UNDERSTANDING THE SUICIDAL MIND: AN ECOLOGICAL INVESTIGATION OF THE DIFFERENTIAL ACTIVATION HYPOTHESIS OF SUICIDAL RELAPSE IN FIRST EPISODE PSYCHOSIS

by

DONNA BELLA BACK

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School of Psychology
University of Birmingham

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UNIVERSITY OF
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Abstract

The incidence of completed and attempted suicide among those with first episode psychosis (FEP) is high. Studies have shown that history of self-harming behaviour remains as the strongest predictor of both attempted and completed suicide in psychosis. Due to the lack of understanding about the suicidal thinking mechanism in psychosis, the development of effective treatment interventions continues to be a major gap for clinicians and patients. More importantly, the rate of suicidal relapse remains tragically frequent. In view of the fact that hopelessness is one of the most significant cognitive risk factors for suicidal behaviour in psychosis, the Differential Activation Hypothesis (DAH) of suicidal relapse may serve as a potential framework for understanding suicidality in psychosis. According to the DAH model, low mood triggers the recurrence of hopeless/suicidal thoughts in individuals who have previously felt suicidal during their early episodes of depression. This thesis sets out to investigate the suicidal thinking process in FEP, by comparing those with a history of suicidal attempt or deliberate self-harm vs. those without using the DAH of suicidal relapse as the main theoretical framework.

First, the Experience Sampling Method (ESM) was employed in order to examine the relationship between hopelessness and mood in the day to day life of people with psychosis. The ESM is a diary keeping procedure that systematically samples real-life data over a 6-day period. The ESM data showed that attenuated hopelessness was found to be more differentially active in response to negative affectivity in the suicidal history group (N = 35) than the non-suicidal group (N = 40).

Second, borrowing from the DAH methodology, the sad mood induction procedure (MIP) was employed. The purpose of the sad MIP was to induce feelings of sadness necessary to create a context that was suitable for reactivating hopeless thoughts. In conjunction with the

sad MIP, the Means-Ends Problem Solving (MEPS) task was employed in order to measure the individual's problem solving skills. It has been previously established that lack of problem solving skills is an important characteristic of hopelessness. In order to test if the dampening of mood will impair the individual's problem solving ability, the MEPS task was performed before and after the sad MIP. The results were as predicted by the DAH: the reduction in problem solving ability following the mood challenge was significantly greater in the suicidal history group (N = 48) than the non-suicidal group (N = 49).

The Future Thinking (FT) task was also employed conjunction with the sad MIP. Similar to the MEPS task, the purpose of the mood challenge was to test if fluency for considering positive events, another important characteristic of hopelessness, will also respond to the changes in mood. The results indicated that the observed reduction in fluency for positive events following the mood challenge was more evident in the suicidal history group (N = 49) than the non-suicidal group (N = 50).

Together, these studies support the validity of the DAH of suicidal relapse as a framework for understanding the suicidal thinking mechanism in psychosis. More importantly, the consistent pattern of results shared between the ecological (ESM) and experimental (sad MIP) studies validates the application of the DAH in the real-life, day to day experiences of those at risk of suicidal relapse. The evidence suggesting the applicability of the DAH in FEP will help establish the importance of the interaction between distal and proximal risk factors for suicidality, which will be of great clinical value in improving the existing risk assessment procedures.

Dedication

To my father

Marino Rodil (1947 – 2011)

"In your last breath, you uttered my name,
Broken and lost, my coldest winter came.
In my dreams, your face I always see,
You are dearly missed today,
tomorrow, and forever will be."

(Donna '13)

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List of Common Abbreviations

ANOVA	Analysis of Variance
ANCOVA	Analysis of Covariance
BHS	Beck Hopelessness Scale
CDSS	Calgary Depression Scale
CR to Hopelessness	Cognitive Reactivity to Hopelessness
CSHF	Columbia Suicide History Form
DAH	Differential Activation Hypothesis
DSH	Deliberate Self-harm
ESM	Experience Sampling Method
FEP	First Episode Psychosis
FT Task	Future Thinking Task
ISST	InterSept Scale for Suicidal Thinking
LEIDS	Leiden Index of Depression Scale
MEPS	Means-Ends Problem Solving
MIP	Mood Induction Procedure
NA	Negative Affectivity
PA	Positive Affectivity
VAS	Visual Analogue Scale

CHAPTER 1

SUICIDALITY IN PSYCHOSIS

1.0. Introduction

The main goal of this thesis is to investigate the suicidal thinking process of individuals who recently suffered an initial episode of psychosis. Suicide is a major health issue worldwide with significant economic implications. According to the World Health Organisation (2012), the worldwide prevalence rate of suicide is about a million a year, which is approximately one complete suicide every 32 seconds. In the UK alone, the Office of National Statistics (2012) reported an incidence of 6,045 completed suicide in 2011, of which 4,552 are men and 1,493 women. Contrary to the popular belief, not everyone who attempts suicide is mentally ill. Whereas many previous studies have indicated a strong link between suicidal behaviour and mental illness, a previous study suggests that only 1 out of 4 suicide attempters have been in contact with the mental health services a year prior to their death (Pirkis & Burgess, 1998).

Understanding suicide and suicidal attempts remains difficult for clinicians and researchers alike. Suicidal behaviour is a complex phenomenon to predict given the enormous amount of potential risk factors, which can be intertwined in a number of ways. The purpose of this chapter is to review the scientific literature on hopelessness as a significant risk factor for suicidal behaviour in early psychosis. Preceding the review is a brief discussion of the general aspects of psychosis, its definition, diagnosis, and associated features. Following this is an overview of the prevalence and risk factors of suicidal behaviour in psychosis, with a particular emphasis on the role of hopelessness as an associated feature of suicidal vulnerability. The concluding discussion will point at the

application of the Differential Activation Hypothesis as a potential model for understanding hopelessness and managing suicidal vulnerabilities in early psychosis.

1.1. The Diagnosis and Prevalence of Psychosis

According to the definition of the APA's *Diagnostic and Statistical Manual of Mental Disorders* (DSM IV; 2000), psychosis is a symptom of a distortion in rational thinking that is often characterised by the person's inability to recognise reality from that of the imaginary. Also commonly described in the literature as a "loss of contact with reality", psychosis typically manifests itself in the form of imaginary experiences (*e.g.* hallucinations) or fictitious beliefs (*e.g.* delusions or paranoia). Other forms of psychosis also include incoherent speech (*e.g.* word salad) and muddled thoughts (*e.g.* flight of ideas) along with a lack of awareness of the psychotic experience (APA, 2000). Whereas psychosis occurs as a symptom of other mental health conditions, the experience of psychosis alone does not warrant a diagnosis of mental illness. The initial episode of psychosis is often referred to as "early psychosis" or "first-episode psychosis" (Kirch, Lieberman, & Matthews, 1992). In general, psychotic episodes can range from briefly losing touch with reality due to the effects of sensory-altering drugs, to perpetually experiencing lapses from reality due to the presence of a long-term and severe psychiatric condition. Both the length and the causal factor of the psychotic experience will help determine the diagnosis of a psychotic illness. A diagnosis is particularly difficult to make during the initial psychotic episode due to the lack of information on the causal factors that triggered the symptom on the first place. In order to formulate a diagnosis, a clinician carries out a mental health examination in the form of a clinical interview. A diagnosis of Schizophrenia is usually given when a psychotic episode lasts for 6 months or more. A diagnosis of Bipolar is typically given when the psychotic symptoms are accompanied by cycles of polar opposite mood swings, from extreme highs

(mania) to lows (depression; APA, 2000). Other types of diagnostic labels for psychosis are: drug-induced psychosis, organic psychosis (psychotic episode due to a particular physical condition), brief reactive psychosis (a brief psychotic experience due to a traumatic life event), psychotic depression (depression with psychotic features), schizophreniform disorder (psychotic episode of less than 6 months), and schizoaffective disorder (psychotic symptoms are neither that of schizophrenia nor a mood disorder; APA, 2000).

