance to the individual and their sense of identity, they latch on to the mere possibility of success and imbue it with hope. Under these conditions the unique nature of hope becomes clear; hope leads to greater goal-consistent behaviour when the odds may not be in our favour.

Across both studies hope mediated the relationship between cubic likelihood or possibility and participant's willingness to act in a way consistent with mitigating climate change. The fact that hope accelerates at lower levels of likelihood and apparently through this leads to action suggests a unique motivational role of hope. Participants did not act solely when they expected or felt more assured of success, as expectancy research suggests. Rather, when they perceived some small likelihood, or focused on the possibility of success, participants acted in part because they were hopeful that the outcome could be achieved. This suggests that while expectancy-based concepts (e.g., optimism) provide motivational benefits when the individual is buoyed by greater odds, hope as a distinct motivator functions when the odds are not in the hoper's favour, and the outcome is of more personal significance.

With greater identification with the natural environment and desire to mitigate climate change, the recognition of some possibility of achieving this goal led to greater hope and support for climate action. While individuals' assessment of likelihood or possibility may be higher than realistically accurate, individuals still hoped, and consequently reported higher motivation, with the perception of low likelihood. The moderating role of personal investment is consistent also with the argument of Kruglanski, Chernikova, Rosenzweig, and Kopetz (2014) that high want, despite low expectancy, can lead to motivational readiness (but this does not hold for the reverse: high expectancy with

low want). In a similar vein, Tversky and Kahneman's (1992) well-known finding that individuals overweigh small possibilities and underweigh large probabilities when making decisions under risk or uncertainty (producing an inverse s-curve similar to that of hope), is more pronounced with items of more affective value (Rottenstreich & Hsee, 2001). Rottenstreich and Hsee (2001) attribute the greater jump in the weighting function with the departure from impossibility, to hope or other positive emotions. The current research suggests that it may be the invocation of hope that mediates the relationship between possibility and behaviour, especially for those more invested in the outcome. Whether hope engenders other positive emotions, or shields individuals from the negative emotions associated with the recognition of a low likelihood of success (Lazarus, 1999; Pettit, 2004), is not clear from this current research. What is clear is that rather than being discouraged by low likelihood of success, those who identify greater importance in the outcome, are hopeful and consequently motivated to act with the mere possibility of success.

Hope then could be pursued in future research as a vehicle for motivation in important outcomes that are possible but not probable. This is not to suggest that hopeful action is always prudent in lower likelihood, especially with the presence of suitable alternate options; but for significant outcomes (i.e., climate change), hope could be cultivated to promote goal consistent behaviour. It should be noted that while some research has shown that increasing hope seems to have limited success in fostering goal consistent behaviour (Chadwick, 2015; Hornsey & Fielding, 2016), this current research suggests that there is still hope for this premise. It could be that although attempts to increase hope through optimistic messages raise subjective ratings of hope, they may also raise perceptions of likelihood beyond hope's unique motivational range, reducing individuals' need to invest in hope. Hope is most needed when the assessment of success is not encouraging (Lazarus, 1991), or to protect motivation from negative feedback (Nelissen, 2017), and at such times hope plays its most unique motivational role. Future

research may be better served making salient the importance of the outcome to the individual, or highlighting that the outcome is still possible, while maintaining the seriousness of the situation and not raising perceptions of likelihood.

The current research leaves unexplained however why, while hope mediated the relationship between cubic likelihood or possibility and climate action, there was some influence of this relationship not explained by hope. Especially in Study 3.2, where the direct relationship between possibility and climate action was still significant, and moderated by personal investment. Beyond hope, the more important the outcome was to the individual and their sense of identity the more they acted to mitigate climate change in lower likelihood. It may be that an outcome of such importance resulted in a commitment to behaviour out of a sense of moral duty or personal obligation regardless of hope. Given the great threat climate change poses to the environment, an individual who identifies strongly with the natural environment may feel compelled to act because they perceive it as the right thing to do, irrespective of whether they believe that action has any chance of being effective. Alternatively, it may be that while the simple measure of hope used in these studies provides theoretical support and understanding of the nature of hope, it is limited by individual's own interpretation of what hope means to them. It could be that the behaviour in the face of low odds reported in this study is reflective of hopeful behaviour not captured by the simple measure of hope used. Such behaviour has still arisen with the confluence of possibility and personal investment, which we have argued is key for the development of hope. However, hope may manifest in action beyond individuals' own ratings of hope, or they may play down their hopes as a protective factor, but still behave in a hopeful manner.

Although the current results provide consistent evidence in support of hope as a motivator for action when perceptions of success are low, this study is somewhat limited by the online survey approach (measuring behaviour and policy intent rather than

observable behaviour), and the correlational nature of the data. While this current research is an important first step into investigating hopeful behaviour, future research of hope in possibility could benefit from investigating hopeful behaviour experimentally.

In conclusion, it can be disheartening when a personally significant goal seems unlikely to be achieved, or not within one's sole ability to obtain. At such times expectancy research suggests the diminished likelihood to negatively affect motivation. However, the current research suggests that rather than being discouraged by the uncertainty of goal success, for those more personally invested in the outcome, hope seems to be a valuable motivational resource at such times. As long as the outcome is perceived as possible, if highly invested in the outcome, hope leads to goal consistent behaviour, against the odds.

CHAPTER 4: Confusing Hope and Optimism when Prospects are Good: A Matter of Language Pragmatics Rather than Conceptual Equivalence

"Like 'love', 'hope' is one of those ridiculously disproportionate words that by all rights should be a lot longer" - Jim Butcher, Turn Coat

In psychological science it is a common approach to take human behaviours and experiences and 'purify' their meaning through conceptual and operational definitions. The advantage is that this establishes an explicit (and ideally shared) understanding of the construct that allows for cumulative research. However its disadvantage can be that this prejudices the understanding of the behaviour or experience and leads to findings and insights that merely reflect the theoretical prejudice, yet may be at odds with lived experience. On the other hand, lived experience and how individuals talk about it, can itself be contradictory or lacking precision. With respect to hope, predominant theories in psychology have conceptualised it as reflecting positive beliefs and confidence about the achievability of a desired outcome (e.g., Snyder et al., 1991); and having operationalised hope accordingly, empirical findings indeed showed similar relationships and benefits for hope as for other constructs that reflect positive expectation, such as optimism (see Aspinwall & Leaf, 2002). However, when measured using a form of the actual word hope, thus leaving its interpretation to participants based on their experience, hope was rated higher and distinct from optimism in times of greater uncertainty; but when success was more expected the nature and ratings of hope and optimism were indistinguishable (Bury et al., 2016a; Bury, Wenzel, & Woodyatt, 2016b). Individuals' experiences with hope thus suggest that it needs to be distinguished from optimism at one level, yet, seemingly contradictory, they conflate the two at another level of likelihood of success.

This raises the question, what does the alignment of hope with optimism mean at higher levels of likelihood? Do hope and optimism represent the same concept at higher

levels of likelihood but not at lower levels? Or are they still distinct? We argue they are distinct, and that the apparent indistinguishability at high levels of likelihood is due to communicative pragmatics. A low rating of hope would express a hopelessness and negative outlook inconsistent with what individuals experience with high expectations. But if forced to choose which concept is most appropriate in the current situation, individuals would more likely choose optimism in high and hope in low likelihood.

Distinguishing Hope and Optimism

Measuring hope directly using a form of the word hope (e.g., adjective, noun) allows researchers to investigate how hope is employed naturally, as well as its benefits (if any), rather than fitting results to support a predetermined theory (cf. Tong et al., 2010). Direct measures have shown hope to be related to greater support for social change (Greenaway et al., 2016), support for climate action and policy (Bury et al., 2016b; Smith & Leiserowitz, 2014), and attitudes of conciliation and forgiveness following a collective apology (Wenzel, Anwari, De Vel-Palumbo, & Bury, 2016), as well as to buffer individuals against negative feedback (Nelissen, 2017). Importantly, using a direct measure Bury et al. (2016a) have shown that hope is rated significantly higher than optimism at lower levels of likelihood that the desired outcome will materialise, but at higher levels of likelihood this distinction disappeared. Furthermore, hope and optimism were differentially related to likelihood; for optimism the relationship was linear (a true measure of one's expectation of success), whereas for those more invested in the outcome, hope shared a cubic relationship with likelihood, jumping early in lower likelihood before aligning with the linear trend of optimism with a greater expectation of success.

That hope plays a greater role in lower likelihood is consistent with recent conceptualisations of hope, which suggest hope is invoked for a desirable outcome with just the possibility of success (Miceli & Castelfranchi, 2010), especially if that outcome is of personal significance to the individual and their sense of self (Bury et al., 2016a,

2016b). It is also consistent with the idea of hope as a shield to despair (Korner, 1970) or a yearning for an uncertain possible future (Lazarus, 1999), or with hope's colloquial and common usage; something to hold on to when the outcome seems bleak. However, that hope and optimism were indistinguishable at higher levels of likelihood, is contrary to theoretical conceptualisations and qualitative research (Averill et al., 1990; Miceli & Castelfranchi, 2010; Pettit, 2004), which suggest optimism is a generalised expectation of success (Carver et al., 2010), whereas hope represents "more important but less likely outcomes" (Bruininks & Malle, 2005, p. 327).

Hence, while employing a direct measurement of hope avoids the potential circularity that research findings largely reflect what we operationally feed into a hope construct, it also comes with the possible cost that individuals' understanding of hope may be inconsistent and contradictory.

Explaining the Confusion of Hope and Optimism

If theory and qualitative evidence suggest hope and optimism are distinct concepts, why then do they seem to align at higher levels of likelihood? We believe that the provision of separate continuous measures of hope and optimism makes individuals consider the concepts in a way they otherwise would not. When success is threatened the need for hope over optimism is clearly apparent; it represents the desperate emotion, the yearning for a desirable but uncertain outcome (Lazarus, 1991). However, with greater confidence - theoretically the domain of optimism - having low hope of success expresses a negative affect and outlook incongruent with the positive outlook one would experience based on the high likelihood of success; so, when asked to rate hope on continuous measures at such times of positive outlook, reporting that one is not hopeful seems inappropriate. Put another way, one can be a hopeful pessimist; however the idea of a hopeless optimist seems ludicrous. By not choosing to call their positive outlook hope in favour of optimism does not suggest they are necessarily hopeless, rather that 'hope' in this

instance suboptimally captures what they experience; it becomes a less relevant notion. Therefore, rather than representing a true account of hope, due to communicative pragmatics hope functions as a representation of optimism in this instance.

Forcing individuals to choose between hope and optimism (or no hope or no optimism), we believe, will help tease apart the distinction between hope and optimism at higher levels of perceived likelihood, and provide further support for hope's role in lower likelihood. We argue that when presented with a continuous measure of hope at higher levels of likelihood, individuals will tend to rate hope as a proxy for optimism; levels of endorsement will not differ between the two. We expect a different finding for a measure that forces individuals to choose the state that best suits their current circumstances. We predict that at higher levels of perceived likelihood of success individuals will be more likely to choose optimism over hope (and over no hope or no optimism). Similarly we predict that when the outcome is perceived as less likely to occur (but not impossible), individuals will be more likely to choose hope over optimism (and over no hope or no optimism), especially for those more invested in the outcome.

Method

Participants and Procedure

Participants were 145 football supporters aged 17 to 82 ($M = 36.79$, $SD = 14.52$), 59 female and 86 male. Participants were recruited via an advertisement placed on social media ($n = 107$) and an online community classified website ($n = 38$) which asked for volunteers with some interest in Australian Rules football. Each advertisement had a link to an online questionnaire, and upon accessing the link participants were randomly allocated to one of three likelihood conditions (low, moderate, and high), and then presented the research material.

Materials

After reading a letter introducing the researcher and the study, participants reported demographic information (e.g., age, gender), who their favourite football team was and how long they had supported this team.

Other variables were measured with 7-point Likert scales (1 = *Not at all*, 7 = *Very much*), with the exception of likelihood and forced choice (see below). *Personal investment* referred to the degree to which the participant found the goal both desirable and personally significant. To begin with, questions were presented measuring the *personal significance* of supporting their team (“Is being a supporter of your team an important part of who you are?”, “How strongly do you identify with other supporters of your team?”, “How closely do you follow Australian rules football?”, “How often do you actively engage with your team (e.g., watch a game live or on TV, read about in newspaper)?”).

Participants then read one of three scenarios that contained the identical first two sentences but then varied to manipulate participants’ perception of likelihood:

“Imagine that you are watching your team play in a very important game. It is currently the beginning of the 4th quarter in a low scoring game.”

- Low likelihood – *“Unfortunately your team is 5 goals down. Your team must kick more goals than they have in the previous 3 quarters unanswered to win the game. A win is possible but it does not seem likely at this stage.”*
- Moderate Likelihood – *“Both teams seem evenly matched and the scores are currently level. It looks like it is a 50/50 contest at this point, with either team having a good chance to win.”*
- High Likelihood – *“Fortunately your team is 5 goals up. The opposition must kick more goals than they have in the previous 3 quarters unanswered to win the game. It seems quite probable that your team will win at this stage.”*

Three questions were then presented measuring the *desirability* of a win (“How much do you want your team to win this game?”, “How important is it to you that your team wins today?”, “Do you desire that your team will win?”). The desire and personal significance questions were combined for a measure of *personal investment*. A principal component analysis (PCA) with orthogonal rotation on the 7 items yielded a single component with eigenvalues over Kaiser’s criterion of 1 and explaining 64.29% of the variance, on which all items loaded substantially ($> .81$). The scree plot also clearly showed an inflection justifying one component. The seven items were averaged to obtain scale scores ($\alpha = .90$).

Participants were then presented with a forced choice question to indicate their level of hope or optimism: “When considering the scenario, if you were to choose, how do you feel?” There were four response options: I am optimistic my team will win; I have hope that my team will win; I am not really optimistic that my team will win; I do not have much hope that my team will win. Next, likelihood, hope and optimism were randomly presented. *Likelihood* of winning was measured with a slider that moved from 0% to 100%. In addition, participants rated their levels of *optimism* (“How optimistic are you that your team will win?”), and *hope* (“Do you have hope that your team will win?”).

Results

Participants’ likelihood ratings suggest that the manipulation worked in the intended manner (Table 4.1). A one-way ANOVA was conducted to assess the difference between likelihood ratings in the likelihood conditions, and as the homogeneity of variance was found to be violated the Brown-Forsythe *F*-ratio is reported. Results suggest a significant difference between ratings of likelihood, $F(2, 116.44) = 130.77, p < .001$, with Games-Howell post hoc analysis showing that the likelihood of a win was rated significantly higher in the high than moderate likelihood condition, $M_{\text{diff}} = 21.29, p < .001$, 95% CI = [14.90, 27.68], and higher in the moderate than low likelihood conditions, $M_{\text{diff}} =$

29.12, $p < .001$, 95% CI = [20.58, 37.67]. For personal investment, on average, participants tended to be moderately highly invested in their football team, significantly above the midpoint of the scale, $t(144) = 15.28$, $p < .001$ ¹¹.

Table 4.1

Mean and Standard Deviation of Main Variables

	Low Likelihood ($n=52$)	Mod Likelihood ($n=48$)	High Likelihood ($n=45$)
Likelihood	31.98 (19.53)	61.10 (16.32)	82.40 (8.25)
Optimism	3.38 (1.42)	4.92 (1.24)	6.05 (1.31)
Hope	5.27 (1.54)	6.00 (1.20)	5.98 (1.47)
Investment	4.93 (1.27)	5.50 (0.98)	4.94 (1.50)

A mixed-model analysis of variance was conducted to assess the impact of condition on supporters' ratings of hope and optimism measured as independent continuous variables.

There was a significant main effect of condition on ratings of hope and optimism, $F(2, 139) = 27.25$, $p < .001$, $\eta_p^2 = .28$. There was also a significant interaction between condition level and ratings of hope and optimism, $F(2, 139) = 19.80$, $p < .001$, $\eta_p^2 = .22$.

Separate analyses for the two measures showed that for optimism there was a significant difference, $F(2, 139) = 48.73$, $p < .001$, $\eta_p^2 = .41$, between low and moderate, $M_{\text{diff}} = 1.49$,

¹¹ For personal investment, ratings in the moderate likelihood condition were unexpectedly higher than in the low and high likelihood conditions. A one-way ANOVA showed a significant difference between personal investment ratings, Brown-Forsythe $F(2, 121.25) = 3.21$, $p = .044$, with Games-Howell post hoc analysis showing no significant difference between low and high likelihood conditions' rating of personal investment, $M_{\text{diff}} = 0.01$, $p = .999$, 95% CI = [-0.68, 0.69], but in the moderate likelihood condition personal investment was marginally higher than in the high likelihood condition, $M_{\text{diff}} = 0.56$, $p = .095$, 95% CI = [-0.08, 1.20], and significantly higher than in the low likelihood condition, $M_{\text{diff}} = 0.57$, $p = .034$, 95% CI = [0.03, 1.11]. As the personal investment measure has items from before (personal significance) and after (desire) the likelihood manipulation a mixed-model ANOVA was run to ensure the manipulation did not have any unintended effect on desire. There was a significant main effect of likelihood on both personal significance and desire, $F(2, 142) = 3.40$, $p = .036$, $\eta_p^2 = .046$, however, there was no interaction between condition level and ratings of personal significance and desire, $F(2, 142) = 0.60$, $p = .549$, $\eta_p^2 = .008$. This suggests that the small differences in personal significance and desire were 'accidental', despite the random allocation of participants.

$p < .001$, 95% CI = [0.96, 2.01], and moderate and high likelihood conditions, $M_{\text{diff}} = 1.17$, $p < .001$, 95% CI = [2.13, 3.20].

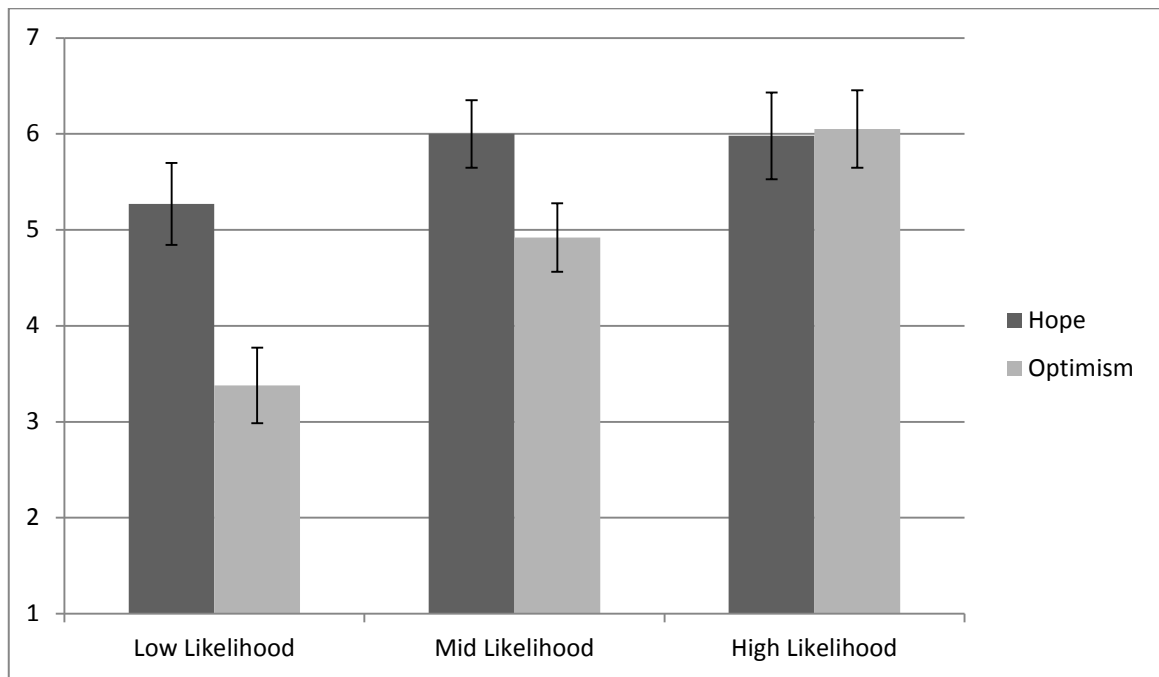


Figure 4.1. Mean differences with 95% CI error bars.

