The measurement of implicit responses to life and death: Implications for sub-clinical psychopathology

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        If we take eternity to mean not infinite temporal duration but timelessness,
        then eternal life belongs to those who live in the present. Our life has no
        end in just the way in which our visual field has no limits.

                                    —*Wittgenstein, Tractatus Logico-Philosophicus*

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Glossary of Acronyms and Abbreviations

AAQ   Acceptance and Action Questionnaire

ACBS   Association for Contextual Behavioural Science:

APE   Associative-Propositional Evaluation model

BAS   Belief in Afterlife Scale

BHS   Beck Hopelessness Scale

CBS   Contextual Behavioural Science

DASS   Depression, Anxiety, Stress Scales

EAST   Extrinsic Affective Simon Task

GNAT   Go/No-Go Association Task

IAT   Implicit Association Test

IMSA   Inventory of Motivations for Suicide Attempts

IRAP   Implicit Relational Assessment Procedure

LOT-R   Life Orientation Test-Revised

NICE   National Institute for Clinical Excellence

NLT   Name Letter Task

NUIM   National University of Ireland, Maynooth

REC   Relational Elaboration and Coherence Model

RFT   Relational Frame Theory

RSES   Rosenberg Self-Esteem Scale

SITBI   Self-injurious Thoughts and Behaviours Interview

SCS   Suicide Cognitions Scale

WHO   World Health Organisation

Abstract

Abstract

What an individual thinks about their own life and death appears to provide useful information on the likelihood of self-destructive behaviour. While these evaluations are typically measured using self-report methodologies, there is a burgeoning literature on *implicit* responses to life and death. The current thesis employs the Implicit Association Test (IAT) and the Implicit Relational Assessment Procedure (IRAP) to assess implicit relational responses to life and death in a non-clinical undergraduate population ($N = 181$) across four experiments. Experiment 1 ($N = 39$) employed the IAT and two IRAPs to measure implicit relations among the self, other people, life and death. The findings replicated previous research using the Death-Life IAT in normative groups and also supported the utility of the Death IRAP and Imagine Death IRAP in measuring clinically-relevant implicit processes. Experiment 2 ($N = 46$) measured responses to life-related stimuli, including evaluations about life in the present versus in the future using the Pessimism IRAP and Self Pessimism IRAP. Experiment 3 ($N = 50$) further developed the IRAP as a measure of future-thinking and explored responses to perceptions of worthiness using the Positivity IRAP and the Worthiness IRAP. Finally, Experiment 4 ($N = 46$) assessed hopelessness about perceived success and failure with the Behaviour IRAP and the Emotions IRAP. In each experiment, the implicit outcomes were compared with standard self-report measures of psychopathology. The self-report measures included the Depression, Anxiety, Stress scales, Belief in Afterlife Scale, Beck Hopelessness Scale, Acceptance and Action Questionnaire, Life Orientation Test-Revised, and the Rosenberg Self-esteem Scale. Overall, the data indicated that responding on the IRAP could differentiate among groups as identified on the self-report measures. The results of the current thesis support the use of the IRAP as an indirect measure of clinically-relevant relational responses regarding life and death.

Chapter 1

General Introduction & Literature Review

Chapter 1
General Introduction & Literature Review

According to the World Health Organisation (WHO, 2012), approximately one million people die by suicide each year and prevalence rates have remained largely unchanged in spite of increased availability of treatments (Kessler, Berglund, Borges, Nock, & Wang, 2005). In the very least, these figures highlight the importance of accurately identifying individuals at risk of suicide and the factors that contribute toward this risk.

Suicide is difficult to predict, in part because those at risk may be unwilling and/or unable to report accurately upon their emotional experiences, intentions, expectations, etc. (Busch, Fawcett, & Jacobs, 2003; Nisbett & Wilson, 1977). But, it is also important to recognise a professional dilemma regarding the development of sound and robust standardised measures of suicide prediction, and how these should be administered (Janis & Nock, 2008; Roos, Sareen, & Bolton, 2013). Part of this dilemma pertains to the fact that almost all standard measures rely on self-reported suicidal ideation and this in turn is relied upon as a predictor of future suicidal behaviour (Silverman & Berman, 2014). However, this approach has thus far failed to identify the factors that potentially influence the progression from suicidal ideation, for example, to suicidal acts (Klonsky & May, 2014). As a result, there have recently been renewed efforts to investigate novel methods in assessing risk, such as biomarkers and epigenetic variations (Guintivano et al., 2014; Le-Niculescu et al., 2013; Mann et al., 2006). One such endeavour includes investigations of *implicit* measures that attempt to identify the implicit cognitions, attitudes or biases that are held by individuals potentially at risk of suicide.

Using *Explicit* Measures to Study Suicidality

Human behaviour has been conceptualised as two distinct forms of evaluative responding. *Intentional responding* refers to behaviour that is explicit, deliberate, controlled, non-automatic or 'explicit' (Nosek, 2007), such as offering your opinion of an individual. The *measurement* of explicit attitudes comprises primarily of interviews, focus groups and Likert scales, in which respondents are encouraged to introspect freely about their evaluations (Nosek, 2007). In the domain of suicidality, a wealth of self-report questionnaires and interviews has been developed to assess risk of suicidal thoughts and behaviours (for a review see Roos et al., 2013). Of these, the scales developed by Beck et al. in the 1970 and 80's (i.e. the Beck Scale for Suicidal Ideation, Beck Hopelessness Scale and Beck Depression Inventory) remain some of the most widely used explicit measures of suicidality to this day. Other commonly used measures include the SADPERSONS scale and structured clinician interviews, which aim to identify demographic and psychological characteristics associated with suicide risk. More recently developed measures include the Self-injurious Thoughts and Behaviours Interview (SITBI), the Inventory of Motivations for Suicide Attempts (IMSA) and the Suicide Cognitions Scale (SCS; May & Klonsky, 2013; Nock, Holmberg, Photos, & Michel, 2007; Rudd et al., in press).

A key focus of research using explicit measures to assess suicidality is to try to determine an individual's level of future risk. Psychological characteristics identified in explicit measures, such as hopelessness, have continuously shown correlations with past suicidal thoughts and behaviours. For example, a history of previous suicide attempts, drug misuse and sense of hopelessness have been shown to increase risk of suicide among individuals diagnosed with schizophrenia (Hawton, Sutton, Haw, Sinclair, & Deeks, 2005). Similar risk-factors have been associated with suicidality among those diagnosed with depression and bipolar disorder (Hawton, Casañas i Comabella, Haw, & Saunders, 2013;

Hawton, Sutton, Haw, Sinclair, & Harriss, 2005). Although these studies are useful in aggregating the factors involved in suicidality, many are limited by their retrospective and correlational research designs.

While a considerable amount of research has been devoted to determining risk factors for suicide, there is a dearth of knowledge surrounding *prediction*, particularly in the short to medium term (see Glenn & Nock, 2014). Indeed, explicit measures appear useful in this regard, but are best at assessing long-term and lifetime risk. For example, Fawcett et al. (1990) found that self-reported hopelessness, suicidal ideation and a history of suicide attempt were associated with suicide risk following one year. Current methods of screening which incorporate clinician prediction and self-report questionnaires do not seem to show predictive validity in identifying individuals at-risk in the near-term (Silverman & Berman, 2014). Furthermore, assessment of suicide risk in primary care settings has shown no influence over future attempted or completed suicide (O'Connor, Gaynes, Burda, Soh, & Whitlock, 2013).

Although much research has been devoted to determining the best predictors of suicidality, there is no consensus on *which* explicit measures and prognostic models provide the greatest predictive validity. Indeed, current National Institute for Clinical Excellence (NICE, 2004) guidelines for self-harm advise that existing scales are not to be used solely to predict future suicide or self-harm, but should only be considered in helping to structure, prompt and add detail to risk-assessment. This highlights the shortcomings of standardised measures of suicide risk-assessment in accurately predicting suicidality and recognises that one major limitation of explicit measures is that presentation bias may contribute to the lack of predictive validity observed. That is, individuals acutely experiencing suicidality are likely to be motivated to conceal their suicidal intent through explicit measures in a manner that occludes accurate risk-assessment.

Using *Implicit* Measures to Study Suicidality

Contrary to intentional responding, *implicit responding* refers to behaviour that is brief, automatic and without intentional control. The measurement of implicit attitudes usually involves one of the following procedures: the Implicit Association Test (Greenwald, McGhee, & Schwartz, 1998); priming procedures (Wittenbrink, Judd, & Park, 1997); the Stroop test (Stroop, 1935; Williams, Matthews, McLeod, 1996); the Go/No Go Association Task (Nosek & Banaji, 2001); the Extrinsic Affective Simon Task (EAST; De Houwer, 2003) or the Implicit Relational Assessment Procedure (IRAP; Barnes-Holmes, Hayden, Barnes-Holmes, & Stewart, 2008). Unlike explicit measures, these typically require respondents to categorise words or pictures under time constraints. Hence, implicit attitudes are typically not subject to conscious awareness and participant introspection. The distinction between explicit and implicit measures is often highlighted by applying the term 'direct' to the former and 'indirect' to the latter (De Houwer, 2006).

The majority of implicit cognition research in the domain of suicidality has been conducted using the *Implicit Association Test (IAT).* The IAT is an automated latency-based task that assumes that an individual will respond more quickly when two stimuli are strongly, rather than weakly, associated. On a typical trial, a category (e.g. 'Flowers') and an attribute (e.g. 'Pleasant') appear on the top left- and top right-hand corners of the screen, with a target stimulus in the centre. Participants must assign the target stimulus to its appropriate category via the 'e' or 'i' key, thus selecting the left- or right-hand category or attribute, respectively. For example, in Roef and Jansen's (2002) IAT measuring attitudes to food amongst obese versus normal-weight samples, participants were required to assign low-fat food words and positive attributes to one category, and high-fat food words and negative attributes to another. The categories were then reversed and participants now assigned low-fat and negative stimuli to one category, and high-fat and positive stimuli to another. Across trials, a difference score

was calculated as an indication of the relative speed with which participants categorised the stimuli. Categorising high-fat with negative attributes and low-fat with positive attributes more quickly than the reverse pairing (High-fat-Positive/Low-fat-Negative) was believed to reflect a positive implicit bias toward low-fat foods. A potential weakness of the IAT lies in its sensitivity to surrounding experimental conditions, such as noise and distraction, while a key strength is its ability to present both word and pictorial stimuli. Variations of the IAT have been used to assess suicidality, with only minor differences in the types of word or picture stimuli employed.

The Go/No-Go Association Task (GNAT) shares conceptual similarities with the IAT. A series of stimuli are presented sequentially and participants respond (i.e. go) or refrain from responding (i.e. no-go) during a time-restricted inter-trial interval. It is hypothesised that participants respond more quickly and accurately on trials that reflect an association between target concepts (e.g. pairing 'Flowers' and 'Pleasant' stimuli, rather than Flowers and 'Unpleasant' stimuli). Response latencies again provide an index of implicit bias and the data can also be used for signal detection analyses. One possible strength of the GNAT is that responses to the concept of interest need not be analysed relative to another concept (as in the IAT). However, a possible weakness of the procedure is its high level of task difficulty and implications for attrition rates (Bar-Anan & Nosek, 2014). Several studies have employed the GNAT to investigate the accessibility of self-harm stimuli amongst a sample of undergraduate students.

The Name Letter Task (NLT, Nuttin, 1985) is typically used as a measure of self-esteem and is founded on the assumption that the letters in an individual's name reflect the self, and evaluations of these letters provide an indicator of self-esteem. Letters appear sequentially and participants rate how much they like each. Positive ratings for the letters in an individual's name indicate high implicit self-esteem. One advantage of the NLT is that its

simplicity does not require participants to respond within a short time limit and thus it may be subject to lower attrition rates. However, the NLT may be susceptible to self-presentation bias if a participant is aware of the task's purpose (Krizan, 2008). The NLT has been used to investigate implicit self-esteem and suicidal ideation amongst an undergraduate sample.

The Stroop Test (Stroop, 1935; Williams et al., 1996) is a latency-based measure of attentional bias. In the Stroop Colour-Word task, the words 'RED', 'BLUE', 'GREEN', 'BROWN' and 'PURPLE' appear sequentially on-screen and participants name the colour in which each word appears. Participant reaction times are longer on trials in which words are incongruent with their corresponding colour (e.g. the word 'RED' presented in blue font). Variations of the Stroop task have been used to measure attention and interference to emotionally-relevant words. It is hypothesised that participants who take longer to name the colour of emotionally salient words, for example, hold an attentional bias toward these stimuli. A potential weakness of the Stroop test is that it cannot present pictorial stimuli which may more accurately depict the construct of interest than word stimuli. However, its key strength lies in the fact that it is less subject to introspection and self-presentation bias than self-report measures. The Stroop test has been used to investigate the accessibility of suicidality-related stimuli among control and clinical samples.

Literature review. In commencing a review of the literature on the use of implicit measures to study suicide and related phenomena, the search strategy yielded 19 unique articles which met the inclusion criteria. Each of these is summarised in Table 1 and more details are provided in the sections below. These sections are organised according to the four most relevant headings: the Death-Life IAT; measuring implicit self-harm; implicit self-esteem and suicidality; and the Suicide Stroop Test.

Table. 1. Studies included in the literature review.

Study	Participants	Explicit Measures	Implicit Measures	Results
Nock, Park et al. (2010)	N = 157 in psychiatric ER (N = 114 with no attempt in past 7dys vs. N = 43 with attempt in 7dys)	Demographics Psychiatric factors, Clinician and patient prediction of attempt in next 6mos, SITBI, BSS	IAT Death/Life=Me/Not Me	Significantly stronger me-death associations with attempt. Patient prediction and IAT predicted attempt at 6mo follow-up.
Randall et al. (2013)	N = 127 in psychiatric ER (of whom N = 107 had 3-mo follow-up)	Demographics Psychiatric factors, SAD PERSONS, Manchester Self-harm Rule, BHS, CAGE assessment for alcohol abuse, Drug Abuse Screening Test 10, BIS BSI (Brief Symptom Inventory)	IAT (6) Death/Life=Me/Not Me Cutting/No-Cutting=Me/Not Me Suicide/Life=Me/Not Me Death=Me Suicide=Me Suicide images=Me	Death-Life IAT predicted self-harm at 3mo follow-up.
Harrison et al. (2014)	N = 408 undergraduates (N = 205(ideation in 12 mo vs. N = 51 attempt vs. N = 152 controls)	Reasons For Living Scale (RFL), Depression, Anxiety, Stress Scales (DASS, Depression), SITBI	IAT Death/Life=Me/Not Me	History of attempts showed greater predictive validity compared with the IAT.

Ellis et al. (2015)	$N = 124$ psychiatric patients	SCID-I/II, Columbia-Suicide Severity Rating Scale (C-SSRS), Patient Health Questionnaire (PHQ-9), BSS, BHS	IAT Death/Life=Me/Not Me	Pro-death responses on the IAT correlated with explicit measures. The baseline IAT predicted suicidal ideation at 6-week discharge.
Price et al. (2009)	$N = 12$ with treatment resistant depression	Montgomery Asberg Depression Rating Scale (MADRS), BSS	IAT (2) Death/Life=Me/Not Me Escape/Stay=Me/Not Me	Reduction in escape-me associations on the IAT post ketamine infusion. .
Price et al. (2014)	$N = 54$ with treatment-resistant depression	Quick Inventory of Depressive Symptomatology (QIDS), BSS, MADRS	IAT (2) Death/Life=Me/Not Me Escape/Stay=Me/Not Me	Reduction in escape-me associations on the IAT post ketamine infusion.
Franklin et al. (2013)	$N = 58$ with self-harm vs. $N = 86$ controls	Difficulties in Emotion Regulation Scale, Emotion Reactivity Scale, Explicit picture ratings survey, SITBI	Affective Misattribution Procedure (AMP) IAT Cutting/No Cutting =Me/Not Me	The self-harm group showed stronger pro-cutting responses on the IAT. Stronger affect responses in self-harm group on the AMP.
Franklin et al. (2014)	$N = 58$ with self-harm	Emotion Reactivity Scale, Explicit picture ratings survey, SITBI	Affective Misattribution Procedure (AMP) IAT Cutting/No Cutting =Me/Not Me	The IAT did not uniquely predict self-harm at 6mo follow-up compared with the AMP and explicit measures.
Nock & Banaji (2007a)	$N = 89$ adolescents ($N = 53$ self-injury vs. $N = 36$ controls)	Demographics, Children's Global Assessment Scale (CGAS), K-SADS-PL, SITBI	IAT (2) Cutting/No Cutting =Positive/Negative Cutting/No Cutting =Me/Not Me	Significant differences between groups on both IATs. IAT had better prediction of non-suicidal self-injury than risk factors.

Nock & Banaji (2007b)	N = 89 adolescents (N = 38 controls vs. N = 37 with ideation, vs. N = 14 with attempts)	Demographic factors, DSM-IV Disorders, SITBI, BSS	IAT Cutting/No Cutting images=Me/Not Me	Negative cutting-me association found in controls, small positive association with ideation, and strong positive association with attempt. IAT predicted attempts prospectively. Two participants who had attempts at 6mo follow-up had significantly stronger cutting-me association.
Dickstein et al. (2015)	N = 136 adolescents. (N = 47 attempt but no self-injury vs. N = 46 self-injury but no attempt vs. N = 43 controls)	Schedule for Affective Disorders and Schizophrenia (K-SADS-PL), Beck Scale for Suicidal Ideation (BSS), SITBI	IAT (4) Escape/Stay=Me/Not Me, Cutting/No Cutting=Me/Not Me, Death/Life=Me/Not Me, Suicide/Life=Me/Not Me	Significant differences among groups on: escape/stay, cutting/no cutting and death/suicide associations. Self-injury participants showed strongest implicit biases on all IATs.
Knowles & Townsend (2012)	N = 141 undergraduates (Study 1: N = 72; N = 24 self-harm, N = 48 controls, Study 2: N = 69; N = 21 self-harm, N = 48 controls)	Suicide Opinion Questionnaire, Valence and arousal Likert scales	Go/No Go Association Test (2) Self-harm=Good/Bad, Self-harm=Arousal/Sedation	Explicit measures outperformed implicits in distinguishing self-harm participants from controls.
Franck et al. (2007)	N = 36 depressed patients (split by ideation) vs. N = 15 controls	Minnesota International Neuropsychiatric Interview, Beck Hopelessness Scale (BHS), RSES, BDI-II	IAT Valuable/Worthless= Me/Not Me	Depressed participants with ideation and controls showed higher implicit self-esteem than depressed without. Depressed with ideation showed greater discrepancies between implicit and explicit measures.

Glashouwer et al. (2010)	$N = 2,221$ ($N = 271$ suicidal ideation, $N = 1,950$ no ideation)	Inventory of Depressive Symptoms (IDR-SR), Psychiatric Diagnosis -- Composite International Diagnostic Interview, BSS	IAT (2) Depressed/Elated=Me/Not Me Anxious/Calm=Me/Not Me	Depressed-me and anxious-me associations predicted suicidal ideation and attempt, as did explicit measures.
Creemers et al. (2012)	$N = 95$ non-clinical undergraduates	Rosenberg Self-Esteem Scale (RSES), Beck Depression Inventory (BDI), Suicidal Ideation Questionnaire (SIQ), Revised UCLA Loneliness Scale-8 (R-ULA)	NLT	Discrepancy between explicit and implicit self-esteem associated with greater suicidal ideation.
Creemers et al. (2013)	$N = 95$ non-clinical undergraduates	BDI, SIQ, R-ULA	IAT Valuable/Worthless= Me/Not Me	Discrepancy between explicit and implicit self-esteem associated with suicidal ideation, depressive symptoms and loneliness.
Becker, Strohback, & Rinck (1999)	$N = 31$ with suicide attempt, vs. $N = 31$ controls	Explicit measures of depression, anxiety and hopelessness	Stroop Task	Attempt participants showed greater interference for suicide-related words.
Williams & Broadbent (1986)	Clinical participants (Ns unavailable)	(information unavailable)	Modified Stroop Task	Greatest interference for suicide-related words with suicide attempt.
Cha et al. (2010)	$N = 124$ in psychiatric ER ($N = 68$ suicide attempt, $N = 56$ no attempt)	Self-Injurious Thoughts & Behaviours Interview (SITBI), Clinician and patient prediction	Stroop Task	Attempt participants showed interference on suicide-related words, but not on non-suicide words.

The Death-Life IAT. The IAT is the most widely used implicit measure of suicidality. And, five studies have employed what is referred to as the Death-Life IAT, most with a clinical sample. The Death-Life IAT presents the categories Death and Life with the categories Me and Not Me, and participants assign words from the former to the latter. The D-score is thus believed to indicate the relative strength of associations between Me-Death and Not Me-Life. In a seminal study, Nock et al. (2010) sought to determine whether participants with a history of suicide attempt would more strongly associate the self with death than participants who were clinically distressed but had no suicide attempt. The findings supported this hypothesis and indicated that participants with attempts showed significantly stronger me-death/not me-life associations than participants who had made no attempts. The study also found preliminary evidence that these associations predicted a suicide attempt in the following six months above and beyond traditional explicit clinical predictors, such as the Scale for Suicidal Ideation and clinician prediction.

Randall, Rowe, Dong, Nock and Colman (2013) used the same Death-Life IAT to assess self-harm with participants presenting at a psychiatric Emergency Room (ER) with self-harm and/or suicidal ideation. The basic research question was whether this sample would also show strong me-death and not me-life associations, and whether this would predict subsequent risk of self-harm. This question was systematically addressed with the use of six related IATs that included: the Death-Life IAT, a Suicide-Life IAT, a Cutting IAT and three single-category IATs (Death=Me/Not Me, Suicide=Me/Not Me and Suicidal Images=Me/Not Me). The findings showed that the Death-Life IAT predicted risk of self-harm at a three month follow-up, with 43.3% sensitivity and 78.8% specificity, although the remaining IATs were not significantly predictive in this regard. A multivariable model including the patient's clinical history, level of education, and Death-Life IAT score predicted self-harm with 96.6% sensitivity and 53.9% specificity.

Harrison, Stritzke, Fay, Ellison and Hudaib (2014) employed the Death-Life IAT with a non-clinical sample of over 400 undergraduate students sub-divided into those with a history of suicide attempt, those with suicidal ideation in the past year and those with no history of suicidality, and their findings differed somewhat from the previous studies. Although the data again showed that a sub-group who had a previous suicide attempt showed a significantly stronger me-death association than those with no attempts, dichotomising the D-score into pro-life and pro-death effects indicated that both groups showed a pro-life bias. Furthermore, although the overall IAT effect was associated with self-harm and suicidal ideation, it did not predict suicidal risk better than a history of previous attempts.

Ellis, Rufino and Green (2015) more recently used the Death-Life IAT with a clinical sample to measure change in implicit associations from the time of hospital admission to discharge. Once again, the overall Death-Life IAT D-score was found to correlate with self-reported suicidal ideation, hopelessness and depression. Notably again, the pro-life association was significantly stronger from admission to discharge, with the overall D-scores predicting suicidal ideation at discharge above and beyond suicide attempt history and explicit measures.

The two final studies to have administered the Death-Life IAT, as originally used by Nock et al. (2010), sought to investigate the effect of ketamine on implicit responses. In addition to the Death-Life IAT, both studies used the Escape IAT to measure the relative strength of associations between Me-Escape and Not Me-Staying. Price, Nock, Charney and Matthew (2009) presented these IATs to individuals with treatment-resistant depression and showed that Escape-Me/Stay-Not Me associations correlated significantly with self-reported suicidal ideation. They also showed that these associations diminished after the ketamine infusion, but only on the Escape IAT and this change was correlated with a reduction in suicidal ideation. In a similar study, now with randomised control features, Price et al. (2014)

found a correlation between Escape-Me associations and self-reported suicidal ideation, and again there were reductions in these responses post-ketamine infusion, but only on the Escape IAT. In both studies, only the Escape IAT (not the Death-Life IAT) correlated with baseline suicidality.

According to Harrison et al. (2014), the Death-Life IAT findings may reflect a diminished desire to live, rather than an active desire to die. Findings from the battery of IATs used by Randall et al. (2013) provide some insight into this suggestion. Specifically, the single category Death=Me/Not Me IAT was not predictive of self-harm, whereas the Death-Life IAT showed significant predictive validity. This difference supports Harrison et al.'s view that associations between life stimuli and the self versus others play an important role in suicidality. Indeed, this may explain why a large number of clinical participants in the studies reviewed displayed a pro-life bias on the IAT. For example, in Price et al. (2014) clinical participants showed a pro-life bias (D-score less than 0) at both baseline and post-intervention. Nock et al. (2010) also found that a large proportion of those with a history of suicide attempt showed a pro-life bias on the Death-Life IAT. Hence, implicit differences between clinical participants and controls may reveal variances in pro-life bias, rather than an increased pro-death bias for the former. This contradicts the hypothesis that those with a history of suicidality display a pro-death bias, while control participants show a pro-life bias. In another study using the Death-Life IAT not reviewed here because it did not explicitly measure suicidality (Tang, Wu, & Miao, 2013), fluctuations in pro-life implicit biases were characterised by undergraduate groups who were administered failure versus success priming procedures. In failure priming conditions, reductions in pro-life bias, rather than an increase in pro-death bias, were observed (see Tang et al., 2013). This again shows that significant implicit differences between groups may be attributed to variations in pro-life bias.