According to the *National Institute of Clinical Excellence* (2009), the prevalence rate of psychotic illness in the UK across age is about 7 per 1000 of the population. Mangalore and Knapp (2006) indicated that about 37 – 40% of the incidence of psychotic episodes in the country satisfy the diagnostic criteria for Schizophrenia. In a survey conducted by the *Office of National Statistics* (2000), schizophrenia alone has a yearly prevalence rate of 5 per 1000 of the population in the UK. Although schizophrenia affects men and women equally, the onset of schizophrenia in men occurs at an earlier point in their lives (15 – 24 years of age) compared to the onset in women (24 – 35 year of age; Hafner, Maurer, Loffler, & Riecher-Rossler, 1993; Hafner, Riecher-Rossler, Maurer, *et al*., 1992). The incidence of schizophrenia has also been reported to be particularly higher in the black and minority ethnic or BMI groups (Bresnahan *et al.*, 2007; Sharpley, Hutchinson, McKenzie, & Murray, 2001).

1.2. Phases of Psychosis

There are three stages to a psychotic episode (APA, 2000). The length of each stage, however, varies greatly from person to person. Stage 1 is known as the *prodromal* phase and is characterised by changes in the person's behaviour and perception of things, along with his/her feelings and thoughts. These changes may be too subtle for some people to and to some extent, completely undetectable (Jackson, McGorry, & McKenzie, 1994; Heinrichs, & Carpenter, 1985; Malla & Norman, 1994). The length of this phase varies but may last up to

several months in some people. Stage 2 is known as the *acute* phase and is characterised by severe, observable psychotic symptoms. This is typically the phase when the person gets referred for diagnosis and treatment. Finally, stage 3 is known as the *recovery* phase. This is the point when the person's psychotic symptoms start to recede with the help of an appropriate treatment. Although recovery has been strongly linked with the delays in treatment (Marshall, Lewis, Lockwood, Drake, Jones, & Croudace, 2005; Wunderink, Sytema, Nienhuis, & Wiersma, 2009), recovery is also linked with a number of individual and social factors. Despite the subjective nature of recovery, the prognosis of psychosis following its first episode is generally good with approximately between a quarter and a third of the people never re-experiencing any form of psychosis again after the initial episode (Wunderink *et al*., 2009; Verma, Subramaniam, Abdin *et al*., 2012).

When a person loses touch with reality, that person also loses touch with people who are important to them (*e.g.* family & friends) and his/her surrounding environment (*e.g.* school or work). The prodromal phase can be complicated for both the sufferers and their family, as the subtle, peculiar changes in the sufferers' behaviour can sometimes cause misunderstanding, or even a break down in relationships. The acute phase, on the other hand, can be a very frightening and traumatic experience not just for the sufferers but also for the people closest to them (Jackson, Knott, Skeate, *et al*., 2004; Barton & Jackson, 2008). A lack of awareness on the part of a family who is caring for an acutely psychotic individual can make a difficult situation distressing for both parties. Unfortunately, identification of psychosis can also be problematic for some general practitioners and many non-mental health nurses (Lamph, 2010). The formation of a specialist service such as the Early Intervention Teams meant that specialist intervention is now available at the earliest sign of psychosis. Intervening at the earliest possible stage not only reduces the trauma associated with the acute psychotic phase, but also ensures a much better prognosis and recovery (Birchwood &

McMillan, 1993a; Birchwood, McGorry, & Jackson, 1997; Birchwood, Fowler & Jackson, 2001; Craig, Garety, & Power, 2004; McGorry & Jackson, 1999; NICE, 2009).

Given that psychosis typically occurs between late adolescence and the early years of adulthood (18 – 25), a particularly crucial period for identity formation and psycho-social development, its disruptive effect often prompts secondary problems such as lack of self-confidence or self-esteem (Birchwood, Fowler, & Jackson, 2001; Gumley, O'Grady, Power, & Schwannauer, 2004; Gumley, Karatzias, Power, *et al.*, 2006). A number of studies conducted by Birchwood and his colleagues indicated that individuals experiencing an FEP were also more prone to depression and suicidal ideation (Birchwood, Smith, McMillan *et al*., 1989; Birchwood, Mason, McMillan, & Healy, 1993b; Rooke & Birchwood, 1998; Iqbal, Birchwood, Chadwick, & Trower, 2000).

1.3. The Prevalence of Suicide in First Episode Psychosis

The reported prevalence rate of suicidal attempt from the moment psychosis starts until the onset of treatment (also known as the *duration of untreated psychosis*) is between 6.5 and 9.6% (Clarke, Whitty, Browne *et al.*, 2006; Foley, Jackson, McWilliams *et al*., 2008). In studies whose samples were recruited from the initial presentation to psychiatric service, rather than the actual psychosis onset, the rate of suicidal attempt prior to starting the initial treatment is between 14% and 28% (Bertelsen, Jeppesen, & Petersen, 2007; Robinson, Harris, Harrigan *et al*., 2009; Barret, Sundet, Faerden *et al*., 2010). Despite the timing discrepancy upon which the rates of suicidal attempts were measured, the incidence of suicidal attempts following treatment remains high across the FEP spectrum. Short-term and long-term follow-up studies indicated a variety of results. One-year follow up studies reported a prevalence rate of attempted suicide between 2.9 and 25.4% (Addington, Williams, Young, & Addington, 2004; Bakst, Rabinowitz, & Bromet, 2010; Nordentoft, Jeppesen,

Kassow *et al*., 2002; Robinson *et al*., 2009), while 2 to 7-year follow-up studies reported a prevalence rate of attempted suicide between 6 and 29.4% (Bakst *et al*., 2010; Foley *et al.*, 2008; Levine, Bakst, & Rabinowitz, 2010; Melle, Johannesen, Friis, *et al*., 2006; Robinson *et al*., 2010; Walsh, Harvey, White *et al*., 2001). In schizophrenia alone, the lifetime prevalence rate of completed suicide is about 5% (Palmer, Pankratz, & Botswick, 2005; Hor & Taylor, 2010), with the highest suicide risk during the early stages of the illness (Brown, 1997; Harris & Barraclough, 1997; Palmer *et al*., 2005). Studies on the FEP spectrum over a 4 to 5-year follow-up period, on the other hand, have estimated the rate of completed suicide in early psychosis between 1 and 3% (Bertelsen et al., 2007; Clarke et al., 2006; Crumlish, Whitty, Kamali *et al*., 2005)

The variability in the prevalence rates of both completed and attempted suicide within the FEP spectrum is probably due to two things. One, the "diagnostic instability" during the early phase of psychosis (Haahr, Friis, Larsen *et al*., 2008) makes the identification of eligible research volunteers complicated for many researchers. Two, the timing discrepancy due to the psychosis being inconsistently detectable during its prodromal phase also contributes to the variability of the study time scales. So far, only a few studies have looked into the incidence of suicidal attempts and deliberate self-harm within the *duration of untreated psychosis*, or that time between the psychosis onset and start of treatment (Harvey, Dean, Morgan *et al*., 2008; Upthegrove, Birchwood, Brunnet, McCollum, & Jones, 2010). The majority of studies have focused only on the time between the initial presentation and treatment onset, or the treatment onset and follow up period.