For hope there was a significant difference between conditions, $F(2, 139) = 4.28$, $p < .001$, $\eta_p^2 = .06$, however pairwise comparison suggests a significant difference only between low and moderate, $M_{\text{diff}} = 0.73$, $p = .011$, 95% CI = [0.17, 1.29], and low and high, $M_{\text{diff}} = 0.71$, $p = .016$, 95% CI = [0.13, 1.28], with no significant difference between moderate and high conditions $M_{\text{diff}} = 0.23$, $p = .94$, 95% CI = [-0.61, 0.57]. As predicted, there was no significant difference between ratings of hope and optimism in the high likelihood condition, $F(1, 139) = 0.09$, $p = .763$, $\eta_p^2 = .001$, $M_{\text{diff}} = 0.07$, 95% CI = [-0.39, 0.53], but there were significantly higher ratings of hope than optimism for both the moderate likelihood condition, $F(1, 139) = 26.18$, $p < .001$, $\eta_p^2 = .16$, $M_{\text{diff}} = 1.13$, 95% CI = [0.69, 1.56], and the low likelihood condition, $F(1, 139) = 80.90$, $p < .001$, $\eta_p^2 = .37$, $M_{\text{diff}} = 1.89$, 95% CI = [1.47, 2.30]. These findings support previous research by Bury et al. (2016a) that supporters presented with a lower likelihood of success rated hope higher than optimism, whereas for high likelihood there was no distinguishable difference between

hope and optimism (see Figure 4.1). In order to investigate whether hope functions as a proxy for optimism at higher levels of likelihood, participants were provided a forced choice question.

Table 4.2

Frequencies and percentage within likelihood condition by forced choice response

	Optimism	Hope	Low Optimism	Low Hope
Low Likelihood	6 (11.5%)	26 (50.0%)	8 (15.4%)	12 (23.1%)
Mod Likelihood	17 (34.7%)	24 (49.0%)	5 (10.2%)	3 (6.1%)
High Likelihood	30 (68.2%)	14 (31.8%)	0 (0%)	0 (0%)
Total	53 (36.6%)	64 (44.1%)	13 (9%)	15 (10.3%)

Table 4.2 shows the frequency with which individual chose optimism, hope, low optimism or low hope across the three conditions. Not surprisingly low hope and low optimism were chosen only in low likelihood and moderate likelihood conditions, but not at all in the high likelihood condition. Hope appeared again to play a greater role in lower likelihood conditions than optimism, and ratings of optimism increased with the change in likelihood condition. To investigate the distinction between hope and optimism at high and low likelihood, a 2x3 Chi-square analysis was run. There was a significant association between likelihood condition and whether participants reported hope or optimism $\chi^2 (2) = 18.64, p < .001$, Cramer's $V = .40, p < .001$. Follow up comparison were in line with predictions, with results suggesting that, based on the odds ratio, those in the lower likelihood condition were 3.07 times more likely to choose hope over optimism than the moderate likelihood condition $\chi^2 (1) = 4.30, p = .038$, and those in the higher likelihood condition were 3.03 times more likely to choose optimism over hope, than the moderate likelihood condition, $\chi^2 (1) = 6.13, p = .013$.

Previous research has shown that personal investment moderates the relationship between perceived likelihood and hope, namely that for those more invested in the hoped-for outcome hope rises early in lower likelihood. A multinomial logistic regression was run to investigate whether personal investment influenced participants' choice of hope in low likelihood over other forced choice options. As the focus of the analysis was on hope and optimism, and with a small n in both the low hope/optimism forced choice options, low hope and low optimism were combined to represent a singular comparison group to hope and optimism (*neither* hopeful nor optimistic). Furthermore as the cell value for the comparison group in the high likelihood condition was zero, and this is unlikely to change with a greater sample, the high likelihood condition was excluded from the analysis. In line with recommendations by Aiken and West (1991) personal investment was centered before being entered into the model. Likelihood conditions, Low and Moderate (reference category), and personal investment were entered as predictors into the model, as well as the likelihood condition by investment interaction term.

Table 4.3 shows the results of the regression analysis. As predicted, for optimism only manipulated likelihood (Low vs. Moderate) showed a significant effect, with those in the moderate likelihood condition 5.88 times more likely to select optimism over neither hopeful/optimistic than those in the low likelihood condition. For hope only the likelihood condition by personal investment interaction term was significant. The odds ratio showed that, as personal investment increased by one unit, supporters in the low likelihood condition (relative to the moderate condition) were 3.48 times more likely to pick hope over neither hopeful/optimistic, suggesting that personal investment leads to greater hope in lower likelihood.

Table 4.3

Multinomial Logistic Regression with Forced Choice as the Dependent Variable

	<i>B</i> (SE)	Wald $\chi^2(1)$	95% CI for Odds Ratio		
			Lower	Odds Ratio	Upper
<i>Optimism vs. Neither</i>					
Intercept	.68 (0.59)	1.34			
Condition (Low vs Mod)	-1.79 (0.76)*	5.55	.04	.17	.74
Investment	.10 (0.56)	.03	.37	1.10	3.33
Condition x Investment	.35 (0.69)	.26	.37	1.42	5.48
<i>Hope vs. Neither</i>					
Intercept	1.43 (0.52)**	7.47			
Condition (Low vs Mod)	-1.06 (0.61) ^a	3.03	.11	.35	1.14
Investment	-.86 (.53)	2.67	.15	.42	.119
Condition x Investment	1.25 (0.58)*	4.57	1.11	3.48	10.93

Note: $R^2 = .19$ (Cox & Snell), $.22$ (Nagelkerke). Model $\chi^2(6) = 21.44$, $p = .002$. * $p < .05$, ** $p < .01$,

*** $p < .001$, ^a $p = .082$.

Discussion

Words avail one to attempt to express and articulate the depths of human experience and emotion, and hope is in no way different in this regard. Hope can represent a refuge¹² from negative feedback (Nelissen, 2017), or a motivational resource in times of great uncertainty (Bury et al., 2016b), however, as this research suggests, when measured on a continuous measure it represents a proxy for optimism when expecting success. As with previous research (Bury et al., 2016a) when plagued by greater uncertainty individuals tend to rate hope significantly higher than its oft purported synonym optimism,

¹² As Breznitz (1986) discusses it, one archaic use of *hope* in the Oxford English Dictionary is that of “an inlet, small bay, haven”, or a refuge from stormy seas.

but at higher levels of likelihood this distinction disappears. However, when forced to choose between hope and optimism, results reflect the distinction of optimism with the expectation of success, and hope's unique role in greater uncertainty.

We suggest that this may occur in part due to the similarities of hope and optimism, in as much as they are both future focused and positively valenced. By virtue of presenting participants with independent continuous variables, it forces them to consider hope in a way that would otherwise be addressed by perceptions of optimism at higher likelihood. But hope and optimism are indeed different; they are not synonymous, not even at higher levels of likelihood. Rather, we would suggest, the similar trajectories found for them with continuous independent measures is due to communicative pragmatics of these measures, where low ratings of hope may indicate hopelessness rather than just the irrelevance or suboptimality of hope as a descriptor of the individual's experience at such times. So when forced to consider which concept best fits the situation, optimism represents a more appropriate fit at higher likelihood.

These results suggest that rather than synonyms, hope and optimism play distinct roles at polar ends of likelihood ratings. Optimism is shown to lie on a continuum, correlating strongly with one's belief in the likelihood of achieving success. While optimism is employed when events are more probable, we would suggest that hope and low optimism (i.e., pessimism) may occupy a lot of the same space, in lower likelihood. Where the two differ, we believe, is in the assessment of those low chances of success. Pessimism or low optimism is the negative appraisal of one's chances, whereas hope seemingly acknowledges the low likelihood of success, but places a "favourable spin" on the situation (Lazarus, 1999). And the favourable spin is more likely for those more personally invested in the outcome, in line with previous research (Bury et al., 2016a). Miceli and Castelfranchi (2010) suggest that hope allows one to make the most positive assessment of the possibility of success, which is supported by recent research showing

that when personally invested in the outcome hope is related to the *possibility*, but optimism to the *probability*, of success (Bury et al., 2016b). And it is with the possibility of success that recent research has shown hope plays an important motivational role (Bury et al., 2016b; Nelissen, 2017; Wenzel et al., 2016).

Hope it seems plays an important role when individuals perceive the chances of success to not be in their favour. This suggests that when measuring hope with a continuous measure, at high levels of likelihood researchers may be tapping into optimism rather than hope. It is important then that researchers measuring hope directly with continuous variables consider the impact that expectation of success may have for hope. Although measuring hope directly is an important medium for investigating the nature of hope, it may inadvertently misrepresent the nature or outcome behaviours (e.g., motivation, persistence) of hope at higher levels of likelihood.

Hope and optimism are related but different constructs. When measured independently with continuous measures they differ in lower likelihood, but seemingly converge as one becomes more assured of success. However, when pressed, participants choose optimism over hope when they expect success, leaving hope's unique nature in lower likelihood of success, to help manage uncertainty.

CHAPTER 5: The Strength of Possibility: Hope and its Persistence in Goal Directed Behaviour

“Hope is the flower of the soul. Let it bloom with action and persistence.” -

Debasish Mridha

While hope is by all accounts a positive attribute, hope seems to be more a weed or plant that grows with great persistence between cracks in the pavement, rather than a flower grown in fertile soil. Despite adverse circumstances and low likelihood of success, hope persists against setbacks and obstructions to make the most of those low chances, to ultimately blossom triumphant. It is in this sense that hope not only provides the impetus to pursue unlikely but personally significant goals (e.g., Chapter 3), but due to the low probabilistic threshold required of hope (a mere possibility), hope is more resistant to setbacks, allowing the hoper to persist despite negative feedback (Miceli & Castelfranchi, 2010; Nelissen, 2017). In contrast, expectancy based constructs (i.e., optimism) arise linearly with likelihood (Chapters 2, 3 & 4), their motivational benefit tied with high probability of success. Setbacks or negative feedback are likely in this case to reduce perceptions of likelihood, and consequently motivation.

The Persistence of Hope

Hope in possibility is argued to provide some significant benefit in mitigating psychological distress and dysfunction (Lazarus, 1991, 1999), and allow the hoper the emotional wherewithal to pursue that hoped-for goal (Korner, 1970; Pettit, 2004). Chapter 3 provided evidence in support of hope's role in motivation in lower likelihood; despite recognising only a low likelihood or possibility of success participants who identified strongly with the environment were more hopeful and consequently reported higher climate mitigating behaviours. Hope was then differentiated from expectancy-based constructs (optimism) not only in the nature of its relationship with likelihood or possibility, but also with its relationship with goal directed behaviour.

However, the advantages of hope in protecting motivation is suggested not to be limited to initiating behaviour, but also sustaining constructive efforts despite negative feedback (Miceli & Castelfranchi, 2010; Nelissen, 2017). This ability to buffer hope against negative feedback is considered a strength of hope in comparison to expectancy-conceptualisations; as Miceli and Castelfranchi (2010) argue, hope is stronger than expectation because it is “more difficult to disappoint a hope than an expectation” (p. 259). For expectancy-based constructs, behaviour is a function of high perceived likelihood of success, and while such constructs have been suggested to be resistant at times to minor setbacks (Roese & Sherman, 2013), with more negative disconfirming information, the expectation must be reassessed.

Contrastingly, hope is never the expectation that something will occur, it is only the possibility that it will; herein lies the strength of possibility. Expectation requires relatively high probability of success, whereas hope only requires a perception of likelihood greater than zero. As hope is relatively free from probability estimates, it can better withstand fluctuations in perceptions of likelihood, and better buffer for motivation and goal pursuit from negative feedback and setbacks (Miceli & Castelfranchi, 2010; Nelissen, 2017; Pettit, 2004). In this sense, hope functions as a shock absorber for motivation, absorbing the bumps and shocks in the road, allowing the individual to continue relatively smoothly on a road to their goal destination. This suggests that, with greater personal investment in the outcome, hope will be present with the possibility of success; consequently hope will be more resistant to negative feedback, allowing one to persist longer in pursuit of their hoped-for goal.

Current Project

This chapter has two complementary aims. The first aim is to establish if hope buffers hoppers against negative feedback, and safeguards motivation. It is suggested that if hope tempers the effects of negative feedback on motivation then we should see hopeful

individuals persist longer with goal directed behaviour, whereas there will be no such persistence for optimism. Secondly, this chapter aims to establish experimentally the relationship between hope and perceptions of likelihood found in previous chapters. More specifically, this study aims to manipulate perceptions of likelihood, to investigate whether the sensitivity to the change from impossibility to possibility found in the cubic function of highly invested individuals (Chapters 2 & 3), can be reproduced experimentally.

Previous chapters have shown that rather than a linear rise with probability estimates (as with optimism), for personally important outcomes, hope has been shown to arise sharply in lower likelihood, before levelling off and rising again with the linear trend of optimism in higher likelihood (i.e., cubic relationship; Chapters 2 & 3). This rise in lower likelihood is similar to the overweighing of small probabilities found in decision making research (Tversky & Kahneman, 1992), especially for affect-rich outcomes (Rottenstreich & Hsee, 2001), suggesting a sensitivity to the departure from impossibility found in this literature.

By manipulating likelihood into impossibility (0% likelihood), possibility (20% likelihood) and probability (80%) conditions, and manipulating personal investment (low & high), I hope to experimentally reproduce the earlier findings, and provide evidence for the persistence of hope. More specifically, I expect optimism will increase linearly with experimentally manipulated likelihood and, as an expectation measure, will not be related to goal-persistence. In contrast, I expect hope will show a jump from impossibility to possibility conditions (and no further increase in the probability condition), but only under conditions of high investment; and I expect hope to lead to greater goal-persistence. Put differently, in the possibility condition (but not the other two conditions) hope and – through hope – goal-persistence will be greater in the high than low investment condition.

Study 5.1

In this study participants (first-year students) were invited to undertake an “intelligence assessment” containing impossible matrix puzzles. Fictional performance feedback on five pre-test puzzles was used to manipulate participants’ perceptions of the likelihood (0%, 20%, 80%) that they would score above a benchmark in the test phase and win a prize. A prize of either \$5 or \$20 was used to manipulate the desirability of achieving the benchmark, based on the assumption that students would attach greater personal significance to the prospect of a higher monetary reward. Participants received negative feedback and the option to leave the study after each of 25 unsolvable puzzles, with the aim to see how long participants would persevere at the assessment. I predicted that optimism would increase linearly with the likelihood condition, but that optimism would not predict participant’s perseverance at the task. Contrastingly, I predicted that there would be an interaction between likelihood condition and hope, with higher ratings of hope in the 20% condition for those more invested in the outcome, and hope would predict participants’ greater persistence at the task.

Method

Participants

Participants ($N = 92$) were 62 female and 30 male students recruited from a first year psychology course at Flinders University. Participants were aged between 18 and 37 years, with an average age of 20.52 ($SD = 4.01$). Students were recruited via a research participation website and received course credit for participating in the study. They were randomly allocated to a 2 (desire: low, high) x 3 (likelihood: 0%, 20%, 80%) design.

Procedure

Participants completed the study in a computer lab. Upon accessing the study participants were given information about the researchers and an overview of the study

which claimed the study aimed to investigate ‘intelligence and emotion’. After consent was given, general demographic information was collected (e.g., age, gender).

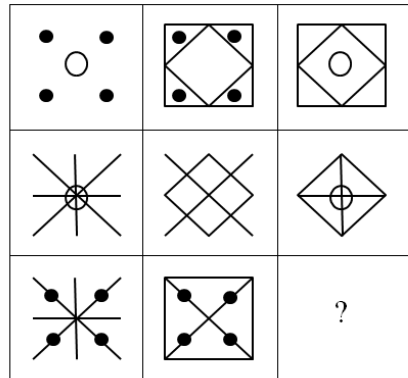
Participants were then told there was a pre-test phase with five puzzles that would allow them to gauge the difficulty of the task, followed by the test phase. Prior to the pre-test phase, participants were given a simple example of the two types of matrix puzzles for training, and received immediate feedback on their performance, as well as the logic behind the puzzles. Participants then proceeded to the pre-test which included five puzzles presented in the same order across conditions. Upon completion of the pre-test participants were randomly allocated to one of six conditions that represented the 2 (desire: low, high) x 3 (likelihood: 0%, 20%, 80%) design. Following experimental manipulation, the dependent variables and manipulation checks were measured.

All participants then started the test-phase and were presented 25 complicated matrix puzzles similar to those used in the pre-test phase of the study, presented in the same order. After submitting their response for each puzzle participants were immediately told that they had not answered the puzzle correctly, and were given the opportunity to leave the study or continue with the next puzzle. At whichever stage participants left the study, they were told they were unsuccessful at scoring above 50%, and were then asked to rate some emotions and two measures to check the perceived solvability of the puzzles included in the study. Participants were then debriefed about the true nature and aims of the study, and as they were misled to believe they could win money, each participant was provided \$5 as well as course credit.

Materials

Matrix puzzles. Two types of matrix puzzles were used in the study, a nine square matrix grid with one blank square containing a question mark (Figure 5.1), and a series of six squares with one blank square containing a question mark (Figure 5.2). Participants were asked to pick from five possible options the response that best fit in the square with a

question mark. The puzzles contained complex logic, but the solution to the puzzle was not included as one of the five answer options. Instead, two of the five choices were designed to be similar but different from the correct response, so as to instil some uncertainty in the participant’s confidence should they be able to follow the puzzle logic.



Which one from the below belongs in the missing space above?

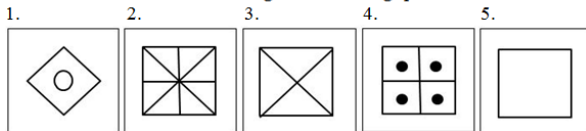
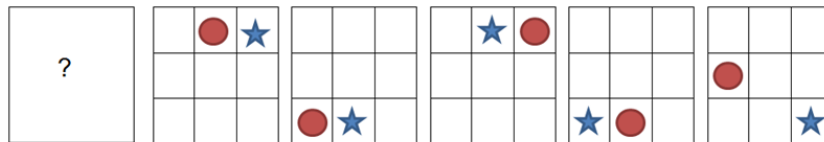


Figure 5.1. Example of a 9-square matrix puzzle



Which one form below belongs in the missing space above?

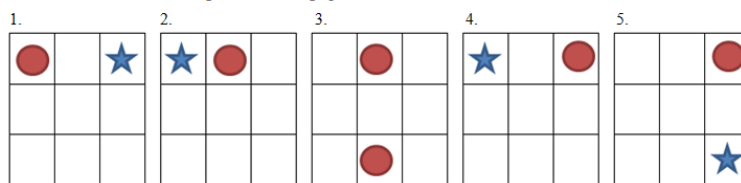


Figure 5.2. Example of a series matrix puzzle.

Experimental manipulations. *Likelihood* was manipulated (0%, 20%, 80%) by giving the participants fictional feedback about their performance in the pre-test phase (“You achieved a score of: 0 out of 5 or 0%; 1 out of 5 or 20%, 4 out of 5 or 80%”).