While it may be assumed that suicidal individuals hold a greater bias toward death rather than life, it may also be the case that these individuals possess *ambivalence* about their desire to live versus die. The tendency to hold conflicting motivations to both live and die has been referred to as the Internal Struggle Hypothesis (Brown, Steer, Henriques, & Beck, 2005; Kovacs & Beck, 1977) and may explain variability in implicit responses across individuals with a history of suicidality. Indeed, O'Connor et al. (2012) have argued that there are different typologies of suicidality among those reporting suicidal ideation, but there is limited evidence as yet to determine what these are.

Measuring implicit self-harm. Four studies have used the IAT, and one has used the GNAT, to investigate the implicit cognitions that may influence self-harm. The four IAT studies (Dickstein et al. 2015; Franklin, Lee, Puzia, & Prinstein, 2013; Nock & Banaji, 2007a; 2007b) broadly compared participants with a history of self-harm with controls. Specifically, Franklin et al. presented a Cutting IAT with the categories Me and Not Me with cutting-related words and images of cut and uncut skin, and found stronger self-cutting associations among participants with self-harm. However, Franklin, Puzia, Lee and Kent (2014) found that the IAT did not predict self-harm better than explicit measures when presented at six-month follow-up with the same participants. These results differ somewhat from those of Nock and Banaji (2007a; 2007b) who used the same IAT to differentiate between *adolescents* with self-harm and controls. Indeed, this study also found significant differences between participants with suicidal ideation versus attempts, when the clinical sample was sub-divided on the explicit measures. Furthermore, the IAT predicted ideation at six-month follow-up. The former study also presented another Cutting IAT that presented the categories Good and Bad with images and words of cut and uncut skin, which again differentiated the two groups, with stronger cutting-bad associations recorded in controls.

In a comprehensive study with four IATs, Dickstein et al. (2015) compared adolescents with a recent suicide attempt, a clinical group with recent self-harm and a group of typically-developing controls. The IATs included: Death/Life=Me/Not Me; Cutting/No Cutting=Me/Not Me; Escape-Stay/=Me-Not Me; and Suicide/Life=Me/Not Me. In all of the IATs, participants with non-suicidal self-injury showed stronger escape-me associations than controls and stronger self-cutting and suicide-me associations than participants with a history of suicide attempts and controls.

The study by Knowles and Townsend (2012) employed the GNAT with undergraduates, including a sub-group with a history of self-harm. Their first study used a Valence GNAT (Self-harm=Good/Bad) and an Arousal GNAT (Self-harm=Arousal/Sedation). The second study, with similar but naïve participants, presented the same GNATs and additional explicit measures. However, neither study successfully differentiated between the main group or self-harm group on the basis of overall GNAT performance.

Implicit self-esteem and suicidality. Although there exists a substantial literature surrounding the relationship between implicit self-esteem and depression (e.g. Franck, De Raedt, & De Houwer 2007), only four studies have specifically investigated the role of implicit self-esteem in suicidality. Franck, De Raedt, Dereu and Van den Abbeele (2007) presented the Rosenberg Self-Esteem Scale (RSES) and a Self-esteem IAT targeting Me/Not Me=Valuable/Worthless associations. The findings indicated that a sub-group of controls and a currently depressed sub-group with suicidal ideation demonstrated higher implicit self-esteem than a depressed sub-group with no ideation. Furthermore, the explicit and implicit measures only diverged in participants with suicidal ideation, but not those with depression but no ideation.

Glashouwer et al. (2010) measured the potential relationship between implicit self-associations with depression/anxiety and suicidal ideation, as measured on the Scale for Suicidal Ideation, in a sample of over 2,000 participants, including 271 with a psychiatric diagnosis. The Depression IAT and the Anxiety IAT were largely similar and assessed Depressed/Elated=Me/Others and Anxious/Calm=Me/Others associations to determine whether participants with suicidal ideation would more readily associate themselves with depression and/or anxiety than controls. The findings indicated that self-depressive and self-anxious associations predicted suicidal ideation and history of attempt, although neither IAT predicted ideation better than the explicit measure.

Creemers, Scholte, Engels, Prinstein and Wiers (2012) used an automated Name Letter Task (NLT) to measure implicit self-esteem in a sample of undergraduates. The findings indicated that a combination of high implicit self-esteem on the NLT and low explicit self-esteem on the RSES correlated with self-reported suicidal ideation, even though implicit self-esteem alone did not predict ideation. This study and its findings were largely replicated by Creemers, Scholte, Engels, Prinstein and Wiers (2013) using the Self-esteem IAT and targeting Valuable/Worthless=Me/Not Me associations. Again, the divergence between implicit and explicit self-esteem measures (i.e. high implicit and low explicit self-esteem) correlated with depressive symptoms and suicidal ideation.

Suicide Stroop Test. Three studies have measured attentional biases toward suicide-related stimuli using the Stroop test. In the first of these, Williams and Broadbent (1986) found attentional interference effects for emotional stimuli in a modified Stroop test with clinical participants with a history of suicide attempt, clinical participants with no attempt, and a control group. The greatest interference effects were observed with participants with a history of attempt. Becker, Strohbach and Rinck (1999) reported similar findings with individuals with a history of attempt, who were slower than controls at naming the colours of

suicide-related stimuli in a Stroop test. More recently, Cha, Najmi, Park, Finn and Nock (2010) also found that clinical participants with a history of attempt showed greater interference for suicide-related stimuli than a clinical sample with no attempts. This study provided preliminary support for the predictive utility of the Suicide Stroop test in identifying those with an attempt at six-month follow-up. The Stroop test also predicted attempts prospectively above and beyond explicit measures, such as clinician/patient prediction and the Scale for Suicidal Ideation.

The studies reviewed here target a variety of implicit associations and effects that are thought to underlie suicidal thoughts and behaviour. Overall, the findings suggest that implicit measures can at best outperform known risk factors in the prediction of suicidality, can complement existing factors in assessing risk or can show no association with suicidality. Although a number of the studies focused on predicting suicidality, the remainder were concerned with comparing implicit outcomes between clinical and control groups. Findings suggest that a range of biases concerning life, death, self-harm, and self-esteem are often associated with suicidal thoughts and behaviours.

Comparisons between Explicit and Implicit Outcomes in Suicidality

In many studies, outcomes on the implicit measures *converge* with the explicit findings. For example, The Death-Life IAT effect was associated with a history of suicide attempt as reported via the SITBI (Nock et al., 2010). The Cutting IAT distinguished among self-reported suicide attempt, suicidal ideation, and non-suicidal sub-groups (Nock & Banaji, 2007b). In Dickstein et al. (2014), the Death-Life IAT, Cutting IAT, and Escape-Stay IAT differentiated between groups based on their self-reported history of attempt and self-harm. The Death IAT correlated with the Beck Scale for Suicidal Ideation, the Beck Hopelessness Scale, and the Patient Health Questionnaire in Ellis et al. (2015). And, the Stroop studies

demonstrated that greater interference for suicide-related stimuli was associated with a history of self-reported suicidal behaviour (Becker et al., 1999; Cha et al., 2010; Williams & Broadbent, 1986).

In other studies, however, there has been divergence between implicit and explicit outcomes. For example, Price et al. (2009; 2014) found no association between the Death-Life IAT and self-reported suicidal ideation in a clinical sample. And Franklin et al. (2013) found that recency and frequency of self-harm as measured by the SITBI did not correlate with the Cutting IAT. In their study on the prediction of self-harm, Randall et al. (2013) found that explicit measures of suicidality outperformed implicit measures.

How to explain the convergence and divergence of findings. Given the findings above, there has been speculation about why outcomes of the same phenomena diverge on explicit and implicit measures. For example, McClelland (1980) proposed that each assesses different levels of psychological functioning. That is, explicit measures tend to predict situationally controlled behaviour, while implicit measures predict self-driven behaviour (McClelland et al., 1989). Other accounts have also proposed that explicit responses are cognitively controlled and retrieved from memory, while implicit responses occur automatically (Wilson, Lindsey, & Schooler, 2000). And two recent, but different, theoretical models have made specific attempts to identify the processes underpinning implicit cognitions. According to the Associative-Propositional Elaboration (APE) model, implicit cognition reflects associations held in memory (Gawronski & Bodenhausen, 2007), while the Relational Elaboration Coherence (REC) model argues that implicit cognition is determined by an individual's relational verbal learning history and current contextual variables (Barnes-Holmes, Barnes-Holmes, Stewart, & Boles, 2010). And there have been even more recent attempts to integrate these accounts as part of a broader move toward highlighting the complementary aspects of cognitive and behavioural approaches to evaluative processes, in a

philosophical endeavour known as the functional-cognitive framework (De Houwer, 2011). These models may assist in explaining why explicit and implicit outcomes both converge and diverge.

Developing a Behavioural 'Implicit' Measure to Study Suicidality: The Implicit Relational Assessment Procedure (IRAP)

The Implicit Relational Assessment Procedure (IRAP) is a behaviour-analytic methodology that attempts to measure verbal histories of relational responding. The basic premise of the IRAP is that participants will respond more quickly when they are required to match stimuli in a way that is consistent rather than inconsistent with their verbal history. In some respects, the IRAP is functionally similar to the IAT. It is a computerised performance-based measure that uses response latency to calculate a difference score that is indicative of brief and immediate evaluative responding. On the other hand, the IRAP departs from the IAT by directly assessing the relation between label and target stimuli. In this way it offers a non-relative analysis of so-called 'implicit bias'.

Consider again the Cutting IAT, which requires participants to categorise images of cut and neutral skin with the categories Me, Not Me, Cutting and No Cutting. If a participant demonstrates a 'pro-self-harm' bias in this context, one cannot determine if this is reflects an association between Cutting and Me stimuli or between No Cutting and Not Me. The IRAP, on the other hand, provides a non-relativistic account of this bias. Consider that on each IRAP trial, a label (e.g. Self or Others) and target stimulus (e.g. Cutting or No Cutting) are presented on-screen with two response options that reflect the functional relationship between stimuli (e.g. 'Similar' and 'Different'). This generates four trial-types or stimulus relations (e.g. Self-Cutting, Self-No Cutting, Others-No Cutting, Others-Cutting) that are believed to be indicative of implicit bias.

Over the past decade, the IRAP has been used to explore implicit evaluations in a range of socially sensitive and clinical domains, and may indeed be better suited to the study of complex propositional clinically-relevant thoughts and appraisals because of its ability to specify precisely the relations among the stimuli (see Vahey, Nicholson, & Barnes-Holmes, 2015). It has also been argued that the associative nature of the IAT is not fully suited to targeting the complex propositional qualities of clinically-relevant thoughts and appraisals. For example, knowing that an individual associates self with death does not specify *the nature of* this association -- this relationship may be one of similarity or opposition, and these may differentially influence future behaviour.

In summary, the IRAP is a behaviour-analytic methodology which, in contrast to socio-cognitive implicit measures, defines its behavioural effects in terms of environment-behaviour interactions rather than in terms of proxies that explain mental constructs. That is, rather than attributing the behavioural effects of implicit measures to mental constructs (i.e. associations in memory), the functional approach to implicit cognition defines these effects in terms of relational responding. As such, this functional approach is entirely consistent with the radical behaviourist perspective.

The Current Research

The IRAP has been used to study implicit evaluations in clinical areas relevant to eating disorders (Parling, Cernvall, Stewart, Barnes-Holmes, Ghaderi, 2012; Roddy, Stewart, & Barnes-Holmes, 2010), substance abuse (Carpenter, Martinez, Vadhan, & Barnes-Holmes, & Nunes, 2012), and anxiety disorders (Nicholson & Barnes-Holmes, 2012). However no published work to date has examined the use of the IRAP in the clinical domain of suicidality, nor test how implicit evaluations of life and death stimuli may be associated with sub-clinical psychopathology.

The overarching aim of the current thesis was to develop the IRAP as a measure of automatic evaluations regarding life and death in a normative population. Secondary aims of the research were to compare the implicit responses with those on explicit measures, and also to compare the IRAPs utility with that of the IAT. In each experiment, at least two implicit measures were used in addition to explicit measures of psychopathology and beliefs regarding life after death. Specifically, the explicit measures included the Depression, Anxiety and Stress Scales, Beck Hopelessness Scale, Acceptance and Action Questionnaire, Belief in Afterlife Scale, Life Orientation Test-Revised, and the Rosenberg Self-esteem Scale. Experiment 1 ($N = 39$) examined implicit responses to life and death stimuli with two IRAPs and an IAT. This experiment compared an existing implicit measure used in the domain of suicidality; the Death-Life IAT, with a Death IRAP using the same stimuli, and an Imagine Death IRAP focusing on personal rather than abstract life and death stimuli. Experiments 2 to 4 proceeded with broadly exploring automatic evaluations regarding life. Specifically, Experiment 2 ($N = 46$) examined implicit evaluations regarding life in the present versus future. The Pessimism IRAP measured optimistic versus pessimistic responses to one's own life now and in the future, whereas the Self Pessimism IRAP focused on self- versus others-based future expectancies. Experiment 3 ($N = 50$) again examined implicit future-thinking and furthermore explored the potential role of worthiness in implicit outcomes. Here, the Positivity IRAP measured self-based responses to the possession of positive versus negative life attributes in the present versus the future. The Worthiness IRAP measured responses surrounding the worthiness of a positive versus negative life. Finally, Experiment 4 ($N = 46$) measured implicit evaluations regarding the emotional and behavioural effects of personal failure and success. The Behaviour IRAP measured responses to the positive and negative *behavioural* consequences of failure and success, whereas the Emotions IRAP measured responses to the positive and negative *emotional* consequences of

failure and success. In general, positive implicit evaluations towards life in the present versus future, as well as an absence of strong bias toward death were found across all experiments. The findings presented offer support for the utility of the IRAP in measuring potentially clinically-relevant verbal histories surrounding life and death.

Chapter 2

Experiment 1

Measuring implicit responses to life and death

using the IAT and the IRAP

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Measuring implicit responses to life and death using the IAT and the IRAP

Implicit evaluations of life and death appear to provide clinically useful insights into an individual's learning history. In the domain of suicidality specifically, implicit measures have shown promise in the prediction of suicidal ideation, self-harm and suicide attempt in the short to medium term. One reason for this relative success, compared with explicit measures, is that implicit methodologies are less susceptible to introspection and demand characteristics, thus potentially offering better predictive validity.

While most research on the implicit measurement of evaluations to life and death has predominantly been conducted from a socio-cognitive perspective, behavioural researchers have recently developed similar tools to measure these phenomena, such as the Implicit Relational Assessment Procedure (IRAP). Indeed, it has been argued that the IRAP may be potentially better suited to the study of complex propositional clinically-relevant thoughts and appraisals than existing methodologies because it specifies precisely the relations among the stimuli (see Vahey, Nicholson, & Barnes-Holmes, 2015).

Although the IRAP is similar to the Implicit Association Test (IAT) in that participants respond quickly and accurately to words and/or pictures across multiple trials, the formats of the two procedures differ. Consider the IRAP used in a study with participants diagnosed with cocaine dependence (Carpenter, Martinez, Vadhan, Barnes-Holmes, & Nunes, 2012). Each trial presented a label stimulus from one of two categories (With Cocaine or No Cocaine), a target from one of two categories (Positive or Negative Effects) and two response options (True and False). As is common in IRAP research, this configuration generated four trial-types (With Cocaine-Positive Effects, With Cocaine-Negative Effects, No Cocaine-Positive Effects and No Cocaine-Negative Effects) and thus four D-scores

believed to be indicative of implicit bias. In short, participants were required to respond consistently with their histories (e.g. With Cocaine-Positive Effects) on certain blocks and inconsistently on others (With Cocaine-Negative Effects), thus shorter response latencies were predicted on consistent blocks for this sample. The findings showed that an implicit positive bias toward cocaine was associated with poorer treatment outcomes.

To date, the IRAP has been used as a measure of implicit evaluations towards a range of clinically-relevant stimuli, although no published research has targeted the measurement of evaluations regarding (personal or abstract) life and death stimuli. In light of this, the first experiment of the current thesis employed a non-clinical sample to measure implicit responses to life and death using the IRAP. Given the small body of existing IAT evidence in this regard, Experiment 1 also employed the IAT, for comparative purposes with the IRAP. The death-related IAT employed here was almost identical to the 'Death-Life IAT' used by Nock et al. (2010) and was simply designed to assess associations among Death, Life, Me and Not Me stimuli. The 'Death IRAP' was designed to target the same stimuli and reactions. In addition, an 'Imagine Death IRAP' was constructed to ascertain whether the presence of the word 'imagining' (or some version thereof) potentially influenced outcomes, perhaps by rendering the stimulus presentations less abstract.

The primary aim of Experiment 1 was to measure implicit evaluations of death and life. A secondary aim was to determine whether the effects observed previously with the Death-Life IAT would be replicated in a non-clinical undergraduate sample. In addition, we sought to determine whether similar implicit responses toward life and death would be observed with the IRAP. As an exploratory measure, a number of self-report questionnaires were also administered to facilitate explicit-implicit comparisons.

Method

Participants

All participants ($N = 39$) were recruited from the undergraduate population of Maynooth University. Three of these reported a mental health complaint on an initial screening questionnaire (details below) and thus did not participate fully in the study. This left a total participating sample of 36. Of these, 13 were male, 23 were female and the mean age of participants was 21 years.

Setting

All individuals participated in the study in an experimental cubicle in the Department of Psychology at Maynooth University, with minimal noise and distraction. All participation was on an individual basis. The researcher was present in the cubicle during instructional phases only, but not during test phases, at which times she remained outside but within a short distance of the cubicle.

Materials

The current study involved three sets of measures, written explicit self-report scales and two types of implicit measure, the IAT (based on Nock et al.'s Death-Life IAT, 2010) and the IRAP. The study also involved two separate IRAPs, one referred to as the Death IRAP and the other referred to as the Imagine Death IRAP.

Explicit Measures. The study employed four standardised explicit measures, designed to assess sub-clinical psychopathology (specifically, hopelessness, psychological avoidance, depression, anxiety and stress) and attitudes to life after death. This battery included the Beck Hopelessness Scale, the Acceptance and Action Questionnaire, the

Depression, Anxiety, Stress Scales and the Belief in Afterlife Scale. The study also included a short Screening Questionnaire to assess participant eligibility.

Screening Questionnaire (SQ). A 2-item screening questionnaire was developed for the purposes of exclusion to identify participants with a self-reported history of psychological distress or serious physical illness. Specifically, the SQ asked about "Anxiety or Phobic Disorder, Panic Attacks, Obsessive Compulsive Disorder, Depression, or any other mental health complaint" or "the presence of a serious, life-threatening, or terminal physical illness". The SQ is provided in Appendix A.

Depression, Anxiety, Stress Scales-21 (DASS). The short form version of the DASS is a 21-item questionnaire which assesses symptomatology associated with depression, anxiety and stress (Lovibond & Lovibond, 1993). The measure contains three sub-scales, each with seven items that indicate the presence and severity of relevant emotional states in the past week. For example, the Depression sub-scale contains the statement "I couldn't seem to experience any positive feeling at all", the Anxiety subscale contains "I felt scared without any good reason" and the Stress sub-scale contains "I tended to over-react to situations". Responding involves a 4-point scale from 0 (Did not apply to me at all) to 3 (Applied to me very much or most of the time). Scores from each sub-scale are summed and multiplied by 2 to generate a total score each for depression, anxiety and stress. Higher scores indicate higher levels of symptomatology (categorised as normal, mild, moderate, severe and extremely severe). The numerical ranges for the Depression sub-scale are 0–9 (normal), 10–13 (mild), 14–20 (moderate), 21–27 (severe) and 28+ (extremely severe). On the Anxiety sub-scale, the ranges are 0–7 (normal), 8–9 (mild), 10–14 (moderate), 15–19 (severe) and 20+ (extremely severe). And on the Stress sub-scale, the ranges are 0–14 (normal), 15–18 (mild), 19–25 (moderate), 26–33 (severe) and 34+ (extremely severe). The DASS-21 has demonstrated satisfactory reliability (Cronbach's αs = .88, .82, and .90 for the Depression, Anxiety and

Stress sub-scales, respectively) and adequate construct validity in a large sample of normative participants (Henry & Crawford, 2005). The DASS is provided in Appendix B.

Beck Hopelessness Scale (BHS). The BHS is a measure of hopelessness that comprises 20 statements regarding expectancies for the future (e.g. "In the future I expect to succeed in what concerns me the most", see Beck, Weismann, Lester, & Texler, 1974). Responding that endorses hopelessness is scored as 1, thus the measure yields a maximum score of 20 and a minimum of 0. Scores ranging from 0 to 3 typically indicate minimal hopelessness, 4-8 indicate mild hopelessness, 9-14 indicate moderate hopelessness and 15-20 indicate severe hopelessness. The BHS has satisfactory internal consistency (Cronbach's α = .88) in a non-clinical sample of university students (Steed, 2001). The BHS is provided in Appendix C.

Acceptance and Action Questionnaire–II (AAQ). The 7-item version of the AAQ is an abbreviation of the original 49-item scale that measures psychological avoidance (Bond et al., 2011). Participants respond to statements such as "I'm afraid of my feelings" on a 7-point scale from 1 (Never true) to 7 (Always true). A total score is calculated by summing all items, with a maximum score of 49 and a minimum of 7. Higher scores indicate more experiential avoidance, while lower scores indicate less avoidance (more acceptance). In a non-clinical sample, Bond et al. reported a mean score of 17.34, compared to 28.34 observed in an out-patient sample. The AAQ-II has shown good reliability (Cronbach's α = .84) and superior psychometric properties to the previous version (Bond et al.). The AAQ is provided in Appendix D.

Belief in Afterlife Scale (BAS). The BAS employed here was a 6-item abbreviation of the original 20-item measure (Orsarchuk & Tatz, 1973) designed to assess views on life after death (e.g. "There must be an afterlife of some sort"). The items are scored on a 10-

point scale from 1 (Total disagreement) to 10 (Total agreement). As the scale is continuous, there are no discrete categories to determine belief versus non-belief in an afterlife. However, higher scores indicate stronger belief in an afterlife, while lower scores indicate lower belief. The BAS has demonstrated adequate reliability (α = .89, see Bering, 2002) and comparisons with similar measures also show high validity (Berman & Hays, 1973; Kurlycheck, 1976). The BAS is provided in Appendix E.

Implicit Measures.

The Implicit Association Test. The Death-Life IAT employed here was similar to Nock et al.'s (2010) and assessed implicit responses to death and life. The IAT presented five self-relevant words (MYSELF, MY, MINE, I, SELF) classified according to the attribute category Me and five other-relevant words (THEM, THEY, THEIRS, THEIR, OTHER) words, classified according to the attribute category Not Me. The IAT also presented five death-relevant words (DEAD, DIE, FUNERAL, LIFELESS, DECEASED) classified according to the attribute category Death and five life-relevant words (ALIVE, LIVE, THRIVE, SURVIVE, BREATHING), classified according to the attribute category Life. The stimuli employed in the IAT are presented in Table 2.1. Please note that the use of capital letters denotes words actually presented on-screen during trials.

Table 2.1 Stimuli in the Death-Life IAT from Experiment 1.

ME	NOT ME
MYSELF	THEM
MY	THEY
MINE	THEIRS
I	THEIR
SELF	OTHER

DEATH	LIFE
DEAD	ALIVE
DIE	LIVE
FUNERAL	THRIVE
LIFELESS	SURVIVE
DECEASED	BREATHING

The Implicit Relational Assessment Procedure (IRAP). Experiment 1 involved two IRAPs -- the Death IRAP and the Imagine Death IRAP.

Death IRAP. The Death IRAP presented a target word from one of two categories (Life or Death), a label word from one of two categories (Self or Others), and the response options TRUE and FALSE on each trial. Please note that only words in capital letters actually appeared on-screen. These stimuli were matched as much as possible to the IAT, hence the six Self label words were MYSELF, MY, MINE, I, SELF, ME, and the six Other label words were THEM, THEY, THEIRS, THEIR, OTHER, OTHERS. The 12 target stimuli were six Death words (DEAD, DIE, FUNERAL, LIFELESS, DECEASED, DEATH) and six Life words (LIVING, ALIVE, LIVE, THRIVE, SURVIVE, BREATHING – see Table 2.2).

Table 2.2 Stimuli in the Death IRAP from Experiment 1, including labels, targets and response options.