1.4. Risk Factors of Suicide in FEP

In a systematic review conducted by Hawton and his colleagues in 2005, it was found that a number of risk factors for suicide in schizophrenia were comparable to that of the non-psychiatric population (*e.g.* previous suicidal attempts, depression, recent loss, & drug misuse). Similar risk factors were found when Hor and Taylor (2010) conducted a systematic review on the studies published after June 2004, the cut- off date for the studies included in the previous review. Hor and Taylor (2010) have also found that in addition to those factors that were shared by the non-psychiatric population, being young, male, and well educated emerged to be the strongest risk factors. Just like Hawton *et al*. (2005), Hor and Taylor (2010) found other risk factors that were illness-specific. Previous studies have shown that individuals suffering from psychotic illnesses are not only at high risks of attempted suicide (Harris & Barraclough, 1998; Harkavy-Friedman, 2006), but also completed suicide (Brown, 1997; Saha, Chant, & McGrath, 2007). According to Limosin et al. (2007), the risk of completed suicide for individuals with psychosis is about 16 times greater than that of the non-psychiatric population. It is for this reason why a more precise identification of the risk factors in this particular clinical group is of great clinical importance. The risk factors identified below were extracted from studies that investigated suicidal behaviour within the FEP spectrum.

1.4.1. Demographic Risk Factors

The most commonly cited demographic risk factors that were found to be significantly associated with completed suicides are young age (Ceskova *et al*., 2011; Walsh *et al*., 2001) and male gender (Ceskova, Prikryl, & Kasparek, 2011; De Hert, McKenzie, & Peuskens, 2001). Alternatively, the risk factors associated with attempted suicide are female gender (Cotton, Lambert, Schimmelmman et al., 2009; Hawton, 1997; Melle *et al*., 2006;

Nordentoft *et al*., 2002; Zahl & Hawton, 2004) and younger age at illness onset (Barret *et al.*, 2010). Substance abuse issues, non-compliance to treatment, and more impaired cognitive functioning are some of the key reasons why the incidence of completed suicide is higher in males than females (Cotton *et al*., 2009).

1.4.2. Clinical and Psychosocial Risk Factors

The most common clinical symptoms that predicted suicidal attempts in both short-term and long-term follow-up studies were depression (Barret *et al*., 2010; Bertelsen *et al*., 2007; Cohen, Lavelle, Rich, & Bromet, 1994; Cotton *et al*., 2009; Crumlish *et al*., 2005; Flanagan & Compton, 2012; Fialko *et al*., 2006; Hawton *et al*., 2005; Melle *et al*., 2006; Robinson *et al*., 2010) and hopelessness (Cohen *et al*., 1994; Klonksy, Kotov, Bakst, Rabinowitz, & Bromet, 2012; Nordentoft *et al*., 2002; Robinson *et al*., 2009), along with greater insight (Barret *et al*., 2010; Crumlish *et al.*, 2005; Flanagan & Compton; 2012; Foley *et al*., 2008). Illness-specific risk factors that were found to be associated with subsequent suicidal attempts include the early stages of the illness (Brown, 1997; Harris & Barraclough, 1997; Palmer *et al*., 2005), less positive symptoms (Verdoux, Liraud, Gonzales *et al.*, 2001), hallucination (Bertelsen *et al*., 2007; Fialko, Freeman, Bebbington *et al*., 2006; Nordentoft *et al*., 2002), negative beliefs (Barret *et al*., 2010; Fialko *et al*., 2006), and anxiety (Fialko *et al*., 2006). Other illness-related factors that were also linked to the recurrence of suicidal behaviour are duration of untreated psychosis (Clarke *et al*., 2006; Melle *et al*., 2006), higher premorbid functioning (De Hert *et al.*, 2001), and prolonged initial admission (Verdoux *et al*., 2001).

1.4.3. Behavioural Risk Factors

Overall, the most prevalent risk factor for suicidal behaviour across the FEP spectrum is the history of self-harm and/or suicidal attempt (De Hert *et al*., 2001; Hawton *et al*., 2005; Flanagan & Compton, 2012; Nordentoft *et al*., 2002; Robinson *et al.*, 2010; Verdoux *et al*., 2001). A number of studies have indicated that problems with alcohol also increased the risk of attempted suicide in early psychosis (Fialko *et al*., 2006; Robinson *et al*., 2010). According to Verdoux (2001), the risk of engaging in suicidal behaviour over a 2-year follow-up was seven-fold in substance abusers. According to the systematic review conducted by Hawton and colleagues (2005), drug misuse was also found to significantly increase the suicidal risks in FEP patients. On the other hand, Tiihonen, Wahlbeck, and Lonnqvist (2006) have indicated that recently discharged first-episode schizophrenia patients were about 37 times more likely to die by suicide than those who are at a later stage of the psychotic illness. This was especially true for those who have an irregular compliance to their anti-psychotic medication.

1.5. Hopelessness as a risk factor in FEP

There is an enormous amount of literature on the role of hopelessness as a risk factor of attempted and completed suicide in both non-psychiatric and psychiatric populations. However, to date, there are only three prospective studies that looked into the relationship between hopelessness and subsequent suicide attempts within the FEP spectrum (Klonksy, Kotov, Bakst, Rabinowitz, & Bromet, 2012; Nordentoft *et al*., 2002; Robinson *et al*., 2009). The other published studies were either retrospective or cross-sectional, with samples that were not exclusive to FEP (Borgeois, Swendsen, Young *et al*., 2004; Cohen *et al*., 1994; Kim, Jayathilake, & Meltzer, 2002; Montross, Kasckow, Golshan *et al*., 2008).