*Desire*¹³ was then manipulated by telling the participants that there was a benchmark of 50% to succeed in the test-phase, and should they score 50% or above they would be presented a monetary reward (low desire = \$5, high desire = \$20), but there would be no reward for scoring below 50%.

Likelihood, hope and optimism. *Likelihood* was measured with one item “What do you think the chances are that you will achieve 50% and receive the reward?” and participants indicated their agreement on a sliding scale from 0% to 100%. *Hope* and *optimism* were each measured with one item “Do you have hope/How optimistic are you - that you will achieve 50% and receive the reward?” (1 – *not at all*, 7 – *very much*).

Desire. Desire was measured with three items assessing the desirability of scoring above the benchmark and receiving the monetary reward, “How desirable is the reward for achieving 50%?”, “How important is it to you to achieve 50%?”, “How much do you want to achieve 50%?” (1 – *not at all*, 7 – *very much*). A principal component analysis (PCA) with orthogonal rotation on the 3 items yielded a single component with eigenvalues over Kaiser’s criterion of 1 and explaining 75.00% of the variance, on which all items loaded substantially (>.61). The scree plot also clearly showed an inflection justifying one component. The three items were averaged to obtain scale scores ($\alpha = .83$).

Persistence. Persistence was measured in two ways; the total response and total time spent on the puzzles. *Total response* was simply a sum of the amount of puzzles completed¹³. For each puzzle attempted, the time from presentation of the puzzle to submission of a response was recorded, and responses on all puzzles attempted were combined to represent the *total-test time*.

¹³ It was considered that money represented an easy and clean way to manipulate desire, with the idea that as most students are generally fiscally challenged, that money would be a personally significant benefit to them, the more money the better. So while money is not necessarily a meaningful reward, it is believed that participants would imbue the money with its own significance from their own circumstances.

Solvability/Believability. Finally, participants were presented two items to measure the believability of the test phase. One item asked how difficult they would rate the puzzles on an 8-point Likert scale (1 to 8: very easy, easy, somewhat easy, neutral, somewhat difficult, difficult, very difficult, impossible), and the other item asked “Given enough time, do you think that someone can solve the puzzles?” measured on a 7-point Likert scale (1 – *not at all*, 7 – *very much*).

Results

Table 5.1 contains the overall descriptive statistics and correlations for all the main variables used in this study. Overall ratings of hope were higher than optimism, which is in line with theory given the low rating of likelihood. As predicted, hope was significantly correlated with total response and time, but for optimism there was no significant relationship.

Table 5.1

Mean and Standard Deviation and Correlations of the Main Variables (Study 5.1)

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Likelihood	39.33	21.59							
2. Optimism	3.35	1.43	.75 ^{***}						
3. Hope	4.68	1.44	.35 ^{**}	.42 ^{***}					
4. Desire	4.76	1.29	.14	.21 [*]	.42 ^{***}				
5. Responses	11.23	8.48	.08	.06	.21 [*]	.35 ^{**}			
6. Time	443.20	367.80	.17	.12	.23 [*]	.33 ^{**}	.78 ^{***}		
7. Difficulty	6.57	1.10	-.08	.01	.22 [*]	.18	.15	.25 [*]	
8. Solvability	3.96	1.92	-.07	-.15	-.13	.09	.13	.18	-.09

All descriptive statistics for the 2x3 design are presented in Table 5.2. A 2x3 ANOVA was employed to check the likelihood manipulation, and there was a significant

main effect of likelihood condition on the likelihood measure, $F(2, 86) = 21.16, p < .001, \eta^2 = .33$. Tukey post-hoc analysis suggests that feedback following the pre-test did result in significantly higher ratings of likelihood in the 80% condition compared to the 20%, $M_{diff} = 27.23, p < .001, CI_{95\%} = [16.44, 38.01]$, and 0% conditions, $M_{diff} = 23.30, p < .001, CI_{95\%} = [12.42, 34.17]$, however, there was no significant difference between the 0% and 20% conditions, $M_{diff} = 3.93, p = .666, CI_{95\%} = [-6.94, 14.80]$. The main effect of desirability was not significant, $F(1, 86) = 1.99, p = .162, \eta^2 = .02$, neither was the interaction, $F(2, 86) = 1.75, p = .180, \eta^2 = .04$. It seems that the feedback following the pre-test did have some effect on perceptions of likelihood, however, despite a relatively accurate rating in the 20% condition ($M = 28.87, SD = 17.04$), the mean was much lower in the 80% condition ($M = 56.10, SD = 19.33$), and much higher in the 0% condition ($M = 32.80, SD = 17.31$) than intended, hence they did not accurately represent the aim of the manipulation.

For the desirability scale, an ANOVA showed no significant main effect of \$20 over \$5, $F(1, 86) = 0.14, p = .905, \eta^2 < .001$, or significant main effect for likelihood, $F(2, 86) = 1.15, p = .323, \eta^2 = .03$, or interaction $F(2, 86) = 1.99, p = .162, \eta^2 = .02$. Furthermore, the desirability manipulation had no significant main effect on any variables included in this study.

For the total responses, an ANOVA showed no significant main effect of manipulated desire, $F(1, 86) = 1.16, p = .284, \eta^2 = .001$, or main effect for likelihood, $F(2, 86) = 0.96, p = .389, \eta^2 = .02$, or interaction of the two $F(2, 86) = 2.00, p = .142, \eta^2 = .04$. Similarly for total time, there was no significant main effect of manipulated desire, $F(1, 86) = 0.21, p = .648, \eta^2 = .002$, or main effect for likelihood, $F(2, 86) = 0.58, p = .562, \eta^2 = .01$, or interaction $F(2, 86) = 0.58, p = .563, \eta^2 = .01$.

To ensure that participant's belief about the solvability or difficulty of the tasks did not influence participant's responses across conditions, separate 2x3 ANOVAs were run on

difficulty and solvability measures. For difficulty, there was no significant main effect of desire, $F(1, 86) = 0.72, p = .397, \eta^2 = .01$, or main effect for likelihood, $F(2, 86) = 0.87, p = .422, \eta^2 = .02$, or interaction $F(2, 86) = 1.18, p = .312, \eta^2 = .03$. Similarly, for solvability there was no significant main effect of desire, $F(1, 86) = 0.31, p = .578, \eta^2 = .004$, or main effect for likelihood, $F(2, 86) = 0.52, p = .598, \eta^2 = .01$, or interaction $F(2, 86) = 0.23, p = .795, \eta^2 = .01$. This suggests that participant's belief in the difficulty or solvability of the puzzles was not influenced by condition.

Table 5.2

Means (and Standard Deviations) for Study 5.1

	0%		20%		80%	
	LD <i>n</i> = 15	HD <i>n</i> = 15	LD <i>n</i> = 16	HD <i>n</i> = 15	LD <i>n</i> = 16	HD <i>n</i> = 15
Likelihood	31.00 (13.63)	34.60 (20.69)	35.38 (17.04)	21.93 (15.50)	58.94 (13.79)	53.07 (24.04)
Desire	4.80 (.92)	4.33 (1.4)	4.33 (1.28)	5.02 (1.27)	5.10 (1.41)	4.98 (1.24)
Optimism	2.60 (1.06)	3.27 (1.58)	3.38 (1.50)	2.33 (1.11)	4.50 (0.89)	3.93 (1.28)
Hope	4.47 (1.60)	4.40 (1.45)	4.56 (1.21)	4.73 (1.49)	5.31 (1.20)	4.60 (1.68)
Responses	13.13 (8.85)	10.40 (7.92)	8.31 (6.84)	10.93 (9.23)	9.56 (7.51)	15.33 (9.74)
Time	483.82 (430.85)	430.85 (331.55)	381.81 (300.09)	393.85 (345.49)	413.47 (388.98)	561.50 (409.13)
Difficulty	6.60 (1.12)	6.93 (.96)	6.12 (1.26)	6.67 (.98)	6.69 (1.08)	6.40 (1.18)
Solvability	4.47 (1.73)	3.87 (1.85)	4.00 (2.39)	4.07 (1.94)	3.75 (1.95)	3.60 (1.77)

Separate 2x3 ANOVAs on the hope and optimism measures showed that for hope there was no significant main effect for likelihood, $F(2, 86) = 1.01, p = .368, \eta^2 = .02$, or main effect of desire, $F(1, 86) = 0.45, p = .503, \eta^2 = .01$, or interaction of the two $F(2, 86) = 0.78, p = .464, \eta^2 = .02$. However, for optimism there was a significant main effect of likelihood condition, $F(1, 86) = 18.04, p < .001, \eta^2 = .001$, but no significant main effect for desire, $F(2, 86) = 1.43, p = .236, \eta^2 = .02$, or interaction between the two $F(2, 86) = 1.18, p = .080, \eta^2 = .03$. Post-hoc analyses showed there was a significant difference between 0% and 80%, $M_{diff} = 1.29, p < .001, CI_{95\%} = [0.52, 2.06]$, and 20% and 80%, $M_{diff} = 1.35, p < .001, CI_{95\%} = [.59, 2.12]$, but not between 0% and 20% likelihood conditions, $M_{diff} = 0.06, p = .852, CI_{95\%} = [-.71, .83]$.

Previous research has shown that optimism rises linearly with perceptions of likelihood, whereas hope rises early in lower likelihood before merging with optimism at higher likelihood (Chapter 2, 3, 4). Given the likelihood findings above, it is not surprising that there was no significant difference between 0% and 20% condition's ratings of optimism, or that there was a rise in optimism for the 80% condition. Hope, on the other hand, was rated higher than optimism, with the difference seemingly reducing with the increase in likelihood, as would be expected. To test whether this was a significant difference, a mixed-model ANOVA was conducted, with results showing a significant interaction between condition level and ratings of hope and optimism, $F(2, 89) = 3.96, p = .022, \eta^2 = .08$. Pairwise comparison suggests hope was rated significantly higher than optimism in the 0%, $F(1, 89) = 30.21, p < .001, \eta^2 = .25, M_{diff} = 1.50, CI_{95\%} = [0.96, 2.42]$, the 20%, $F(1, 89) = 43.67, p < .001, \eta^2 = .33, M_{diff} = 1.77, CI_{95\%} = [1.24, 2.31]$, and 80% conditions, $F(1, 89) = 7.64, p = .007, \eta^2 = .08, M_{diff} = 0.74, CI_{95\%} = [0.21, 1.28]$, but seemingly less so in the latter condition. To probe this interaction further the difference between hope and optimism was calculated and run in a separate ANOVA, with post-hoc analyses suggesting that there was no significant difference in the hope-optimism

differential between the 0% and 20% conditions, $M_{diff} = 0.27$, $p = .476$, $CI_{95\%} = [-.49, 1.03]$, but compared to the 80% condition the hope-optimism difference was significantly greater in the 20% condition, $M_{diff} = -1.03$, $p = .008$, $CI_{95\%} = [-1.79, -.28]$, and marginally greater in the 0% condition, $M_{diff} = -0.76$, $p = .051$, $CI_{95\%} = [-1.52, .003]$.

To investigate the proposed moderated mediation analyses, the PROCESS (model 7) approach by Hayes (2013) was adopted. As attempts to experimentally manipulate desirability were unsuccessful, the measure of desire was instead used as the proposed moderator. Furthermore as the 0% and 20% conditions were not significantly different in their ratings of likelihood, they were combined to create a low likelihood condition ($M = 30.80$, $SD = 17.34$), and were contrast coded with the 80% condition (-1, 1, respectively). The 80% condition actually represented a more moderate likelihood condition ($M = 56.10$, $SD = 19.33$) that differed significantly from the new low likelihood condition (0% and 20% combined), $t(90) = 25.29$, $p < .001$, $CI_{95\%} = [17.39, 33.19]$, $d = 1.38$. Likelihood condition was entered as the independent variable, with measured desire as the proposed moderator; hope and optimism were entered in separate analyses as mediators, with the persistence measures - total time and total responses - as dependent variables.

Table 5.3 shows the results of the PROCESS analyses for the proposed moderated mediation via hope, with separate analyses for total response and total time as dependant variables. While there was a significant effect of desire on hope, there was no significant effect of likelihood or the predicted likelihood by desire interaction. Furthermore, there was no direct effect of likelihood condition on total responses $B = 0.60$, $CI_{95\%} = [-1.37; 2.57]$, or indirect effect via hope, $B = .14$, $CI_{95\%} = [-.16; .69]$. Importantly, inconsistent with predictions, the index of moderation showed that the indirect effect of likelihood via hope was also not significantly moderated by desire, $B = -.07$, $CI_{95\%} = [-.49; .24]$. However, overall there was a marginally significant effect of hope on the total amount of puzzles participants persisted in attempting. In regards to the total time, there was no direct effect

of likelihood condition on total time $B = 19.70$, $CI_{95\%} = [-60.50; 99.91]$, or indirect effect via hope, $B = 6.88$, $CI_{95\%} = [-6.32; 31.89]$. And as before, inconsistent with predictions, the index of moderation showed that the indirect effect of likelihood via hope was also not significantly moderated by desire, $B = -3.29$, $CI_{95\%} = [-24.21; 9.74]$. Again, there was a marginally significant effect of hope on the total time participants persisted working on the puzzles.

Table 5.3

Hope PROCESS Analyses with Total Response and Total Time as Dependent Variables

	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	$CI_{95\%}$
DV: Hope			$R = .43, F(3,88) = 5.79, p = .001$		
Constant	.05	.17	0.30	.764	[-.29, .39]
Likelihood Condition	.12	.17	0.72	.471	[-.22, .46]
Desire	.44	.16	2.85	.006	[.13, .75]
Likelihood Condition x Desire	-.06	.16	-0.38	.704	[-.37, .25]
DV: Total Response			$R = .22, F(2,89) = 2.26, p = .110$		
Constant	11.42	.98	11.66	<.001	[9.48, 13.37]
Hope	1.17	.61	1.91	.060	[-.04, 2.39]
Likelihood Condition	.60	.99	0.61	.546	[-1.37, 2.57]
DV: Total Time			$R = .23, F(2,89) = 1.90, p = .156$		
Constant	449.63	41.42	10.86	<.001	[367.33, 531.92]
Hope	55.71	28.68	1.94	.055	[-1.27, 112.69]
Likelihood Condition	19.70	40.36	0.49	.627	[-60.50, 99.91]

As predicted, there was a significant effect of likelihood condition on ratings of optimism, with optimism rated higher in the higher the likelihood condition (Table 5.4).

Table 5.4

Optimism PROCESS Analyses with Total Response and Total Time as Dependent

Variables

	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>CI</i> _{95%}
DV: Optimism		$R = .46, F(3,88) = 8.92, p < .001$			
Constant	.21	.14	1.45	.151	[-.08, .49]
Likelihood Condition	.63	.14	4.38	<.001	[.34, .91]
Desire	.16	.14	1.15	.254	[-.12, .44]
Likelihood Condition x Desire	-.02	.14	-0.13	.901	[-.30, .26]
DV: Total Response		$R = .10, F(2,89) = 0.38, p = .866$			
Constant	11.48	1.02	11.27	<.001	[9.46, 13.50]
Optimism	0.12	.68	0.17	.866	[-1.24, 1.48]
Likelihood Condition	.77	1.07	0.72	.474	[-1.36, 2.91]
DV: Total Time		$R = .12, F(2,89) = 0.51, p = .604$			
Constant	447.99	42.44	10.55	<.001	[363.66, 532.33]
Optimism	25.53	31.36	0.81	.418	[-36.79, 87.85]
Likelihood Condition	14.69	44.22	0.33	.741	[-73.18, 102.55]

There was no significant relationship of desire with optimism, nor interaction between desire and likelihood on optimism. In regards to total responses, there was no significant main effect of optimism, nor was there a significant direct effect of likelihood condition, $B = 0.77$, $CI_{95\%} = [-1.36; 2.91]$, nor indirect effect via optimism, $B = .07$, $CI_{95\%} = [-.81; 1.00]$; and the index of moderation showed that the indirect effect of likelihood via optimism was also not significantly moderated by desire, $B = -.002$, $CI_{95\%} = [-.21; .17]$. Likewise for total time there was no significant main effect of optimism, direct effect of

likelihood, $B = 14.69$, $CI_{95\%} = [-73.18; 102.55]$, or indirect effect via optimism, $B = 19.52$, $CI_{95\%} = [-19.26; 58.48]$, nor a moderated indirect effect, $B = -.45$, $CI_{95\%} = [-13.98; 6.91]$.

Discussion

This study aimed to show that for those who found the reward of performing on an ‘intelligence assessment’ more desirable, that there would be a jump in hope (but not in optimism) between impossibility (0% condition) and possibility (20%) of success, but no further increase in the 80% condition, and that hope would lead to greater goal-persistence. In contrast, it was predicted that optimism as an expectancy measure would increase linearly with the experimentally manipulated likelihood, but would not lead to greater goal-persistence. Unfortunately, due to an unsuccessful attempt to manipulate desirability, and a limited manipulation of likelihood, these research goals were difficult to adequately address.

For the desirability manipulation the promise of \$5 or \$20 did not have a significant effect on participants’ ratings of desirability, or on any of the other variables included in the study. It may be that the monetary value did not differ sufficiently to elicit higher ratings of desire, and a larger sum of money as an incentive may have greater success. But it could also be that money (in particular the limited sums I could realistically offer) represents too superficial an outcome, and perhaps framing the outcome as representing something of more personal significance to the individual and their sense of identity would have a greater effect on individuals’ investment in the outcome variables.

In regards to the likelihood manipulations, although participants in the 20% condition rated likelihood close to what was intended, in the 0% condition they were more confident, and in the 80% condition less confident, than expected. With ratings in the 80% likelihood condition averaging near chance (50%), there was not really a high likelihood group in this study. It may be that the puzzles were too difficult that participants did not believe the result of the pre-test; or, alternatively, with two of the possible responses

similar to the correct answer, participants were not as confident with their answer as they could be, and thus perceived their success as luck, and not predictive of future success. For the 0% condition, it could be that feedback of zero correct responses was not believable, or that predictions were biased to protect their self-esteem. It was also possible that mention of a “50% benchmark” of success muddied the pre-test feedback, and functioned as an anchor that drew 0% likelihood up, and 80% likelihood down.

Despite the less than desirable manipulation outcomes, there were some promising results for hope and its role as a buffer against negative feedback. Respondents in the present study perceived overall a relatively low likelihood of success. And in line with previous research (Chapters 2, 3, & 4) participants rated hope significantly higher than optimism, and this was particularly true when likelihood was low. As there was not technically a high likelihood group, it was not possible to say that hope and optimism were converging at higher likelihood, but results of the interaction between hope and optimism suggest that a decline in the difference between hope and optimism with the increase in likelihood as predicted. More importantly, contrary to optimism, hope was significantly correlated to both the amount of puzzles attempted and the total time spent attempting the puzzles. This suggests that hope may indeed help protect motivation, or buffer against negative feedback when the odds are not perceived as being in one’s favour.

While the current study provides some support of the persistence of hope, a limitation of this current study was the small cell sizes across the conditions.

Study 5.2

Study 5.2 was designed to test the same hypotheses as Study 5.1, but with some changes to the procedure to try and improve the manipulations. Firstly, rather than manipulating simple desire via a monetary incentives, a manipulation of investment was employed that tapped into participants’ sense of self and identity, linking success in the test phase to higher intelligence and greater success in university and career prospects. For the

likelihood manipulation, the instructions stressed that the puzzles were extremely difficult, in order to try and reduce any possible defensiveness in the 0% group. Furthermore, in the 20% and 80% conditions, correct answer options were included in a ratio to match the condition (1 out of 5, 4 out of 5) to try and make success in the 80% condition more linked to skill (for those that could follow the logic of the puzzle). Additionally, to avoid confusion or possible anchor affects in likelihood ratings, rather than suggesting there was a “50% benchmark” required for success, success was linked to different performance ranks split into quartiles.