Self Label	Others Label
ME	OTHERS
MYSELF	THEM
MY	THEY
MINE	THEIRS
I	THEIR
SELF	OTHER
Death Targets	**Life Targets**
DEATH	LIVING
DEAD	ALIVE
DIE	LIVE
FUNERAL	THRIVE
LIFELESS	SURVIVE
DECEASED	BREATHING
Response Option 1	**Response Option 2**
TRUE	FALSE

The Death IRAP comprised of four possible label-target combinations (typically referred to as trial-types): Self-Death; Self-Life; Others-Death; and Others-Life (see Figure 2.1). Participants responded to these combinations by selecting one of two response options, TRUE or FALSE, assigned to the "d" and "k" keys, respectively. Responses on the Death IRAP trials were defined as either consistent or inconsistent, where consistent responding was denoted as "pro-death" and inconsistent responding was denoted as "pro-life", similar to the Death-Life IAT. When a trial presented the label SELF with a Death target, choosing TRUE was consistent, but FALSE was inconsistent. When a trial presented SELF with a Life target, FALSE was consistent and TRUE inconsistent. When a trial presented OTHERS with a Death target, FALSE was consistent and TRUE inconsistent. And when a trial presented OTHERS with a Life target, TRUE was consistent and FALSE inconsistent.
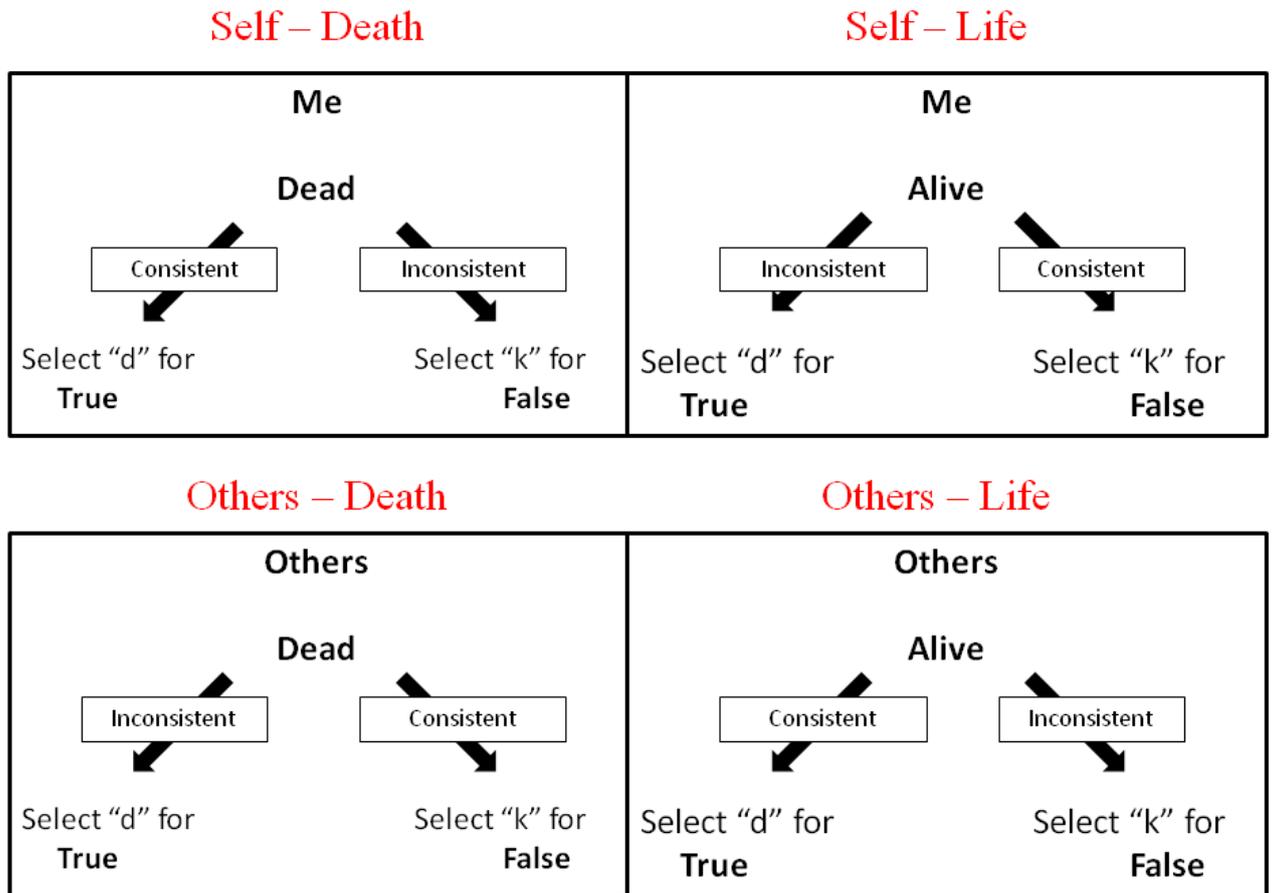
Figure 2.1 Examples of the four trial-types in the Death IRAP from Experiment 1. On each trial, a label stimulus (Self or Others), a target stimulus (Death or Life) and two response options (TRUE and FALSE) appeared on-screen simultaneously. This generated four trial-types: Self-Death; Self-Life; Others-Death; and Others-Life. The words 'consistent' or 'inconsistent' were never shown.

Imagine Death IRAP. The Imagine Death IRAP was identical in structure to the Death IRAP, but differed in terms of the stimuli presented. The Imagine Death IRAP presented a target word from the same two categories (Life or Death) as the Death IRAP, a label word from the same two categories (Self or Others), and the response options TRUE and FALSE on each trial. The three Self label statements were I IMAGINE ME, I VISUALISE ME and I PICTURE ME, and the three Other label statements were I

IMAGINE OTHER PEOPLE, I VISUALISE OTHER PEOPLE and I PICTURE OTHER

PEOPLE. The 12 target stimuli were six Death words (DECAYING, BURIED, LIFELESS,

DECEASED, DEAD, DYING) and six Life words (ALIVE, THRIVING, SURVIVING,

BREATHING, LIVE, LIVING – see Table 2.3).

Table 2.3 Stimuli in the Imagine Death IRAP from Experiment 1, including labels, targets and response options.

Imagining Self Label	Imagining Others Label
I IMAGINE ME	I IMAGINE OTHER PEOPLE
I VISUALISE ME	I VISUALISE OTHER PEOPLE
I PICTURE ME	I PICTURE OTHER PEOPLE
Death Targets	**Life Targets**
DECAYING	ALIVE
BURIED	THRIVING
LIFELESS	SURVIVING
DECEASED	BREATHING
DEAD	LIVE
DYING	LIVING
Response Option 1	**Response Option 2**
TRUE	FALSE

The Imagine Death IRAP comprised of four trial-types: Imagining Self-Death;

Imagining Self-Life; Imagining Others-Death; and Imagining Others-Life (see Figure 2.2).

Responses on the Imagine Death IRAP trials were again defined as either consistent or

inconsistent, where consistent responding was denoted as "pro-life" and inconsistent

responding was denoted as "pro-death". When a trial presented the label I IMAGINE ME

with a Death target, choosing TRUE was consistent, but FALSE was inconsistent. When a

trial presented I IMAGINE ME with a Life target, FALSE was consistent and TRUE

inconsistent. When a trial presented I IMAGINE OTHER PEOPLE with a Death target, FALSE was consistent and TRUE inconsistent. And when a trial presented I IMAGINE OTHER PEOPLE with a Life target, TRUE was consistent and FALSE inconsistent.

Imagining Self - Death

I imagine me

Lifeless

Consistent → Select "d" for **True**

Inconsistent → Select "k" for **False**

Imagining Self - Life

I imagine me

Surviving

Inconsistent → Select "d" for **True**

Consistent → Select "k" for **False**

Imagining Others - Death

I imagine other people

Lifeless

Inconsistent → Select "d" for **True**

Consistent → Select "k" for **False**

Imagining Others - Life

I imagine other people

Surviving

Consistent → Select "d" for **True**

Inconsistent → Select "k" for **False**

Figure 2.2 Examples of the four trial-types in the Imagine Death IRAP from Experiment 1. On each trial a label stimulus (Self or Others), a target stimulus (Death or Life), and two response options (TRUE and FALSE) appeared on-screen simultaneously. This generated four trial-types: Self-Death; Self-Life; Others-Death; and Others-Life. The words 'consistent' or 'inconsistent' were never shown.

Ethical Considerations

All aspects of Experiment 1 adhered to the ethical guidelines outlined by the British Psychological Society (BPS, 2009) and the Psychological Society of Ireland (PSI, 2010), and received prior ethical approval from the Maynooth University Research Ethics Committee or

underwent ethical review at the departmental level. The key ethical issues pertaining to the Experiment 1 may be summarised as follows. 1. Each participant completed a consent form, which highlighted specific ethically-relevant features, provided details on the nature and aims of the research, and outlined freedom to withdraw at any point. 2. All data was anonymised and analysed at group level. 3. No participant who reported a history of psychological distress in the SQ was exposed to any of the death-related implicit measures. 4. The lack of distress or harm associated with the IRAP has been demonstrated by empirical evidence[1]. 5. The word "suicide" from the original Death-Life IAT used by Nock et al. (2010) was removed. 6. Participants were fully debriefed and provided with researcher contact details. It is important to emphasise that no participant expressed any signs of distress prior to, during, or after involvement in the study.

Procedure

Experiment 1 comprised of four stages. Stage 1 always involved the explicit measures and the three remaining stages involved the three implicit measures (i.e. two IRAPs and the IAT). However, the order in which the three implicit measures were presented was randomised across participants. Ten participants were exposed to the Death IRAP in Stage 2, followed by the Imagine Death IRAP in Stage 3 and then the Death-Life IAT in Stage 4. Ten participants were exposed to the Imagine Death IRAP, followed by the Death IRAP and then the Death-Life IAT. Eleven participants were exposed to the Death-Life IAT, followed by the Death IRAP and then the Imagine Death IRAP. Finally, eight participants were exposed to the Death-Life IAT, followed by the Imagine Death IRAP and then the Death IRAP. In the interests of clarity, the sections below provide procedural details for participants presented with the IAT in Stage 2, the Death IRAP in Stage 3 and the Imagine Death IRAP in Stage 4.

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[1] Refers to unpublished research discussed in personal communication with Dr. Barnes-Holmes.

Apart from this manipulation of the experimental sequence for the implicit measures, all other aspects of the study were identical for all participants.

Stage 1: Explicit Measures. All participants initially completed the SQ to assess eligibility for further involvement. Those who indicated any previous or current mental health or (serious) physical complaint were thanked and participation was terminated. All remaining participants completed the other four explicit measures in the following order: DASS, BHS, AAQ and BAS, and then proceeded immediately to Stage 2.

Stage 2: Implicit Measure (e.g. IAT). Stage 2 always involved an implicit measure and participants were exposed to the IAT, the Death IRAP or the Imagine Death IRAP at this stage. Prior to commencing the practice trials for the IAT, participants were exposed to automated instructions for IAT completion, as follows.

> In this study, you will see words appear one at a time in the middle of the screen. Sort these words into groups according to the labels that appear in the top right and left corners of the screen.
>
> Press the left E key if you see a word belonging to the group on the left. Press the right I key if you see a word belonging to the group on the right.
>
> Please respond as quickly and as accurately as you can. Pay close attention to the group labels on the left and right, since they will change from block to block. On the next screen, you will see the words you will be sorting in this task.
>
> Please ask the experimenter now if you have any questions.
>
> You will be asked to sort words into the categories of DEATH, LIFE, ME, and NOT ME.
>
> The words in each category are shown below.
>
> | DEATH | LIFE | ME | NOT ME |
> |---|---|---|---|
> | Dead | Alive | Myself | Them |
> | Die | Live | My | They |
> | Funeral | Thrive | Mine | Theirs |
> | Lifeless | Survive | I | Their |
> | Deceased | Breathing | Self | Other |
>
> When the word in the centre corresponds to one of the categories on the left, you will use the E key, and when the word in the centre corresponds to one of the categories on the right, you will use the I key.
>
> Sort the words as quickly as possible while making as few mistakes as possible.

Trial block presentation was counterbalanced across participants, with half completing Me-Life/Not Me-Death trials first and the remaining completing Me-Death/Not Me-Life trials first. In total, seven trial-blocks were presented. The following block order demonstrates the task structure for participants who completed Me-Life/Not Me-Death trials first.

Block 1: Life–Death discrimination. The first block required participants to assign words to the Life and Death categories. DEATH was presented on the top left of the screen and LIFE on the top right. Individual words from each category appeared in the centre of the screen and participants assigned these to their corresponding category using the 'E' key for Death words and the 'I' key for Life words. All stimuli were presented in green font during this block. The following instructions were presented on-screen prior to commencement of the first trial:

> Put your index fingers on the E and I keys of your keyboard. Words representing the categories at the top will appear one-by-one in the middle of the screen. When the word belongs to a category on the left, press the E key; when the word belongs to a category on the right; press the I key. Words belong to only one category. If you make an error, a red X will appear – fix the error by hitting the other key. GO AS FAST AS YOU CAN – WHILE MAKING AS FEW MISTAKES AS POSSIBLE. Press space bar when ready.

Pressing the spacebar following these instructions led to the presentation of the Life–Death discrimination trials. The target word stimulus remained in the centre of the screen until a correct response was emitted, after which the word was removed and the next word appeared. If an incorrect response was emitted (e.g. selecting 'E' instead of 'I' for a life-related word), a red X appeared directly below the target word. The red X disappeared once a correct response was emitted. Each word from the Death and Life categories was presented twice in a total of 20 trials.

Block 2: Not Me–Me discrimination. The second block was identical to the previous block, except that the target words now belonged to the Me and Not Me categories and appeared in white font. The following instructions appeared before the first trial:

> See above: the categories have changed. The words for sorting have changed as well. The rules, however, are the same. When the word belongs to a category on the left, press the E key; when the word belongs to a category on the right; press the I key. Words belong to only one category. A red X appears after an error – fix the error by hitting the other key. GO AS FAST AS YOU CAN – WHILE MAKING AS FEW MISTAKES AS POSSIBLE. Press space bar when ready.

Block 3: Consistent categories test. In Block 3, there were now four categories in each trial. The Death and Not Me categories appeared on the top left of the screen, and the Life and Me categories appeared on the top right. The colours of the words from previous blocks remained the same. Each word from the four categories was presented once, in a total of 20 trials. The following instructions appeared before the first trial:

> See above: the four categories you saw separately now appear together. Remember, each word belongs to only one group. The green and white labels and words may help you to identify the appropriate category. Use the E and I keys to categorise words into the four groups on the left and the right, and correct errors by hitting the other key. GO AS FAST AS YOU CAN – WHILE MAKING AS FEW ERRORS AS POSSIBLE. Press the space bar when ready.

Block 4: Consistent categories test. Block 4 contained 40 trials, with each target word from the four categories presented twice. The following instructions appeared before the first trial:

> Sort the same four categories again. The green and white labels and words may help to identify the appropriate category. Use the E and I keys to categorise words into the four groups on the left and on the right, and correct errors by hitting the other key. GO AS FAST AS YOU CAN – WHILE MAKING AS FEW MISTAKES AS POSSIBLE. Press space bar when ready.

Block 5: Life–Death discrimination. This block was identical to Block 1, except that the Life category now appeared on the top left and the Death category on the top right. The following instructions appeared before the first trial:

Notice above: there are only two categories and they have switched positions. The category that was previously on the left is now on the right, and the category that was on the right is now on the left. Practice this new configuration. Use the E and I keys to categorise words to the left and to the right, and correct errors by hitting the other key. Press space bar when ready.

Block 6: Inconsistent categories test. This block was similar to Block 3, except that the Life and Not Me categories appeared together on the top left, while the Death and Me categories appeared together on the top right. The following instructions appeared before the first trial:

See above: the four categories now appear together in a new configuration. Remember, each word belongs to only one group. The green and white labels and words may help to identify the appropriate category. Use the E and I keys to categorise words into the four groups on the left and on the right, and correct errors by hitting the other key. Press space bar when ready.

Block 7: Inconsistent categories test. The final test block was similar to Block 4, with the Life and Not Me categories presented together and assigned to the 'E' key, and the Death and Me categories together and assigned to the 'I' key. The instructions were as follows:

Sort the same four categories again. The green and white labels and words may help to identify the appropriate   category. Use the E and I keys to categorise words into the four groups on the left and on the right, and correct   errors by hitting the other key. GO AS FAST AS YOU CAN–WHILE MAKING AS FEW MISTAKES AS   POSSIBLE.

The procedure for the inconsistent-first IAT was the same as above, except that the presentation of Blocks 1, 3 and 4 occurred in place of Blocks 5, 6 and 7, and vice-versa.

Stage 3: Implicit Measure: (e.g. Death IRAP). Prior to commencing the IRAP practice trials, participants were exposed to automated instructions for IRAP completion, as follows.

Now please answer AS IF you associate yourself with death and other people with life.
Try to get as many as possible 'right' according to the rule above.
Press space bar to continue.

Participants were verbally instructed that during IRAP trials a word or phrase would appear on the top of the screen, along with a word in the centre of the screen, and that their task was to respond as True or False according to the rule presented at the beginning of the block. They were also informed that the rule would switch during the next block, so that they should respond, for example, as if they associated themselves with life and other people with death (for participants who began on a consistent block, this would be the case).

Each IRAP trial presented a label stimulus, a target stimulus and two response options (as described above). Selecting the 'correct' response option for a particular block of trials removed all stimuli from the screen for a 400 ms interval before the next trial appeared. Selecting the 'incorrect' response option for a particular block was consequated by a red 'X' in the middle of the screen directly below the target. The next trial only appeared when a correct response was emitted.

Each IRAP block presented 24 trials in a quasi-random order with the constraint that each of the 12 target stimuli appeared twice, once with each of the two types of label. As described above, the IRAP trials are typically conceptualised in terms of four trial-types (see Figures 2.1 and 2.2). The randomisation algorithm ensured that within each block of 24 trials the four trial-types are each presented six times, and that the same trial-type is never presented twice in succession.

In Block 1, and all subsequent *odd* numbered blocks, participants were required to respond in a pattern that was "pro-death" (e.g. Self-Death-True). In Block 2, and all subsequent *even* numbered blocks, participants were required to respond in a pattern that was "pro-life" (e.g. Self-Death-False). Trial block presentation was counterbalanced across participants, with half completing the Self-Death/Others-Life trials first and the remaining half completing the Self-Life/Others-Death trials first.

The IRAP commenced with a minimum of two practice blocks. Participants were required to achieve ≥ 80% correct and a response latency ≤ 2000 ms for each practice block. If they failed to achieve these performance criteria, they were provided with automated feedback on their performance and practice blocks then continued up to a maximum of 8 blocks (i.e. 4 pairs). Failing to meet the criteria after 8 practice blocks terminated participation. When the criteria were reached on a pair of practice blocks, participants proceeded automatically to a series of six test blocks. Progression through the test blocks was irrespective of performance, although participants continued to receive feedback on block performance (to encourage the maintenance of accurate and rapid responding). In addition, the instruction: "This is a test – go fast. Making few errors is okay" appeared at the beginning of each block. The IRAP programme automatically recorded response accuracy (based on the first response emitted on each trial) and response latency (time in ms between trial onset and emission of correct response) for each participant on each trial. At the end of the last test block, the following message appeared on-screen: "Thank you. That is the end of this part of the experiment. Please report to the researcher".

Stage 4: Implicit Measure: (e.g. Imagine Death IRAP). All structural and procedural aspects of the Imagine Death IRAP were identical to the Death IRAP.

Results

Analytic Strategy

Experiment 1 sought to measure implicit responses to life and death in terms of self and others using the IAT and two IRAPs. Explicit measures of psychopathology and attitudes to life after death were also presented. Hence, a secondary aim of the study was to compare implicit and explicit responses. Mean scores were calculated for each explicit measure and

assessed relative to norms. Each implicit measure was analysed separately. A one-sample t-test confirmed whether the mean IAT D-score was significant from 0 and a correlation matrix determined whether it correlated with the explicit measures. Similarly, a one-sample t-test confirmed whether any of the trial-type D-scores on either IRAP was significant from 0 and a correlation matrix determined potential relationships with the explicit measures. Where correlations were significant, the explicit scores were sub-divided according to suggested or clinical cut-offs and one-way ANOVAs compared the implicit performances of the respective sub-groups. Finally, a correlation matrix calculated potential relationships among the IAT D-score and the trial-type D-scores on the IRAPs.

Explicit Measures

Mean scores and standard errors were calculated for all four explicit measures (DASS, BHS, AAQ and BAS) and are presented in Table 2.4.

Table. 2.4 Mean scores with standard error values for each explicit measure.

Explicit Measure	Mean (SE)
DASS	
-Depression	9.94 (1.44)
-Anxiety	6.61 (1.47)
-Stress	13.0 (1.59)
BHS	4.22 (.55)
BAS	30.97 (2.83)
AAQ	20.67 (1.51)

The DASS Depression mean was 9.94 and thus within normal range (0 - 9). This reflected the scores of 22 participants, while 2 indicated mild depression (10 - 13), 4 were moderate (14 - 20), 7 were severe (21 - 27), and 1 was extremely severely depressed (28 +). The Anxiety mean was 6.61, again within normal range (0 - 7). This reflected the scores of

26 participants, while 1 indicated mild anxiety (8 - 9), 4 were moderate (10 - 14), 1 was severe (15 - 19), and 4 were extremely severely anxious (20 +). Finally, the Stress mean was 13, again within normal range (0 - 14). This reflected the scores of 26 participants, while 4 indicated mild stress (15 - 18), 2 were moderate (19 - 25), 5 were severe (26 - 33), and 1 was extremely severely stressed (34 +).

The BHS mean was 4.22 and thus categorised as mild hopelessness (4-8). Twenty participants scored as minimal hopelessness (0 - 3), 11 were mild (4 - 8), and 5 were moderate (9 - 14; none were severe).

The AAQ mean was 20.67 and thus marginally above normal avoidance (>17.34). Despite this, 17 participants scored below the norm, indicating low avoidance, and 19 scored above the mean, indicating high avoidance.

The BAS mean was 30.97 and thus suggested neutrality in belief about an afterlife. Twenty-one participants scored above the mean, indicating stronger belief in an afterlife, while 15 scored below the mean, indicating low belief in an afterlife.

IAT Data

The IAT data were calculated according to the procedures recommended by Greenwald, Nosek and Banaji (2003). Response latencies, defined as the time in milliseconds between trial onset and the emission of a correct response, were transformed into D-scores for each participant. (This controlled for the possibility of individual differences in speed of responding, which may have confounded between groups effects). The D-algorithm used presently may be summarised as follows. 1. Latencies above 10,000ms from the data set were removed and replaced with the mean response latency of those remaining correct responses in the corresponding block. 2. Latencies for incorrect responses were also replaced with the mean response latency of those remaining correct responses in the corresponding block 3. Data for participants who produced more than 10% of trials with latencies less than 300ms

were discarded. 4. Means for trials in each of the four blocks 3, 4, 6, and 7 were calculated. 5. A standard deviation was calculated for blocks 3 and 6, and for blocks 4 and 7. 6. The difference scores between blocks 3 and 6, and between blocks 4 and 7 were calculated. 7. Each difference score was divided by its corresponding standard deviation. 8. These remaining two scores were averaged to compute the final D-score. A D-score was calculated for each participant, positive scores indicated a pro-death bias, whereas negative scores indicated a pro-life bias.

The mean D-score across all participants was -0.43 ($SD = .43$), revealing a strong pro-life effect. A one-sample t-test confirmed that the mean IAT D-score was statistically significant from 0 by a mean of 0.43, 95% CI [0.28 to 0.57], $t(35) = 6.015$, $p < .0005$.

A series of correlations were conducted to determine the putative relationships between the IAT D-score and the explicit measures, but none of the correlations proved significant (all p's > .09).

IRAP Data

The IRAP response latency data were transformed according to the D-algorithm outlined in Barnes-Holmes, Barnes-Holmes, Stewart and Boles (2010) for both IRAPs conducted presently. The various steps may be summarised as follows. 1. Latencies greater than 10,000ms were removed from the dataset. 2. If data for a participant showed latencies less than 300ms on more than 10% of test blocks, the data were removed. 3. Twelve standard deviations were calculated for each pair of test blocks (four for each of the trial-types). 4. Twenty-four mean latencies were calculated for the four trial-types in each individual test block. 5. Difference scores were computed for the four trial-types in each pair of test blocks by subtracting the consistent 'pro-death' blocks from the corresponding inconsistent 'pro-life' blocks. 6. The difference scores were divided by their associated standard deviations from step 3, resulting in 12 D-scores, one for each trial-type in each of the test block pairs. 7.

Four final D-scores were calculated by averaging the three scores for each trial-type across the three test-block pairs. One D-score was calculated for each of the four trial-types in both IRAP measures. The D-scores for trial-types three and four in each IRAP were reversed for ease of interpretation. Positive scores indicate pro-death responding, whereas negative scores indicate pro-life responding.

Death IRAP Data. Six participants did not meet the pass criteria for the Death IRAP, leaving *N = 30*. The mean D-scores for each trial-type are illustrated in Figure 2.3. The IRAP effect for the Self-Death trial-type was negligible, while Self-Life showed a strong pro-life effect (i.e. participants responded more quickly to Self-Life-True than Self-Life-False). Others-Death showed a modest pro-death effect, while the Others-Life effect was negligible.

Figure 2.3 Mean D-scores, with standard error bars, for the four trial-types in the Death IRAP from Experiment 1. Positive scores indicate pro-life responses, while negative scores indicate pro-death responses.

A one-samples t-test determined if any of the trial-type D-scores differed significantly from zero, and as expected, both Self-Life (M = 0.566, SD = .335, 95% CI [0.69 to 0.44],

t(29) = -9.234, p < .0001) and Others-Death did (M = -0.181, SD = .389; t(29) = -2.539, p = .017, 95% CI [0.69 to 0.44]).

Correlations between the Death IRAP and Explicit Measures. A correlation matrix calculated potential relationships between the trial-type D-scores on the Death IRAP and the explicit measures. Only Others-Death correlated marginally with AAQ scores, r = 0.39, n = 30, p = 0.05, suggesting that a pro-death pattern for Others correlated with lower avoidance (all other p's > .1). As there are no standardised cut-offs for the AAQ, a median split of scores was conducted (hence approximately representing low (N = 14) versus high (N = 16) avoidance groups). Four one-way ANOVAs then compared the two groups on each trial-type. However, these analyses indicated that the difference between the two groups did not approach statistical significance for any trial-type (all p's > .1).