1.5.1. Hopelessness: Studies that Link Suicidality in FEP and Hopelessness

Of the three prospective studies that examined the link between hopelessness and suicidal risks in FEP, only two studies were able to demonstrate the predictive value of hopelessness in determining the recurrence of suicidal behaviour in this particular sample. In a randomised controlled trial of first-episode schizophrenia-spectrum patients, Nordentoft and colleagues (2002) found that baseline hopelessness was significantly associated with the attempted suicides during the 1-year follow-up. However, hopelessness did not emerge as a predictor of subsequent suicidal attempts after controlling for the effects of the other clinical variables in the multivariate analysis (*e.g.* positive & negative symptoms, depression, *etc.*). On the contrary, Robinson *et al*.'s (2010) 7.4 year follow-up study on the prevalence and risk factors of suicide in FEP indicated that along with self-harm, suicidal tendencies, and depression, hopelessness emerged as one of the key predictors of subsequent suicidal attempts during the follow-up period. More importantly, Robinson and colleagues (2010) confirmed that the predictive value of hopelessness holds true after covarying out the effects of age at psychosis onset, gender, DUP and previous self-harm. A similar pattern of results were found in Klonsky *et al*.'s (2012) 10 year cohort study of first admission patients with psychosis. To this point, this is the only study that specifically set out to examine hopelessness as a predictor of future suicidal behaviour exclusively within the FEP spectrum. Results from this authoritative study revealed that baseline hopelessness significantly predicted subsequent suicidal attempts within the 10-year follow-up period, and this holds true after controlling for depression. Intriguingly, further analyses indicated that the predictive power of hopelessness was strongest over short-term intervals (2 years or less). Klonsky and colleagues (2010) indicated the predictive power of hopelessness as a risk factor of a suicide attempt remained strong only until the subsequent 2 years. Following the 2-year period after the hopelessness was assessed, the predictive power of hopelessness declines to

the minimum level. For example, results showed that baseline hopelessness predicted suicide attempts up until the 24-month follow-up period, but not the later follow-ups (*i.e.* 48 month – 10 years). A similar pattern of results was found when hopelessness was measured at 24th month and predicted suicide attempts over the subsequent 2 years (*i.e.* between 24 and 48th month follow up), but not the follow-ups after that.

Despite the congruence of outcome of Robinson *et al.*'s (2010) and Klonsky's *et al.*'s (2012) studies, the overall findings about the predictive role of hopelessness on future suicidal attempts in FEP are subject to a number of limitations, thus, making it hard to interpret. First, the studies used different scales to measure the construct of hopelessness. Klonsky *et al.* (2012) employed the Beck Hopelessness Scale (BHS; Beck, Weissman, Lester, & Trexler ,1974). The BHS is a tool that is renowned for being the "gold-standard" measure of hopelessness. On the other hand, Robinson *et al.*, (2010) employed The Royal Park Multidiagnostic Instrument for Psychosis or the RPMIP (McGorry, Singh, Copolov *et al.*, 1990). Although the RPMIP has a respectable reliability (mean kappa for all items = .70) and validity (RPMIP vs. DSM-III-R: kappa = .65, 74% agreement) overall, to date, there is no published information about the validity and reliability of the hopelessness items in this measure. Second, due to the fact that Robinson *et al.*'s study (2010) was only on a part of an overarching research programme, the study was not originally designed to examine the risk factors of suicidal behaviour. Due to this, hopelessness was only measured at baseline and unlike Klonsky *et al*. (2012), Robinson and colleagues (2010) was not able to demonstrate the trajectory of hopelessness as a predictor of attempted suicide across the different follow-up periods. Third, although both studies were able to demonstrate the relationship between hopelessness and recurrence of suicidal behaviour in early psychosis, both studies were not able to capture the social contexts (*e.g.* social support) and other clinical or behavioural

factors (*e.g.* depression, problem-solving skills, & others) that might have facilitated hopelessness, and more importantly the recurrence of suicidal behaviour.

1.5.2. Hopelessness: The Need for a Theoretical Model in Psychosis

While there is an increasing amount of information on the risk factors of suicidal behaviour in early psychosis, to date, there is no model that explains the mechanism of suicidal thinking in either the FEP spectrum or general psychotic disorders. With the mortality rate by suicide in schizophrenia alone being 10 times greater than the non-psychiatric population (Nordentoft, Laursen, Agerbo *et al.*, 2004) and the first-episode patients being at higher risks of killing themselves than those who are at a later stage of the illness (Bertelsen *et al*., 2007), it is crucial to have a model of suicidality that takes into account the *experience* of psychosis. Although previous studies have shown that the risks of attempted suicide in FEP are strongly linked with depression (Barret *et al*., 2010; Bertelsen *et al*., 2007; Cohen *et al*., 1994; Cotton *et al*., 2009; Crumlish *et al*., 2005; Flanagan & Compton, 2012; Fialko *et al*., 2006; Hawton *et al*., 2005; Melle *et al*., 2006; Robinson *et al*., 2010) and hopelessness (Cohen *et al*., 1994; Klonksy *et al.*, 2012; Nordentoft *et al*., 2002; Robinson *et al*., 2009), along with higher insight (Barret *et al*., 2010; Crumlish *et al.*, 2005; Flanagan & Compton; 2012; Foley *et al*., 2008), there are risk factors that are specific to the experience of the illness itself. For example, the early stage of the illness (Brown, 1997; Harris & Barraclough, 1997; Palmer *et al*., 2005) has been linked to subsequent suicidal attempts. At this point in time, it is a fact that the presence of a psychotic disorder (Cohen *et al*., 1994; Nordentoft *et al*., 2004; Verdoux *et al*., 2001), especially those with significant depressive symptoms (Barret *et al*., 2010; Bertelsen *et al*., 2007; Cohen *et al*., 1994; Cotton *et al*., 2009; Crumlish *et al*., 2005; Flanagan & Compton, 2012; Fialko *et al*., 2006; Hawton *et al*., 2005; Melle *et al*., 2006; Robinson *et al*., 2010), are at particular high risks for both

attempted and completed suicide. However, it is not exactly clear if the experience of psychosis *per se,* more specifically the early phase of the illness, has any impact on the relationship between hopelessness and risks for suicidal behaviour.

So far, the literature on suicidal behaviour more broadly is predominantly limited by two things: First, theoretical models of suicidality were narrowly grounded on either biosocial [*i.e.* Schotte & Clum's stress-diathesis model (1987)] or the cognitive [i.e. Baumeister's *Escape theory* (1999) & Carver & Scheier's *Self-regulation* or *Goal-Disengagement model* (1998)] aspects of suicidal behaviour. And although the stress-diathesis model (Schotte & Clum, 1987) paved the way to the conception of two of the most promising theoretical models of suicidal behaviour to date [*i.e.* Williams & Pollock's *Cry of Pain Model* (2001), which led to the formation of the *Differential Activation Hypothesis of suicidal relapse* (Lau, Segal, & Williams, 2004)], the earlier *stress-diathesis model* (Schotte & Clum, 1987) was simply restricted to the importance of certain risk factors and the relationship between them (Mann, Waternaux, Haas, & Malone, 1999). Second, samples used to test these models were limited to either the non-psychiatric, healthy population, or currently and previously recovered depressed individuals. In view of these two current limitations in the literature, the present study looks into the application of the DAH of suicidal relapse (Lau, Segal, & Williams, 2004) as a potential model for understanding suicidality in psychosis. With the assumptions of the DAH framework focusing on the underlying mechanism of suicidal thinking, the applicability of this model in psychosis will help clinicians manage and prevent suicidal relapse better. This is especially crucial in FEP as the suicidal thinking process often happens too quickly and the incidence of completed suicide often happens unexpectedly.