Method

Participants

Participants ($N = 213$) were 141 female and 72 male students recruited from a first year psychology course at Flinders University. Participants were aged between 17 and 60 years, with a mean age of 21.55 ($SD = 6.62$). Students were recruited in the same way as in Study 5.1, and were again randomly allocated to a 2 (investment: low, high) x 3 (likelihood: 0%, 20%, 80%) design.

Procedure

The procedure for Study 5.2 was almost identical to Study 5.1 with a few exceptions intended to produce the sought after manipulations. Study 5.2 again was conducted in the social psychology lab. The pre-test included the same five puzzles as Study 5.1, however, to try and make their performance more believable some of the puzzles were solvable, by having the correct answer as one of the options. Across the conditions the puzzles varied in the amount that the actual solution to the puzzle was presented as one of the five answer options, depending on the condition they were allocated (e.g., one solvable puzzle for the ‘1 out of 5 – 20%’ condition). For those without a solution, no true solution was presented, though two of the five choices were again designed to be similar but different from the correct response, so as to instil some

uncertainty in the participant's confidence should they follow the puzzle logic. The test-phase contained again the same 25 puzzles, and individuals were given immediate negative feedback and the option to leave or continue the study, after submitting a response for each puzzle.

Material

The materials were also identical to Study 5.1, with the exception of the desire/investment manipulation and manipulation check measure, and the focus of the likelihood/hope/optimism measures to reflect the new goal.

Experimental manipulation. *Likelihood* was again manipulated via feedback following the pre-test (e.g., "You achieved a score of 1/5 or 20%"). Unlike Study 5.1, *personal investment* was manipulated by making relevant personal and identity information about performing successfully in the test-phase. The information differed across conditions, with the low investment group given neutral information about the task and made no mention of intelligence or performance benefits (e.g., the majority of people score on the middle two quartiles). However, for the high investment group, the manipulation attempted to make salient the identity of 'higher intelligence' and the benefits of doing well in the test (e.g., greater success at University, higher paying professional careers), so participants would feel assured in their own sense of intelligence and future success by doing well in the test.

- Low Investment: *"Test results are generally rated into 4 separate quartiles, with the majority of participants scoring in the middle two quartiles;*

75-100% - Top Quartile

50-74% - Upper Middle Quartile

25-49% - Lower Middle Quartile

0-24% - Bottom Quartile

We are primarily interested in emotions and how they function across the different quartiles.”

- High Investment: *“Test results are generally rated into 4 separate quartiles.*

75-100% - Top Quartile

50-74% - Upper Middle Quartile

25-49% - Lower Middle Quartile

0-24% - Bottom Quartile

Individuals, who score in the top quartile, as well as having higher levels of intelligence, tend to have greater success at University, especially in exams, and go on to post-graduate studies. Individuals who score in the top quartile are also more likely to work in high paying professional careers.

We are primarily interested in emotions and how they relate to higher intelligence and performance on complex tasks, so hope to focus on students in the Top Quartile.”

Participants were then presented different instructions about questions assessing their thoughts and feelings at this stage in the study, specifically how they believed they would feel about either “scoring in the top quartile” (Low Investment) or “showing higher intelligence by scoring in the top quartile” (High Investment). Participants were then presented the same emotion questions as Study 5.1.

Personal investment. *Personal Investment* was measured with five items assessing both the personal significance and desirability of scoring in the top quartile. Items include two personal significance items (“I consider myself an intelligent person.”, “Being one of the smartest people in the room is important to me”) and three desire questions (“How desirable is scoring in the top quartile to you?”, “How important is scoring in the top quartile to you?”, “How much to you want to score in the top quartile?”). A principal component analysis (PCA) with orthogonal rotation on the 5 items yielded a single

component with eigenvalues over Kaiser's criterion of 1 and explaining 64.26% of the variance, on which all items loaded substantially ($>.75$). The scree plot also clearly showed an inflection justifying one component. The five items were averaged to obtain scale scores ($\alpha = .86$), with higher scores indicating higher investment.

Likelihood, optimism and hope. Likelihood, optimism and hope were measured the same as in Study 5.1 but the questions were phrased to reflect the new outcome (e.g., "Do you have hope that you will score in the top quartile?").

Persistence. Persistence was measured with the same method as Study 5.1. *Total response* was the sum of the amount of puzzles completed, and *total time* was the total time spent on each puzzle from presentation to response combined.

Results

Similar to Study 5.1, the overall sample rated perceptions of likelihood relatively low. Hope was rated significantly higher than optimism overall, $t(212) = 10.87, p < .001$, however, both hope and optimism were significantly correlated with total time, but neither were related to total amount of responses (Table 5.5).

Table 5.5

Mean and Standard Deviation and Correlations of the Main Variables (Study 5.2)

	<i>M</i>	<i>SD</i>	1	2	3	4	5		
1. Likelihood	33.73	23.78							
2. Investment	4.45	1.28	.40 ^{***}						
3. Optimism	2.78	1.45	.81 ^{***}	.40 ^{***}					
4. Hope	3.83	1.81	.61 ^{***}	.47 ^{***}	.65 ^{***}				
5. Responses	15.19	9.09	-.03	.05	.003	-.01			
6. Time	607.81	423.10	.16 [*]	.19 ^{**}	.16 [*]	.18 ^{**}	.57 ^{***}		
7. Difficulty	6.76	1.06	-.13	-.004	-.11	.07	.19 ^{**}	.11	
8. Solvability	4.39	1.98	-.08	.09	-.09	-.01	-.13	-.14 [*]	-.23 ^{**}

Descriptive statistics for the 2x3 design are presented in Table 5.6. A 2x3 ANOVA was employed to check the likelihood manipulation, and there was a significant main effect of likelihood condition on the likelihood measure, $F(2, 207) = 21.16, p < .001, \eta^2 = .33$, however again there was only significant differences between the 80% and 20%, $M_{diff} = 22.63, p < .001, CI_{95\%} = [14.20, 31.05]$, and the 80% and 0% conditions, $M_{diff} = 24.63, p < .001, CI_{95\%} = [16.23, 33.02]$, with no significant difference between the 0% and 20% conditions, $M_{diff} = 2.00, p = .839, CI_{95\%} = [-6.37, 10.37]$. As with Study 5.1 following pre-test feedback the 80% condition ($M = 49.60, SD = 20.56$) were much less confident than predicted, and the 0% condition ($M = 24.97, SD = 22.91$) much more confident than intended, and similar to the 20% condition ($M = 26.97, SD = 19.65$). The main effect of personal investment was not significant, $F(1, 207) = 1.99, p = .162, \eta^2 = .02$, neither was the interaction, $F(2, 86) = 1.75, p = .180, \eta^2 = .04$. For the personal investment scale, an ANOVA showed no significant investment main effect, $F(1, 207) = 1.43, p = .217, \eta^2 < .01$, or significant main effect for likelihood, $F(2, 207) = 2.64, p = .074, \eta^2 = .03$, or interaction $F(2, 207) = 0.48, p = .748, \eta^2 = .003$. It was thought that perhaps the desire items in the investment scale were a better check of the manipulation than the personal significance item as they are more focused on the study materials, however there was no significant main effect for either desire $F(1, 207) = 1.68, p = .196, \eta^2 = .01$, or personal significance, $F(1, 207) = .52, p = .472, \eta^2 = .003$.

Similar to Study 5.1, with total responses as dependent variable, an ANOVA showed no significant main effect of manipulated investment, $F(1, 207) = 1.59, p = .209, \eta^2 = .01$, or main effect for likelihood, $F(2, 207) = 0.70, p = .932, \eta^2 = .001$, or interaction $F(2, 207) = 0.07, p = .932, \eta^2 = .001$. Similarly for total time, there was no significant main effect of manipulated investment, $F(1, 207) = 2.23, p = .137, \eta^2 = .01$, or main effect for likelihood, $F(2, 207) = 1.41, p = .248, \eta^2 = .01$, or interaction $F(2, 207) = 0.63, p = .534, \eta^2 = .01$.

Separate 2x3 ANOVAs also found no difference between conditions in the difficulty and solvability measures. For difficulty, there was no significant main effect of investment, $F(1, 207) = 0.66, p = .419, \eta^2 = .003$, or main effect of likelihood, $F(2, 207) = 1.45, p = .238, \eta^2 = .01$, or interaction $F(2, 207) = 0.67, p = .511, \eta^2 = .01$. Similarly, for solvability there was no significant main effect of investment, $F(1, 207) = 1.42, p = .235, \eta^2 = .01$, or main effect for likelihood, $F(2, 207) = 0.78, p = .461, \eta^2 = .01$, or interaction $F(2, 207) = 0.31, p = .736, \eta^2 = .003$.

Table 5.6

Means (and Standard Deviations) for Study 5.2

	0%		20%		80%	
	LD	HD	LD	HD	LD	HD
	<i>n</i> = 36	<i>n</i> = 36	<i>n</i> = 35	<i>n</i> = 36	<i>n</i> = 36	<i>n</i> = 34
Likelihood	22.47 (24.28)	27.47 (21.51)	26.14 (18.82)	27.78 (20.66)	49.11 (22.27)	50.12 (18.90)
Investment	4.07 (1.56)	4.24 (1.33)	4.47 (1.38)	4.39 (1.37)	4.52 (1.31)	4.81 (1.19)
Optimism	2.28 (1.34)	2.17 (1.06)	2.74 (1.40)	2.36 (1.36)	3.64 (1.46)	3.53 (1.34)
Hope	3.61 (1.84)	2.64 (1.48)	4.11 (1.68)	3.67 (1.71)	4.53 (1.84)	4.47 (1.73)
Responses	15.97 (8.22)	13.75 (9.23)	15.94 (9.48)	14.83 (8.88)	16.03 (9.91)	14.62 (9.16)
Time	633.05 (433.95)	466.16 (353.87)	649.81 (460.25)	565.60 (406.15)	672.33 (407.93)	664.23 (462.13)
Difficulty	6.86 (.87)	6.61 (1.05)	7.03 (.71)	6.81 (1.12)	6.56 (1.32)	6.68 (1.17)
Solvability	4.69 (1.82)	4.53 (1.92)	4.51 (2.35)	3.89 (1.92)	4.44 (2.09)	4.26 (2.12)

A 2x3 ANOVA on hope showed a significant main effect for likelihood, $F(2, 207) = 11.43, p < .001, \eta p^2 = .10$, with post-hoc analyses showing significant differences between the 0% and 20% conditions, $M_{diff} = 0.76, p = .023, CI_{95\%} = [.08, 1.44]$, and 0% and 80% conditions, $M_{diff} = 1.38, p < .001, CI_{95\%} = [.69, 2.06]$, but not between the 20% and 80% conditions, $M_{diff} = .61, p = .088, CI_{95\%} = [-.07, 1.30]$. There was also a small main effect of investment, $F(1, 207) = 4.38, p = .038, \eta p^2 = .02$, but not in the expected direction, with low investment rating hope higher, $M = 4.08, SD = 1.81$, than the high investment condition, $M = 3.58, SD = 1.79, t(211) = 2.06, p = .041, M_{diff} = 0.51, d = .28$. There was however, no significant interaction between likelihood and investment $F(2, 207) = 1.27, p = .283, \eta p^2 = .01$.

For optimism there was a significant main effect of likelihood condition, $F(1, 207) = 20.06, p < .001, \eta p^2 = .16$, but no significant main effect for investment condition, $F(2, 207) = 1.21, p = .273, \eta p^2 = .01$, or interaction between the two $F(2, 207) = 0.25, p = .783, \eta p^2 = .002$. Post-hoc analyses showed that, similar to likelihood above, there was a significant difference between the 0% and 80%, $M_{diff} = 1.36, p < .001, CI_{95\%} = [0.51, 1.57]$, and 20% and 80%, $M_{diff} = 1.04, p < .001, CI_{95\%} = [.84, 1.89]$, but not between the 0% and 20% likelihood conditions, $M_{diff} = 0.33, p = .309, CI_{95\%} = [-.20, .85]$.

As with Study 5.1, ratings of hope were higher than optimism across the likelihood conditions, a mixed-model ANOVA shows a significant effect of condition on ratings of hope and optimism, $F(1, 210) = 119.58, p < .001, \eta p^2 = .36$. Pairwise comparison suggests there was a significant difference between ratings of hope and optimism in the 0%, $F(1, 210) = 29.79, p < .001, \eta p^2 = .12, M_{diff} = 0.90, CI_{95\%} = [.58, 1.23]$, the 20%, $F(1, 210) = 64.53, p < .001, \eta p^2 = .24, M_{diff} = 1.34, CI_{95\%} = [1.01, 1.67]$, and 80% conditions, $F(1, 210) = 29.70, p < .001, \eta p^2 = .12, M_{diff} = 0.91, CI_{95\%} = [.58, 1.25]$. However, unlike Study 5.1 there was no significant interaction between condition level and ratings of hope and optimism, $F(2, 210) = 2.22, p = .111, \eta p^2 = .02$.

The PROCESS (model 7) approach by Hayes (2013) was again used to investigate the proposed moderated mediation. Again, as the investment manipulation was not successful as measured by the investment manipulation check, the personal investment measure was entered as a proposed moderator. Also, as there was again no difference between the 0% and 20% conditions on ratings of likelihood, they were combined to form a low likelihood condition ($M = 25.97$, $SD = 21.30$), and contrast coded with the 80% condition (-1, 1), which represented again a moderate likelihood ($M = 49.60$, $SD = 20.56$), significantly different from the new low likelihood condition, $t(211) = 7.69$, $p < .001$, $CI_{95\%} = [17.58, 29.69]$, $d = 1.13$. Variables were entered into the model in the same order as Study 5.1.

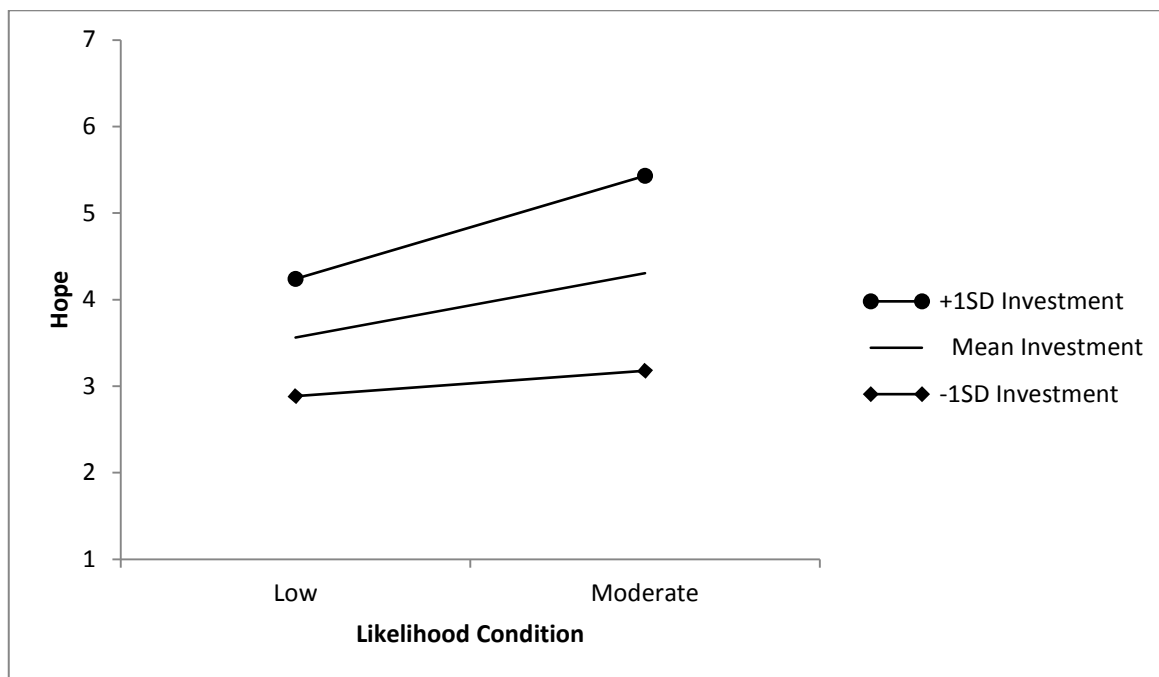


Figure 5.3. The interaction between likelihood condition and investment on hope at +1 and -1 standard deviations of investment.

Table 5.7 shows the results for the two persistence analyses with hope as the proposed mediator. Both personal investment and likelihood condition shared a significant relationship with hope, and the predicted interaction of the two was marginally significant. After the moderator was transformed down and up one standard deviation from the mean,

the relationship between likelihood and hope was stronger and significant at higher, $B = 0.60$, $p < .001$, but not lower, $B = 0.14$, $p = .292$, levels of personal investment (Figure 5.3). In regards to total response there was no significant main effect of hope, no direct effect of likelihood condition, and no indirect effect via hope, $B = -0.02$, $CI_{95\%} = [-.31; .26]$. Despite the marginal significant interaction, and inconsistent with predictions, the index of moderation showed that the indirect effect of likelihood via hope was also not significantly moderated by investment, $B = -0.01$, $CI_{95\%} = [-.17; .12]$.

Table 5.7

Hope PROCESS Analyses with Total Response and Total Time as Dependent Variables

	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>CI</i> _{95%}
DV: Hope		$R = .52$, $F(3,209) = 24.39$, $p < .001$			
Constant	3.93	.11	36.21	<.001	[3.72, 4.15]
Likelihood Condition	.37	.11	3.42	.001	[.16, .59]
Investment	.70	.09	7.89	<.001	[.53, .89]
Likelihood Condition x Investment	.18	.09	1.97	.051	[-.0004, .35]
DV: Total Response		$R = .02$, $F(2,210) = 0.02$, $p = .977$			
Constant	15.43	1.56	9.79	<.001	[12.32, 18.54]
Hope	-0.05	.36	-0.14	.890	[-.76, .66]
Likelihood Condition	.14	.71	0.19	.846	[-1.25, 1.53]
DV: Total Time		$R = .19$, $F(2,210) = 3.88$, $p = .022$			
Constant	467.20	65.84	7.10	<.001	[337.41, 596.99]
Hope	39.00	16.08	2.43	.016	[7.30, 70.70]
Likelihood Condition	25.69	32.15	0.80	.425	[-37.69, 89.06]

In contrast, for total time, hope showed a significant relationship and, while there was no significant direct effect of likelihood condition, there was a significant indirect effect via hope, $B = 14.48$, $CI_{95\%} = [3.38; 32.99]$. More importantly, the index of moderation showed that the indirect effect of likelihood via hope was significantly moderated by investment, $B = 6.83$, $CI_{95\%} = [.89; 19.46]$. Probing of the conditional indirect effects at plus and minus one standard deviations of investment shows a stronger and significant indirect effect for those more invested in performing well on the assessment, $B = 23.26$, $CI_{95\%} = [5.33; 51.51]$, and non-significant for those less invested, $B = 5.70$, $CI_{95\%} = [-3.86; 23.26]$.