Imagine Death IRAP. Five participants did not meet the pass criteria for the Imagine Death IRAP, leaving *N* = 31. The mean D-scores for each of the four trial-types are illustrated in Figure 2.4. The Self-Death trial-type was negligibly pro-death, while Self-Life showed a strong pro-life effect. Both Others-Death and Others-Life showed negligible pro-death effects. A one-samples t-test confirmed that Self-Life was significant (M = -0.486, SD = .303; t(30) = -8.937, p<.0001, 95% CI [0.69 to 0.44]).
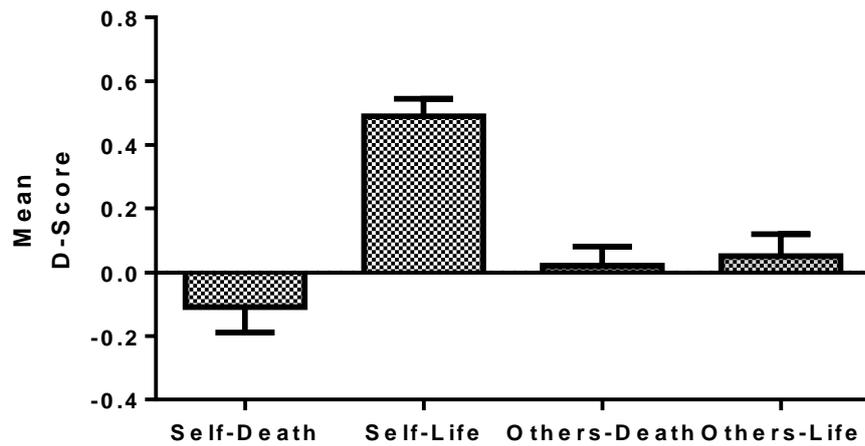
Figure 2.4 Mean D-scores for trial-types in the Imagine Death IRAP from Experiment 1. Positive scores indicate pro-life responses, while negative scores indicate pro-death responses.

Correlations between Imagine Death IRAP and Explicit Measures. A correlation matrix calculated potential relationships among the trial-type D-scores and the explicit measures. Two correlations were recorded (all other p's > .2).

Self-Life correlated with DASS Stress, $r = 0.39$, $n = 31$, $p = 0.03$, suggesting that this pro-life self pattern was associated with higher stress. The D-scores were then compared for normal ($N = 19$) versus high sub-groups (i.e. collapsing mild, moderate, severe and extremely severe, $N = 12$) on the Stress sub-scale and the means are presented in Figure 2.5.
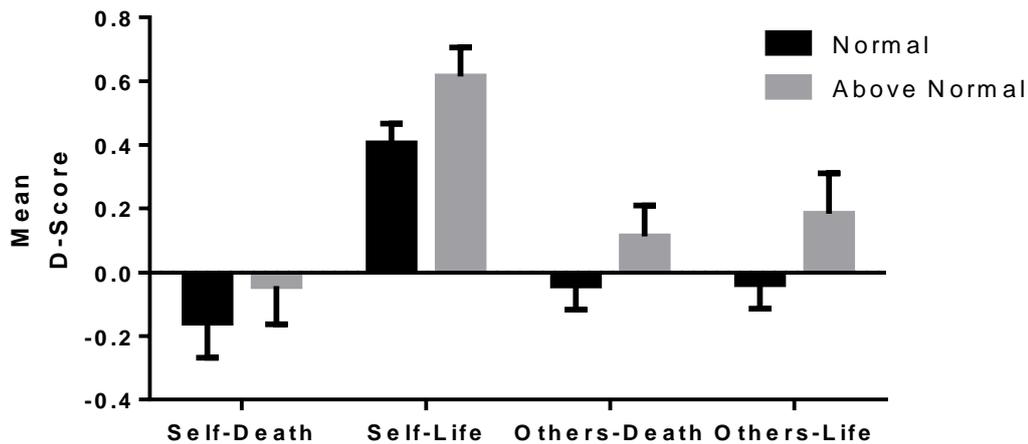
Figure 2.5 Mean D-scores for the Imagine Death IRAP from Experiment 1, divided according to participants who scored within the normal range of (DASS) Stress, and those who scored as high stress. Positive scores indicate pro-death responses, while negative scores indicate pro-life responses.

Self-Death was marginally pro-death for the normal stress group and negligibly pro-death for the high stress group. Self-Life showed a strong pro-life effect for both groups, with the high stress group showing the stronger effect. Both groups showed negligible effects on Others-Death, although the effect for the normal stress group was pro-death, while the effect for the high stress group was pro-life. Others-Life was negligibly pro-death for the normal group and marginally pro-life for the high group. Four one-way ANOVAs compared the two groups on each trial-type and revealed a near significant effect for Self-Life, $F (1, 29) = 3.82$, $p = .06$, (all p's $> .12$).

The correlation matrix also showed that Others-Life correlated with Depression, r = 0.37, n = 31, p = 0.04, suggesting that this pro-life others pattern was associated with higher depression. The D-scores were then compared for normal (N = 18) versus high depression (i.e. collapsing mild, moderate, severe and extremely severe, N = 13). However, four one-

way ANOVAs compared the two groups on each trial-type and did not reveal any significant differences between the groups (all p's > .3).

Implicit-Implicit Correlations

A series of correlations were performed to compare the D-scores of individual trial-types from each IRAP and the IAT D-scores. No significant correlations were observed among any of the trial-types from the Death IRAP and Imagine Death IRAP, or among the Death-Life IAT and the IRAPs (all p's > .07).

Summary of Results

Outcomes on the explicit measures were homogeneous and close to normal range. Specifically, the DASS Depression, Anxiety and Stress sub-scale means were all normal. The BHS mean reflected low hopelessness. The AAQ mean reflected marginal avoidance. And the BAS mean showed neutrality in belief about an afterlife. The mean IAT D-score showed a significant pro-life effect, but did not correlate significantly with any explicit measure. The Death IRAP primarily showed a significant pro-life effect on the Self-Life trial-type. A significant pro-death effect was recorded on Others-Death and this correlated marginally with the AAQ, but sub-dividing AAQ scores according to low versus high avoidance did not differentiate responding on this trial-type. The Imagine Death IRAP also showed a significant pro-life effect on Self-Life, which correlated with Stress and a comparison of normal versus high scores indicated that the latter showed a stronger (approaching significance) pro-life effect. Although Others-Life responding did not produce a significant IRAP effect on the Imagine Death IRAP, it correlated with Depression, but sub-dividing the scores did not differentiate responding on this trial-type. No significant correlations were observed among the Death and Imagine Death trial-types, neither did the IAT D-score correlate with these.

Discussion

Experiment 1 sought to measure implicit responses to life and death using the IRAP and IAT, and aimed to test if implicit outcomes on the IAT would show similarities with the IRAP. As one would expect with the current non-clinical sample, implicit responses on all three measures in Experiment 1 were significantly positive toward life-related stimuli. This IAT outcome was consistent with previous research using the Death-Life IAT with normative samples. While the IRAP outcomes also showed pro-life effects, they did not reveal anti-death effects toward the death-related stimuli. One possible account for this finding is that the life-related stimuli presented in the implicit measures were more salient than the death-related stimuli because of richer verbal histories regarding life than death, especially with normative young adult samples. As a result, Experiment 2 focused more specifically on developing IRAPs to explore responses to life-related stimuli.

Chapter 3

Experiment 2

Developing the IRAP as a measure of future-thinking
by exploring implicit responses to life in the present versus the future

Chapter 3
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Developing the IRAP as a measure of future-thinking
by exploring implicit responses to life in the present versus the future

Evaluations of the future, especially expectations of positive and negative life events, appear to interact with psychopathology. Specifically, minimising positive thoughts about the future has been associated with suicidal thoughts and behaviour, independently of known risk-factors (MacLeod, Pankhania, Lee, & Mitchell, 1997; O'Connor, Fraser, Whyte, MacHale, & Masterson, 2008). And, outcomes on the Future Thinking Task (FTT; MacLeod & Byrne, 1996) have been associated with depression and anxiety.

A number of recent studies have measured *implicit* evaluations and expectancies of the future (e.g. Broccoli & Sanchez, 2009; Meites, Deveney, Steele, Holmes, & Pizzagalli, 2008). For example, Kosnes, Whelan, O'Donovan and McHugh (2013) presented the phrases 'I expect' and 'I don't expect' with positive versus negative characteristics of the future in an IRAP and found that a sample with sub-clinical depression had reduced positive expectancies for the future, compared with controls.

Several studies have also looked at future thinking in terms of comparing self with others. For example, using the FTT, MacLeod and Conway (2007) found that well-being was associated with self-based, rather than others-based, positivity. Furthermore, participants with a history of suicidality showed less self-based positive expectations on the FTT, but no reduction on others-based positivity.

Similar research efforts have been devoted specifically to the study of hopelessness and its potential relationship with suicidality (Abramson et al., 1998; Kuo, Gallo, & Eaton, 2004; MacLeod et al., 2005). Hopelessness is often defined as the expectation of negative future outcomes, coupled with a helpless expectancy of changing these (Abramson et al., 1998). The Beck Hopelessness Scale (BHS; Beck et al., 1974) is the dominant measure of

hopelessness and appears to predict suicidality at six-month and ten-year follow-ups (Beck, Brown, & Steer, 1989; Petrie, Chamberlain, & Clarke, 1988). Hence, this relationship suggests that hopelessness is a key predictor of suicidality (Fawcett et al., 1987; Groholt, Ekeberg, & Haldorsen, 2006).

The primary aim of Experiment 2 was to measure implicit evaluations regarding optimistic and pessimistic future expectancies. And, a secondary aim was to compare implicit future-thinking with self-report measures of psychopathology, such as the BHS. The 'Pessimism IRAP' was designed to assess implicit responses towards one's own life in the present versus in the future, whereas the 'Self Pessimism IRAP' assessed self- versus others-focused future-thinking.

<center>**Method**</center>

Participants

All participants (*N* = 46) were recruited from the undergraduate population of Maynooth University. Three failed to meet the pass criteria for both IRAPs presented currently, hence the total participating sample was 43. Of these, 18 were male, 25 were female and the mean age of participants was 22 years and 9 months.

Setting

All aspects of the setting were identical to Experiment 1.

Materials

The current study involved two sets of measures, five written self-report scales and two IRAPs.

Explicit Measures. The study employed a battery of explicit measures to assess sub-clinical psychopathology (specifically, hopelessness, self-esteem, optimism/pessimism, psychological avoidance, depression, anxiety and stress). These included the DASS, the BHS, the Rosenberg Self-esteem Scale (RSES), the Revised Life Orientation Test (LOT-R) and the AAQ. For details of those measures employed previously (DASS, BHS and AAQ) see Chapter 2.

Rosenberg Self-esteem Scale (RSES). The RSES is a 10-item measure of global self-esteem (Rosenberg, 1979). Participants indicate positive or negative self-referential feelings (e.g. "On the whole, I am satisfied with myself") on a 4-point scale from 0 (Strongly Disagree) to 3 (Strongly Agree). To calculate an overall self-esteem score, the 10 individual scores are summed (five are reversed), thus yielding a maximum score of 30 and a minimum of 0. Scores of 15-25 are considered within the normal range of self-esteem, whereas scores

<center>55</center>

<15 suggest low self-esteem. The RSES has shown good internal consistency and test-retest reliability (Schmitt & Allik, 2005; Shevlin, Bunting & Lewis, 1995). The RSES is provided in Appendix F.

Revised Life Orientation Test (LOT-R). The LOT-R is a measure of dispositional optimism that comprises 10 items of positive expectations (e.g. "In uncertain times, I usually expect the best", Scheier, Carver, & Bridges, 1994). Participants respond on a 5-point scale from 0 (Strongly Disagree) to 4 (Strongly Agree). An overall score is calculated by summing the 6 key items (3 are reverse scored) and removing the rest (e.g. "It's important for me to keep busy"), thus yielding a maximum score of 24 and a minimum of 0. Higher values imply greater optimism. Normative data provided by Glaesmer et al. (2012) reported a mean LOT-R value of 15.8 ($SD = 3.9$) for a young adult population. The LOT-R has shown adequate internal consistency (Cronbach's $\alpha = .72$) and good test-retest reliability (Hirsch, Britton, & Conner, 2010). The LOT-R is provided in Appendix G.

Implicit Measures. Experiment 2 involved two IRAPs -- the Pessimism IRAP and the Self Pessimism IRAP.

Pessimism IRAP. The Pessimism IRAP presented a target word from one of two categories (Optimism or Pessimism), a label statement from one of two categories (Present or Future), and the response options TRUE and FALSE on each trial -- see Table 3.1. The label statement from the Present category was MY LIFE NOW IS and the label statement from the Future category was MY FUTURE IS. The 12 target stimuli were six Optimism words (BRIGHT, PLEASANT, POSITIVE, WORTHWHILE, HOPEFUL, OPTIMISTIC) and six Pessimism words (DARK, SCARY, DOOMED, POINTLESS, NEGATIVE, BLEAK).

Table 3.1 Stimuli in the Pessimism IRAP from Experiment 2, including labels, targets and response options.

Present Label	Future Label
MY LIFE NOW IS	MY FUTURE IS
Optimism Targets	**Pessimism Targets**
BRIGHT	DARK
PLEASANT	SCARY
POSITIVE	DOOMED
WORTHWHILE	POINTLESS
HOPEFUL	NEGATIVE
OPTIMISTIC	BLEAK
Response Option 1	**Response Option 2**
TRUE	FALSE

The Pessimism IRAP comprised of four trial-types: Present-Optimism; Present-Pessimism; Future-Optimism; and Future-Pessimism (see Figure 3.1). When a trial presented the label MY LIFE NOW IS with an Optimism target, choosing TRUE was consistent, but FALSE was inconsistent. When a trial presented MY LIFE NOW IS with a Pessimism target, FALSE was consistent and TRUE inconsistent. When a trial presented MY FUTURE IS with an Optimism target, FALSE was consistent and TRUE inconsistent. And when a trial presented MY FUTURE IS with a Pessimism target, TRUE was consistent and FALSE inconsistent.
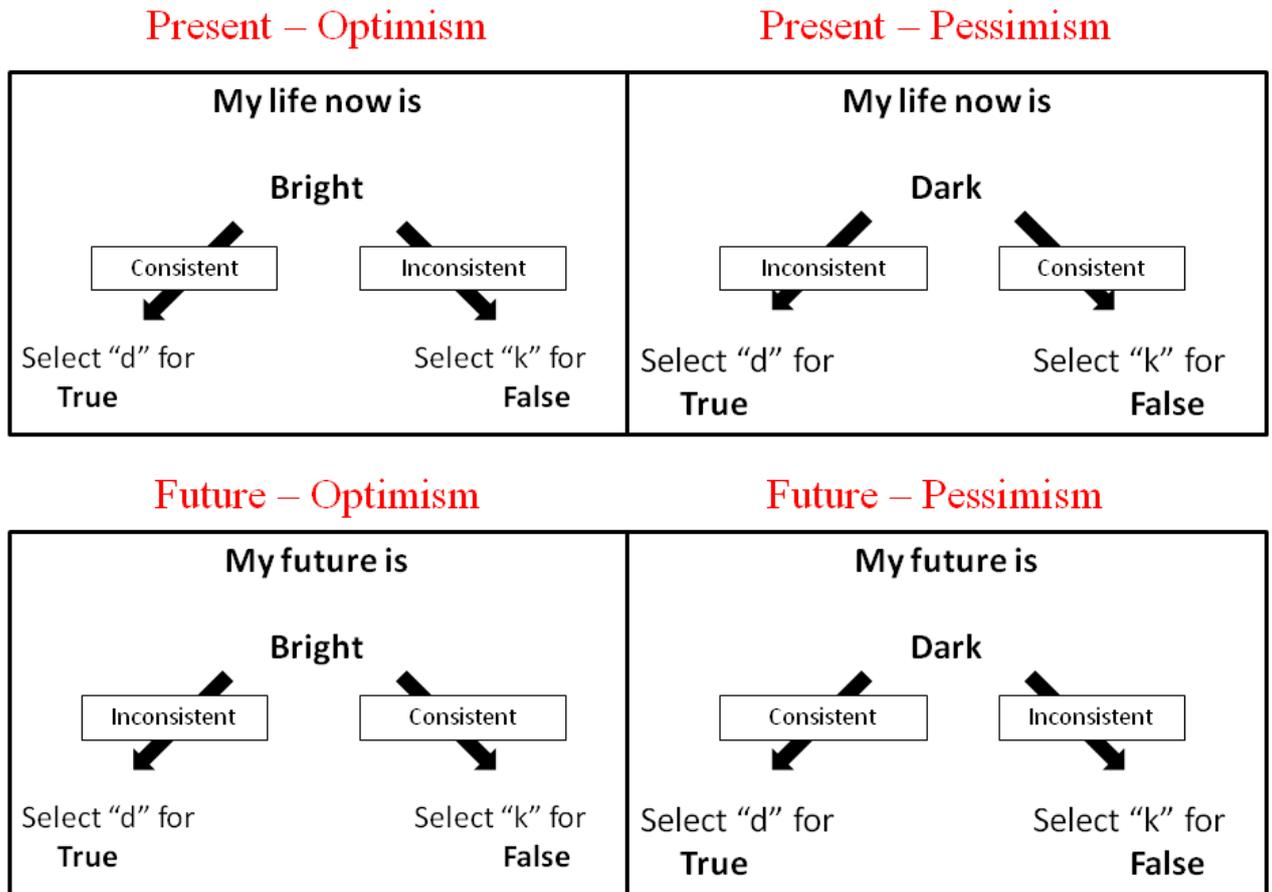
Figure 3.1 Examples of the four trial-types in the Pessimism IRAP from Experiment 2. On each trial, a label stimulus (Present or Future), a target stimulus (Optimism or Pessimism), and the two response options (TRUE and FALSE) appeared on-screen simultaneously. This generated four trial-types: Present-Optimism; Present-Pessimism; Future-Optimism; and Future-Pessimism.

Self Pessimism IRAP. The Self Pessimism IRAP presented a target word from one of two categories (Optimism or Pessimism), a label statement from one of two categories (Self or Others), and the response options TRUE and FALSE on each trial -- see Table 3.2. The label statement from the Self category was MY FUTURE NOW IS and the label statement from the Others category was OTHER PEOPLE'S FUTURES ARE. The 12 target stimuli were the same six Optimism words (BRIGHT, PLEASANT, POSITIVE, WORTHWHILE, HOPEFUL, OPTIMISTIC) and the same six Pessimism words (DARK, SCARY, DOOMED, POINTLESS, NEGATIVE, BLEAK) from the Pessimism IRAP.

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Table 3.2 Stimuli in the Self Pessimism IRAP from Experiment 2, including labels, targets and response options.

Self Label	Others Label
MY FUTURE IS	OTHER PEOPLE'S FUTURES ARE
Optimism Targets	**Pessimism Targets**
BRIGHT	DARK
PLEASANT	SCARY
POSITIVE	DOOMED
WORTHWHILE	POINTLESS
HOPEFUL	NEGATIVE
OPTIMISTIC	BLEAK
Response Option 1	**Response Option 2**
TRUE	FALSE

The Self Pessimism IRAP comprised of four trial-types: My Future-Optimism; My Future-Pessimism; Other Future-Optimism; and Other Futures-Pessimism (see Figure 3.2). When a trial presented MY FUTURE IS with an Optimism target, choosing TRUE was consistent, but FALSE inconsistent. When MY FUTURE IS appeared with a Pessimism target, TRUE was inconsistent, but FALSE consistent. When OTHER PEOPLE'S FUTURES ARE appeared with a Pessimism target, TRUE was consistent, but FALSE inconsistent. When OTHER PEOPLE'S FUTURES ARE appeared with an Optimism target, TRUE was inconsistent, but FALSE consistent.
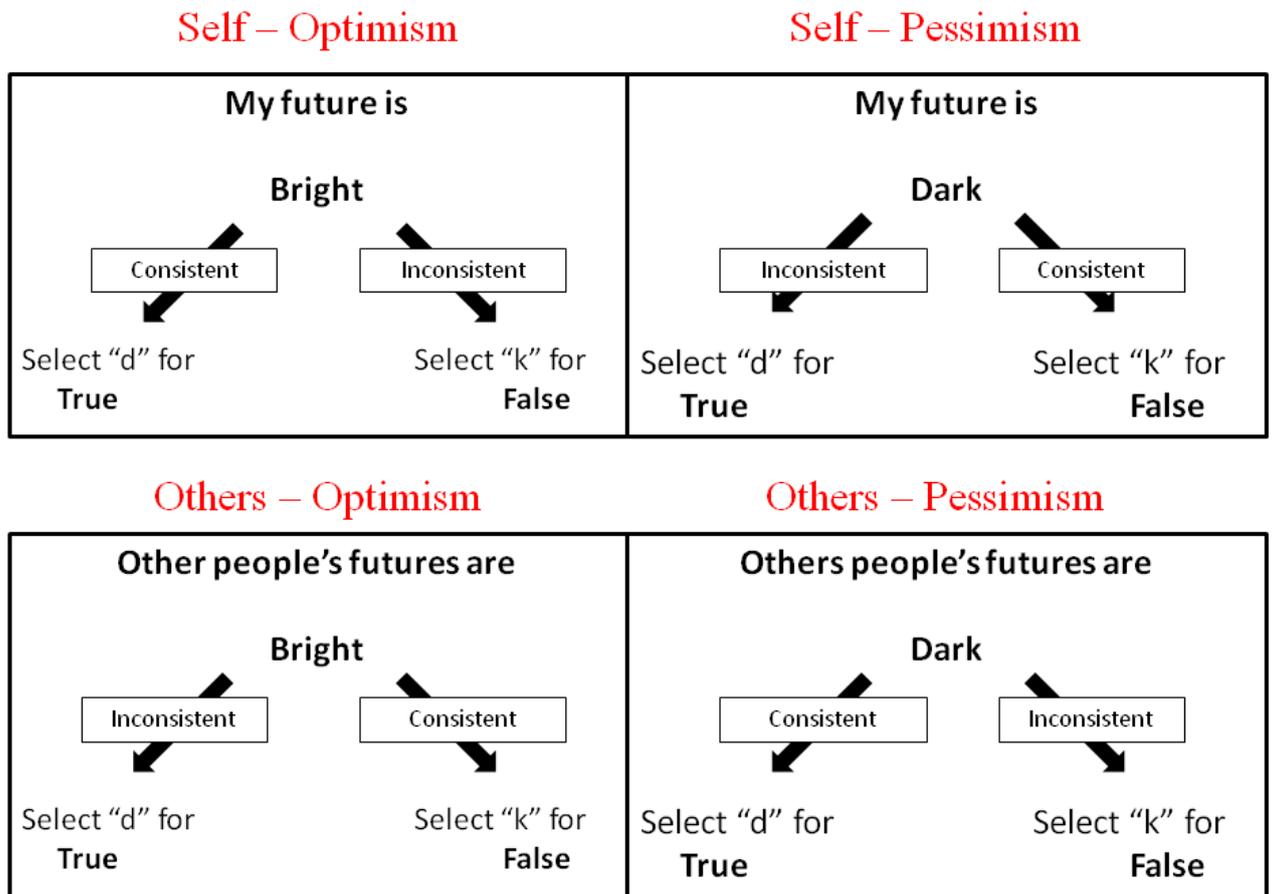
Figure 3.2 Examples of the four trial-types in the Self Pessimism IRAP from Experiment 2. On each trial, a label stimulus (Self or Others), a target stimulus (Optimism or Pessimism), and the two response options (TRUE and FALSE) appeared on-screen simultaneously. This generated four trial-types: My future-Optimism; My Future-Pessimism; Other Future-Optimism; and Other Future-Pessimism.

Ethical Considerations

      All ethical issues of concern in Experiment 1 applied to the current study and were dealt with in accordance with the same ethical guidelines and practices. The SQ was removed because none of the experimental measures contained death-related stimuli. Once again, no participant reported any signs of distress prior to, during, or following the experiment.

Procedure

Experiment 2 comprised of three stages. Stage 1 involved the explicit measures and the remaining stages involved the two IRAPs. The order in which the IRAPs were presented was randomised across participants. Twenty one participants received the Pessimism IRAP first, while 25 received the Self Pessimism IRAP first. The procedural aspects of the IRAP were identical to Experiment 1, except for the reduction of the response accuracy requirement from ≥80% to ≥75% in order to account for the increased complexity of label and target stimuli in subsequent experiments, which may cause an increase in attrition rates.

Results

Analytic Strategy

The analytic strategy adopted in Experiment 2 was largely similar to the previous study, with the exception of the IAT which was now removed. The current study sought to measure implicit responses to self-based and others-based life in the future using two IRAPs. A series of explicit measures of relevant psychopathology and attitudes regarding the future provided insight into participants' self-reports of these phenomena. A secondary aim of the experiment was, therefore, to compare the implicit responses with the explicit responses. Mean scores were first calculated for each of the five explicit measures and were then assessed relative to norms. Thereafter, each implicit measure was analysed separately. A one-sample t-test was also used to confirm whether any of the trial-type D-scores on either IRAP were statistically significantly different from 0. A correlation matrix also determined potential relationships among the trial-type D-scores on each IRAP and the explicit measures. If any of these correlations were statistically significant, the scores on the relevant explicit

measure were split according to suggested or clinical cut-offs and the IRAP performances were then compared for the two sub-groups using one-way ANOVAs. Finally, a correlation matrix calculated potential relationships among the trial-type D-scores on the Pessimism and Self Pessimism IRAPs.