1.6. The Differential Activation Hypothesis of Suicidal Relapse

The DAH of suicidal relapse (Lau *et al.*, 2004) was an extension of Teasdale's DAH of depressive relapse (1988), which in brief suggests that due to the formation of a link between the depressed mood and certain negative thinking patterns during the early depressive episodes, reoccurrences of low mood will trigger these patterns of negative thinking (Teasdale & Barnard, 1993). The ease and the extent to which these negative thinking patterns are triggered by the depressed mood is what Teasdale referred to as the "cognitive reactivity" to depression (Teasdale & Barnard, 1993). Lau and colleagues (2004) extend Teasdale's DAH of depressive relapse (1988) by employing the assumptions of his model to explain the mechanism of suicidal thinking. By adopting the assumptions of the original DAH, the differential activation model of suicidal relapse suggests that during the early episodes of depression, a link is formed between a depressed mood and a pattern of negative and maladaptive thoughts. Hopelessness, as a form of an intensely negative, self-referential thinking, occurs as part of these negative and maladaptive thinking patterns that becomes associated with the depressed mood. The link that is formed between the depressed mood and hopelessness is then reinforced through repeated episodes of depression. The stronger the link between the depressed mood and hopelessness, the more easy and likely hopeless thoughts will get reactivated in the event that low mood reoccurs. In keeping with Teasdale's idea of "cognitive reactivity", the ease and extent to which the depressed mood can trigger hopelessness is what characterises the individual's cognitive reactivity to hopelessness (Lau *et al.*, 2004; Williams *et al*., 2008). In other words, the greater the reactivity to hopelessness is, the more vulnerable the individual is to a suicidal relapse. An elevated CR to hopelessness would simply mean that even minor negative shifts in mood will easily reactivate hopeless/suicidal cognition.

1.6.1. Generalised hopelessness vs. Cognitive reactivity to hopelessness

Historically, the word *hopeless* originate from the 16th century and was a combination of the old English words *"hopa"*, which means "to place trust in, or to rely in", and *"leas"*, which means "without" (dictionary.com unabridged). By literally combining the meaning of these two old English words together, the definition of *hopelessness* then becomes *without having anyone or anything to put your trust in.* Linehan and colleagues (1983) described hopelessness as the lack of reasons for living, while Beck and colleagues (1999) characterised it as a negative outlook for the future. In 1975, Beck, Kovac, and Weissman first linked hopelessness with suicidality and since then, numerous attempts have been made to uncover the role of this multifaceted construct in suicidal behaviour.

To date, the literature on suicidal behaviour in early psychosis has only looked into hopelessness as a generalised pessimistic view of the future, which is typically measured by using the Beck Hopelessness Scale (Beck *et al.*, 1974). In 2004, Lau and colleagues introduced the concept of "cognitive reactivity to hopelessness" as the core idea of their DAH of suicidal relapse. The term "cognitive reactivity" to hopelessness literally translates as the vulnerability to hopeless thoughts. Unlike the concept of *generalised hopelessness* which characterises how negative the individual perceives the future on the whole, *cognitive reactivity to hopelessness* characterises the individual's tendency to pessimistic thinking given a negative situation. In summary, *generalised hopelessness* describes the overall response of the individual to a difficult situation, while *CR to hopelessness* describes the more immediate response should the individual encounter a difficult situation.

1.6.2. Studies on cognitive reactivity to hopelessness

As the DAH of suicidal relapse (Lau *et al*., 2004) is still in its early stages, there is only a limited number of studies that currently supports its assumptions. So far, the

application of the DAH of suicidal relapse has only been tested on a sample or previously depressed individuals, and that was largely due to the fact that suicidal ideation is a one of the most crucial symptoms of depression. In 2005, Williams, Barnhofer, Crane, and Beck conducted a study to test the hypothesis. The main objective of the study was to investigate the effects of mood on the individual's problem-solving ability. Previous studies have identified problem-solving deficit as a behavioural marker of hopelessness (Schotte & Clum, 1982; Orbach, Bar-Joseph, & Dror, 1990; Sadowsky & Kelly, 1993). The sample consisted of 3 groups: (1) 15 previously depressed individuals without the history of suicidal ideation, (2) 19 previously depressed individuals with a history of suicidal ideation, and (3) 22 never depressed individuals. According to Williams and colleagues (2005), the lack of coping options is exacerbated by impaired problem solving ability, which then facilitates the escalation of the depressed mood into suicidal thoughts. A mood priming technique was employed in order to test if a downward shift in mood will significantly impair the problem solving ability of the previously depressed group with a history of suicidal ideation. Consistent with the authors' assumption, results showed that only the previously depressed group with a history of suicidal ideation exhibited impaired problem solving performance following a sad mood induction. However, the impairment was only evident in the *effectiveness,* but not in the *number* of problem solving means. In other words, although there was a significant decrease in the effectiveness of the problem solving means following the mood challenge, quantity of the problem solving means generated did not differ between groups. As cited by authors themselves, this study has a number of limitations. First, the sample size is relatively small. Second, the autobiographical memory data are in conflict with previous studies. The autobiographical memory task was also employed in this study as the authors also speculated that impaired performance is associated with the lack of specificity in autobiographical memory. Unexpectedly, scores of individuals with & without histories of

depression did not differ in autobiographical memory tests. Finally, the absence of a neutral mood induction control group that could have helped identify the effects of any undesirable variables on the problem solving performance.

Following this, Hepburn, Barnhofer, and Williams (2006) investigated the effects of mood on future thinking on a sample of 52 non-depressed individuals. A number of studies have evidenced that the lack of fluency in positive future thinking is a significant feature of hopelessness (MacLeod, Rose, & Williams, 1993; MacLeod, Pankhania, Lee, & Mitchell, 1997; MacLeod & Byrne, 1996). The sample was randomly allocated to the two mood priming conditions (positive vs. negative). The results were in agreement with the authors' hypothesis as the negative mood induction reduced the fluency for good events while the positive mood induction reduced the fluency for bad events. Intriguingly, however, the negative mood induction did not increase the fluency for bad events just as the positive mood induction did not increase the fluency for good events. The authors suggested that such a pattern of results may be due to the possibility that future fluency was more sensitive to diminution than increase when subjected to subtle mood changes. In addition to investigating the effect of mood on future thinking, it was also predicted that future fluency is due to mood-related changes in the evaluation process (*i.e.* positive vs. negative categorisation of events). Although evidence showed that mood influenced the perceived valence of events (*e.g.* good events were rated as more negative in a sad than recovered mood), the change in pre- to post-induction future fluency did not correlate with the change in pre- to post-induction valence ratings. However, the authors suggested the lack of association between perceived valence and future fluency might be due to the small sample size and should therefore not be ruled out on this occasion. In addition to the sample size, there are further limitations to this study. The sample consisted of non-depressed students whose characteristics are different to that of a clinical sample, who are at higher risks of suicidal

behaviours. Although the mood challenge in general altered future fluency as predicted, the lack of neutral mood induction made it slightly difficult to isolate the effects of the positive and negative mood induction on future fluency. However, overall, this study was an important step in the literature of the DAH of suicidality. The confirmation that even subtle shifts in mood altered future fluency was a novel and important finding, which served as a platform for studies that aim to explore the mechanism of hopeless or suicidal cognition.