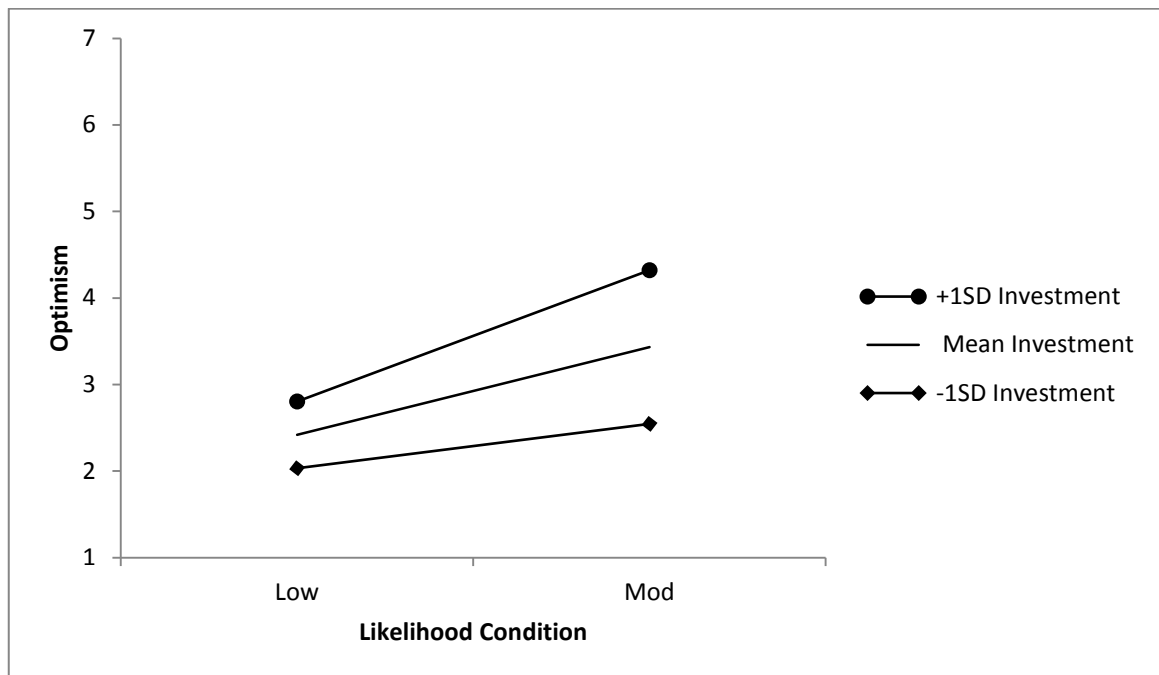


Figure 5.4. The interaction between likelihood condition and investment on optimism at +1 and -1 standard deviations of investment.

Results for moderated mediation analyses with optimism as the proposed mediator can be found in Table 5.8. Likelihood condition and personal investment were both significantly linearly related to optimism, and unexpectedly, there was also a significant interaction between the two on optimism. After the moderator was transformed down and up one standard deviation from the mean, the relationship between likelihood and

optimism was stronger at higher, $B = 0.76$, $p < .001$, than lower $B = 0.26$, $p = .013$, levels of personal investment (Figure 5.4). Despite the significant interaction, there was no significant moderated indirect effect via optimism on either total response, $B = -0.02$, $CI_{95\%} = [-.19; .20]$, nor total time, $B = 8.37$, $CI_{95\%} = [-.28; 21.00]$. Nor was there a significant indirect effect via optimism for either total response, $B = -0.01$, $CI_{95\%} = [-.52; .45]$, or total time, $B = 21.73$, $CI_{95\%} = [-1.42; 47.09]$.

Table 5.8

Optimism PROCESS Analyses with Total Response and Total Time as Dependent Variables

	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	$CI_{95\%}$
DV: Optimism		$R = .55$, $F(3,209) = 31.92$, $p < .001$			
Constant	2.92	.09	34.23	<.001	[2.76, 3.09]
Likelihood Condition	.51	.09	5.93	<.001	[.34, .68]
Personal Investment	.50	.07	7.59	<.001	[.37, .62]
Likelihood Condition	.20	.07	2.99	.003	[.07, .32]
x Desire					
DV: Total Response		$R = .01$, $F(2,210) = 0.01$, $p = .986$			
Constant	15.23	1.59	9.60	<.001	[12.13, 18.40]
Optimism	-0.01	.49	-0.03	.980	[-.98, .96]
Likelihood Condition	.12	.73	0.16	.870	[-1.32, 1.56]
DV: Total Time		$R = .17$, $F(2,210) = 2.48$, $p = .086$			
Constant	495.29	71.83	6.90	<.001	[353.69, 636.90]
Optimism	42.87	23.76	1.80	.073	[-3.97, 89.72]
Likelihood Condition	19.37	33.55	0.58	.564	[-46.77, 85.51]

Discussion

As with Study 5.1, it was not possible to investigate experimentally whether the move from impossibility to possibility saw a leap in hope for those more invested in the outcome; and whether this led to greater persistence as predicted. Attempts to manipulate likelihood were not successful as intended, despite the changes made for Study 5.2. Again, the 0% condition rated their likelihood higher than expected, and not significantly different from the 20% condition. Additionally, the 80% condition again rated their chances lower than expected and Study 5.1, this time rating their chances of success less than chance.

Study 5.2 also had similar problems with attempts to manipulate personal investment, with the manipulation having no effect on the manipulation check measure. It may just be that participants did not link sufficiently the identity manipulations (e.g., higher IQ, university success) to the outcome of the “test-phase” (scoring in the top quartile), and thus performance on the puzzles did not reflect the measured personal investment. The manipulation did have a small effect on hope, but not in the intended direction, with those in the low investment condition reporting slightly higher hope. But the idea of higher investment leading to less hope does not fit with the positive relationship between hope and the measure of investment, nor did it have any significant effect when included in the moderated mediation analyses. It may just be that the small differences in hope were ‘accidental’, despite the random allocation of participants.

Although the manipulations were not successful, there were some interesting results, especially in regards to persistence of hope. Again, overall the participants reported low likelihood of success, and reported higher ratings of hope than optimism. Unlike Study 5.1, both hope and optimism were positively and significantly correlated with total time, however, when included in the moderated mediation analyses there was a significant main effect of hope, but not optimism (though there was a trend). However, of more interest are the (marginal) significant interaction between likelihood condition and investment on

hope, and the conditional effects on total time spent on the matrix puzzles. Plotting of the moderation shows that for those more invested in the outcome, hope was rated higher than for those less invested in the outcome, and this difference was greater for what is essentially a moderate likelihood group. This change in hope at different levels of likelihood visually resembles what would be expected from the cubic function of hope (Chapters 2 & 3). For those more invested in the outcome hope was higher in lower and moderate likelihood, and this hope was associated with greater time spent trying to solve the assessment puzzles. In contrast, those less invested, and for ratings of optimism, there was no significant relationship with persistence. Unfortunately, due to the low ratings of likelihood it is not clear how this trend would play out in higher likelihood, but these results support the idea that hope buffers motivation against negative feedback when one perceives low odds of success.

While the total time measure provides promising support for the persistence of hope, the total response measure was not so accommodating, with no significant relationship between hope (or optimism) and total response. However, this may be due to a problem with the measure. Despite lower ratings of likelihood, optimism and hope than in Study 5.1, participants completed a higher amount of puzzles in Study 5.2. In fact 38% of participants completed all 25 matrix puzzles, as opposed to 17% in Study 5.1. While this may suggest that participants found the outcome more desirable than in Study 5.1 and thus persisted longer; this was not reflected in the ratings of personal investment. Furthermore, despite completing more puzzles, the correlation between total response and total time was weaker in Study 5.2. Upon closer inspection, in later puzzles a large number of participants spent much less time on the puzzles; with scores of zero seconds for quite a few puzzles. This suggests that rather than leaving the study when they stopped thinking success was possible, some participants stopped trying to solve puzzles and just clicked through to the

end. Consequently, the total response measure was not necessarily an accurate measure of persistence for Study 5.2.

I attempted to correct for ‘insincere’ responses by removing responses that were more than one standard deviation shorter than the average time spent on pre-test trials (before the manipulations), and thus may represent responses that are suspect. Doing this did produce results for total response in a similar direction as the total time measure, and results from Study 5.1 (e.g., main effect of hope, $B = 0.41$, $SE = .23$, $p = .078$, $CI_{95\%} [-.05, .86]$, and, non-significant, for optimism on total response, $B = 0.44$, $SE = .32$, $p = .172$, $CI_{95\%} [-.19, 1.07]$); and the moderated mediation via hope was (just) significant and similar to total time, $B = 0.07$, $CI_{95\%} [.0001, .26]$, with the conditional indirect effect stronger and significant at higher, $B = 0.25$, $CI_{95\%} [.01, .74]$, but not at lower levels of investment, $B = 0.08$, $CI_{95\%} [-.01, .35]$. However, such attempts to remove suspected dishonest response were also problematic. Rather than there being a clear point where participants ‘stopped trying’ followed by removed ‘insincere’ responses, for some participants one or two puzzles towards the beginning of the test-phase were also removed, so it was not clear if it was removing only insincere responses. However, it does suggest that possible insincere responses may have created a ceiling effect for total response, and that steps to reduce this in the future may provide more interpretable results.

Why participants seemed to click through to the end rather than exit in Study 5.2 is not clear. Anecdotally, student comments in Study 5.2 suggested they were more concerned about receiving course credit, with a number of participants asking if they had to complete all puzzles to receive course credit. With Study 5.1 being run exclusively in Semester 2 (2014), first-year student participants may have had more experience with research participation, and been more assured of what counts as participation in terms of course credit. In contrast, with the exception of 43 participants, participation in Study 5.2 was primarily in semester 1 (2015 & 2016), and as such the first-year participants were

new to research, and may have felt they were required to answer every puzzle to receive course credit (despite no such instruction given).

An unusual finding in Study 5.2 is the interaction between likelihood condition and personal investment on optimism. In Chapters (2, 3, & 4) and with Study 5.1 in this chapter, there was no personal investment and likelihood interaction on optimism. It is unclear why there was one in this study.

General Discussion

Hope's role in possibility has been said to protect goal-striving despite the odds (e.g., Chapter 3), but hope's role as a protector of motivation is not limited to promoting goal-striving, rather it also extends to buffering motivation against negative feedback (Miceli & Castelfranchi, 2010; Nelissen, 2017). The two present studies provide some empirical support for this claim, with participants generally pessimistic about their chances of success, hope, but not optimism, was related to greater persistence at the puzzle tasks. With the recognition of possibility, hope was rated significantly higher than optimism, and hope was related to time spent on puzzles and the amount of puzzles completed (in Study 5.1 at least).

More importantly, for total time in Study 5.2 (and some suggestion for total puzzles when excluding 'insincere' responses), for those more personally invested in the outcome hope was rated higher at what was essentially moderate likelihood compared to low likelihood, and this was related to greater persistence. Thus, an increase in chances (but still within the domain of possibility than probability) led to greater hope and through hope to greater persistence, but only for those highly invested in the task. These findings were in line with the cubic function for hope found in Chapters 2 and 3, and with the low and moderate likelihood conditions of Chapter 4, providing further evidence in support of the role of possibility and personal investment in developing hope, and its motivational benefit, distinct from expectation measures. Rather than a positive expectation of success,

hope arises in possibility for personally important outcomes, and seemingly promotes and protects motivation as suggested (Korner, 1970; Miceli & Castelfranchi, 2010), at least in the short term.

It may be that this is the greatest strength of hope. If plagued by great uncertainty about reaching a valued goal, being able to remain sanguine and pursue this goal despite setbacks and negative feedback is surely a benefit, especially when considering the alternative (succumbing to negative emotion). That is, of course, assuming that more adaptive measures are not being ignored if available, which would be counterproductive in terms of adaptive coping (Korner, 1970; Lazarus, 1999). While hope was ultimately unrewarded in this instance, it is conceivable that remaining hopeful and persisting at tasks allows one to make the most of that limited likelihood, giving one the best chance of achieving an important goal (Pettit, 2004).

What was disappointing about the two studies was that it did not clarify the change in hope with the departure from impossibility, or its role in higher likelihood. In both studies it appeared that participants did not seem to accept the likelihood rating provided them (with the exception of the 20% condition where they were relatively accurate); participants seemed to reject a zero percent chance, but were also sceptical of high likelihoods. For those in the 80% group it may just be that they did not connect the feedback provided with their own belief in their performance on the task. The logic in the puzzles was quite complex, and the answer options provided were meant to cause uncertainty if they could follow the logic, so it is understandable that they may have attributed their pre-test performance to luck, and therefore dampened their perceptions of performance. However, this does not account for the overconfidence shown by the 0% condition.

It may be there are two separate influences on the ratings of likelihood for the 0% and 80% conditions. Rather than a failure to manipulate likelihood, this may be how hope

is maintained when there is no perceivable chance of success. While Korner's (1970) suggestion of *pure hope* does not quite seem appropriate as participants have inflated their likelihood rather than ignoring it, this may be reflective of overestimation of likelihood found in the unrealistic optimism literature (Shepperd et al., 2015), which is said to be influenced by the desirability of the outcome (Massey et al., 2011). It may be that when presented with no chance for an outcome high in personal investment, individuals refuse to concede the odds, and to maintain hope inflate their chances. When splitting the sample from Study 5.2 by condition there was a significant correlation between investment and likelihood for the 0% ($r = .39, p = .001$), but not the 20% condition ($r = .12, p = .332$) which is consistent with this idea; however, there was a stronger correlation for the 80% condition ($r = .47, p < .001$). So it is unclear how desire would lead to an inflation of likelihood in the 0% but not the 80%. This is also tempered by there being no relationship between desire and likelihood for any condition in Study 5.1 (0%, $r = .28, p = .137$; 20%, $r = -.12, p = .533$; 80%, $r = .08, p = .682$).

While the lower-likelihood group does not seem to fit Lazarus' (1999) assertion that individuals rate their chances realistically so best to cope, it may also be that they have provided what they believe as realistic chances. The same ambiguity around having two answers that are similar to the correct answer may have led the 0% to attribute this to bad luck, or that they know they were close to finding the answer. If they felt they could follow the logic and therefore made a mistake with their choice of two possible options, they may feel they can improve in the test-phase. It is not that they felt they could not solve the puzzles per se, and it is important to note that there was no difference between perceptions of solvability across conditions, but with more opportunity they could improve their performance.

In regards to the desire/investment manipulation, it was not only unclear why they were unsuccessful (as discussed earlier), but why the manipulation checks were

inconsistent in providing the expected interaction with likelihood, based on previous chapters. For Study 5.1 it was thought that while money is somewhat a superficial outcome, participants may invest their own importance into winning, especially if they are fiscally challenged first year students. It may be that this did not happen, and that this is why the interaction was present for Study 5.2, which was couched more in terms of personal significance to the individual. Future research may benefit from using a real-world outcome that better represents a goal of personal significance to the individual (however hard these are to find and manipulate).

Despite the disappointment of the manipulations, and while being mindful of the post-hoc nature of the statistical approaches taken to remedy the situation, this chapter did provide some valuable information in regards to its primary aims of demonstrating the persistence of hope in the face of negative feedback, and differentiating it from optimism. When confronted with the low likelihood of success, hope not only arises with the possibility of success, but it also seems to provide greater resilience to setbacks and negative feedback, allowing one to persist in working towards a cherished goal.

CHAPTER 6: Holding on to Hope and Sustaining Behaviour

Sazed shook his head. "Men are more resilient than that. Our belief is often strongest when it should be the weakest. That is the nature of hope." – Brandon

Sanderson, Mistborn

Hope is almost exclusively investigated in terms of circumstances in which hope *arises*, what ingredients seem most important for hope to develop, and this thesis is no exception. Hope is explored as something to obtain, or to shield one in trying times, something immediate and important going forward. As it is most commonly considered a future focused construct, or arising as a response to some personal threat, this is not surprising (nor necessarily problematic). However, if hope is only viewed as something that can be gained in troubling times, and not what may remain in growing uncertainty or sustain motivation when the outcome seems increasingly not in one's favour, then a potential strength of hope may be being ignored (Aspinwall & Leaf, 2002). This chapter aims to provide some preliminary evidence of the enduring quality of hope, and its role in sustaining behaviour.

As previously noted, colloquially we "cling to hope" or "never give up hope". Hope is seen as something that allows individuals to endure hardship, because as Birenbaum (2015) –a holocaust survivor – suggests, "hope is the last to die". While some research (i.e., Chapter 5; Nelissen, 2017) shows that hope may protect motivation from negative feedback, it does not address the nature of this protection in the long term, or as confidence of success diminishes. This raises the question whether hope has enduring qualities that enable it to sustain individuals in the long term. Or is it merely a 'passion' that is short lived?

Breznitz (1986) suggests that rather than a cognitive state, or fleeting thought, hope is an "ongoing process" (p. 296). He argues that hope must be a persistent process to have sufficient impact on individual's coping and adjustment to stress. In a similar vein, in the

medical literature Folkman (2010) suggests that, although hope may ebb and flow, it has a key quality that allows hope to manage stress and uncertainty over time – an ability to hold two conflicting outlooks. She suggests one can recognise the reality of a problem and all it heralds, but also recognise the possibility and have hope that it may not occur.

It is again hope's "independence from probability estimates" that assists in this process, that not only makes hope stronger than expectations (Miceli & Castelfranchi, 2010, p. 259), but as I argue, stronger in the long term. Optimism, for example, which is more often treated in terms of positive expectations of success (Peterson, 2000), seems to represent in a sense a weathervane for probability estimates, rising and falling with one's perceptions of likelihood of success (see earlier chapters). Contrastingly, hope's strength, as Miceli and Castelfranchi (2010) argue is in the cheapness of the evidence required to engender hope, which suggests that with the passing of time hope would be less influenced by the rise and, more importantly, the fall of one's confidence of success.

As the previous chapters suggest, personal investment in the outcome would also play an important role in the durability of hope. Qualitative research suggests that as individuals hope for outcomes that are important to them, hope is not as fleeting as other anticipatory emotions (e.g., wish; Bruininks & Malle, 2005). Similarly, Korner (1970) suggests that the importance to the self of the hoped-for outcome being obtained invariably leads to a commitment to hope. In this sense I agree with Scheier and Carver (2001) who argue that hope allows one to "hold on to valued goals" and persist in goal striving despite difficult times¹⁴. I would suggest that, should one's confidence in an outcome waver or decline with the passing of time, if one is sufficiently invested in the outcome, then hope should help one weather the storm.

¹⁴ Though Scheier and Carver's (2001) emphasis on confidence in achieving their outcome seems to go beyond the confidence normally associated to hope, especially when experiencing difficult times.

Hope, thus sustained, allows individuals to keep employing problem-focused coping in the face of a challenging reality by working towards their goals, but also employing emotion-focused coping that minimises the effect of fear and anxiety that may arise due to the increasing challenges (Folkman, 2010). In other words, as shown for terminal patients, one can acknowledge the seriousness of one's diagnosis and "prepare for the worst", whilst coping with one's illness by "hoping for the best" (Clayton et al., 2008, p. 657). This allows individuals to recognise the reality of the situation but still sustain a positive outlook and goal-focussed behaviour; hope provides motivation for individuals to remain engaged in the hoped-for outcome (Averill et al., 1990; Bruininks & Malle, 2005)

I argue that with the passing of time and an increasing challenge, such as an approaching deadline, individuals more personally invested in the outcome will be able to maintain higher levels of hope, whereas those less personally invested will be more likely to lose hope with passing time and increasing challenges. In turn, hope allows individuals to keep engaging in behaviours in pursuit of their goals.

Study 6.1

Study 6.1 aims to investigate the enduring nature of hope by exploring its presence and ability to sustain PhD candidates across their candidature. Anecdotally, when one sets out on one's PhD journey, the prospect of submitting a thesis in 3-4 years seems highly achievable, and one perhaps glibly predicts with great optimism the glorious and sun filled moment one submits one's mighty tome, and walks proudly adorned in august cap and gown (and fancy new title) into the future. However, as the years pass by, and the toils and tribulations of life and research impose their immense weight on one's psyche and situation, the submission date approaches alarmingly and threateningly quick. Amongst the PhD's jabs and blows optimism falls bloody and beaten on the wayside, but at some stage – though one is not sure when – hope takes up some of the weight and shines weakly but clearly, a way forward. Together propped up under hope's shoulder, one stumbles and

staggers, but moves always forward, one desperate step at a time, until with great relief one falls before the submission office and proffers pathetically what is left of one's soul.