Explicit Data

Mean scores and standard errors were calculated for all five explicit measures (DASS, BHS, RSES, LOT-R and AAQ) and are presented in Table 3.3.

Table. 3.3 Mean scores with standard error values for each of the explicit measures.

Explicit Measure	Mean (SE)
Depression	8.51 (1.35)
Anxiety	8.74 (1.28)
Stress	13.53 (1.52)
BHS	4.19 (0.54)
RSES	18.84 (0.84)
LOT-R	15.42 (0.59)
AAQ	23.12 (1.47)

The DASS Depression mean was 9.94 and thus bordered on the normal-mild range. In total, 22 participants scored as normal, 5 as mildly depressed, 6 as moderately depressed, and 3 as extremely depressed. The Anxiety mean was 8.74 and mild. Twenty-six participants scored as normal, 8 as moderately anxious, 2 as severely anxious, and 7 as extremely anxious. Finally, the Stress mean was 13.53 and normal. Twenty-seven participants scored as normal, 8 as mildly stressed, 1 as moderately stressed, 3 as severe, and 4 as extremely severe.

The BHS mean was 4.19 and categorised as low hopelessness. This reflected the scores of 27 participants, while 10 indicated mild hopelessness, 5 were moderate, and 1 severely hopeless. The RSES mean was 18.84 and normal. This reflected 31 participants, while 3 showed high self-esteem and 9 showed low. The LOT-R mean was 15.42, thus indicating normal levels of optimism (15.8). Twenty-one participants scored below the norm, indicating low optimism, while 26 scored above the mean indicating high optimism. The AAQ mean was 23.12 and marginally above normal avoidance (i.e. >17.34). Sixteen participants scored below the norm, indicating low avoidance, and 30 scored above the mean, indicating high avoidance.

IRAP Data

Pessimism IRAP. Six participants did not meet the accuracy criterion, resulting in a final participating sample of 37. The mean D-scores per trial-type are presented in Figure 3.3. The IRAP effect on Present-Optimism was moderately optimistic (i.e. participants responded more quickly to Present-Optimism-True than False), while the Present-Pessimism effect was negligible. Future-Optimism was also moderately optimistic, while Future-Pessimism was negligibly optimistic. A one-samples t-test indicated that both Present-Optimism (0.23, 95% CI [0.11 to 0.34], $t(36) = 3.937$, $p < .0001$) and Future-Optimism (.20, 95% CI [0.32 to 0.08], $t(36) = 3.503$, $p = .001$) effects were statistically significant (all other p's > .3).
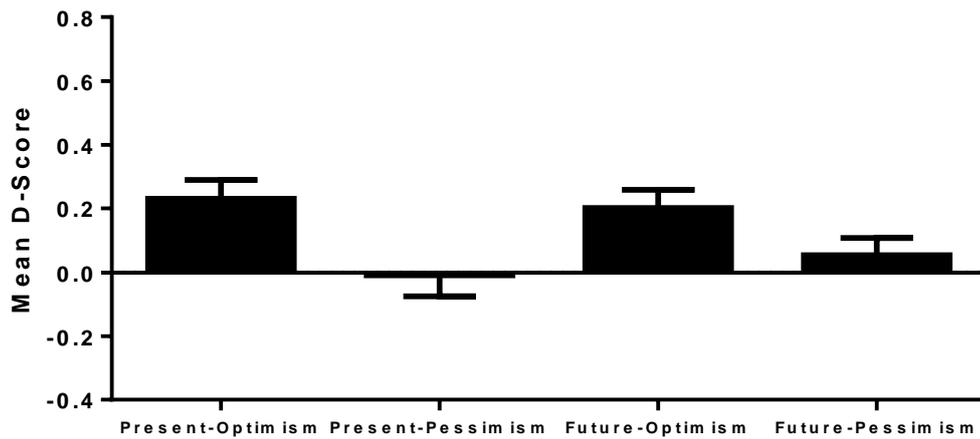
Figure 3.3 Mean D-scores with standard error bars for the four trial-types in the Pessimism IRAP from Experiment 2. Positive scores indicate optimism, whereas negative scores indicate pessimism.

Correlations between the Pessimism IRAP and Explicit Measures. A series of correlations explored relationships among the four trial-types and explicit measures. The majority of correlations were not statistically significant (all p's > .1), except for four, all of which involved the Present-Optimism trial-type.

Responding on Present-Optimism correlated positively with the LOT-R (r = .48, p = .01), suggesting a relationship between this aspect of implicit optimism and self-reported optimism. As there are no standardised cut-offs for the LOT-R, a median split of scores was conducted (hence loosely representing high (*N* = 16) versus low optimism (*N* = 21)) and the means are presented in Figure 3.4.
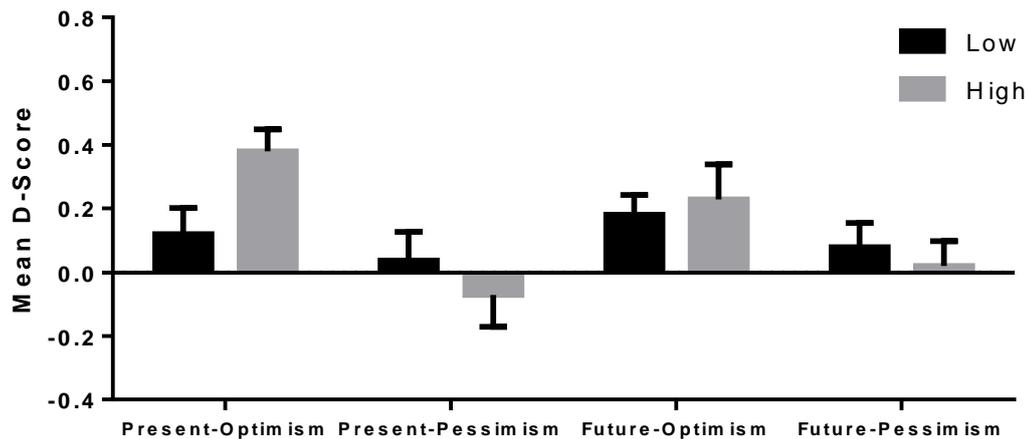
Figure 3.4 Mean D-scores for the Pessimism IRAP from Experiment 2, divided according to participants who scored high versus low in optimism on the LOT-R. Positive scores indicate optimism, whereas negative scores indicate pessimism.

Present-Optimism was strongly optimistic for the high self-reported optimism group and marginally optimistic for the low group. Present-Pessimism showed negligible effects for both groups. On the Future-Optimism trial-type both groups showed moderate optimistic responses, with the high optimism group displaying a slightly stronger effect in this instance On Future-Pessimism the two groups showed negligibly optimistic responses. Four one-way ANOVAs compared the two groups on each trial-type and revealed a statistically significant difference for Present-Optimism, $F (1, 35) = 5.22$, $p = .03$, (all other p's > .4).

Present-Optimism also correlated positively with the RSES (r = .41, p = .01), suggesting a relationship between this aspect of implicit optimism and self-esteem. The RSES scores were split into low (0 - 15, $N = 8$) and normal/high (15 - 30, $N = 29$) sub-groups and compared on IRAP performance. The mean D-scores for each group are illustrated in Figure 3.5.
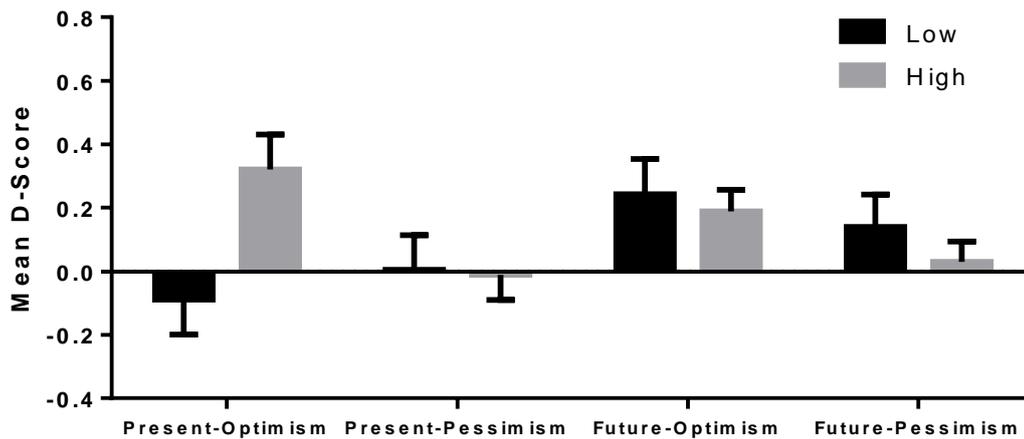
Figure 3.5 Mean D-scores for the Pessimism IRAP from Experiment 2, divided according to participants who scored as low versus normal/high self-esteem on the RSES. Positive scores indicate optimism, whereas negative scores indicate pessimism.

On Present-Optimism, the low self-esteem group showed marginal pessimism, while the normal/high group showed moderate optimism. On Present-Pessimism both groups showed negligible responses, in the direction of optimism for the low group and in the direction of pessimism for the normal/high group. On Future-Optimism, both groups showed moderate optimism, with the low group showing the stronger effect. On Future-Pessimism, the low self-esteem group showed marginal optimism, while the normal group showed negligible optimism. Four one-way ANOVAs comparing the two groups on each trial-type indicated that the difference on Present-Optimism was again statistically significant ($F(1, 35) = 10.41$, $p < .0005$; all other p's > .4).

Present-Optimism correlated negatively with the AAQ ($r = -.33$, $p = .05$), suggesting a relationship between this aspect of implicit optimism and experiential avoidance. As there are no standardised cut-offs for the AAQ, a median split was conducted to compare low ($N = 18$) and high ($N = 19$) avoidance. However, four one-way ANOVAs indicated that the groups did not differ significantly on any trial-type (all p's > .07).

Present-Optimism also correlated negatively with (DASS) Stress (r = -.32, p = .05).

The D-scores were then compared for normal (N = 24) versus above normal sub-groups (i.e.

collapsing mild, moderate, severe and extremely severe, N = 13). The mean D-scores for

each group are illustrated in Figure 3.6.
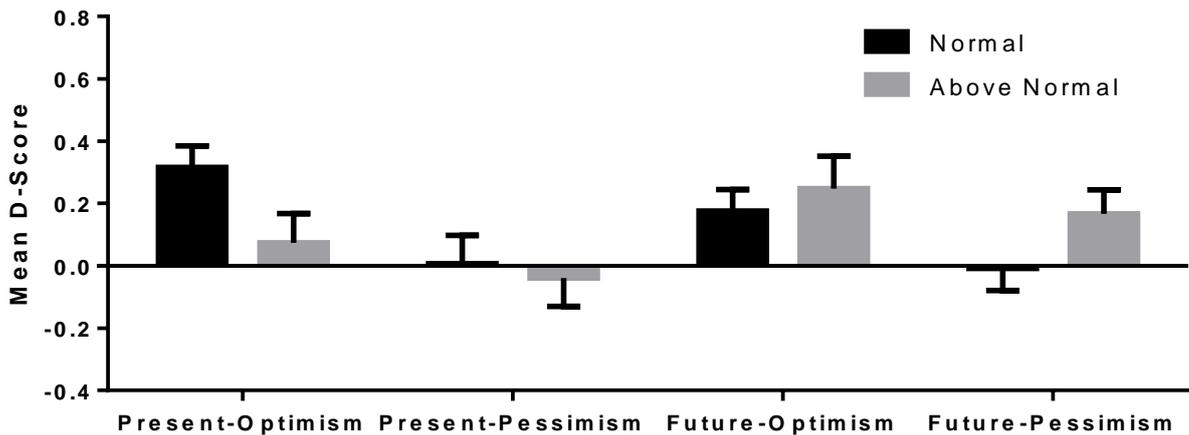
Figure 3.6 Mean D-scores for the Pessimism IRAP from Experiment 2, divided according to participants who scored as normal versus above normal Stress on the DASS. Positive scores indicate optimism, whereas negative scores indicate pessimism.

Present-Optimism was moderately optimistic for the normal stress group and

negligibly optimistic for the high stress group. Both groups showed negligible effects on

Present-Pessimism, although the effect for the normal stress group was optimistic, while the

effect for the high stress group was pessimistic. Both groups showed moderately optimistic

effects on Future-Optimism, however the effect for high stress group was stronger. Future-

Pessimism was negligibly pessimistic for the normal group and marginally optimistic for the

high group. Four one-way ANOVAs indicated that the difference between groups on Present-

Optimism trial-type was statistically significant ($F(1, 35) = 4.21$, $p \leq .05$; all other p's > .1).

Self Pessimism IRAP. One participant did not meet the accuracy criterion, resulting

in a final sample of 42 participants. The mean trial-type D-scores are presented in Figure 3.7.

Responding on My-Future-Optimism showed a strong optimistic effect, while My-Future-Pessimism showed moderate optimism. Other-Future-Optimism was negligibly optimistic, while Other-Future-Pessimism was moderately pessimistic. A one-samples t-test indicated that both My-Future-Optimism (0.43, 95% CI [0.32 to 0.55], t(41) = 7.727, p <.0001) and Other-Future-Pessimism (0.13, 95% CI [0.01 to 0.26], t(41) = 2.144, p <.04) were statistically significant (all other p's > .3).
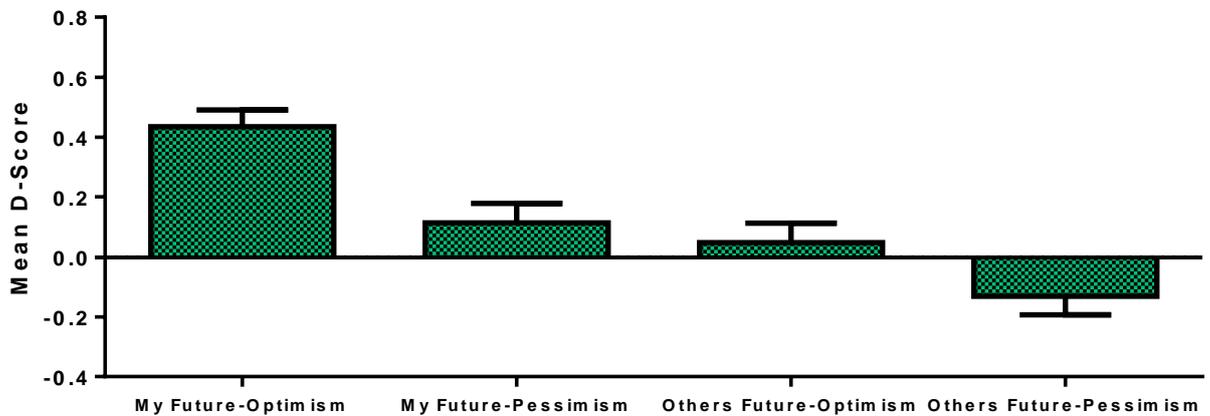
Figure 3.7 Mean D-scores for trial-types in the Self Pessimism IRAP from Experiment 2. Positive scores indicate optimism, whereas negative scores indicate pessimism.

Correlations between Self Pessimism IRAP and Explicit Measures. The majority of correlations were not statistically significant (all p's > .1), except for three, involving My Future-Optimism and Other Future-Pessimism.

My-Future-Optimism correlated positively with the LOT-R (r = .31, p = .05). As before, a median split was conducted to loosely distinguish between high (*N* = 24) and low (*N* = 18) optimism). However, four one-way ANOVAs indicated that the two groups did not differ significantly on any trial-type (all p's > .1).

Others Future-Pessimism correlated positively with the RSES (r = -.34, p = .03). The RSES scores were split into low (0 - 15, *N* = 11) and normal/high (15 - 30, *N* = 31) sub-

groups and compared on IRAP performance. The mean D-scores for each group are

illustrated in Figure 3.8.
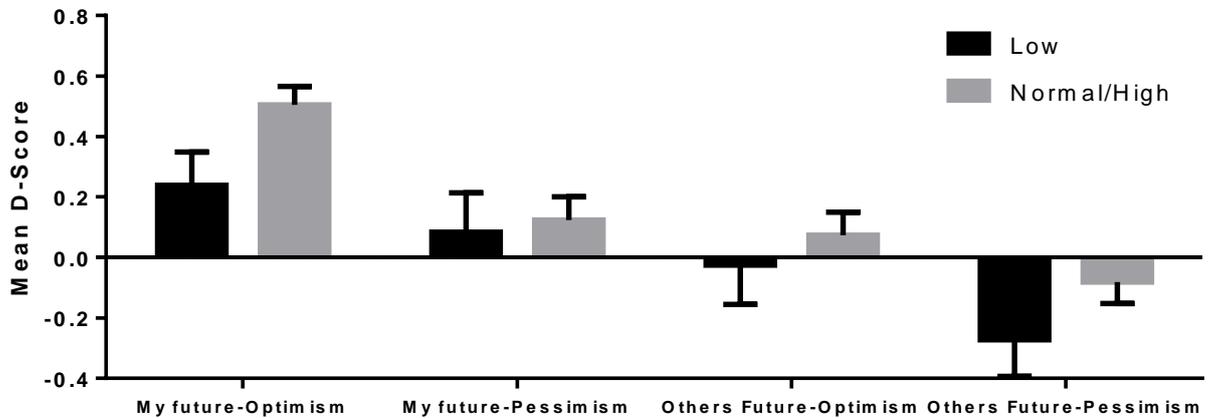
Figure 3.8 Mean D-scores for the Self Pessimism IRAP from Experiment 2, divided
according to participants who scored as low versus normal/high self-esteem on the RSES.
Positive scores indicate optimism, whereas negative scores indicate pessimism.

On My Future-Optimism, the low self-esteem group showed moderate optimism,

while the normal/high group showed strong optimism. On My Future-Pessimism both groups

similarly showed marginal optimism. On Others Future-Optimism, the low self-esteem group

showed marginal pessimism and the normal/high group marginal optimism. On Future-

Pessimism, both groups demonstrated pessimism, with the low group showing the strongest

effect. Four one-way ANOVAs comparing the two groups on each trial-type indicated that

the difference on My Future-Optimism was statistically significant ($F(1, 40) = 4.72$, $p = .04$;

all other p's > .2).

Others Future-Pessimism also correlated negatively with the BHS (r = -.34, p = .03).

BHS scores were split by collapsing mild, moderate and severe hopelessness (scores of 4-20,

$N = 16$) and comparing these with minimal (scores of 0-3, $N = 26$). However, four one-way

ANOVAs indicated that these two groups did not differ significantly on any trial-type (all p's

> .07).

Implicit-Implicit Correlations

A correlation matrix calculated potential relationships between the trial-type D-scores on the two IRAPs. Present-Optimism on the Pessimism IRAP correlated positively with My Future-Optimism on the Self Pessimism IRAP ($r = .4$, $n = 36$, $p = .01$) and Present-Pessimism on the Self Pessimism IRAP correlated positively with My Future-Pessimism on the Self Pessimism IRAP ($r = .41$, $n = 36$, $p = .01$). My Future-Pessimism on the Pessimism IRAP correlated positively with the Others Future-Pessimism on the Self Pessimism IRAP ($r = .35$, $n = 36$, $p = .04$).

Summary of Results

Outcomes on the explicit measures were homogeneous and close to normal range. That is, the Depression, Anxiety and Stress sub-scale means were all in the normal or mild categories. The BHS mean reflected low hopelessness. The RSES mean was in the normal range. The AAQ mean reflected marginal avoidance. And the LOT-R mean showed moderate optimism.

The Pessimism IRAP primarily showed a statistically significant optimistic effect on the Present-Optimism trial-type, which correlated with the LOT-R, RSES, AAQ and Stress scores. Participants with normal stress showed statistically significantly stronger optimism on this trial-type compared than those with above normal stress. These comparisons applied similarly to high versus low self-esteem and high versus low explicit optimism. There was also a statistically significant optimistic effect on the Future-Optimism trial-type.

The Self Pessimism IRAP also showed a statistically significant optimistic effect on My Future-Optimism, which correlated with the LOT-R, but there was no differentiation between sub-groups. There was also a pessimistic effect on Others Future-Pessimism, which

correlated with the BHS and the RSES. There was no statistically significant differentiation between the BHS sub-groups on this trial-type. Others Future-Pessimism correlated with the RSES, however dividing the RSES into low versus normal/high self-esteem sub-groups yielded a statistically significant difference on My Future-Optimism. A series of correlations showed statistically significant relationships between the present-focused and future-focused optimism trial-types and also between the present and future-focused pessimism trial-types. Furthermore, My Future-Pessimism correlated with Others Future-Pessimism.

Discussion

The aim of Experiment 2 was to measure implicit future-thinking. Across both the Pessimism IRAP and Self Pessimism IRAP significantly optimistic responses to self-based future were observed. On the Pessimism IRAP, participants also evaluated their life in the present as positive. However, this positivity toward the present and future were not observed on the others-based trial-types. In general, the results concord with implicit outcomes recorded with Kosnes et al.'s (2013) normative sample. The correlation analyses provided evidence for a relationship between the implicit measures and explicit measures of psychopathology, and clear group differences were observed in some contexts. The current experiment manipulated the label stimuli between the Pessimism IRAP and Self Pessimism IRAP to focus on self versus others-based future-thinking, although the target stimuli were constant across both IRAPs (i.e. they focused on general outlook toward the future, such as bright and pleasant versus dark and scary). In the following experiment, implicit evaluations regarding self-based future-thinking were measured again, but the target stimuli were manipulated to determine the potential influence of this on previous outcomes.

Chapter 4

Experiment 3

Further development of the IRAP as a measure of personal future-thinking and an

investigation of implicit worthiness

Chapter 4

Experiment 3

Further development of the IRAP as a measure of personal future-thinking and an investigation of implicit worthiness

Experiment 3 sought to further develop the IRAP as a measure of future-thinking and to explore evaluations of the worthiness of a positive versus negative life. The findings from Experiment 2 indicated that non-clinical participants showed positive implicit evaluations of their own lives (but not others) in the present and in the future. The current study specifically sought to develop the Pessimism IRAP by targeting self-based evaluations of the *possession* of positive versus negative life attributes in the present and future. That is, the Positivity IRAP developed for Experiment 3 investigated the specific life attributes that may drive the positivity observed previously (e.g. the possession of friendship, intimacy and achievement, versus loneliness, rejection and misery).

The second IRAP employed in Experiment 3 targeted whether participants had a perception of being worthy of positive and negative life attributes. Implicit worthiness has been explored previously with a self-esteem IAT, in which participants categorise Me and Not Me stimuli with Valuable (e.g. successful, competent) and Worthless (e.g. inferior, stupid) stimuli. The findings of this research indicate that participants with a history of suicidality tend to show high implicit self-esteem but low *explicit* self-esteem (Franck et al., 2007). The primary aim of Experiment 3 was to further explore evaluations regarding self-based future-thinking, and also to measure implicit evaluations surrounding the worthiness of a positive or negative life.

Method

Participants

All participants (*N* = 50) were recruited from the undergraduate population of Maynooth University. Two failed to meet the pass criteria of the two IRAPs presented currently, leaving a total sample of 48. Of these, 20 were male, 28 were female and the mean age was 20 years and 12 months.

Setting

All aspects of the setting were identical to the previous experiments.

Materials

The current study involved two sets of measures; five self-report scales and two IRAPs.

Explicit Measures. All five explicit measures (DASS, BHS, RSES, LOT-R and AAQ) from Experiment 2 were employed again.

Implicit Measures. Experiment 3 involved two IRAPs -- the Positivity IRAP and the Worthiness IRAP.

Positivity IRAP. The Positivity IRAP presented a target word from one of two categories (Positive or Negative), a label statement from one of two categories (Present or Future), and TRUE and FALSE on each trial -- see Table 4.1. The label statement from the Present category was I ALREADY HAVE and the label statement from the Future category was I WILL ALWAYS HAVE. The 12 target stimuli comprised of 6 Positive words (FULFILMENT, INTIMACY, FRIENDSHIP, PLEASURE, ACHIEVEMENT, JOY) and 6 Negative words (REJECTION, MISERY, LONELINESS, WORRY, REGRET, HOPELESSNESS).

Table 4.1 Stimuli in the Positivity IRAP from Experiment 3, including labels,
targets and response options.