Williams, Crane, Barnhofer, Van der Does, and Segal (2006) also published a study, which prospectively examined the recurrence of suicidal ideation across depressive episodes. The aim of this study was twofold: (1) to examine the extent of association between suicidal ideation and other symptoms of major depression across depressive episodes, and (2) to investigate the nature of inconsistencies in suicidality across episodes, and when they arise. A total of 69 individuals with a history of Major Depression (MDD) were allocated to treatment as usual and prospectively studied over a 12-month period. Follow-up data revealed that a total of 38 individuals (56%) had a recurrence of depression. Results suggest that suicidal ideation is the only symptom that appears consistent across depressive episodes. The authors, however, have pointed out that there was a decrease in severity of suicidality from previous episode to recurrence. One of the reasons is the possibility that patients might have underreported current suicidal ideation in fear of intervention. Overall, this study provided initial evidence on the recurrence of suicidal behaviour across depressive episodes in line with the assumptions of DAH of suicidal relapse. According to the DAH, once suicidal ideation has occurred during a depressive episode, it is more likely to reoccur along with the re-emergence of another depressive episode. The two main limitations of this study include the small sample size, and that the reoccurrence of suicidal ideation was measured in the absence of suicidal attempts.

Enthused by the results of the previous study, the same authors (Williams, Van der Does, Barnhofer, Crane, & Segal, 2008) conducted a study to investigate if the reoccurrence of suicidal or hopeless thoughts over time can be illustrated using the DAH of suicidality. There were 3 parts to this study. The aim of studies 1 and 2 was to examine if cognitive reactivity as measured by the hopelessness/suicidality subscale of the Leiden Index of Depression Scale – revised version (Van der Does & Williams, 2003) will be associated with previous suicidal ideation. On the other hand, the aim of study 3 was to examine if higher CR as measured by the LEIDS' hopelessness subscale will be associated with impairment in future fluency when in a sad mood state. Participants in the study 1 consisted of 36 previously depressed and 80 never depressed first year undergraduate psychology students, while participants in study 2 consisted of 63 previously depressed and 57 never depressed middle-aged adults. Participants who have been identified as previously depressed met the criteria for the previous Major Depression using Major Depression Questionnaire (Van der Does, Barnhofer, & Williams, 2003). As predicted, results of studies 1 and 2 indicated that individuals who had higher scores on LEIDS' hopelessness/suicidal ideation subscale also admitted to having suicidal ideations in the past when feeling depressed. Such pattern of data was consistent with the previous study (Williams et al., 2006), which illustrated that suicidal ideation was the only symptom that was consistent across depressive episodes. On the other hand, participants in study 3 were a subgroup of individuals who took part in study 2. Of the 32 individuals who met the inclusion criteria, 13 had been previously depressed without suicidal ideation, 5 had been previously depressed with suicidal ideation, and 14 had never been depressed at all. Results for study 3 also confirmed the assumption that CR, as measured by the LEIDS' hopelessness/suicidality subscale, was predictive of the changes in positive future fluency (as measured using the Future Fluency Task) following the sad mood induction. Similar results were found in an earlier study conducted by Hepburn and

colleagues (2006), which indicated a decrease in positive future fluency following a sad mood induction. Despite the promising results, careful considerations must be observed when drawing conclusions from this study. The authors have identified a number of limitations. Firstly, the sample size is relatively small and the rate of depression in both genders did not differ. Secondly, the specificity of the relationship between history of suicidal ideation and CR to hopelessness was based on two things: (1) with the exception of guilt, all other depressive symptoms did not predict CR to hopelessness, and (2) history of suicidal ideation did not predict the other subscale of LEIDS. Despite the association between history of suicidal ideation and CR to hopelessness holding true after controlling for current depression and severity of past depression, the authors suggested that the sample size might be lacking in power to detect the differences between the other subscales of LEIDS. More importantly, the lack of distinction between the magnitude of group differences in the hopelessness subscale, and the other LEIDS' subscales across the two groups (with suicidal ideation vs. without suicidal ideation) seemed to suggest that history of suicidal ideation may not only be specific to higher CR to hopelessness. Further analyses showed that both the ruminative and avoidant tendency were significant covariates to CR to hopelessness. Finally, the authors pointed out that the LEIDS' hopelessness subscale was devised to measure CR to hopelessness or suicidal ideations and not to suicidal attempts. As the majority of the participants in this study only had histories of ideation, the interpretation of results with regards to the use of this subscale is therefore limited only within this type of sample. The authors recognised that this measure needs to be validated in a clinical sample with higher rates of suicidal attempts.

In summary, the results of the previous studies support the assumptions of the DAH of suicidal relapse by demonstrating that a subtle downward shift in mood impairs problem solving (Williams *et al*., 2005) and fluency for positive events (Hepburn *et al*., 2006), two of the most widely recognised characteristics of hopelessness. The observed recurrence of

suicidal behaviour across depressive episodes also renders support to the DAH of suicidal relapse, which suggest that once suicidal ideation occurs as a feature of an early depressive episode, it is more likely to reoccur in another depressive episode (Williams et al., 2006 & 2007). Together, these results illustrate that vulnerability to suicidal thinking can be measured via quantifiable behavioural features of hopelessness (*e.g.* problem solving & future fluency). Identification of the most relevant risk factors for suicide is crucial for a successful prevention and treatment of suicidal behaviour. While the DAH framework is only in its infancy, evidence that supports its concept on *cognitive reactivity* represents a good starting point for further investigation of the suicidal thinking mechanism.

CHAPTER 2

THE EXPERIENCE SAMPLING METHOD

2.0. Introduction

One of the major difficulties in investigating suicidal thinking is the lack of context that is relevant to the occurrence of this pernicious thinking process. To date, the suicidal thinking *process* has only been studied within the confines of the laboratory. The purpose of this chapter is to review the scientific literature on the Experience Sampling Method (Delespaul, 1995; de Vries, 1992) in order to assess its potential as a research tool for investigating the suicidal thinking process in early psychosis. Preceding the review is a brief discussion of the general aspects of the ESM, its definition and use in psychosis research, limitations and strengths, and validity and reliability as a research method. Following this is a review of the previous ESM studies in psychosis. The concluding discussion will point at the application of the ESM as a potential tool for investigating the suicidal thinking mechanism in psychosis using the DAH framework.

2.1. The Experience Sampling Method (ESM): An Overview

The ESM was originally defined as a process of collecting data about a person's daily life experiences (Hektner, Schmidt, & Csikszentmihayli, 2007). The use of ESM was first initiated by Hektner, Schmidt, and Csikszentmihayli during the early 1970's to study the 'flow' (Hektner *et al*., 2007) of daily life experiences. It all started with the use of pagers activated at random times from a central radio station, prompting people to write in their diaries about the things they have done and enjoyable moments of their day. The last 4 decades of research has transformed the ESM into using a more structured diary method,

making it a widely popular tool in investigating an extensive range of human behaviour and activities, in a variety of disciplines (*e.g.* psychology, sociology, & anthropology).