More serious again, it seems that PhD candidates may experience some degree of planning fallacy (Kahneman & Tversky, 1977), where their perception of submitting their thesis on time is based on internal beliefs (e.g., perceptions of time), rather than considering the individual elements that make up the task (Kruger & Evans, 2004), or what it takes to complete a PhD thesis. However, when factors and challenges that have been shown to impact PhD completion and attrition are experienced first-hand, it seems that candidates become less confident of submitting on time.

Factors that have been shown to influence delays in submission and attrition, and therefore possibly hope, are for example whether the candidate receives financial support (Wright & Cochrane, 2000). Some research suggests that part-time students are more likely to be delayed in completion than full-time students (Martin, Maclachlan, & Karmel, 2001), others suggest full-time students are more likely to be delayed (Wright & Cochrane, 2000), while quite a few studies suggest no significant difference (see Manathunga, 2002). The quality of the supervisor/student relationships has also been linked to timely completion, specifically whether the supervisor takes a more pedagogical approach (e.g., help students take risks, learning experience) rather than treating their candidate as just an extension of their research (Manathunga, 2005). Latona and Browne (2001) synthesised research in this area and suggested that supervisory practices that positively influence completion include tailored and timely feedback, frequent meetings with students, open and dynamic negotiation of mutual expectations and responsibilities, and supportive and collegial relationships with students. Additionally, beyond supervision format, quality of relationship to the supervisor and financial support, it is suggested that institutional factors, such as practical support (e.g., computer, office, training opportunities) or the presence of a

collegial research culture, have been linked to a reduction in PhD attrition and completion times (Latona & Browne, 2001; Manathunga, 2002, 2005).

I predicted that as participants move through their PhD candidature their perception of submitting their thesis on time would diminish, as too would their hope and optimism of completing on time. However, I predicted that there would be an interaction between candidature time and personal investment on hope, but not optimism, insomuch that those more invested in the outcome would show less decline in hope. Furthermore, I expected a moderated mediation effect, with those highly (vs. less) invested in the outcome (timely completion) maintaining higher levels of hope and, through this, engaging in more goal-focused behaviour instrumental to thesis completion.

Method

Participants

Participants were 142 PhD students aged 20 to 73 ($M = 35.74$, $SD = 11.84$), 103 female, recruited from the research higher degree cohort of one South Australian University. Participants were more often full-time students ($n = 102$) than part-time students ($n = 40$), and were more likely to be receiving financial support ($n = 109$) than not ($n = 32$; 1 chose not to respond).

Procedure

An email request was sent to the Dean of graduate research at a South Australian University who forwarded an invitation to all PhD candidates asking them to take part in an online study. Contained within the invitation was information about the researchers and the study, and a link to an online questionnaire. Participants were advised that the study aimed to investigate PhD candidates' attitudes and beliefs about completing their thesis in a timely manner.

Materials

An initial check confirmed all participants were currently PhD candidates, and then basic demographic information was collected (e.g., age, gender). Information about study load (0 = part-time, 1 = full-time) and financial support (0 = no, 1 = yes) was collected, and whether participants had already submitted their thesis, with those indicating the affirmative excluded from the study ($n = 11$). All variables were measured on a 7-point Likert scale (1 = Not at all, 7 = Very much), with the exception of candidature time and likelihood.

Personal investment. *Personal investment* indicates the participant's ratings of desire and personal significance of an outcome. Three items measured *desire* ($\alpha = .90$) "How much do you desire to submit your thesis on time?" "Is submitting your thesis in a timely manner important to you?" "How much do you want to submit your thesis on time?"; and *personal significance* ($\alpha = .70$); "Is being a PhD candidate an important part of who you are?", "How important is your PhD work and research to your future career ambitions?", "How strongly do you identify as a PhD candidate?". A principal component analysis (PCA) with orthogonal rotation on the 6 items yielded two components with eigenvalues over Kaiser's criterion of 1 and explaining 73.35% of the variance, on which all items loaded substantially ($> .63$). The scree plot also showed an inflection justifying two components, with items loaded across the desire and personal significance distinction. However, for theoretical and consistency reasons (and given a strong first factor, explaining more than 50% of the variance), all items were combined with the mean representing a scaled score ($\alpha = .72$), with higher score representing greater personal investment.

Time. *Time* represents the duration of the participants candidature at the time of the study in months. The score for participants who indicated that they were studying part-time was halved to best represent an equivalent full-time load. Four participants who had

exceeded the standard maximum candidature length of 48 months – and thus could not submit their thesis on time – were consequently excluded from the study.

Likelihood, optimism and hope. *Likelihood* measured the participant's perceived likelihood of success on a slider ranging from 0%-100% ("What do you think the chances are that you will submit your thesis on time?"). *Optimism* was measured with a single item, "How optimistic are you that you will submit your thesis on time?", and *hope* was also measured with a single item, "Do you have hope that you will submit your thesis on time?"

Thesis behaviour. Three items measured the degree to which participants' were undertaking behaviours to ensure the timely completion of their thesis, "Have you been undertaking courses to assist you with your thesis writing (e.g., writing & statistics workshops)?" "Have you made plans to ensure you can complete what needs to be done to ensure you finish in a timely manner?"; "Are you actively and energetically pursuing your PhD project?". Principal component analysis (PCA) with orthogonal rotation on the 3 items yielded one component with eigenvalues over Kaiser's criterion of 1 and explaining 60.40% of the variance, on which all items loaded substantially ($> .53$). The mean of the combined items represented the scale score, with higher score representing greater thesis consistent behaviour, however the reliability score was quite low ($\alpha = .53$).

Supervisor support. Six items covered ways in which academic supervision has been suggested to influence timely submission (Latona & Browne, 2001; Manathunga, 2005) to create a measure of *supervisor support* ($\alpha = .90$); "Do you receive timely feedback from your supervisor(s)?", "Do you find feedback on your writing from your supervisor helpful?", "Do you meet with your supervisor(s) as frequently as you feel necessary?", "Do you feel supported by your supervisor(s)?", "Do you feel you have an open and dynamic relationship with your supervisor where ideas are freely shared and respected?". Principal component analysis (PCA) with orthogonal rotation on the 6 items

yielded one component with eigenvalues over Kaiser's criterion of 1 and explaining 68.51% of the variance, on which all items loaded substantially ($> .81$).

University support. Seven items that represent key areas of university support and culture suggested to influence timely completion (Latona & Browne, 2001; Manathunga, 2005) were created to measure *university support* ($\alpha = .87$); "Have you been supplied appropriate resources for your candidature (e.g., office, computer, journal access)?" "Do you feel supported by your University?" "Do you feel you belong to a greater research community at your University?" "Do you feel isolated and detached from staff and other students at your University?" (reverse coded), "Do you feel the University provides you with enough opportunity for research training and development?", "Do you get much opportunity to discuss research and other issues with other PhD candidates and academics?". Principal component analysis (PCA) with orthogonal rotation on the 7 items produced one component with eigenvalues over Kaiser's criterion of 1 and explaining 56.41% of the variance, on which all items loaded substantially ($> .81$).

Results

Mean and standard deviations, as well as correlations between all main variables are presented in Table 6.1. On average participants were just over halfway through their second year of candidature, and were relatively confident of submitting on time, though this perception of likelihood significantly declined over the course of the candidature, as predicted. Ratings of hope were significantly higher than optimism, $t(128) = 6.06$, $p < .001$, $d = .40$, and both were negatively correlated with candidature time, but positively correlated with behaviour¹⁵. Of the control variables, both supervisor and university support were positively correlated with both hope and optimism, and university support with thesis behaviour.

¹⁵ Hope and optimism were highly correlated. Please note that in the following regression analyses Tolerance statistics ($> .25$) and Condition Indices (< 11) indicated that multicollinearity was not a problem.

Table 6.1

Mean and Standard Deviation and Correlations of all Variables (Study 6.1)

<i>N</i> =129	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Time	19.12	12.94									
2. Likelihood	73.03	26.44	-.26**								
3. Investment	5.86	.82	-.15	.30**							
4. Optimism	5.17	1.71	-.26**	.87***	.38***						
5. Hope	5.81	1.58	-.27**	.77***	.35***	.70***					
6. Supervisor Support	5.93	1.16	-.13	.30***	.12	.28**	.29**				
7. University Support	5.05	1.21	-.25**	.31***	.46***	.29**	.35***	.33***			
8. Study Load	.72	.45	-.09	.14	.19*	.14	.08	.14	.18*		
9. Funded	.77	.42	.16	-.17*	.10	-.12	-.17	-.08	-.003	.56***	
10. Behaviour	5.28	1.14	.16	.22*	.35***	.26**	.24**	.12	.25**	-.08	-.15

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Separate hierarchical regressions with hope and optimism as the dependent variable were conducted to investigate the predicted interaction between personal investment and candidature time¹⁶ on hope (but not on optimism; Table 6.2). In both instances all predictor variables were centred before being entered into the model, with personal investment and candidature time entered in the first step, followed by the interaction of the two in the second step, whilst controlling for study load, and financial, supervision and university support in the third step. With all variables in the model both funding and supervisor support are significantly related to hope and optimism, suggesting a supportive supervisor and finance are positive influences on hope and optimism. In regards to the hypothesised relationship, findings reflect the descriptive results above with hope and optimism both showing a significant negative relationship with time and a significant positive relationship with personal investment. Importantly, there was no significant interaction of time and investment on optimism, but as predicted, there was for hope.

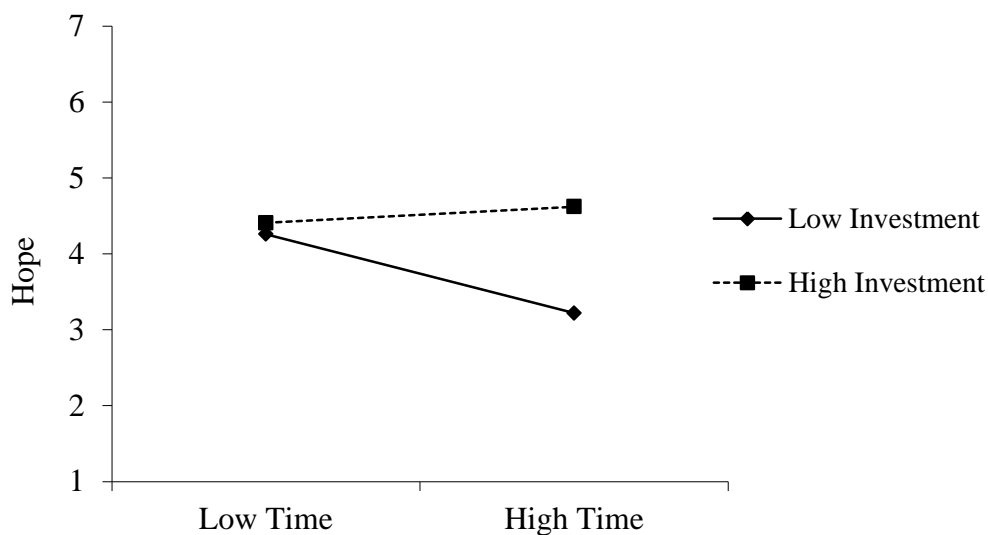


Figure 6.1: The interaction between candidature time personal investment on hope (Study 6.1)

¹⁶ Candidature time was divided by twelve (i.e., expressed in years instead of months) as a more convenient scaling for the regression results.

Table 6.2

Hierarchical Regression for Hope and Optimism as Dependent Variable (Study 6.1)

	Hope			Optimism		
	<i>B</i>	<i>SE_B</i>	β	<i>B</i>	<i>SE_B</i>	β
Step 1	$\Delta R^2 = .172, \Delta F(2, 126) = 13.04^{***}$			$\Delta R^2 = .186, \Delta F(2, 126) = 14.42^{***}$		
(Constant)	5.81 ^{***}	.13		5.17 ^{***}	.14	
Time	-.33 ^{**}	.12	-.22	-.33 [*]	.13	-.21
Investment	.61 ^{***}	.16	.32	.72 ^{**}	.17	.35
Step 2	$\Delta R^2 = .03, \Delta F(1, 125) = 5.07^*$			$\Delta R^2 = .01, \Delta F(1, 125) = 1.66$		
(Constant)	5.86 ^{***}	.13		5.20 ^{***}	.14	
Time	-.32 ^{**}	.12	-.22	-.33 [*]	.13	-.21
Investment	.58 ^{***}	.16	.30	.70 ^{***}	.17	.34
Time x Investment	.33 [*]	.15	.18	.21	.16	.10
Step 3	$\Delta R^2 = .10, \Delta F(4, 121) = 4.19^{**}$			$\Delta R^2 = .08, \Delta F(4, 121) = 3.21^*$		
(Constant)	4.13 ^{***}	.80		3.72 ^{***}	.89	
Time	-.19	.12	-.13	-.22	.13	-.14
Investment	.47 ^{**}	.17	.25	.66 ^{**}	.18	.32
Time x Investment	.35 [*]	.14	.19	.23	.16	.12
Study Load	.31	.34	.09	.57	.38	.15
Funding	-.85 [*]	.36	-.23	-.84 [*]	.40	-.21
Supervisor Support	.24 [*]	.11	.18	.28 [*]	.12	.19
University Support	.15	.12	.11	.01	.13	.01

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

To investigate the nature of this interaction, the simple effects were tested at high and low levels of personal investment; with the model re-run after transforming the moderator down and up by 1 standard deviation, respectively. In line with predictions, for

respondents less invested in the outcome there was a significant negative relationship between hope and time ($B = -.48, p = .004$), but not for those highly invested ($B = .10, p = .559$), for whom the relationship was slightly positive but not significant. For those more invested in the outcome there was no significant decline of hope with the passing of time (Figure 6.1).

Table 6.3

PROCESS 7 analyses prediction of thesis behaviour (Study 6.1)

	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>CI</i> _{95%}
DV: Behaviour	$R = .37, F(3,125) = 7.31, p < .001$				
Constant	3.46	.62	5.57	<.001	[3.05, 4.68]
Hope	.05	.09	.59	.559	[-.12, .22]
Optimism	.14	.08	1.86	.066	[-.01, .30]
Time	.33	.09	3.53	.001	[.14, .51]
Study Load	-.15	.26	-.55	.580	[-.67, .37]
Funding	-.35	.28	-1.26	.210	[-.90; .20]
Supervisor Support	-.01	.09	-.10	.924	[-.18, .16]
University Support	.24	.09	2.79	.006	[.07, .41]

To test the moderated mediation prediction the PROCESS (Model 7) approach by Hayes (2013) was adopted. Thesis behaviour was entered into the model as the dependent variable, with candidature time as the independent variable. Hope and optimism were entered as potential mediators, and personal investment as the potential moderator, with study load, and financial, supervision and university support entered as controls. Consistent with the hierarchical regression reported above (Table 6.2) both hope and optimism were significantly related to investment and time, with again an interaction of time and investment on hope. However, only time and university support had a significant

relationship with thesis behaviour; neither optimism nor hope was significantly related to behaviour (Table 6.3). The index of moderated mediation suggests investment did not significantly moderate the indirect effects of time on thesis behaviour through either optimism, $B = .03$, $CI_{95\%} = [-.01; .14]$, or hope $B = .02$, $CI_{95\%} = [-.03; .11]$ ¹⁷.

Discussion

Results from Study 6.1 supported the predicted interaction between candidature time and personal investment on hope, however, this did not lead to greater thesis behaviour. Similar to perceptions of likelihood, hope and optimism diminished with the duration of participants' candidature. However, in fact, for hope only those less personally invested in the outcome showed a significant negative relationship between candidature time and hope, whereas for those more invested in the outcome there was no decline in hope, in line with predictions.

However, neither optimism nor hope was significantly related to thesis behaviours, and the predicted moderation mediation effect via hope was consequently also not confirmed. While there was a significant positive relationship between time and university support with thesis behaviour these results should be considered with some caution. The behaviour measure in this study had low reliability. One item in particular ("Have you been undertaking courses to assist you with your thesis writing [e.g., writing & statistics workshops]?") did not load well with the other items, and considerably reduced the overall reliability of the measure ($\alpha = .82$ with this item deleted). I would suspect that while items measuring the making of plans and actively working on their thesis refer to something all candidates can do, the other item spoke of undertaking courses which may not be available or pertinent to all PhD candidates.

¹⁷ Analyses without the control variables produces similar results, with the index of moderated mediation suggesting investment did not significantly moderate the indirect effects of time on thesis behaviour through either optimism, $B = .03$, $CI_{95\%} = [-.01; .13]$, or hope $B = .04$, $CI_{95\%} = [-.01; .14]$

Study 6.2

Study 6.2 is essentially identical to Study 6.1 except with a different, broader sample, and with some improved items that were problematic in Study 6.1. The study was run at a similar time period (March-April, 2016), but in the year following Study 6.1. Rather than one university sample, the study was pitched to all Australian universities, and was also shared across the world.

Method

Participants

Participants were 467 PhD students aged 21 to 68 ($M = 33.44$, $SD = 9.89$), consisting of 358 females and 109 males. Participants were recruited from two sources, directly from five Australian universities (from 4 different states and 1 territory; $n = 385$) and from an advertisement on twitter ($n = 82$). Of the twitter sample 32 participants were from various Australian universities, and 50 were from various universities across the globe (New Zealand $n = 2$, South Africa $n = 2$, Turkey $n = 1$, Western Europe $n = 4$, Canada $n = 8$, US $n = 6$, Scandinavia $n = 2$, United Kingdom $n = 25$). Participants were again more often full-time students ($n = 367$) than part-time students ($n = 100$), and were again more likely to have financial support ($n = 374$) than not ($n = 93$). Of the sample, 36 participants indicated they had already submitted their thesis and were excluded from the study. A further six participants who had exceeded the 48 month limit normally extended to full time students were also excluded. Participants received no incentive or payment for participating in this study.

Procedure

Similar to Study 6.1 an email was sent to the School of Graduate Research, but this time at all Australian universities (excluding the university in Study 6.1) asking if they would disseminate amongst their PhD candidates an invitation to take part in the study. Five universities (University of Adelaide, University of Canberra, Deakin University,

University of Queensland and University of Western Australia) thankfully shared the invitation with their PhD cohort, which included a link to the online questionnaire. Additionally, in response to the initial graduate research emails, one academic offered to share the study information on a popular research twitter handle, which had global reach. A new version of the study that contained items to represent the new possible world demographic (e.g., country of origin) was produced and shared on twitter.

Materials

Materials for Study 6.2 were almost identical to Study 6.1 with a few changes and additions. Participants were asked to record the name of their University, and for participants in the world-wide sample they were additionally asked to record the country their university was situated in and the expected completion time of a PhD in that country¹⁸. Other changes were for the personal investment and the thesis behaviour measures.

Personal investment. One of the items in Study 6.1 was more career rather than PhD orientated and consequently did not load as well as the other items in a factor analyses. This item was removed and was replaced with the following; “Is completing a PhD thesis an important goal in your life?”. Principal component analysis (PCA) with orthogonal rotation on the 6 items yielded two components with eigenvalues over Kaiser’s criterion of 1 and explaining 79.45% of the variance, on which all items loaded substantially ($> .65$). Again, however, for theoretical and consistency reasons (and given a strong first factor, explaining more than 50% of the variance), all items were combined with the mean representing a scaled score ($\alpha = .78$), with higher score representing greater personal investment.