Present Label	Future Label
I ALREADY HAVE	I WILL ALWAYS HAVE
Positive Targets	**Negative Targets**
FULFILMENT	REJECTION
INTIMACY	MISERY
FRIENDSHIP	LONELINESS
PLEASURE	WORRY
ACHIEVEMENT	REGRET
JOY	HOPELESSNESS
Response Option 1	**Response Option 2**
TRUE	FALSE

The Positivity IRAP comprised of four trial-types: Present-Positive; Present-

Negative; Future-Positive; and Future-Negative (see Figure 4.1). When a trial presented the

label I ALREADY HAVE with a Positive target, TRUE was consistent, but FALSE

inconsistent. When a trial presented I ALREADY HAVE with a Negative target, FALSE was

consistent and TRUE inconsistent. When a trial presented I WILL ALWAYS HAVE with a

Positive target, FALSE was consistent and TRUE inconsistent. And when a trial presented I

WILL ALWAYS HAVE with a Negative target, TRUE was consistent and FALSE

inconsistent.
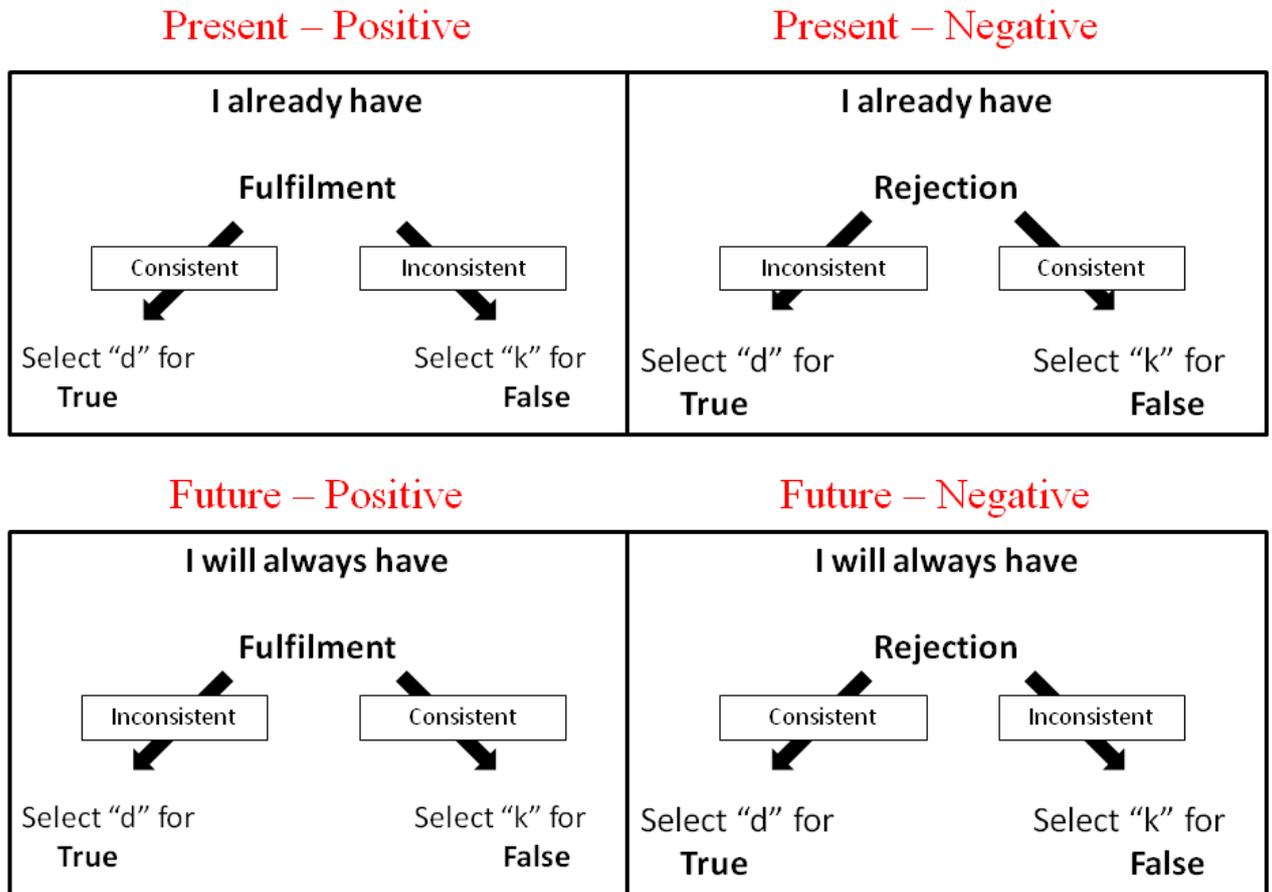
Figure 4.1 Examples of the four trial-types in the Positivity IRAP from Experiment 3. On each trial a label stimulus (Present- or Future-related), a target stimulus (Positive or Negative), and the two response options (TRUE and FALSE) appeared on-screen simultaneously. This generated four trial-types: Present-Positive; Present-Negative; Future-Positive; and Future-Negative.

Worthiness IRAP. The Worthiness IRAP presented a target word from one of two categories (Positive or Negative), a label statement from one of two categories (I Deserve or Others Deserve), and the response options TRUE and FALSE on each trial -- see Table 4.2. The label statement from the Self category was I DESERVE, and the label statement from the Others category was OTHER PEOPLE DESERVE. The 12 target stimuli were identical to the Positivity IRAP, with 6 Positive words (FULFILMENT, INTIMACY, FRIENDSHIP, PLEASURE, ACHIEVEMENT, JOY) and 6 Negative words (REJECTION, MISERY, LONELINESS, WORRY, REGRET, HOPELESSNESS).

Table 4.2 Stimuli in the Worthiness IRAP from Experiment 3, including labels,
targets and response options.

I Deserve Label	Others Deserve Label
I DESERVE	OTHER PEOPLE DESERVE
Positive Targets	**Negative Targets**
FULFILMENT	REJECTION
INTIMACY	MISERY
FRIENDSHIP	LONELINESS
PLEASURE	WORRY
ACHIEVEMENT	REGRET
JOY	HOPELESSNESS
Response Option 1	**Response Option 2**
TRUE	FALSE

The Worthiness IRAP comprised of four trial-types: I Deserve-Positive; I Deserve-

Negative; Others Deserve-Positive; and Others Deserve-Negative (see Figure 4.2). When a

trial presented I DESERVE with a Positive target, TRUE was consistent, but FALSE

inconsistent. When a trial presented I DESERVE with a Negative target, FALSE was

consistent and TRUE inconsistent. When a trial presented OTHER PEOPLE DESERVE with

a Positive target, FALSE was consistent and TRUE inconsistent. And when a trial presented

OTHER PEOPLE DESERVE with a Negative target, TRUE was consistent and FALSE

inconsistent.
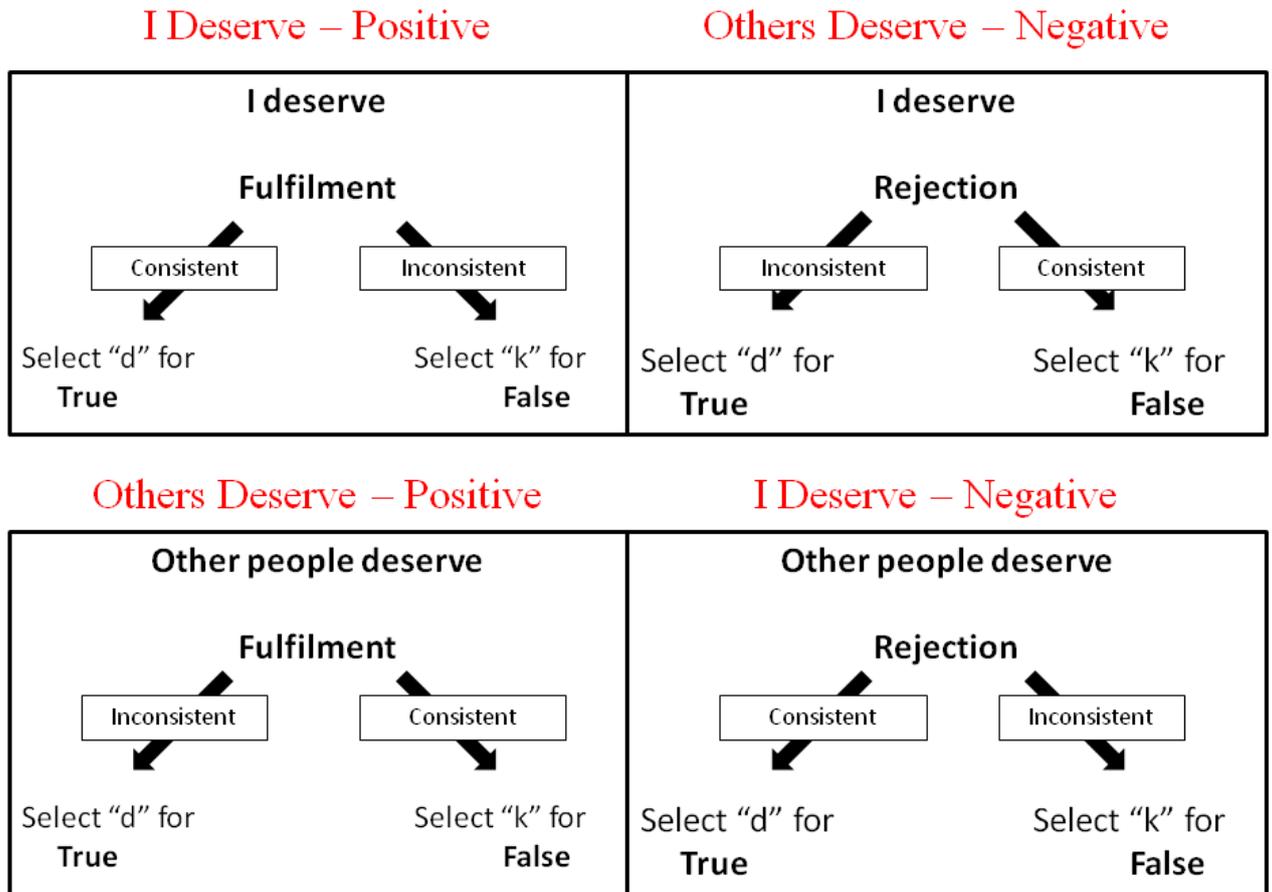
Figure 4.2 Examples of the four trial-types in the Worthiness IRAP from Experiment 3. On each trial a label stimulus (I Deserve or Others Deserve), a target stimulus (Positive or Negative), and the two response options (TRUE and FALSE) appeared on-screen simultaneously. This generated four trial-types: I Deserve-Positive; I Deserve-Negative; Others Deserve-Positive; and Others Deserve-Negative.

Ethical Considerations

The same ethical issues of concern in Experiment 2 applied here and were attended to accordingly. Once again, no participant reported any signs of distress prior to, during, or following the experiment.

Procedure

Experiment 3 again comprised of three stages. Stage 1 involved the five explicit measures and the remaining two stages each involved completion of one of the two IRAPs.

The order in which the IRAPs were presented was randomised across participants, with 23 participants completing the Positivity IRAP first and 25 completing the Worthiness IRAP first. The procedural aspects of the IRAP were identical to the previous experiments.

Results

Analytic Strategy

The analytic strategy adopted in Experiment 3 was identical to the previous study. The current experiment sought to measure implicit responses to the present versus future and to the worthiness of a positive versus negative life. A secondary aim was again to compare the implicit responses with explicit measures of psychopathology.

Explicit Data

Mean scores and standard errors were calculated for the five self-report measures (DASS, BHS, RSES, LOT-R and AAQ) and are presented in Table 4.3.

Table. 4.3 Mean scores with standard error values for each of the explicit measures.

Explicit Measure	Mean (SE)
Depression	9.54 (1.29)
Anxiety	8.25 (1.03)
Stress	12.42 (1.19)
BHS	4.25 (0.47)
RSES	17.46 (0.56)
LOT-R	12.06 (0.44)
AAQ	23.27 (1.17)

The Depression mean was 9.54 and bordered on mild. In total, 27 participants scored as normal, 8 as mildly depressed, 7 as moderately depressed, 3 as severely depressed, and 3 as extremely depressed. The Anxiety mean was 8.25 and mild. Twenty-four participants scored as normal, 10 as mildly anxious, 7 as moderately anxious, 1 as severely anxious, and 6 as extremely anxious. The Stress mean was 12.42 and normal. Twenty-seven participants scored as normal, 12 as mildly stressed, 7 as moderately stressed, 1 as severe, and 1 as extremely severe.

The BHS mean was 4.25 and thus mild in hopelessness. This reflected the scores of 20 participants, while 23 indicated minimal hopelessness, 4 were moderate, and 1 severely hopeless. The RSES group mean was 18.84 and normal. This reflected 34 participants, while 1 showed high self-esteem and 13 showed low. The LOT-R group mean was 12.06, and thus below the norm. This reflected 43 participants, while 6 scored above the norm thus indicating high optimism. The AAQ mean was 23.27 and marginally above normal avoidance. Fourteen participants scored as below the norm as low avoidance, and 34 scored above the norm as high avoidance.

Positivity IRAP. Ten participants did not meet the pass criteria for the Positivity IRAP, resulting in a final sample of 37 for this measure. The mean D-scores for each trial-type are illustrated in Figure 4.3. Present-Positive was moderately positive. Present-Negative was negligibly negative. Future-Positive was moderately positive. Future-Negative was negligibly positive.
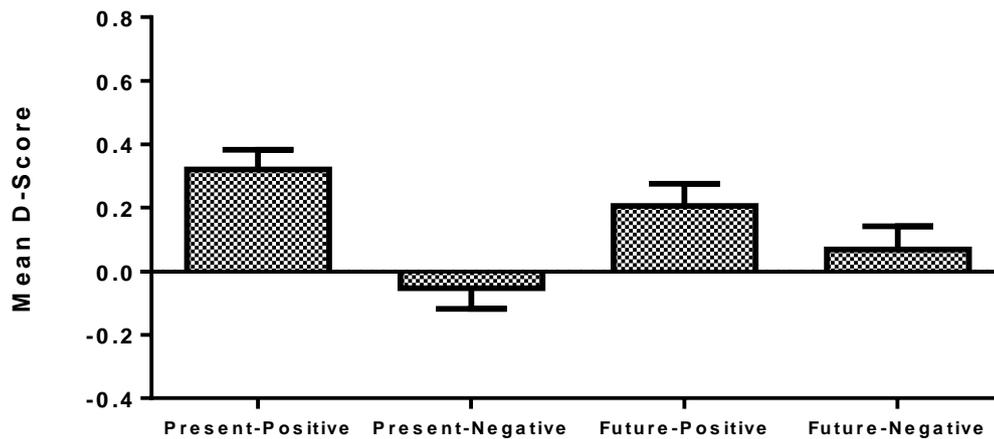
Figure 4.3 Mean D-scores with standard error bars for the Positivity IRAP from Experiment 3. Positive scores indicate positive responding, while negative scores indicate negative responding.

A one-samples t-test confirmed that Present-Positive (0.32, 95% CI [0.19 to 0.44], t(37) = 5.152, p <.0001), and Future-Positive (0.21, 95% CI [0.06 to 0.35], t(37) = 2.938, p <.01) were statistically significantly different from 0 (all other p's>.4).

Correlations between Positivity IRAP and Explicit Measures. A correlation matrix explored the putative relationship among the trial-types and the explicit measures, and one correlation was recorded (all other p's > .07).

Present-Positive correlated negatively with depression (r = -.41, p = .01), suggesting that low depression was associated with this aspect of implicit positivism. The D-scores were then compared for normal (N = 21) versus high depression (i.e. collapsing mild, moderate, severe and extremely severe, N = 16) on the Depression sub-scale and the mean D-scores for these are presented in Figure 4.4.

81
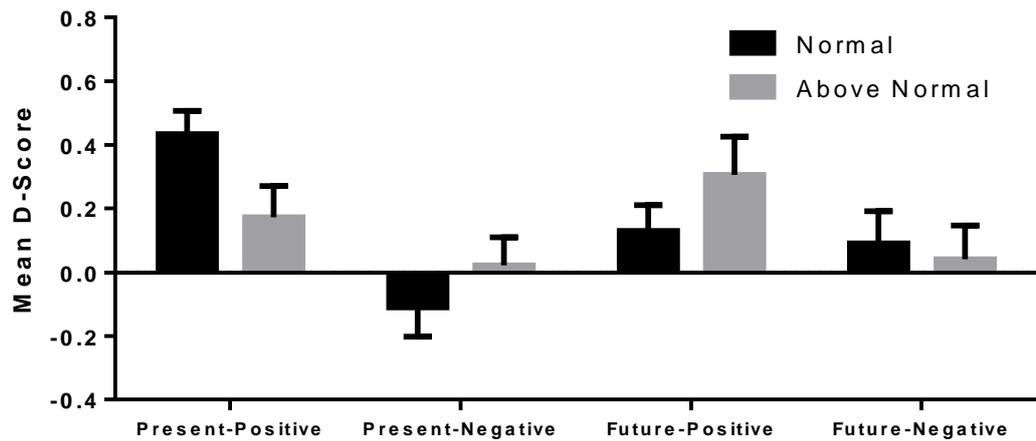
Figure 4.4 Mean D-scores on the Positivity IRAP from Experiment 3, divided according to participants who scored as normal versus high depression on the Depression sub-scale. Positive scores indicate positive responding, while negative scores indicate negative responding.

On Present-Positive, the normal group showed a strong positivity effect, whereas the high depression group showed a more modest effect. On Present-Negative, the normal group showed marginal negativity, while the high group showed marginal positivity. On Future-Positive, the normal group showed marginal positivity, while the high group showed a stronger effect. Finally, on Future-Positive, both groups showed marginal positivity. Four one-way ANOVAs comparing the two groups on each trial-type indicated that the difference on Present-Positive was statistically significant ($F(1, 35) = 4.778$, $p = .03$; all other p's > .2).

Worthiness IRAP. All participants met the pass criteria for the Worthiness IRAP, therefore the final participating sample was 48. The mean D-scores for each trial-type are presented in Figure 4.5. I Deserve-Positive showed a strong worthiness effect, while I Deserve-Negative was only marginally worthy. Others Deserve-Positive showed modest worthiness, while Others Deserve-Negative was negligibly worthy.
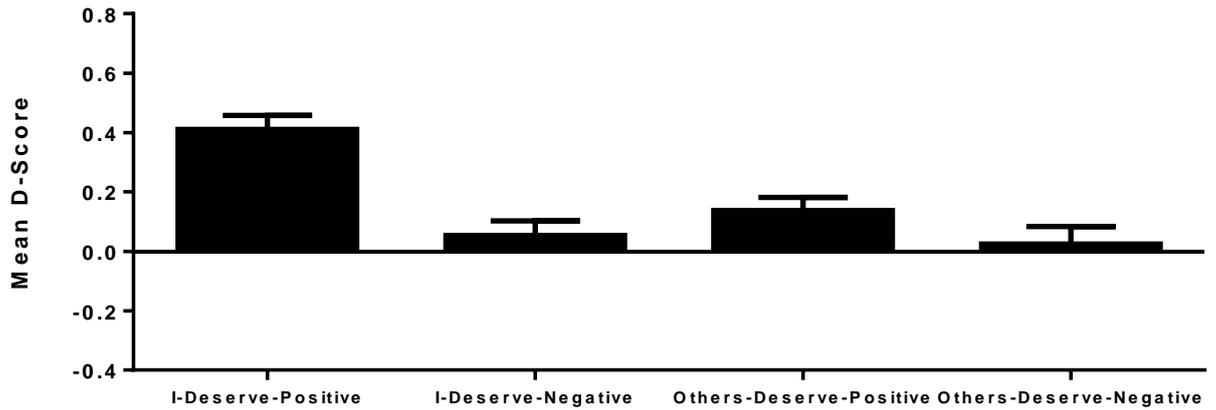
Figure 4.5 Mean D-scores with standard error bars for each trial-type in the Worthiness IRAP from Experiment 3. Positive scores indicate worthiness responding, while negative scores indicate unworthiness responding.

A one-samples t-test confirmed that I Deserve-Positive (0.41, 95% CI [0.31 to 0.51], t(47) = 8.70, p <.0001) and Others Deserve-Positive (0.14, 95% CI [0.05 to 0.22], t(47) = 3.162, p = .003) were statistically significantly different from 0 (all other p's > .3).

Correlations between Worthiness IRAP and Explicit Measures. A correlation matrix calculated potential relationships among the trial-type D scores and the explicit measures. Two correlations were recorded (all other p's > .07).

I Deserve-Negative correlated negatively with Depression (r = -.36, n = 48, p = .013), suggesting that higher levels depression was associated with greater self unworthiness. The D-scores were then compared for normal (N = 27) versus high depression (i.e. collapsing mild, moderate, severe and extremely severe, N = 21) on the Depression sub-scale and the mean D-scores for these are presented in Figure 4.6.
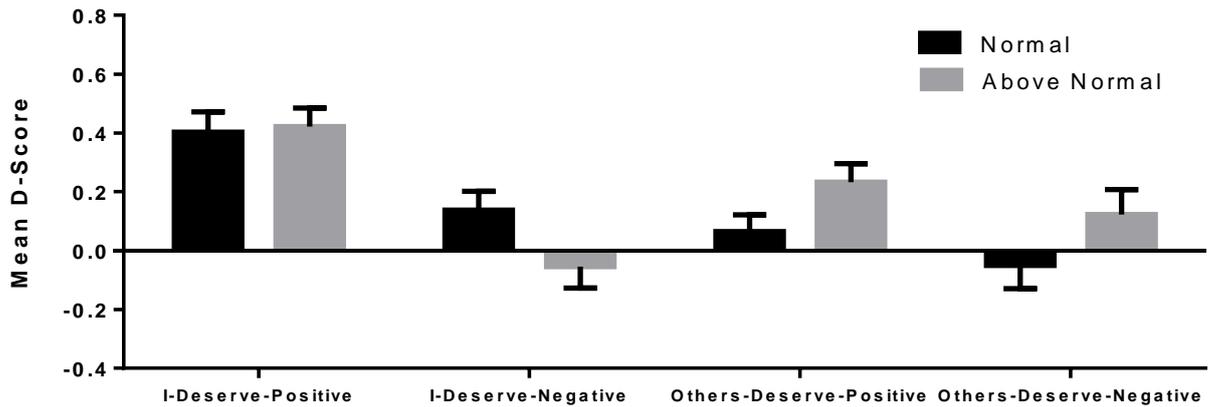
Figure 4.6 Mean D-scores on the Worthiness IRAP from Experiment 3, divided according to participants who scored as normal versus high depression on the Depression sub-scale. Positive scores indicate worthiness responding, while negative scores indicate unworthiness responding.

On I Deserve-Positive, both groups similarly showed strong worthiness. On I Deserve-Negative, the normal group showed marginal worthiness, while the high group showed marginal unworthiness. On Others Deserve-Positive, the above normal group showed modest worthiness, while the normal group showed a marginal effect. Finally, on Others Deserve-Negative, the normal group showed marginal unworthiness, while the high group showed marginal worthiness. Four one-way ANOVAs comparing the two groups on each trial-type indicated that the difference on I Deserve-Negative was marginally statistically significant ($F(1, 46) = 3.943$, $p = .05$), and the difference on Others Deserve-Positive approached significance ($F(1, 46) = 3.868$, $p = .06$, all other p's > .1).

A marginally statistically significant negative correlation was also observed between I Deserve-Negative and Anxiety (r = -.28, p = .05), suggesting that higher anxiety was associated with this aspect of implicit unworthiness. The D-scores were then compared for normal (N = 24) versus high anxiety (i.e. collapsing mild, moderate, severe and extremely severe, N = 24) on the Anxiety subscale and the mean D-scores for these are presented in Figure 4.7.
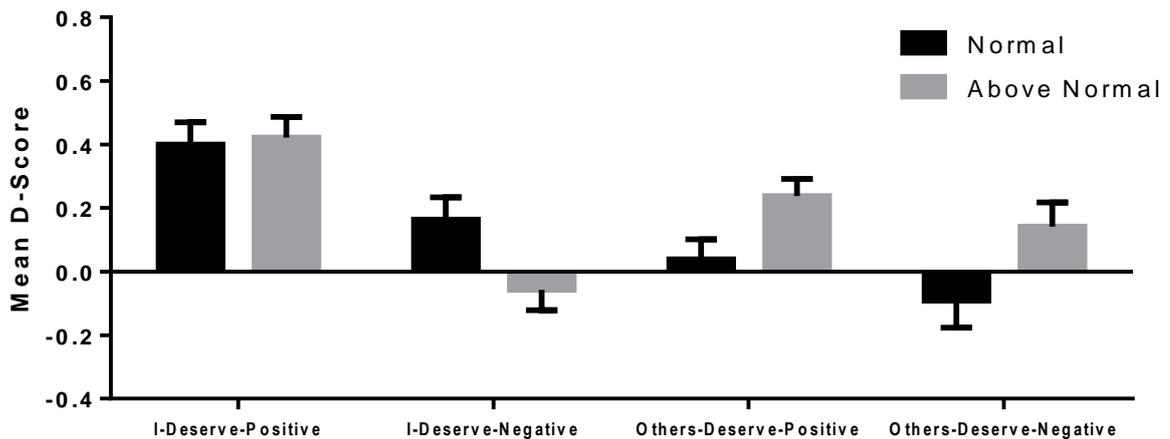
Figure 4.7 Mean D-scores on the Worthiness IRAP from Experiment 3, divided according to participants who scored as normal versus high anxiety on the Depression sub-scale. Positive scores indicate worthiness responding, while negative scores indicate unworthiness responding.

On I Deserve-Positive, both groups showed strong worthiness. On I Deserve-Negative, the normal group showed marginal worthiness, while the high group showed marginal unworthiness. On Others Deserve-Positive, the normal group showed marginal worthiness, whereas the high group showed a much stronger effect. Finally, on Others Deserve-Negative, the normal group showed marginal unworthiness, while the high group showed modest worthiness. Four one-way ANOVAs comparing the two groups on each trial-type indicated that the differences on I Deserve-Negative ($F(1, 46) = 5.477$, $p = .02$), Others Deserve-Positive ($F(1, 46) = 5.743$, $p = .02$) and Others Deserve-Negative ($F(1, 46) = 4.194$, $p = .05$) were statistically significant (remaining $p > .8$).