Researchers of contemporary ESM studies characterise the ESM as a systematic diary keeping technique, which requires individuals to fill in a self-report questionnaire at predetermined times of the day within his/her real life environment (Delespaul, 1995; de Vries, 1992). The term "diary keeping" was central to the description of the ESM for two reasons: (1) the questionnaires are compiled in a form of a small diary or booklet, and (2) just like the traditional diary; the ESM booklet keeps a record of daily events and activities over a specific period of time. The self-report questionnaires in an ESM diary usually consists of open- and close-ended, Likert formatted questions, which were formulated to assess for topics that are of key interest in the study. Depending on the study, each questionnaire will take about 1 to 1.5 minutes to complete and each ESM diary consists of at least 3 to 10 identical questionnaires that are to filled in one questionnaire at a time, as and when prompted by a programmable device (*e.g.* a digital wristwatch, mobile phone, personal digital assistant/PDA, or beeper), at predetermined times of the day. Sampling time schedules are always semi-randomised in order to avoid clustering of the sampling time points (Delespaul, 1995; de Vries, 1992). The duration of ESM studies vary from a day to several years (Csikszentmihayli & Schneider, 2001).

2.2. The Use of ESM in Psychosis Research

In clinical research, the ESM is also referred to as the "Ecological Momentary Assessment" (Stone & Shiffman, 1994). However, for the purpose of this review, only the term ESM will be used. The use of ESM as a research tool in psychosis has come a long way since it was initially used in 1987 (Hurlburt & Melancon) when a patient with schizophrenia was asked to write a narrative description of her daily hallucinatory experiences. Over the last

25 years, this purely qualitative, freestyle-written diary method has evolved into what is now the present-day ESM, a diary keeping technique that is more systematic and structured. The advancement of ESM as a research tool in psychopathology is largely due to a group of clinicians and researchers from the University of Maastricht in The Netherlands (*e.g.* Delespaul, de Vries, Myin-Germeys, Van Os, & others). At the same time Hurlburt and Melancon (1987) first used ESM on a single case study, Delespaul and de Vries (1987) devised an ESM diary with open- and close-ended questions. The reformulated diary questionnaire was used to capture the daily life experiences of 11 non-psychiatric volunteers and 11 patients with chronic mental illness. Through the use of both open- and close-ended questions, Delespaul and de Vries (1987) were able to qualitatively and quantitatively measure the day to day activities of both groups, and more importantly, the illness-related experiences of the patient group. Since then, the use of ESM has been dramatically transformed from being a mere qualitative measure to a dual-function research tool that is capable of sampling qualitative and quantitative data all together.

2.2.1. The Contemporary ESM in Psychosis Research

Nowadays, the ESM questionnaire or the experience sampling form (ESF; Delespaul, 1995; Delespaul & de Vries, 1987) in psychosis research generally consist of questions about the individual's thoughts, mood, somatic and psychotic symptoms, context (*e.g.* place & people), activities, and events. Questions on thoughts, context, activities, and events are a combination of open-ended (*e.g. "What are you thinking?"* or "*Who are you with?"*) and close-ended, follow-up questions (*e.g. "My thoughts are pleasant."* or *"My thoughts are clear."*) with a Likert-type response scale (1 = not at all and 7 = almost always). On the other hand, questions on mood, somatic, and psychotic symptoms are entirely close-ended (*e.g. "I feel tired."* or *"I feel secure."*) with the identical 7-point Likert-type response scale. The

questions on the ESF are based on the standard mental health examination procedure in psychiatry while the coding of the open-ended questions is based on the ESM instruction manual formulated by Delespaul and de Vries (1987). Although many researchers still use some of the components of the original Delespaul and de Vries' ESF (1987), the entire content of the ESF can be tailored according to the purpose of the study provided that: (a) newly formulated questions must be piloted to establish its reliability and validity, (b) completion time of the entire ESF must be between 2 to 3 minutes to retain good compliance (Delespaul, 1995; Delespaul & deVries, 1994).

Until recently, the use of ESM in psychosis research has always been conducted using a paper and watch procedure. Paper based diaries (typically A6 in size) along with a signalling device (*e.g.* digital wristwatch) were considered to be the most economical, convenient, easy, and efficient way of conducting ESM studies (Palmier-Claus, Taylor, Gooding, Dunn, & Lewis, 2011). With the recent advances in handheld computing technology, two studies were able to demonstrate the use of electronic devices (*i.e.* PDA's) to conduct the ESM in a sample of patients with psychotic disorders (Kimhy, Delespaul, Corcoran *et al*., 2006; Granholm, Loh, & Swendsen, 2008). Findings from both studies indicated a high compliance rate (87% - Granholm et al., 2008 & 80% - Kimhy *et al*., 2006), that did not significantly differ from that of the non-psychiatric control group (81% - Kimhy *et al*., 2006). Whereas the participants in Granholm and colleagues' study (2008) reported positive feedback for their overall electronic diary keeping experience, participants in Kimhy *et al*.'s (2006) study found the use of electronic devices quite challenging.

2.2.2. Feasibility and Compliance

The feasibility of employing the ESM in a sample of individuals, with a spectrum of psychotic disorders has already been demonstrated in previous studies (Delespaul, de Vries,

& Van Os, 2002; Delespaul & de Vries, 1987; Hurlburt & Melancon, 1987; Myin-Germeys, Delespaul, & de Vries, 2000; Myin-Germeys, Nicolson, & Delespaul, 2001; Myin-Germeys, Krabbendam, Jolles, Delespaul, & Van Os; 2002; Myin-Germeys, Krabbendam, Delespaul, & Van Os, 2003; Lardinois, Myin-Germeys, Bak, Mengelers, Van Os, & Delespaul, 2003, & many others). Despite the relatively high drop-out rates in patients with more severe and chronic psychotic symptoms (Oorschot *et al*., 2009), previous studies have illustrated that a respectable number of valid diary reports can be achieved in this particular clinical sample.

Compliance rates in ESM studies are calculated by dividing the total number of valid diary reports (also called ESF) completed with the total number of expected reports. For instance, 10 diary reports over 6 days is equivalent to 60 expected reports. If a participant manages to complete 30 valid reports (completed within 15 minutes after the signal; Delespaul, 1995) out of the 60 expected reports, then the calculated compliance rate is equivalent to 50%. Oorschot and colleagues (2009) indicated that the compliance rate in schizophrenia sample was around 66%, although higher rates were reported from other studies (79% - Kimhy *et al*., 2010; 87% - Graholm *et al*., 2008).

2.2.3. Limitations and Strengths

The key strength of the ESM is that it measures real life experiences as they occur in their natural context (Myin-Germeys *et al.*, 2009). Due to this, the ecological validity is high and the chances of selective memory or recall bias is minimal (Kiviniemi & Rothman, 2006; Kikuchi, Yoshiuchi, Mikasaka, Ohashi *et al*., 2006; Myin-Germeys *et al*., 2009). As the ESM is designed to repeatedly collect multiple data at different time points over a prolonged period of time and more importantly, within the natural everyday life context of the participant, the ESM data offers: (a) an opportunity to examine the role of contextual factors and its interaction with thoughts, feelings, and behaviour of an individual, (b) a chance to explore

other potentially important underlying mechanisms or processes, and (c) a better understanding of how the variables under study function over time (Myin-Germeys *et al*., 2009).