¹⁸ As the expected completion of a PhD was five years in some areas, participants from international universities were initially excluded from the study. But as excluding them did not significantly change the results, they were left in the analyses reported.

Thesis behaviour. Due to the low reliability rating of the thesis behaviour measure in Study 6.1, the coursework based question, that is not necessarily applicable to all candidates was replaced with two items; “Are you actively working towards writing goals that are set by yourself and your supervisor?”, “Are you actively working towards progress deadlines/milestones set by the school or faculty?”. All items were combined with the mean representing a scaled score ($\alpha = .79$), with higher scores representing greater thesis consistent behaviour. Principal component analysis (PCA) with orthogonal rotation on the 4 items yielded one component with eigenvalues over Kaiser’s criterion of 1 and explaining 62.69% of the variance, on which all items loaded substantially ($> .73$).

Supervisor support. *Supervisor support* ($\alpha = .92$) was measured with the same six items as Study 6.1, with principal component analysis (PCA) with orthogonal rotation producing one component explaining 72.00% of the variance, on which all items loaded substantially ($> .73$).

University support. *University support* ($\alpha = .83$) was also measured with the same seven items as Study 6.1, with principal component analysis (PCA) with orthogonal rotation producing one component explaining 50.82% of the variance, on which all items loaded substantially ($> .81$).

Results

The means and standard deviations and correlations of all the main variables (Table 6.4) are very similar to that of Study 6.1. Participants were generally just past the mid-point of their second year, and were generally quite confident in submitting on time. Hope was again rated higher than optimism, $t(417) = 11.51, p < .001, d = .31$, and as expected both showed a similar negative correlation with candidature time as perceived likelihood. Both hope and optimism were similarly correlated with thesis behaviour¹⁹. Again, both supervisor and university support were positively related with hope and optimism, and also with thesis behaviour.

¹⁹ Hope and optimism were highly correlated. Please note that in the following regression analyses Tolerance statistics ($> .25$) and Condition Indices (< 11) indicated that multicollinearity was not a problem.

Table 6.4

Mean and Standard Deviation and Correlations of the Main Variables (Study 6.2)

<i>N</i> =418	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Time	19.38	12.94									
2. Likelihood	70.72	26.44	-.30***								
3. Investment	5.74	.82	-.10*	.33***							
4. Optimism	5.03	1.71	-.26**	.87***	.38***						
5. Hope	5.55	1.58	-.29***	.82***	.40***	.85***					
6. Supervisor Support	5.48	1.16	-.13**	.28***	.27***	.31***	.34***				
7. University Support	4.69	1.21	-.10*	.18***	.21***	.23***	.24***	.48***			
8. Study Load	.78	.45	.14**	-.01	.13**	.01	.06	.08	.20***		
9. Funded	.79	.42	.13**	-.07	-.002	-.07	-.05	-.02	.14**	.62***	
10. Behaviour	5.30	1.14	-.09	.33***	.46***	.38***	.41***	.41***	.41***	.14**	.04

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

A hierarchical regression was again run to test the predicted interaction of investment and time on hope (Table 6.5), with items entered into the model the same as Study 6.1. Similar to Study 6.1 and in line with predictions, hope and optimism both shared a similar negative relationship with time and positive relationship with investment, but only the time by investment interaction on hope was significant.

Table 6.5

Hierarchical Regression for Hope and Optimism as Dependent Variable (Study 6.2)

	Hope			Optimism		
	<i>B</i>	<i>SE_B</i>	β	<i>B</i>	<i>SE_B</i>	β
Step 1	$\Delta R^2 = .22, \Delta F(2,415) = 59.50^{***}$			$\Delta R^2 = .22, \Delta F(2,415) = 58.56^{***}$		
(Constant)	5.55 ^{***}	.07		5.03 ^{***}	.07	
Time	-.40 ^{***}	.07	-.25	-.42 ^{***}	.07	-.27
Investment	.67 ^{***}	.08	.38	.65 ^{***}	.08	.36
Step 2	$\Delta R^2 = .01, \Delta F(1,414) = 7.07^{**}$			$\Delta R^2 = .003, \Delta F(1,414) = 1.38$		
(Constant)	5.56 ^{***}	.07		5.04 ^{***}	.07	
Time	-.40 ^{***}	.07	-.25	-.42 ^{***}	.07	-.27
Investment	.65 ^{***}	.08	.36	.64 ^{***}	.08	.36
Time x Investment	.19 ^{**}	.07	.12	.08	.07	.05
Step 3	$\Delta R^2 = .10, \Delta F(4,410) = 8.01^{***}$			$\Delta R^2 = .04, \Delta F(4,410) = 5.53^*$		
(Constant)	3.90 ^{***}	.36		3.63 ^{***}	.37	
Time	-.36 ^{***}	.07	-.23	-.38 ^{***}	.07	-.24
Investment	.52 ^{***}	.08	.29	.53 ^{***}	.08	.30
Time x Investment	.22 ^{**}	.07	.13	.10	.07	.06
Study Load	.29	.22	.07	-.002	.22	-.001
Funding	-.29	.22	-.07	-.16	.22	-.04
Supervisor Support	.26 ^{***}	.06	.21	.20 ^{**}	.06	.17
University Support	.06	.07	.04	.09	.07	.06

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Analyses at plus one and minus one standard deviation of investment showed that for those less invested in the outcome there was a strong significant negative relationship between hope and time ($B = -.57, p < .001$), but for those more highly investment the negative relationship was weaker and not statistically significant ($B = -.16, p = .082$). As predicted, for those more invested in the outcome there was no significant decline of hope with the passing of time (Figure 6.2).

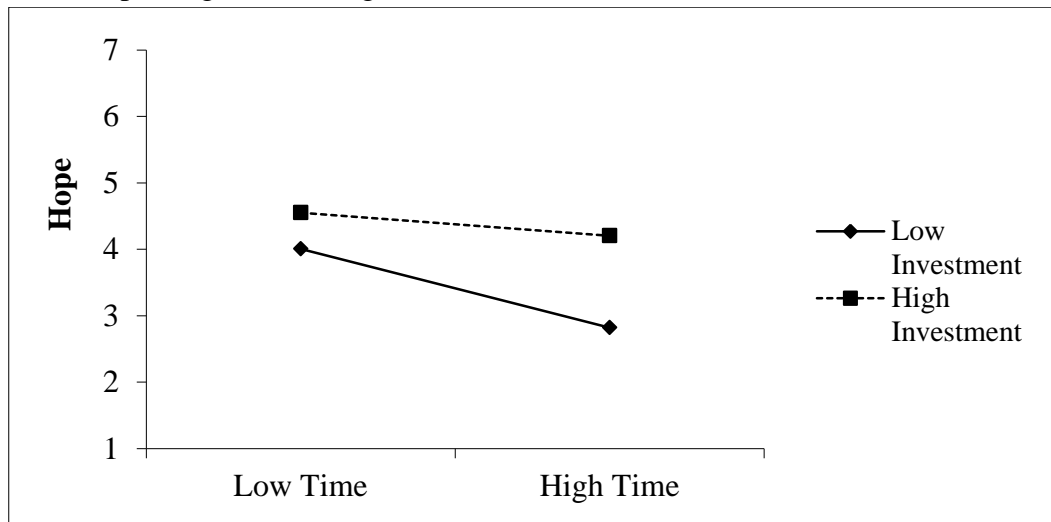


Figure 6.2: The interaction between candidature time personal investment on hope (Study 6.2)

Hayes’ (2013) PROCESS macro was again used to investigate the proposed moderated mediation, with items entered identically to Study 6.1. Figure 6.3 shows the results of the overall moderated mediation analysis. Both hope and optimism shared a similar relationship to time as seen in the analysis above and similar to Study 6.1; however, unlike the previous study there was a significant effect of hope (but not optimism) on thesis behaviour. Unlike Study 6.1 there was no significant direct effect of candidature time on thesis behaviour, $B = .04, SE = .05, p = .390, CI_{95\%} = [-.05, .14]$.

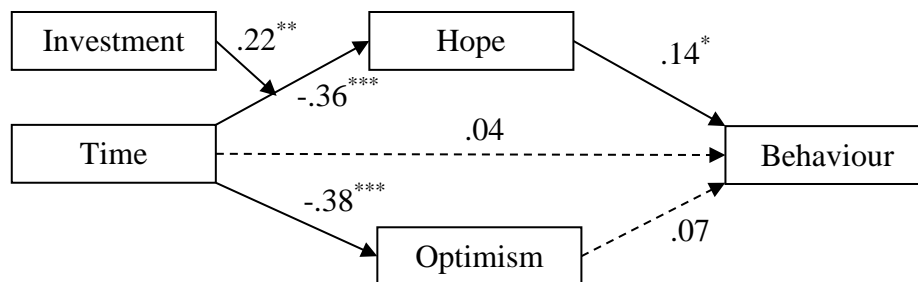


Figure 6.3. Results of the moderated mediation analysis. Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Importantly, there was no moderated mediation via optimism, $B = .01$, $CI_{95\%} = [-.003; .04]$ but, as predicted, there was a significant moderated mediation via hope, $B = .03$, $CI_{95\%} = [.01; .08]$ ²⁰. The indirect effect of time on thesis behaviour was significantly moderated by investment. As Table 6.6 shows there was stronger negative conditional indirect effect for those less invested than for those highly invested in the outcome.

Table 6.6

Test of proposed conditional indirect effects (Study 6.2)

	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>CI</i> _{95%}
DV: Behaviour	$R = .55, F(7,410) = 25.50, p < .001$				
Constant	2.07	.26	7.89	<.001	[1.55, 2.58]
Hope	.14	.06	2.60	.010	[.03; .25]
Optimism	.07	.05	1.26	.208	[-.04, .18]
Time	.04	.05	.86	.390	[-.05, .14]
Supervisor Support	.16	.04	3.87	<.001	[.08, .24]
University Support	.24	.05	4.91	<.001	[.14, .33]
Study Load	.22	.15	1.48	.140	[-.07, .52]
Finance	-.08	.15	-.53	.599	[-.37, .21]
Conditional indirect effect of time on thesis behaviour (via hope) at values of investment					
Investment	Indirect Effect	Boot SE	BC 95% CI		
-1 SD (-1.00)	-.08	.04	[-.17; -.02]		
Mean (.00)	-.05	.03	[-.11; -.01]		
+1 SD (1.00)	-.02	.02	[-.08; -.001]		

²⁰ Analyses without the control variables produced similar results; there was no moderated mediation via optimism, $B = .01$, $CI_{95\%} = [-.005; .04]$, but there was a slightly stronger significant moderated mediation via hope, $B = .04$, $CI_{95\%} = [.01; .10]$. With a stronger indirect effect for those less invested (-1 SD), $B = -.12$, $CI_{95\%} = [-.23; -.05]$, than more invested (+1 SD), $B = -.05$, $CI_{95\%} = [-.12; -.01]$.

Discussion

Results for Study 6.2 provided support for the theoretical predictions. For PhD candidates more invested in the finishing in a timely manner there was no significant decline in hope over time, and this was related to greater thesis behaviour. In contrast, investment did not qualify the decline of optimism over the thesis candidature and, controlling for other variables, optimism did not predict the effort candidates put into completing their thesis on time. These results expand on Study 6.1 and suggest that those more invested in finishing their PhD in a timely manner maintain relatively stable levels of hope, and hope in this instance maintains efforts towards completing their thesis on time.

General Discussion

Hope is considered a resource that people can tap into in times of uncertainty (Korner, 1970; Lazarus, 1991, 1999). The research presented in earlier chapters of this thesis has underlined this view in the sense that individuals highly invested in the outcome seem to recruit hope on the basis of mere possibility, but against the odds, of success. However, the present two studies show that individuals, when they are invested in the outcome, also maintain hope (more so than optimism) in the face of increasing challenges and uncertainty, and this allows them to keep going. PhD candidates overall lost hope and optimism with the duration of their PhD, but for those who found the outcome more desirable and personally significant, there was a fairly stable level of hope that they would finish on time, in contrast to optimism.

Furthermore, limitations regarding the reliability of the behaviour measure in Study 6.1 aside, Study 6.2 shows that hope in these circumstances protects motivation over time. Such results are in line with theorists and clinicians who have argued that hope is an ongoing coping process that sustains constructive efforts (Breznitz, 1986; Lazarus, 1991), or qualitative research that has shown hope to engage individuals with their hoped-for goal (Averill et al., 1990; Bruininks & Malle, 2005). Hope it seems is not simply a brief positive

outlook, nor does it lead to idleness, rather, it represents an asset to individuals in the long term.

To borrow the metaphor, it seems that hope as a shield against despair and depression does not simply protect one from a single blow; rather like personal armour it maintains a steady defence. In this sense it reflects the problem and emotional coping strategies said to be embodied by hope (Folkman, 2010; Lazarus, 1991). These results are consistent with the concept of hope functioning as an emotion-focused coping strategy, managing the stress of the PhD candidature, allowing for a more problem-focused approach of maintaining motivation and effort towards timely completion. Although a more direct measure of coping may elucidate this distinction in future research, these current results suggest that those more invested in the outcome can find some positive evidence to support hope, which allows them to maintain motivation.

Lazarus (1999) suggests that “people are so tenacious in their search for grounds on which to hope” (p. 675), and this research suggests that they may find this within the relationship with their supervisor(s). University and supervisor support (Study 6.2 only) were positively related to thesis behaviour as would be expected given research on timely completion (Latona & Browne, 2001; Manathunga, 2005), however it seems that supervisor relationship specifically had a positive effect on the candidates. In both studies greater perceived support from one’s supervisor was associated with greater hope (and optimism). It may be that the importance of supervisor approach and relationship in reducing attrition and delays in submission of theses is in part because it fosters hope within their students. Buoyed by these hopes, candidates are more inclined to work towards the shared goal of timely completion.

One of the limitations of this study was its cross sectional design. While using participants who are at different time points within their candidature to rate variables gives a reasonable idea of the progression of optimism and hope with the passing of time, it is

limited in its causal inferences. Future research may like to use a longitudinal design, so one can track individual's hope as they progress through their candidature, and better view the impact of the control factors and individuals' belief in possibility specifically. It may also be good in future research to track observable behaviour (e.g., milestone reports) rather than relying on individual reports of motivational behaviour, or to experimentally manipulate hope to see its effect on motivation.

Aspinwall and Leaf's (2002) suggestion that it would be an interesting line of enquiry to investigate hope as confidence diminishes rather than as probability arises was confirmed in this chapter. Findings support suggestions by theorists that hope is an ongoing process and protector of motivation (e.g., Korner, 1970), and provide an exciting line of future research. A greater personal investment in the outcome allows individuals to hold on to hope over time, and maintain positive behaviour.

CHAPTER 7: General Discussion

“Strange as it may seem, I still hope for the best, even though the best, like an interesting piece of mail, so rarely arrives, and even when it does it can be lost so easily.”

— *Lemony Snicket, The Beatrice Letters*

In this thesis I investigated a new approach to the psychology of hope. Unlike the predominant research on hope within psychology, that has placed emphasis on hope arising with the expectation of success, this approach suggests that hope is engendered with just the possibility of success. Furthermore, hope’s role in lower likelihood would be most evident for individuals who find the outcome more desirable and representative of something of significance to themselves or their sense of identity. The present research has led to interesting insight into the unique nature of hope, distinct from expectancy based concepts. In this final chapter I will first discuss the current findings and place them within the current literature of hope, focusing on the three original aims of this thesis; that is, to investigate a hope conceptualised as the confluence of possibility and personal investment, differentiate this hope from expectancy-based measures, and investigate any behavioural benefits of a hope in possibility. I will then discuss insights and limitations that arose during the thesis, and suggest some future directions for the study of hope’s unique nature.

Hope: Possibility and Personal Investment (Reprise)

Hope, I argue, is a product of uncertainty; it is precisely the uncertainty of reaching one’s goal that causes one to hope. This view is mirrored in some qualitative research (e.g., Bruininks & Malle, 2005), contributions by other theorists (e.g., Downie, 1963; Korner, 1970; Lazarus, 1999) and hope’s more colloquial uses. In line with Miceli and Castelfranchi (2010) specifically, I predict that hope requires only possibility in order to emerge. This was reflected in the results in this thesis with situations that embodied a low likelihood of success, where participants were generally hopeful despite the low odds (especially when compared to optimism). This was not only true for the hope ratings of

low likelihood groups (Study 2.1) or conditions (Chapters 4 & 5), but in other chapters where participants' overall perceptions of likelihood of obtaining their hoped-for goal were low (Chapters 2, 3, & 5).

However, hope is not engendered for any mundane desire, but for outcomes that represent some personal significance or importance to the hoper (Averill et al., 1990; Korner, 1970). And indeed, results showed for those – and only for those – who had a greater personal investment in the outcome hope jumped early in lower likelihood, with mere possibility, before levelling off and arising again in higher probability (Chapters 2 & 3). A similar pattern was seen between low and moderate likelihood conditions in participants attempting intelligence assessments (Study 5.2), and more invested football supporters were also more likely to choose hope over neither hopeful/optimistic when presented with a low likelihood of their team winning (Chapter 4). This pattern of hope jumping early in lower likelihood is consistent with the concept of hope playing a greater role in possibility rather than probability (Miceli & Castelfranchi, 2010), with this link made more explicitly clear in Study 3.2, where for those more invested in the outcome hope was related to perceptions of possibility rather than probability of success.

These results confirm that hope's unique character is in low likelihood when personally important outcomes are perceived as being possible. Hope's quick acceleration with the recognition of possibility, I argue, allows the hoper some positive relief from the uncertainty of reaching a cherished goal. This pattern is in line with Tversky and Fox (1995) who suggest that hope's impact is with the departure from impossibility to possibility. They reason that possessing a lottery ticket will engender hope, but, while purchasing a second ticket may raise hope, it will not double it. Hope's non-linear rise with likelihood reported in this thesis is reflective of this, and suggests that hope is relatively free from probability estimates (cf., Miceli & Castelfranchi, 2010), just the recognition of possibility is enough to engender hope, even with the decline of fortune (Chapter 6). It is in

possibility that hope's distinctiveness is most evident, especially when one is personally invested in the outcome.

Hope Separate from Expectancy Measures

While evidence in this thesis of hope arising in possibility already demonstrates the unique nature of hope, differentiating it from expectancy measures (e.g., optimism, Hope Theory) elucidated this unique contribution further. As optimism is often used synonymously with hope, this thesis explored the conceptual differences between the two. Although optimism can be thought of as a general positive expectation for the future (Carver et al., 2010; Scheier & Carver, 1985), or as an explanation style (Buchanan & Seligman, 1995), to match measures of hope in this thesis, a more idiosyncratic version of optimism was chosen (Peterson, 2000). Researchers have suggested that such optimism rises linearly with one's perceptions of likelihood, or with the confidence of success (Averill et al., 1990; Reimann et al., 2014). Consistent with this, I found across all studies that optimism was strongly positively correlated with likelihood and probability (Study 3.2). Optimism was rated significantly higher in high likelihood, and rated significantly lower than hope in low likelihood. However, a key contribution of the present research program is that it provided empirical evidence for the distinctness of two concepts not only in that they were rated differently in the realm of possibility, but also by the nature of their relationship with likelihood, with hope showing a cubic rather than linear relationship with likelihood, for those more invested in the outcome.

Personal investment, however, also distinguishes hope from optimism. While hope was more pronounced for outcomes of more significance, optimism was not influenced by the personal significance of the outcome (with the exception of Study 5.2). It seems that optimism more often reflects the confidence in which individuals expect to reach a goal, whereas hope is related to more important but less likely outcomes (cf., Bruininks &

Malle, 2005), arising in lower likelihood for outcomes that are of greater importance to the individual.