Implicit-Implicit Correlations

A correlation matrix calculated potential relationships among the trial-type D-scores on the two IRAPs. Future-Negative on the Positivity IRAP correlated positively with I Deserve-Negative on the Worthiness IRAP ($r = .36$, $p = .03$). A positive correlation was found between I Deserve-Positive and Others Deserve-Negative on the Worthiness IRAP ($r =$

.31, $p = .03$). Furthermore, a negative correlation was found between I Deserve-Negative and Others Deserve-Negative on the Worthiness IRAP ($r = -.32$, $p = .03$).

Summary of Results

The outcomes on the self-report measures were homogeneous and within the normal ranges. Specifically, the DASS sub-scale means were in the normal or mild ranges. The BHS mean was mild and the RSES was normal. The AAQ mean reflected marginal avoidance. However, the LOT-R reflected low optimism.

The Positivity IRAP showed a statistically significant positive effect on the Present-Positive trial-type, which correlated with Depression, and differentiated statistically significantly between normal versus above normal sub-groups. There was also a significantly significant positive effect on Future-Positive. The Worthiness IRAP showed a strong I Deserve-Positive effect and a modest Others Deserve-Positive effect. The I Deserve-Negative trial-type correlated with Depression and statistically significantly differentiated between normal and above normal levels of depression. A marginally statistically significant correlation was observed between the I Deserve-Negative trial-type and anxiety. Sub-dividing the Anxiety scores into normal and above normal groups showed a statistically significant difference between the groups on I Deserve-Negative, Others Deserve-Positive and Others Deserve-Negative. I Deserve-Negative on the Worthiness IRAP correlated with Others Deserve-Negative on the same IRAP, and Future-Negative on the Positivity IRAP. Others Deserve-Negative also correlated with I Deserve-Positive on the Worthiness IRAP.

Discussion

Consistent with Experiment 2, positive evaluations to life in the present and future were recorded on the Positivity IRAP. The Worthiness IRAP indicated self- and others-based worth regarding a positive life across all four trial-types. Correlation analyses demonstrated a

number of statistically significant links with the explicit measures, as well as differences between high and low symptomatic groups for individual trial-types in both IRAPs. These findings highlight the utility of the IRAP in measuring implicit future-thinking and worthiness. At this juncture in the current research agenda, the hopeful and optimistic effects regarding life in the present and future appeared to be robust. Therefore, the final experiment targeted an aspect of hopelessness other than evaluations of the present and future, namely, that of achievement hopelessness.

Chapter 5

Experiment 4

Using the IRAP to measure implicit responses to present failure and success

Chapter 5

Experiment 4

Using the IRAP to measure implicit responses to present failure and success

According to Beck and Steer (1988), one of the core beliefs of hopelessness is that an individual "will never succeed at what they attempt to do". Indeed, feelings of defeat, entrapment and powerlessness are closely associated with depression, anxiety and suicidality (Taylor, Gooding, Wood, & Tarrier, 2011). Defeat and entrapment are typically measured explicitly, using the Defeat Scale and the Entrapment Scale (Gilbert & Allan, 1998), but feelings such as these have seen very little investigation with implicit measures, with the exception of one study by Bast and Barnes-Holmes (2015), which found that participants had negative implicit responses to failure and positive implicit responses to success.

The final experiment of the current thesis sought to measure implicit evaluations of hopelessness in response to self-based success and failure. Two IRAPs were employed for this purpose: the Emotions IRAP targeted emotional responses to failing and succeeding (e.g. feeling worthless versus feeling valuable), while the Behaviour IRAP targeted behavioural responses to failing and succeeding (e.g. I should give up versus I should continue).

Method

Participants

All participants (*N* = 46) were recruited from the undergraduate population of Maynooth University. All met the pass criteria for at least one of the two IRAPs presented currently. Of the total sample, 20 were male, 26 were female and the mean age was 20 years and 7 months.

Setting

All aspects of the setting were identical to the previous experiments.

Materials

The current study involved two sets of measures; the same five self-report scales used previously (DASS, BHS, RSES, LOT-R and AAQ) and two IRAPs, namely the Emotions IRAP and the Behaviour IRAP.

Emotions IRAP. The Emotions IRAP presented a target word from one of two categories (Hopeless or Hopeful), a label statement from one of two categories (Failure or Success), and the response options TRUE and FALSE on each trial -- see Table 5.1. The label statement from the Failure category was WHEN I FAIL, and the label statement from the Success category was WHEN I SUCCEED. The 12 target stimuli were 6 Hopeless emotions (I FEEL WORTHLESS, I FEEL DOOMED, I FEEL SAD, I FEEL USELESS, I FEEL OVERWHELMED, I FEEL HOPELESS) and 6 Hopeful emotions (I FEEL GOOD, I FEEL HAPPY, I FEEL VALUABLE, I FEEL JOYFUL, I FEEL CHEERFUL, I FEEL HOPEFUL).

Table 5.1 Stimuli in the Emotions IRAP from Experiment 4, including labels, targets and response options.

Failure Label	Success Label
WHEN I FAIL	WHEN I SUCCEED
Hopeless Targets	**Hopeful Targets**
I FEEL WORTHLESS	I FEEL GOOD
I FEEL DOOMED	I FEEL HAPPY
I FEEL SAD	I FEEL VALUABLE
I FEEL USELESS	I FEEL JOYFUL
I FEEL OVERWHELMED	I FEEL CHEERFUL
I FEEL HOPELESS	I FEEL HOPEFUL
Response Option 1	**Response Option 2**
TRUE	FALSE

The Emotions IRAP comprised of four trial-types: Failure-Hopeless; Failure-Hopeful; Success-Hopeless; and Success-Hopeful (see Figure 5.1). When a trial presented WHEN I FAIL with a Hopeless target, TRUE was consistent, but FALSE inconsistent. When a trial presented WHEN I FAIL with a Hopeful target, FALSE was consistent and TRUE inconsistent. When a trial presented WHEN I SUCCEED with a Hopeless target, FALSE was consistent and TRUE inconsistent. And when a trial presented WHEN I SUCCEED with a Hopeful target, TRUE was consistent and FALSE inconsistent.

Failure – Hopeless

When I fail

I feel hopeless

Consistent   Inconsistent

Select "d" for   Select "k" for
True   False

Failure – Hopeful

When I fail

I feel hopeful

Inconsistent   Consistent

Select "d" for   Select "k" for
True   False

Success – Hopeless

When I succeed

I feel worthless

Inconsistent   Consistent

Select "d" for   Select "k" for
True   False

Success – Hopeful

When I succeed

I feel valuable

Consistent   Inconsistent

Select "d" for   Select "k" for
True   False
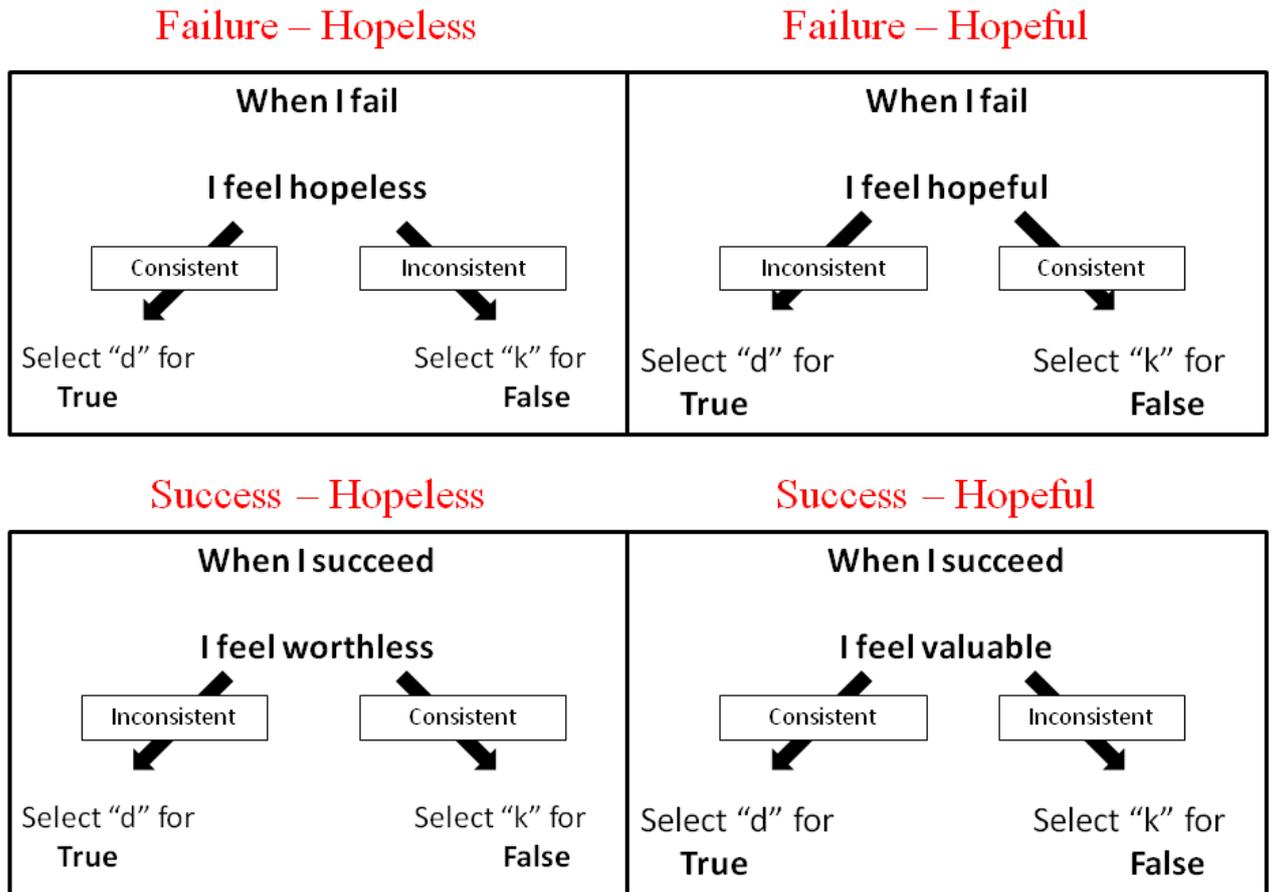
Figure 5.1 Examples of the four trial-types in the Emotions IRAP from Experiment 4. On each trial, a label stimulus (Failure or Success), a target stimulus (Hopeless or Hopeful), and the two response options (TRUE and FALSE) appeared on-screen simultaneously. This generated four trial-types: Failure-Hopeless; Failure-Hopeful; Success-Hopeless; and Success-Hopeful.

Behaviour IRAP. The Behaviour IRAP presented a target word from one of two categories (Hopeless Behaviour or Hopeful Behaviour), a label statement from one of two categories (Failure or Success), and the response options TRUE and FALSE on each trial -- see Table 5.2. As before, the label statement from the Failure category was WHEN I FAIL, and the label statement from the Success category was WHEN I SUCCEED. The 12 target stimuli were 6 Hopeless Behaviours (I SHOULD GIVE UP, I AM TO BLAME, IT'S MY FAULT, NOTHING CAN BE DONE, I HAVE NO OPTIONS, THINGS ONLY GET WORSE) and 6 Hopeful Behaviours (I SHOULD CONTINUE, IT'S MY SUCCESS, IT'S

BASED ON MY ACTIONS, EVERYTHING IS POSSIBLE, I HAVE MANY OPTIONS,

THINGS ONLY GET BETTER).

Table 5.2. Stimuli in the Behaviour IRAP from Experiment 4, including labels, targets and response options.

Failure Label	Success Label
WHEN I FAIL	WHEN I SUCCEED
Hopeless Behaviour Targets	**Hopeful Behaviour Targets**
I SHOULD GIVE UP	I SHOULD CONTINUE
I AM TO BLAME	IT'S MY SUCCESS
IT'S MY FAULT	IT'S BASED ON MY ACTIONS
NOTHING CAN BE DONE	EVERYTHING IS POSSIBLE
I HAVE NO OPTIONS	I HAVE MANY OPTIONS
THINGS ONLY GET WORSE	THINGS ONLY GET BETTER
Response Option 1	**Response Option 2**
TRUE	FALSE

The Behaviour IRAP comprised of four trial-types: Failure-Hopeless Behaviour; Failure-Hopeful Behaviour; Success-Hopeless Behaviour; and Failure-Hopeful Behaviour (see Figure 5.2). When a trial presented WHEN I FAIL with a Hopeless Behaviour target, TRUE was consistent, but FALSE was inconsistent. When a trial presented WHEN I FAIL with a Hopeful target, FALSE was consistent and TRUE inconsistent. When a trial presented WHEN I SUCCEED with a Hopeless target, FALSE was consistent and TRUE inconsistent. And when a trial presented WHEN I SUCCEED with a Hopeful target, TRUE was consistent and FALSE inconsistent.

Failure – Hopeless Behaviour

When I fail

I should give up

| Consistent | Inconsistent |

Select "d" for **True**   Select "k" for **False**

Failure – Hopeful Behaviour

When I fail

I should continue

| Inconsistent | Consistent |

Select "d" for **True**   Select "k" for **False**

Success – Hopeless Behaviour

When I succeed

Things only get worse

| Inconsistent | Consistent |

Select "d" for **True**   Select "k" for **False**

Success – Hopeful Behaviour

When I succeed

Things only get better

| Consistent | Inconsistent |

Select "d" for **True**   Select "k" for **False**
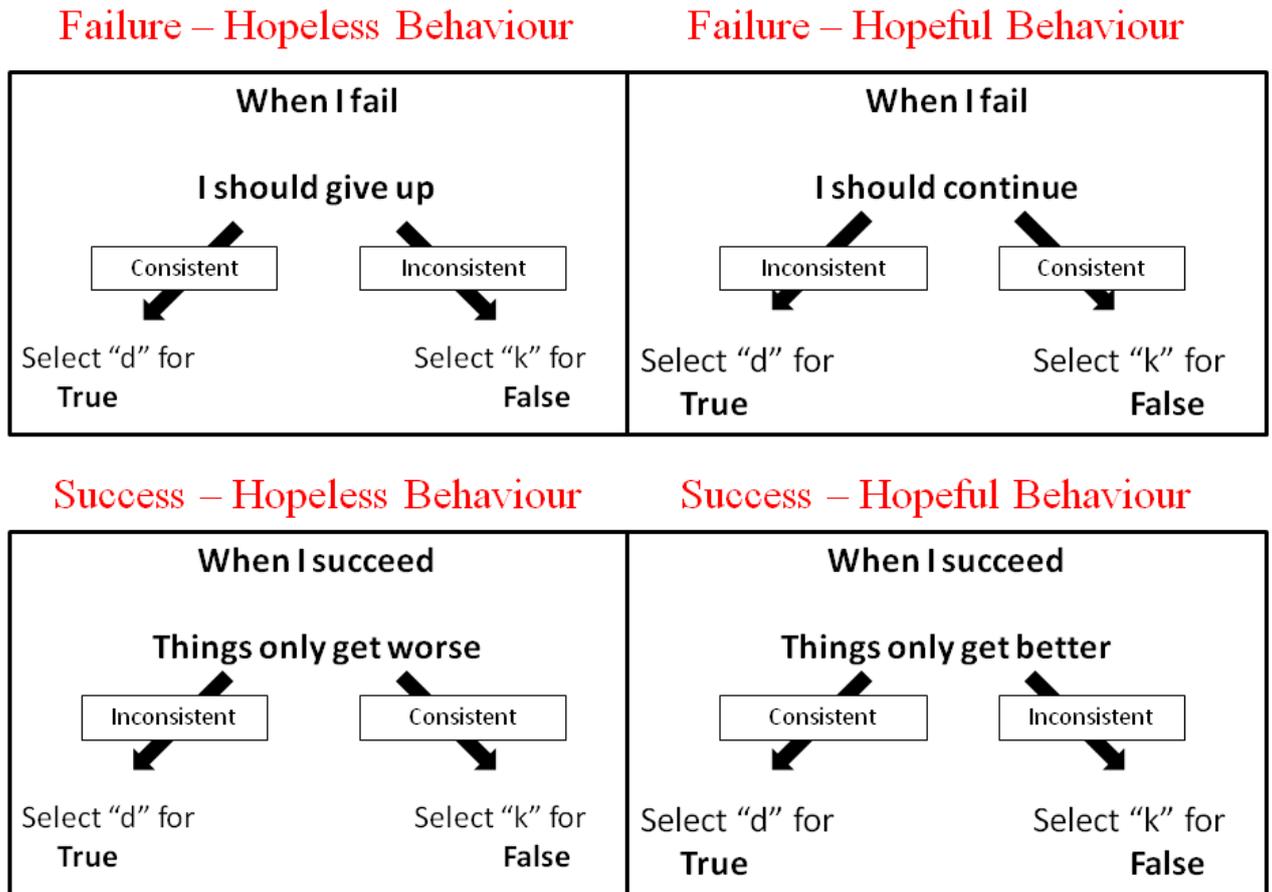
Figure 5.2 Examples of the four trial-types in the Behaviour IRAP from Experiment 4. On each trial a label stimulus (Failure or Success), a target stimulus (Hopeless Behaviour or Hopeful Behaviour), and two response options (TRUE and FALSE) appeared on-screen simultaneously. This generated four trial-types: Failure-Hopeless Behaviour; Failure-Hopeful Behaviour; Success-Hopeless Behaviour; and Success-Hopeful Behaviour.

Ethical Considerations

All ethical issues of concern in the previous experiments applied here and were attended to accordingly. Again, no participant reported any signs of distress prior to, during, or following the experiment.

Procedure

Once again, Experiment 4 comprised of three stages. Stage 1 involved the explicit measures, and the remaining stages involved the two IRAPs. The order in which the IRAPs were presented was randomised across participants. Twenty-four participants completed the Emotions IRAP first, while 22 completed the Behaviour IRAP first. The procedural aspects of the IRAP were identical to the previous experiments.

Results

Analytic Strategy

The analytic strategy adopted in Experiment 4 was identical to the previous studies.

Explicit Data

Mean scores and standard errors were calculated for the five self-report measures (DASS, BHS, RSES, R-LOT and AAQ) and are presented in Table 5.3.

Table. 5.3. Mean scores with standard error values for each of the explicit measures.

Explicit Measure	Mean (SE)
Depression	8.48 (1.08)
Anxiety	8.83 (1.16)
Stress	13.30 (1.26)
BHS	4.24 (0.41)
RSES	18.74 (0.61)
LOT-R	14.28 (0.66)
AAQ	24.74 (1.22)

The Depression mean was 8.48 and normal. Twenty-eight participants scored as normal, 6 as mildly depressed, 9 as moderately depressed, 1 as severely depressed, and 2 as

extremely depressed. The Anxiety mean was 8.83 and mild. Twenty-four participants scored as normal, 4 as mildly anxious, 8 as moderate, 5 as severe and 5 as extremely anxious. The Stress mean was 13.30 and normal. Twenty-six participants scored as normal, 8 as mild, 8 as moderate, 3 as severe, and 1 as extremely severe.

The BHS mean was 4.24 and categorised as mild hopelessness. This reflected the scores of 20 participants, while 23 indicated minimal hopelessness and 3 were moderate. The RSES mean was 18.74 and normal. This reflected 35 participants, while 4 showed high self-esteem and 7 showed low. The LOT-R mean was 14.28, thus indicating normal optimism. This reflected 30 participants scoring below the norm, while 16 scored above the norm. The AAQ mean was 24.74 and thus above normal avoidance. Eight participants scored below the norm as low avoidance, and 38 scored above the norm as high in avoidance.

Implicit Data

Emotions IRAP. All participants met the accuracy criterion of the Emotions IRAP, resulting in a total sample of 46. The mean D-scores for each trial-type are presented in Figure 5.3. The IRAP effect on Failure-Hopeless was moderately hopeless, while the Failure-Hopeful was modestly hopeful. Success-Hopeless showed even greater hopefulness, with an even stronger effect on Success-Hopeful.
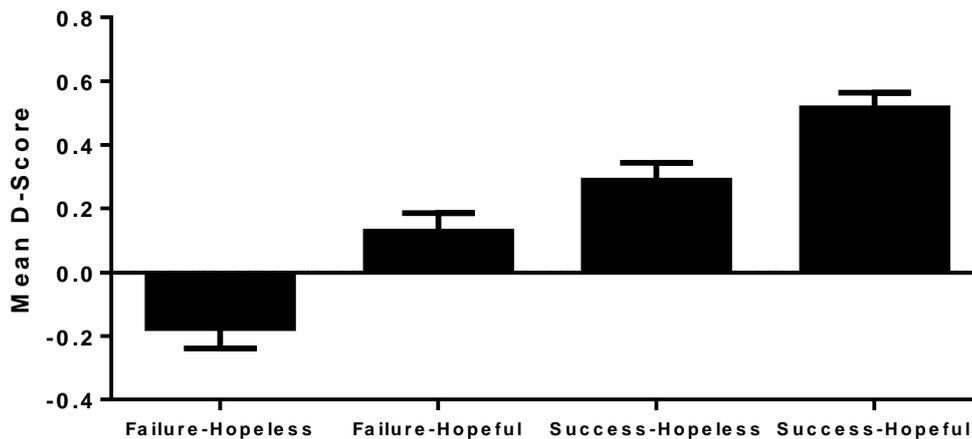
Figure 5.3 Mean D-scores with standard error bars for the four trial-types in the Emotions IRAP from Experiment 4. Positive scores indicate hopeful responding, whereas negative scores indicate hopeless responding.

A one-samples t-test indicated that all trial-types were statistically significantly different from 0: Failure-Hopeless (-0.18, 95% CI [-0.30 to -0.04], $t(45) = -2.762$, $p < .01$); Failure-Hopeful (0.13, 95% CI [0.01 to 0.24], $t(45) = 2.195$, $p = .03$); Success-Hopeful (0.29, 95% CI [0.17 to 0.40], $t(45) = 5.113$, $p < .0001$), and Success-Hopeless (0.51, 95% CI [0.42 to 0.61], $t(45) = 10.551$, $p < .0001$).

Correlations between Emotions IRAP and Explicit Measures. A correlation matrix explored potential relationships among the trial-types and the explicit measures, and found one statistically significant correlation (all other p's > .1). A negative correlation was observed between Success-Hopeless and the AAQ ($r = -.29$, $p = .05$), suggesting this aspect of implicit hopefulness was associated with higher avoidance. As there are no standardised cut-offs for the AAQ, a median split of scores was conducted (hence approximately representing low (N = 23) versus high (N = 23) avoidance groups) and the mean scores on each trial-type are presented in Figure 5.4.
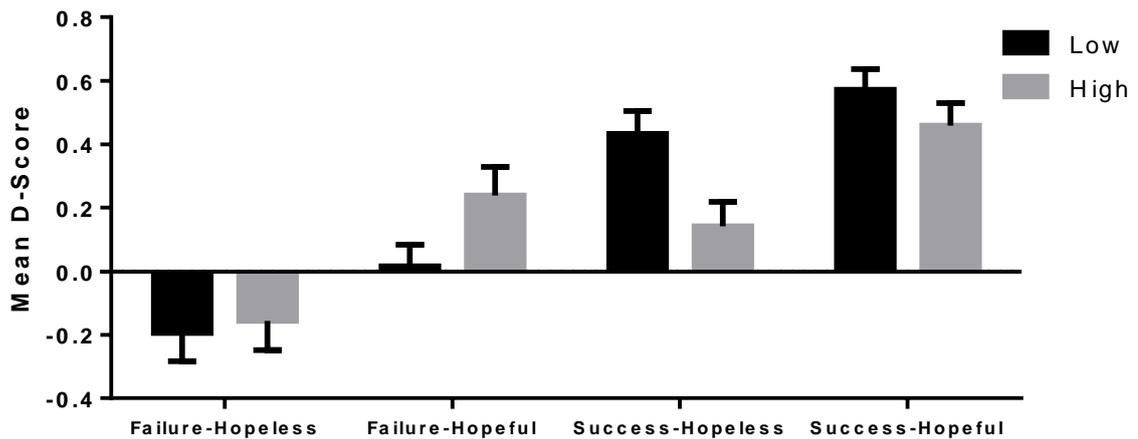
Figure 5.4 Mean D-scores on the Emotions IRAP from Experiment 4, divided according to participants who scored as low versus high psychological avoidance on the AAQ. Positive scores indicate hopeful responding, whereas negative scores indicate hopeless responding.

Failure-Hopeless was marginally hopeless for both low and high avoidance groups. Failure-Hopeless showed a modest hopeful effect for the high avoidance group, with the low avoidance group showing a negligibly hopeful effect. Success-Hopeful was marginally hopeful for the high group, and strongly hopeful for the low avoidance group. Four one-way ANOVAs compared the two groups on each trial-type and revealed a near statistically significant effect for Failure-Hopeful ($F(1, 44) = 3.929$, $p = .05$) and a statistically significant effect for Success-Hopeless ($F(1, 44) = 7.739$, $p = .01$) (all other p's > .3).