There was some overlap between hope and optimism across the studies, with hope and optimism often rated similarly in higher likelihood. Higher ratings of hope in probability are supportive of expectancy-based hope constructs (e.g., Snyder et al., 1991; Stotland, 1969), or suggest that hope and optimism may be synonymous with greater confidence. However, Chapter 4 clarifies these findings, showing that, rather than conceptual equivalence, high ratings of hope in higher likelihood reflect instead a pragmatic use of language, where to suggest one is hopeless when confident of success seems contrary to one's expectations. When forced to choose between hope and optimism the distinction became clear, participants picked hope more often in low likelihood and optimism when more certain of success. In this sense these results fit with one of the "rules" of hope, namely that individuals should not hope for outcomes that are perceived likely to occur (Averill et al., 1990).

Language pragmatics may also account for some of the more inconsistent findings involving low invested individuals. While in some studies (e.g., 2.1, 5.2) for those less invested hope showed no relationship with likelihood, in others hope arose linearly with likelihood (Study 2.2) or possibility (Study 3.2), similar to that of optimism. It may be that rather than the psychologically important hope in possibility found for highly invested individuals, ratings of hope for low invested individuals represent merely a pragmatic assessment of likelihood, similar to that of optimism. Whereas hope for invested individuals in possibility represents the yearning emotion of hope, that leads to behaviour (see below), for those less invested it may express merely how confident they feel about success, because reporting no hope seems illogical given their perceptions of likelihood.

Although not a specific focus of the current research, scenarios representing differing levels of agency were deliberately chosen to provide evidence in support of

hope's independence from personal agency, a key component in Snyder et al.'s (1991) expectancy-based Hope Theory. Snyder et al. (1991) suggest that high levels of agentic thoughts in concert with perceptions of pathways to one's goals lead to hope, or that individuals are hopeful when they believe they can obtain a goal by their own resources. However, while an assessment of agency may factor into perceptions of likelihood, hope is more commonly associated with outcomes that are more uncontrollable (Averill et al., 1990; Bruininks & Malle, 2005; McGeer, 2004), or for outcomes that present no personal opportunity to generate the outcome (Tong et al., 2010). In this thesis participants' ability to directly control the outcome differed across the studies; from no real agency in the football and election studies, to a more collective agency in the climate change studies, and finally to highly controllable outcomes with the intelligence assessment and timely completion of PhD studies. Despite the differing levels in which individuals could influence the outcome, hope and its relationship to possibility and personal investment were similar across all studies. This suggests that while appraisals of agency may factor into individual's assessments of likelihood, agency thoughts are not necessary for hope to develop. Additionally, if the hoped-for goal does not offer any individual ability to affect the outcome, then it is not possible for them to generate pathway thoughts to that goal. Hope then is distinct from agency, not only in regards to Hope Theory, but from other Western expectancy-based conceptualisations of agency that have control and self-efficacy beliefs at their 'foundation' (Bandura, 2000; Morris, Menon, & Ames, 2001).

The findings in this thesis demonstrate that hope is not an expectation of success. The discrete influence of hope is in lower likelihood, with the mere possibility of success. Although hope and expectancy-based constructs may overlap, or share some of the same space in probability estimates (e.g., the hopeful pessimist), the two conceptual frameworks capture different aspects of the human experience. This provides an exciting line of inquiry

for future research, to investigate the influence of hope on various outcomes (e.g., behaviour, well-being, coping) when the odds of success are low.

Hopeful Behaviour Against the Odds

With hope's true nature established in possibility, distinct from expectancy, this raises questions about its motivational properties. As motivation to act is most commonly seen to arise when one expects behaviour to lead to valued outcomes (e.g., Becker, 1976; Fishbein & Ajzen, 1975), if hope distinctly emerges with low expectation one could conclude that hope has the potential to lead to idleness. While it is not *necessary* for hope to have a motivational benefit, if that is the true nature of hope, most theorists agree that hope leads to or protects motivation (e.g., Korner, 1970; Miceli & Castelfranchi, 2010), or allows one to remain sanguine until behaviour is available (Pettit, 2004). Results in this thesis provide support for the suggestion that hope is associated with increased motivation and behaviour. For those invested in the outcome, hope in possibility leads to goal-consistent behaviour (Chapter 3), tempers the effects of negative feedback on goal striving (Chapter 5), and is associated with maintaining behaviour over time despite challenges and uncertainty (Chapter 6). When confronted by the negative reality of obtaining an outcome of personal significance, hope arises and motivates the hoper to their goal.

This is not to suggest that pursuing outcomes that are perceived as unlikely to be obtained is always the best course of action. Certainly expectancies are generally appropriate to inform one's behaviour and goal striving; working towards goals that are perceived with some certainty to succeed makes adaptive sense. However, this thesis demonstrates that for outcomes that represent something of personal significance to an individual and their situation but are considered unlikely to succeed, hope represents a great asset in realising those goals. In this regard sentiments expressed by Lazarus (1999) and, to a degree, Korner (1970) are pertinent. They suggest that so long as more adaptive behaviour is not being ignored (where available), or that it does not interfere with effective

coping, then hope seems desirable. Being able to remain positive despite negative odds, and work towards a significant goal, allows individuals to make the most of those odds (Pettit, 2004).

Insights, Limitations and Future Directions

Inflating possibility. I suggested earlier that hope arises when faced with the negative reality of likely not achieving an important goal, however this thesis suggests that at times this ‘reality’ may contain probability estimates a little more positive than objectively warranted. While it is argued that most expectancy perceptions are accurate (Roese & Sherman, 2013), or that people assess their likelihood accurately allowing them to best cope with the situation (Lazarus, 1999), this thesis reports some data which shows that perceptions of likelihood tend to be higher than they objectively should be. As I argued in Chapter 5, in regards to the unsuccessful manipulation of 0% likelihood, it might have been the case that, as the results of the pre-test did not necessarily represent a strict objective zero likelihood of success for the test-phase, but rather suggested odds based on past performance, these odds may not have necessarily been believed. Put differently, past performance at best provided an estimate with – as in classic statistics – a certain ‘confidence interval’, but participants might have imbued the non-zero element of the confidence interval – the possibility of success – itself with hope: the hope that the probability of succeeding is not as low as zero. Whereas the present research largely assumed a static perception of likelihood that feeds into optimism and hope, it is possible that the relationships are of a more dynamic nature, where likelihood perceptions are also affected by hope – or the desire to hope and to protect oneself from hopelessness.

Beyond the 0% condition in Chapter 5, this inflation of odds was also seen in the 20% condition – the most accurate condition in those studies – where participants rated their perceptions of likelihood around 8-10% higher than expected. Similarly in Chapter 4, in the moderate likelihood condition, despite being told there was a 50/50 chance of a win,

participants rated the likelihood at 61.10%. Additionally, although the low and high likelihood scenarios were essentially the same (with fortunes reversed), the distance from impossibility to low likelihood ratings (31.98%), was higher than the distance from certainty to high likelihood ratings (distance of 17.60%). Although, again, these were not necessarily strict objective odds of success, it does suggest that individuals confronted with low likelihood of success may inflate their chances.

A similar tendency to report overly optimistic odds has been found in the unrealistic optimism literature (Shepperd et al., 2015), although, as suggested in this literature, overestimations of likelihood are generally quite modest (cf., Folkman, 2010; Taylor & Armor, 1996). This can be interpreted that individuals' ratings still recognised the general likelihood of success, they simply inflated it slightly. Massey et al. (2011) have presented similar findings, showing that individuals still adjust their perceptions of likelihood in line with objective odds, but for outcomes that are more desirable participants add a constant that maintains higher odds than is warranted. In this sense Lazarus (1999) is correct that individuals are (generally) accurate in their appraisal of the odds, but placing the "most favourable spin" (p. 659) on those odds, so as not to undermine hope, may include an inflation of these odds. It may be that hope rises with the belief in possibility (Miceli & Castelfranchi, 2010), but that hope then feeds back into those possibility ratings, to give a positive boost to one's mood and to support hope.

Energising behaviour. That hope arises for improbable outcomes and is associated with goal directed behaviour against the odds is evident from the studies reported in this thesis. What is not clear is when imbued with hope where the motivation comes from to pursue and persist despite the uncertainty of success. For expectancy-value theories the motivation is clear, individuals work towards goals of value in which they expect their efforts will be rewarded (Fishbein & Ajzen, 1975). Optimism arises linearly with the perception of likelihood of success, suggesting motivation in this sense is that of the

rational actor working towards an expected reward. Hope is not the expectation or confidence of success, rather the possibility of success. I am not suggesting hoppers are necessarily 'irrational actors', but it is not clear where the motivation to pursue the unlikely goals originates. Although hope is said to protect motivation (Korner, 1970) and to energise and engage one with the outcome (Bruininks & Malle, 2005; McGeer, 2004), with evidence in support of this in this thesis, it is not clear what it is specifically about hope that leads to motivation.

Other researchers have suggested that, although high want (i.e., value) and expectancy combined determine behaviour, if the magnitude of the want is sufficient enough, motivation will still develop with low levels of expectancy (Kruglanski et al., 2014). This seems consistent with findings in this thesis, and suggests that it may be hope which mediates high want and motivation. It was found that, when a goal of real significance to the individual and their sense of self or identity was seen as unlikely to be achieved, hope arose and was associated with motivation and behaviour. It may be that when the self or identity is under threat, hope often "represents the only way of retaining our identity and selfhood and not losing ourselves to the turmoil of brute, disheartening fact" (Pettit, 2004, p. 161). This may be why hope focuses one's energies to the future goal (McGeer, 2004) and is often characterised as desperate yearning (Lazarus, 1991), because to do otherwise would be to abandon something that is central to one's sense of self and identity.

It may then be the positive affect associated with hope (i.e., the yearning and sanguinity) that provides the impetus for motivation and behaviour. The decision making under risk and uncertainty literature may provide some insight into how this may occur. Although emotion and affect is often not considered vital to the decision making process (see Loewenstein et al., 2001), affect has been shown to directly influence behaviour (Zajonc, 1980), and emotions are characterised by approach/avoid distinctions (Zajonc,

1998). Similarly, despite often only being thought of in terms of anticipatory emotions, that is, the emotions expected to occur upon experiencing a specific outcome, other research suggests that affect also influences the appraisal processes (Clore, Schwarz, & Conway, 1994; Loewenstein et al., 2001).

In their risk-as-feelings theory, Loewenstein et al. (2001) suggest that anticipated outcomes (i.e., what will occur if successful) and subjective probabilities of achieving an outcome, not only influence the cognitive evaluation of whether to pursue an outcome, but they also influence affect experienced at the time of the appraisal. This then, they argue, suggests that “the impact of cognitive evaluations on behaviour is mediated, at least in part, by affective responses” (p. 271). This can be seen with discrete emotions, such as the effects of fear and anger on judgement tending to lead to more cautious or risk-seeking behaviour respectively (Lerner & Keltner, 2000). Research by Rottenstreich and Hsee (2001) also provides some support of this, with affect-rich outcomes leading to a higher weighting of possibility in decision making (which they suggested may be hope), which led to an inverse-s curve similar to what was found for hope in this thesis (Chapter 2 & 3). As hope is engendered in times of great uncertainty, it may be that a similar process happens when hoping in possibility.

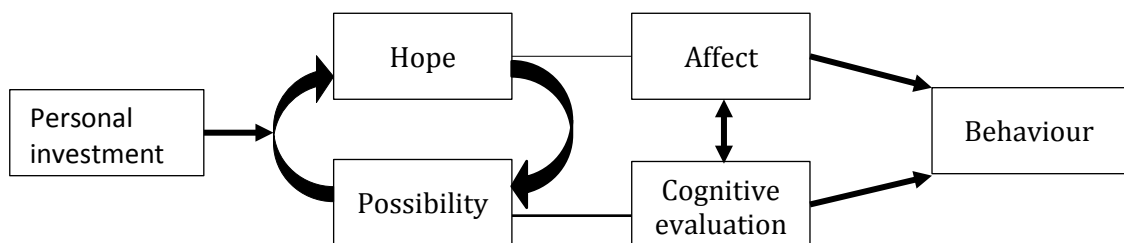


Figure 7.1. Motivational model of hope

Figure 7.1 presents a model similar to risk-as-feelings described above, but with some changes to reflect hope as conceptualised in this thesis. Subjective appraisals of

possibility and personal investment²¹ in the outcome interact to produce hope, as shown in this thesis. Furthermore, as suggested above, the relationship between hope and possibility appraisals may not be as static as originally conceived, and hope may in turn influence possibility. This could be through hopers being more flexible in their assessment of the odds, or perhaps by focusing attention more on evidence that supports and maintains hope (De Mello et al., 2007). Hope and its associated positive affect may energise the individual into action (Bruininks & Malle, 2005), but may also influence cognitive appraisals of whether to engage with the outcome. While behaviour is often determined based on weighing of expectations, it is suggested that the affect associated with hope allows individuals to make the most positive assessment of the possibility of success (Miceli & Castelfranchi, 2010), or that the affective components of hope override the need for an expectation of success to engage behaviour. While one may weigh the costs and benefits of a more mundane outcome as being “only possible” and not worth the energy, for an outcome of significant importance the hopeful affect leads to the assessment that the outcome “is still possible!” And with a hope that is more important to the individual’s self and sense of identity, the affective aspects of hope will be stronger and exert a greater influence on decision making, and consequent behaviour.

It is in this way that hope functions as a shield for motivation from the negative affect associated with greater uncertainty (Korner, 1970) and emotion-coping strategy (Lazarus, 1999). Rather than becoming despondent by their low odds of success, hope allows one to remain positive, and this leads to goal consistent behaviour. While the results in this thesis support the idea of hope as a shield, it is a limitation of the current studies that affect – both positive and negative – were not measured (beyond hope itself), which could

²¹ Anticipated outcomes in the risk-as-feelings theory include anticipated emotions of either obtaining or failing to obtain an outcome. Appraisals of personal investment are most likely very similar. To assess the desirability of an outcome individuals must assess what impact obtaining the outcome would have on their life (e.g., change in circumstance, positive affect, identity relevance), and the magnitude of this impact would determine their personal investment.

clarify the role of affect in motivation and behaviour. Future research should measure affect and positive coping directly, when investigating the role of hope in motivation for unlikely outcomes.

Whatever the underlying source of the motivation for hopeful behaviour, hope does seem to be an asset in initiating and maintaining motivation in the face of uncertain odds for important outcomes. As much discussed in this thesis, while expectancy-based constructs may predict behaviour for when one is confident of success (Carver et al., 2010) or their own ability to bring about success (Bandura, 1997), this new approach to hope has great implications for future research, providing a new avenue to predict and explain individual behaviour for times when one is not confident of reaching their desirable goal, or when it is not within their sole power to bring about. A hope that requires small possibilities to develop provides greater insight into why individuals overweigh small probabilities when making decisions (Rottenstreich & Hsee, 2001), and may contribute to future research into how affect and emotions influence individuals' decision making processes.

Similarly future research could investigate the impact of making salient the ingredients of hope (possibility and personal investment) to influence behaviour for important but uncertain outcomes. For example, in clinical practice and clinical treatment manuals (e.g., Barlow, 2008; Carr, 2006) it is often suggested that it is important to instil hope in one's client that the treatment will work. This is especially true when the treatment is confronting, or is not the quick fix that clients were expecting. Hope in this clinical setting is said to assist in clients agreeing to pursue a suggested treatment plan, as well as maintaining engagement in therapy and associated practices (e.g., homework), argued necessary for improvement. As with academic supervisors in Chapter 6 it could be that the clinicians and therapists could assist in influencing hope, so clients can persist despite uncertainty of success. This research suggests that to instil hope it is not a matter of raising

expectations of success (which may seem unbelievable), rather just making salient the *possibility* of success. Additionally, for those reluctant to change, or not convinced in the treatment, some motivational interviewing might assist the clients to become more invested in the treatment plan, and more hopeful of a reduction in symptoms.

Rather than at an individual level, future research could also investigate how the ingredients of hope influence behaviour on a collective level, an area touched on in Chapter 3. Although there is research currently being conducted on hope influence on collective action, (e.g., policy support; see Shuman, Cohen-Chen, Hirsch-Hoefler, & Halperin, 2016), there is some inconsistency in results especially when trying to manipulate hope to influence behaviour (Chadwick, 2015; Hornsey & Fielding, 2016). While there is some measurement inconsistencies in these approaches (e.g., combining measures of optimism and hope to measure hope; e.g., Hornsey & Fielding, 2016; Shuman et al., 2016), future research could investigate how this new approach to hope functions on a collective level, its influence on collective action for unlikely outcomes, and how investment in the outcome may operate and be manipulated at a group level. The way hope is articulated and framed in this arena may have important implications for public policy. For example framing is an important but often overlooked aspect when it comes to engaging the public to participate in programs that promote the common good (Kusmanoff et al., 2016).

Alternatively, while hope has generally been discussed as an asset in this thesis, rather than trying to manipulate hope, future research may like to investigate times when the employment of hope in uncertainty may not necessarily be appropriate. This may be pertinent when the alternate actions are both physically and psychologically safer or where an overinvestment in possibility may lead to maladaptive behaviour or beliefs (e.g., gambling addiction; Lynch, 1990).

While there was no specific focus on hope as an emotion in this research - the focus rather on hope's emergence and differentiation from expectancy measures - this current research has implications for emotion research. By using single measures with a variation of the word hope, this research was able to assess hope as it naturally arises without preconceived notions of what hope is, which produced results similar to theoretical descriptions of hope found in the emotion literature (Lazarus, 1991, 1999; Roseman, Spindel, & Jose, 1990). Hope in emotion research is suggested to arise from appraisals of goal (Lazarus, 1999) or motive consistent (Roseman et al., 1990) outcomes, and arising in uncertainty – though uncertainty ranges from possibility (Lazarus, 1991; 1999) to outcomes that are merely not definite (Roseman & Evdokas, 2004). This thesis clarifies the role and nature of uncertainty in hope, but also sheds some light on the behavioural tendencies of hope. Although, Lazarus (1991) suggests the action tendencies of hope are unclear, both he and Roseman et al. (1990) suggest hope would be characterised by approach behaviours, which is supported in this current research. While this may not represent specific outcomes as highlighted by negative emotions (e.g., fear leads to flight; see Fredrickson & Branigan, 2005), it does suggest more broad goal-directed behaviours. Future research should explore further the relationship between hope, emotions and behaviour, especially in regards to other emotions linked to hope such as fear. Fear is suggested to arise similarly to hope, in times of uncertainty. But rather being engendered by 'motive-consistent' outcomes, fear is argued to arise for motive-inconsistent outcomes (Roseman et al., 1990), or like anxiety, as a response to a threat-appraisal (Folkman, 2010); which suggests that hope and fear arise similarly but differ by the perspective of the appraisal of the outcome taken. Future research could explore whether hope and fear are mutually exclusive, or whether hope arises despite fear.

Conclusion

The research presented in this thesis contributes to the ongoing literature on hope, providing evidence in support of a new approach to hope distinct from expectancy based constructs. Rather than arising linearly with expectations of obtainment (as with optimism), for those more invested in the outcome, hope was engendered in lower likelihood, when the outcome was possible but not probable. Hope in possibility represents the shield from despair and depression it is argued to be, and fits more accurately with colloquial conceptualisations. This research also suggests that despite the low levels of likelihood required for hope to develop, such hope does not lead to idleness; rather, hope is associated with goal striving, persistence despite negative feedback, and goal-consistent motivation in the long term. This research has valuable implications for how hope can assist individuals cope with uncertainty, and maintain goal striving for outcomes of significant importance, deemed unlikely to succeed.

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