Behaviour IRAP. Six participants did not meet the accuracy criterion, resulting in a final participating sample of 40. The mean group D-scores per trial-type are presented in Figure 5.5. The IRAP effect on Failure-Hopeless Behaviour was moderately hopeless, while Failure-Hopeful Behaviour was negligibly hopeful. Success-Hopeless Behaviour was also moderately hopeful, while Success-Hopeful Behaviour was strongly hopeful.
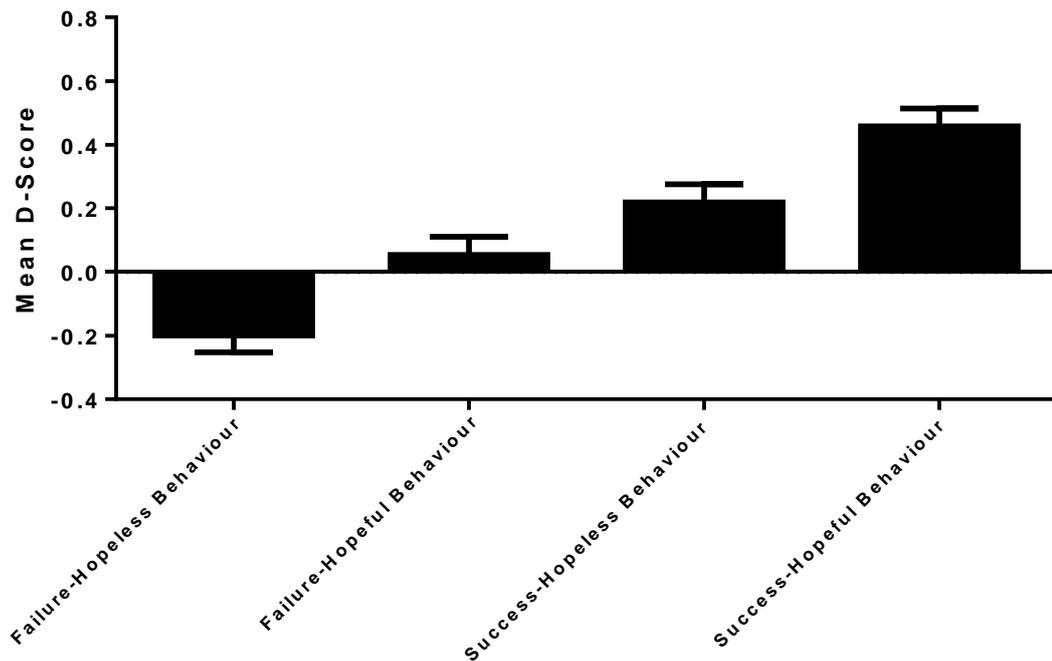
Figure 5.5 Mean D-scores with standard error bars for the four trial-types in the Behaviour IRAP from Experiment 4. Positive scores indicate hopeful responding, whereas negative scores indicate hopeless responding.

A one-samples t-test confirmed that three of the four trial-types were statistically significantly different from 0: Failure-Hopeless Behaviour (-0.20, 95% CI [-0.31 to -0.09], t(39) = -3.720, p <.01); Success-Hopeless Behaviour (0.22, 95% CI [0.10 to 0.33], t(39) = 3.828, p < .0001); and Success-Hopeful Behaviour (0.46, 95% CI [0.10 to 0.33], p < .0001); (remaining p > .3).

Correlations between Behaviour IRAP and Explicit Measures. A correlation matrix explored the putative relationships among the trial-types and the explicit measures. Two correlations were recorded (other p's > .4).

Failure-Hopeless Behaviour correlated positively with the AAQ (r = 0.35, p = 0.03), suggesting that this aspect of implicit hopelessness is associated with psychological avoidance. A median split of AAQ scores was conducted (hence approximately representing low (N = 20) versus high (N = 20) avoidance groups) and the two groups were compared on

each trial-type. However, four one-way ANOVAs indicated that the two groups did not differ statistically significantly on any trial-type (all p's > .2).

Failure-Hopeful Behaviour correlated negatively with anxiety (r = -0.33, p = 0.04), suggesting that this aspect of implicit hopefulness was associated with higher anxiety. The D-scores were compared for normal (N = 21) versus high (N = 19) anxiety (collapsing mild, moderate, severe and extremely severe) on the Anxiety sub-scale. However, four one-way ANOVAs indicated that the two groups did not differ statistically significantly on any trial-type (all p's > .07).

Implicit-Implicit Correlations

A correlation matrix calculated potential relationships among the trial-type D-scores on the two IRAPs. On the Emotions IRAP, Failure-Hopeless correlated positively with Failure-Hopeful (r = 0.41, p = 0.01). Failure-Hopeful also correlated negatively with Success-Hopeless (r = -0.44, p < .01). Furthermore, Success-Hopeless correlated with Success-Hopeful (r = 0.36, p = 0.01) on the Emotions IRAP. No correlations were observed within the trial-types of the Behaviour IRAP, nor between the Emotions and Behaviour IRAPs.

Summary of Results

Outcomes on the explicit measures were homogeneous and close to normal. The Depression, Anxiety and Stress means were normal or mild. The BHS mean reflected low hopelessness. The AAQ mean reflected marginal avoidance. The LOT-R mean reflected moderate optimism. And the RSES mean was normal.

The Emotions IRAP showed a statistically significant hopeless effect on Failure-Hopeless and statistically significant hopeful effects on Failure-Hopeful, Success-Hopeless and Success-Hopeful. Success-Hopeless correlated with the AAQ and statistically significantly differentiated between low and high avoidance. The Behaviour IRAP also

showed a statistically significant hopeless effect on Failure-Hopeless Behaviour, which correlated with the AAQ and anxiety, but did not differentiate sub-groups on either scale. The Behaviour IRAP also showed statistically significant hopeful effects on Success-Hopeless Behaviour and Success-Hopeful Behaviour. Some trial-types of the Emotions IRAP correlated with each other, namely Failure-Hopeful and Failure-Hopeless (positive), Failure-Hopeful and Success-Hopeless (negative), and Success-Hopeless and Success-Hopeful (positive).

Discussion

The current experiment sought to measure implicit evaluations surrounding a core belief associated with hopelessness; namely that of perceived defeat. On both the Emotions and Behaviour IRAPs, hopeless responses were recorded toward failing and hopeful responses toward succeeding. This is what one would likely expect from a non-clinical sample, and in general supports the implicit outcomes of a previous IRAP study by Bast and Barnes-Holmes (2015). Given the small literature on implicit responses surrounding achievement hopelessness, no specific predictions could have been made with regard to interactions between implicit and explicit measures. However, correlation analyses showed statistically significant relationships among the explicit measures and individual trial-types, and clear AAQ group differences were found on the Emotions IRAP.

Chapter 6

General Discussion & Conclusions

Thoughts and appraisals about one's life and death appear to be crucial in the assessment of suicidality, and figure strongly in explicit measures of this domain. However, a growing body of research on the use of implicit measures has signalled the potential utility of indirect measures in the prediction and understanding of suicidality. The current thesis endeavoured to build upon this research by measuring implicit relational responses to life- and death-related stimuli using the IRAP in normative samples. A secondary aim of the thesis was to explore potential relationships between implicit outcomes and explicit measures of psychopathology and well-being. This final chapter begins with an overview of each experiment and its findings, and proceeds by highlighting the possible contribution of the current research to the relevant fields.

Overview of Research and Summary of Findings

The four experiments presented in the current thesis broadly explored naturally occurring verbal relations (or networks) that may be involved in evaluations of death/life, future-thinking, worthiness and hopelessness. This rationale was based on existing findings which indicate that *implicit* evaluations of death and life are associated with suicidality and are predictive of future suicidal thoughts and behaviours. For example, some variations of the IAT can predict suicidal ideation, self-harm and suicide attempt at short term follow-up (e.g. Nock & Banaji, 2007; Nock et al., 2010; Randall et al., 2013). Preliminary research also suggests that implicit hopelessness and negative future-thinking are risk-factors for clinical and sub-clinical depression, respectively (Franck et al., 2007; Kosnes et al., 2013). The current thesis expanded upon this research by measuring relevant implicit responses using the IRAP, which has shown considerable utility thus far in targeting clinically-relevant implicit reactions.

Experiment 1: Findings and implications. Experiment 1 sought to build upon previous research using the Death-Life IAT (Dickstein et al., 2015; Ellis et al., 2015; Harrison et al., 2014; Nock et al., 2010; Price et al., 2009; 2014; Randall et al., 2013) as a measure of self-death and others-life associations. The primary objective of this experiment was to compare implicit outcomes between the IAT and the IRAP, with a particular focus on the IAT's 'pro-life' bias as observed with normative participants (e.g. in Harrison et al.). The secondary objective was to determine whether manipulating single words versus propositions in the IRAP (i.e. comparing the Death IRAP with the Imagine Death IRAP) influenced its outcomes. And, the tertiary objective was to compare implicit and explicit outcomes. The Death-Life IAT showed a statistically significant and strong pro-life effect, with a mean D-score that was consistent with previous studies. Outcomes were largely similar across the two IRAPs, with both also showing a strong pro-life effect on the Self-Life trial-type.

The strong pro-life effects recorded in Experiment 1 are not surprising with a normative sample who likely have a strong history of co-ordinating themselves with living, rather than dying. Nevertheless, the Self-Death trial-type did not show an anti-death effect. The two additional manipulations embedded in Experiment 1 involved a comparison between self and others, and comparing the Death IRAP with the Imagine Death IRAP. However, neither manipulation appeared to have any influence over responding. That is, Others-focused trial-types did not produce strong IRAP effects and there were little or no differences between the two IRAPs. The lack of effects regarding Others may be accounted for by the fact that it is often difficult for IRAP participants to categorise others specifically or in a manner that has particular meaning, and as such effects would be much smaller relative to the effects for self, a concept that is very clearly defined and specified for any adult. The overlap in outcomes between the two IRAPs, on the other hand, likely suggests a functional similarity in the way in which participants interpreted the stimuli across both. Indeed, it seems unlikely

that participants, as in the Others trial-types, had difficulty categorising 'Imagining' given that the self-life effects were strong.

Although Experiment 1 employed a non-clinical sample, its findings may have practical and conceptual implications for the understanding and assessment of suicidality. That is, it may in fact be of greater benefit to assess self-life relations, rather than self-death relations as one might assume, with individuals presenting with suicidal ideation or a history of attempts. For example, the Death-Life IAT used by Harrison et al. (2014) indicated that the majority of a sample with a history of suicide attempt displayed a pro-life bias, although the mean overall D-score was statistically significantly higher for individuals with no such history. As an addition to the IAT, the use of the IRAP in Experiment 1 indicates that the now established self-life effect is not accompanied by a self-death effect. Further research on these effects using the IRAP might go some way toward clarifying Harrison et al.'s claim that implicit suicidal cognition may be better characterised by a diminished desire to live than an inflated desire to die.

Experiment 2: Findings and implications. The rationale for Experiment 2 derived primarily from the fact that very little research has investigated implicit future-thinking and its possible clinical implications. The primary aim of the study was to record implicit responses to optimistic and pessimistic future expectancies, using two IRAPs that targeted self- and others-based life in the present versus the future. The Pessimism IRAP targeted the relations between one's own life now and in the future, and the findings showed statistically significant optimistic responding to both timeframes. The Self Pessimism IRAP targeted self-versus others-based future expectancies and showed strong optimism toward self-future juxtaposed with marginal pessimism towards others-future.

Unlike the first study, Experiment 2 yielded correlations between the IRAPs. Specifically, Present-Optimism correlated with My Future-Optimism, suggesting that

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evaluating one's future positively was associated with the same evaluations toward life in the present. Similarly, Present-Pessimism correlated with My Future-Pessimism, indicating that evaluating life in the present negatively was associated with the same evaluations regarding the future. My Future-Pessimism also correlated with Others Future-Pessimism, suggesting that negative implicit evaluations to one's own life are associated with similar evaluations of other people's lives.

A large body of research using explicit measures has linked a lack of positive future-thinking to depression and suicidality (e.g. MacLeod et al., 1997; O'Connor et al., 2008). And the IRAPs in Experiment 2 showed clear associations and group differences on self-reports of optimism, self-esteem and stress, particularly on the Present-Optimism trial-type of the Pessimism IRAP. More precisely, the Pessimism IRAP showed stronger positive effects on Present-Optimism for the sub-divided high self-esteem and low stress groups. Furthermore, the Self Pessimism IRAP showed stronger optimistic effects on My Future-Optimism for the high self-esteem group compared with low self-esteem. These results tentatively suggest that implicit responses to life in the present and future tap into some aspects of sub-clinical symptomatology, such as low self-esteem and high stress.

Research conducted by MacLeod and Conway (2007) found that participants with better well-being showed stronger explicit self- than others-based positive future expectancies. And indeed the self-future optimism recorded in Experiment 2 supports this. Furthermore, higher explicit optimism was associated with stronger implicit optimism (on My Future-Optimism) and individuals with lower explicit self-esteem showed statistically significantly lower implicit optimism than those with normal-high self-esteem.

To date, only one published study with sub-clinically depressed undergraduates by Kosnes et al. (2013) has examined implicit future-thinking with the IRAP. Unlike this original study, however, Experiment 2 did not show any correlation between explicit

depression and implicit future-thinking. Several factors may account for this difference. First, Experiment 2 employed the DASS to measure depression, while Kosnes et al. employed the Beck Depression Inventory (BDI). Second, the two IRAPs used currently targeted future-thinking as life now versus future within the context of self versus others, while the original study presented the propositions 'I expect' versus 'I don't expect' with positive and negative events.

Although both Experiment 2 and the original study by Kosnes et al. (2013) showed self-future positivity, more IRAP research will be needed to determine whether these effects are artefacts of particular stimulus arrangements. Concern for this possibility is prompted by some differences recorded between the two IRAPs developed for Experiment 2. Specifically, both IRAPs presented My Future-Optimism/Pessimism, but they also differed in that the Pessimism IRAP measured future-thinking as life now/future, while the Self Pessimism IRAP measured future-thinking as self/others. The D-scores for these two future-thinking trial-types differed, although they comprised the same label and target stimuli. Specifically, the My Future-Optimism effect was much stronger (+0.23) on the Self Pessimism IRAP. This finding indicates that responding to the future is stronger in the context of the self versus others (as also observed in Experiment 1) and highlights the possible influence of the contrasting label category.

Experiment 3: Findings and implications. Experiment 3 further explored the IRAP as an implicit measure of future-thinking, with the development of the Positivity IRAP, and the Worthiness IRAP also allowed exploration of implicit responses to worthiness.

Data from the Positivity IRAP naturally showed positive evaluations to life both in the present and future that were consistent with the optimism observed in Experiment 2. Similarly, there were no statistically significant effects on the negative trial-types (as was the

case with death). Interestingly, this positivity was not equally strong for all participants, when the data showed that responding on Present-Positive statistically significantly differentiated between normal and above normal self-reported depression (i.e. more depressed individuals were less positive).

Data from the Worthiness IRAP also showed strong positivity for both self and others as worthy. And interestingly again, this varied across groups when the self-report measures were sub-divided. That is, the normal anxiety group demonstrated stronger self-worthiness on I Deserve-Negative compared with the above normal anxiety group. Furthermore, the latter group also showed statistically significantly stronger worthiness towards other people on Others Deserve-Positive and Others Deserve-Negative. These findings again suggest the potential role of an implicit sense of self- and other-worthiness in sub-clinical psychopathology.

As with the previous study, a number of correlations were observed across IRAPs in Experiment 3. That is, Future-Negative correlated with I Deserve-Negative, suggesting that evaluating one's future negatively was associated with worthiness of a negative life. Perhaps surprisingly, I Deserve-Positive correlated with Others Deserve-Negative, suggesting that perceived self-worthiness was associated with unworthiness of other people. Similarly, I Deserve-Negative correlated negatively with Others Deserve-Negative, suggesting that perceived unworthiness towards oneself was associated with the worthiness of other people.

Experiment 4: Findings and implications. The purpose of Experiment 4 was to measure implicit responses to the emotional and behavioural consequences of failure and success. Although defeat and entrapment have shown strong links with suicidality (Taylor et al., 2011), no study to date has measured implicit evaluations of these constructs or their implications for psychopathology. In simple terms, the Emotions IRAP targeted the

emotional consequences of failing and succeeding, while the Behaviour IRAP targeted the *behavioural* consequences of failing and succeeding.

In spite of the emotional vs. behavioural manipulation, outcomes on both IRAPs were largely similar. The Failure-Hopeless trial-type showed a hopelessness effect, while the other trial-types showed hopefulness with respect to succeeding and failing. This combination of both hopelessness and hopefulness is precisely what the IRAP appears to add over the IAT and indicates that one's emotional and behavioural reactions are multi-faceted. The similarity between the two IRAP outcomes also suggests a functional overlap between these two types of reactions. That is, feeling hopeful or hopeless is not functionally independent of behaving in such a way. Although correlations between the implicit and explicit measures were again limited, the fact that individuals with self-reported low avoidance showed stronger hopefulness responses on Success-Hopeless in the Emotions IRAP supports the broad experiential avoidance disorder model on which acceptance-based therapies are constructed.

The implicit outcomes of Experiment 4 concord with those of Bast and Barnes-Holmes (2015) in terms of forgiveness as related to succeeding and failing. The aforementioned study used a Feelings IRAP and Outcomes IRAP to measure the emotional and behavioural consequences of failing and succeeding, and both showed similar outcomes to those reported in Experiment 4. That is, hopeless responses were found on the Failure-Hopeless trial-types and hopeful responses were recorded on the remaining trial-types. Although the target and label stimuli of the IRAPs here differed from Bast and Barnes-Holmes , the implicit outcomes remained largely similar, thus demonstrating robust effects.

Generic Issues and Possible Future Directions

The results of the current thesis should be interpreted within the context of a number of general issues and limitations pertaining to the IRAP and implicit measures more

generally. The current section therefore highlights these issues and offers suggestions for future research.

With few exceptions across all four experiments of the current thesis, the statistically significant mean D-IRAP scores were mainly observed on positive rather than negative trial-types (e.g. Self-Life vs. Others-Death). This skew in the outcomes, observed also with other IRAPs, was the focus of a recent study by O'Shea, Watson and Brown (2015), which suggested that the IRAP is subject to a general positivity bias. A considerable body of IRAP effects indeed supports this view, although this is entirely consistent with Relational Frame Theory (on which the IRAP is based) in that adults will likely have larger relational networks containing positive than negative evaluative functions. Indeed, this view is also supported by mainstream evidence. For example, Dodds et al. (2015) have shown that universally (across 10 languages) individuals tend to evaluate words positively, and Peters, Vieler and Lautenbacher (2015) found that high explicit scores of happiness and life satisfaction correlated with greater attention to positively valenced images and faces in the context of eye-tracking.

What will be important for future IRAP research is to determine whether this bias is influencing or masking other IRAP effects, such as negativity. For example, when positivity and negativity are contrasted, will a strong positivity bias nullify any effects for negativity simply by virtue of contrast effects? Hence, Death IRAPs might show, for example, death effects only under certain stimulus conditions. Although the IRAP is now well established with approximately 50 published studies, more research remains to be done on the potential influence of this type of procedural parameter.

A general limitation of the current thesis is that the implications of the findings for the understanding of psychopathology are limited by the non-clinical undergraduate sample. Furthermore, for ethical reasons, direct indices of suicidality could not be included. These

may have yielded important correlations, given that the explicit measures of broad well-being that were included did generate interesting correlations with the IRAP. These correlations were made possible by the fact that a proportion of the current sample scored outside the normal range across some of the measures. While this may not fully constitute what could be called a sub-clinical sample, it does shed some light on the further development of the IRAP as a measure of implicit cognitions that feature in psychopathology. For example, correlations with the AAQ suggest the use of the IRAP as an implicit measure of emotional avoidance and a possible index of treatment utility.

Final Remarks and Conclusions

The aims of the current thesis were broad and exploratory. There is a growing, but still small, body of research in which the IRAP has been used to investigate clinical phenomena and little or no published work that is applicable to suicide. Our primary intention, therefore, was to add to this body of research broadly to determine whether further use and development of the IRAP in this applied context is worthwhile, and in particular whether the procedure can grapple with the complexities of the cognitions involved in suicidal ideation or intent. Overall, the findings were clear, interesting and positive, and suggest that this research track is worth pursuing. It is always more interesting to work directly with clinical samples, than to take the slower route through normative individuals, although the former is naturally fraught with ethical and logistical concerns which often extend beyond masters level work. Nonetheless, much was still learned from the normative sample recruited here especially because a sizeable proportion of this yielded outcomes that were outside the normal range on various explicit measures, and these correlated in interesting ways with the implicit responses on the IRAPs. While much more procedural work on the IRAP is clearly needed and further work with normative samples and clinically-

relevant stimuli is warranted, the current thesis suggests that there may well be a future in which the IRAP could be used for clinical assessment of treatment evaluation. The current work is one small step in that important direction.

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Appendix A: Screening Questionnaire from Experiment 1

Q1. Do you suffer from any of the following:

Anxiety or Phobic Disorder, Panic Attacks, Obsessive Compulsive Disorder, Depression, any other mental health complaint, or any reason that you would prefer not to participate in this study?

- Yes

- No

Q2. Please insert your age in the space provided.

Appendix B: DASS-21

DASS21	*Name:*	*Date:*

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 Did not apply to me at all
1 Applied to me to some degree, or some of the time

2 Applied to me to a considerable degree, or a good part of time
3 Applied to me very much, or most of the time

1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (eg, in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3

Appendix C: Beck Hopelessness Scale

Please indicate whether each statement applied to you *over the past week, including today* using True or False.

1. I look forward to the future with hope and enthusiasm

2. I might as well give up because there is nothing I can do about making things better for myself

3. When things are going badly, I am helped by knowing that they cannot stay that way forever

4. I can't imagine what my life would be like in ten years

5. I have enough time to accomplish the things I want to do

6. In the future, I expect to succeed in what concerns me most

7. My future seems dark to me

8. I happen to be particularly lucky, and I expect to get more of the good things in life than the average person

9. I just can't get the breaks, and there's no reason I will in the future

10. My past experiences have prepared me well for the future

11. All I can see ahead of me is unpleasantness rather than pleasantness

12. I don't expect to get what I really want

13. When I look ahead to the future, I expect that I will be happier than I am now

14. Things just won't work out the way I want them to

15. I have great faith in the future

16. I never get what I want, so it's foolish to want anything

17. It's very unlikely that I will get any real satisfaction in the future

18. The future seems vague and uncertain to me

19. I can look forward to more good times than bad times

20. There's no use in really trying to get anything I want because I probably won't get it

Appendix D: AAQ-II

Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

1 never true	2 very seldom true	3 seldom true	4 sometimes true	5 frequently true	6 almost always true	7 always true

1. My painful experiences and memories make it difficult for me to live a life that I would value	1 2 3 4 5 6 7
2. I'm afraid of my feelings.	1 2 3 4 5 6 7
3. I worry about not being able to control my worries and feelings.	1 2 3 4 5 6 7
4. My painful memories prevent me from having a fulfilling life.	1 2 3 4 5 6 7
5. Emotions cause problems in my life.	1 2 3 4 5 6 7
6. It seems like most people are handling their lives better than I am.	1 2 3 4 5 6 7
7. Worries get in the way of my success.	1 2 3 4 5 6 7

Appendix E: Belief in Afterlife Scale (Modified)

Please respond using the scales below, where 1 = Total Disagreement and 10 = Total

Agreement

1. Earthly existence is the only existence we have
2. There must be an afterlife of some sort
3. The idea of there exists somewhere some sort of afterlife is beyond my comprehension
4. Many scientists believe in a life after death: they are right, there is one
5. A belief in an afterlife may be useful for some, but I don't believe in one at all
6. There is supportive evidence for the existence of an afterlife

Appendix F: Rosenberg Self-Esteem Scale

Instructions: Below is a list of statements dealing with your general feelings about yourself. If you strongly agree, circle **SA**. If you agree with the statement, circle **A**. If you disagree, circle **D**. If you strongly disagree, circle **SD**.

1.	On the whole, I am satisfied with myself.	SA	A	D	SD
2.	At times, I think I am no good at all.	SA	A	D	SD
3.	I feel that I have a number of good qualities.	SA	A	D	SD
4.	I am able to do things as well as most other people.	SA	A	D	SD
5.	I feel I do not have much to be proud of.	SA	A	D	SD
6.	I certainly feel useless at times.	SA	A	D	SD
7.	I feel that I'm a person of worth, at least on an equal plane with	SA	A	D	SD
8.	I wish I could have more respect for myself.	SA	A	D	SD
9.	All in all, I am inclined to feel that I am a failure.	SA	A	D	SD
10.	I take a positive attitude toward myself.	SA	A	D	SD

Appendix G: Revised Life Orientation Test (LOT-R)

Instructions:

Please answer the following questions about yourself by indicating the extent of your agreement using the following scale:

[0] = strongly disagree

[1] = disagree

[2] = neutral

[3] = agree

[4] = strongly agree

Be as honest as you can throughout, and try not to let your responses to one question influence your response to other questions. There are no right or wrong answers.

1. In uncertain times, I usually expect the best.
2. It's easy for me to relax.
3. If something can go wrong for me, it will.
4. I'm always optimistic about my future.
5. I enjoy my friends a lot.
6. It's important for me to keep busy.
7. I hardly ever expect things to go my way.
8. I don't get upset too easily.
9. I rarely count on good things happening to me.
10. Overall, I expect more good things to happen to me than bad.