The ESM also has a number of limitations that need to be borne in mind. As a self-report assessment, the ESM is prone to subjective personal biases (Christensen *et al*., 2003). However, it is important to note that the ESM was purposely devised to assess the individual's subjective account in order for researchers to understand the nature of his/her personal experiences in everyday life. Hektner and colleagues (2007) pointed out that being able to measure the individuals' subjective experiences may bring a more practical insight about the reality of some of the mental illnesses.

Another limitation is the relatively high financial cost of running an ESM study. Due to its prolonged data sampling, time consumption is also high in ESM studies. Some of the participants also find the repeated assessments and the overall length of the study quite intense and challenging. Such issues sometimes cause participants to skip or miss a significant amount of sampling times, "back fill" or "forward fill" their diaries (Granholm *et al*., 2007), and misreport the time of reports in their diary (Hektner *et al*., 2007).

2.2.4. Validity and Reliability

As discussed briefly in the previous section, the fact that ESM relies on self-reports poses questions on the validity of its procedure. However, the fact that a good number of widely used psychometric measures in many clinical and research settings also rely on self-reports, does not necessarily make the ESM a valid measure. As the completion of this self-report measure depends on the prompts of a signalling device, the ESM reports are generally less prone to selective memory biases or "recall biases". Kimhy and colleagues (2006), however, pointed out that due to the highly subjective nature of the ESM questions (*i.e.*

questions on thoughts & mood) and the natural tendency of these variables (e.g. mood & thoughts) to vary over time, the ESM data may not necessarily capture a valid behavioural outcome. Previous studies have illustrated that affective variability or instability is characteristic of individuals who are at risk of developing psychosis (Delespaul & de Vries, 1987; Myin-Germeys *et al*., 2000; Palmier-Claus *et al*., 2011). Such variability in affect, along with the fluctuations of the psychotic symptoms over time (Delespaul, 1995; de Vries, 1992), explains why the conventional reliability testing is not applicable for the ESM questionnaire. Instead, Delespaul (1995) has suggested employing a "multiple indicator" approach by looking at the reliability of correlated constructs (e.g. negative mood and psychotic symptoms).

2.3. The ESM Studies in Psychosis

The use of the Experience Sampling Method (ESM) in psychosis research started 26 years ago with a single case study of a patient with schizophrenia (Hurlburt & Melancon, 1987). Prior to that, clinicians and researchers knew very little about the day to day experiences of those who suffer from psychosis. Since ESM was first employed in psychosis studies, researchers began to uncover some of the important aspects of the illness; from the frequency of hallucinatory and delusional experiences to the momentary fluctuations of mood, the incidence of substance misuse, the individual's reactivity to minor stresses in everyday life, along with the people and places that provide a suitable context for the worsening or improvement of certain psychotic symptoms. However, to date, the ESM has not yet been utilised to explore the occurrence and fluctuation of hopeless or suicidal thoughts in a sample of individuals with psychosis. For the purpose of illustrating the reliability of the ESM as a valid research tool for assessing momentary experiences in psychosis, a summary of ESM studies published between 1987 and 2011 is presented on

Table 1. For the sake of brevity, only studies that are relevant to the ESM study in this thesis will be discussed.

Of the identified studies, 9 investigated affective variability and/or stress reactivity while the rest of the studies examined hallucinatory experiences (7), cognition and genetics (4), substance misuse (2), and anticipatory pleasure towards daily activities (1). Of the 9 relevant studies, 3 were specifically focused on affective variability, 5 on stress reactivity, and 1 on the relationship between life events and stress reactivity on a day to day basis. All three studies on affective variability confirmed that affective variability is characteristic of a psychotic illness (Delespaul & deVries, 1987; Myin-Germeys *et al*., 2000; Palmier-Claus *et al*., 2011). Specifically, according to Myin-Germeys and colleagues (2000), patients with schizophrenia had less variability and intensity in their positive affective responses but greater variability and intensity in their negative affective responses. Contrary to the results of previous laboratory-based experiments (Gaebel & Woelwer, 1992; Kring, Kerr, Smith, & Neale, 1993; Kring & Neale, 1996), the ESM data presented by Myin-Germeys *et al.* (2000) gave emphasis to the importance of contextual factors in the psychopathology.

Of the three studies on affective variability, Palmier-Claus *et al*.'s, (2011) was the only one who investigated the association between ESM-measured affectivity, and baseline severity and frequency of suicidal behaviour (*i.e.* ideation, suicidal attempt, or self-harm). Although the study illustrated a link between affective variability and suicidal behaviour, the results were limited by a number of important issues: (1) the sample size is relatively small (N = 27), (2) the definition of suicidal behaviour is too broad (*i.e.* suicidal ideation was included), (3) the assessment of suicidal behaviour was based on a retrospective interview, and (4) the number of 'suicidal' individuals were not reported. More importantly, as affective

Table 1. Summary of ESM Studies in Psychosis

Authors	**Sample size and characteristics**	**Sampling Method**	**Results**
Delespaul & deVries (1987)	*N* = 11 patients with schizophrenia & 11 non-psychiatric controls	10 samplings/day over 6-day period	Patients with schizophrenia displayed more variability in their thoughts, mood, & activity motivation
Hurlburt & Melancon (1987)	Single case study of a 23 year old patient with schizophrenia	At least 10 samplings/day over a 2-week period	Patient reported 71 narrative descriptions of distorted images (e.g. blue glass appearing as yellow, patient seeing things in a crooked or tilted angles/shapes) including visualisation of her voice in the form of hand-printed, colourful displays
Myin-Germeys, Delespaul, & deVries (2000)	*N* = 58 schizophrenia patients with blunted or non-blunted affect & 65 non-clinical controls	10 samplings/day over 6-day period	Schizophrenic patients had less intensity & deviations in positive emotions but greater intensity & variability in negative emotions compared to the control group. Blunted & non-blunted sub-groups did not differ in their patterns of emotional experience.
Myin-Germeys, Nicolson, & Delespaul (2001)	*N* = 34 individuals with schizophrenia spectrum disorder	10 samplings/day over 6-day period	Increases in negative emotion & inactivity were associated with delusional moments. Delusional moments intensified auditory hallucinations.
Delespaul, deVries, & Van Os (2002)	*N* = 57 individuals with schizophrenia spectrum disorder	10 samplings/day over 6-day period	Intensity of auditory hallucination increased with engagement in leisure activities and decreased with social withdrawal. Higher baseline anxiety was associated with subsequent auditory hallucinations.

Table 1. Summary of ESM Studies in Psychosis

Authors	Sample size and characteristics	Sampling Method	Results
Myin-Germeys, Krabbendam, Jolles, Delespaul, & Van Os (2002)	*N* = 42 patients with schizophrenia in remission	10 samplings/day over 6-day period	Overall cognitive functioning did not influence emotional sensitivity to stress, although some data illustrated that higher cognitive functioning facilitated greater emotional sensitivity to stress.
Myin-Germeys, Krabbendam, Delespaul, & Van Os (2003)	*N* = 42 patients with schizophrenia in remission	10 samplings/day over 6-day period	Life events (LE) were not associated with subjective appraisal of stress (activity or event-related stress). LE was associated with emotional reactivity (increased NA & decreased PA).
Lardinois, Myin-Germeys, Bak, Mengelers, Van Os, & Delespaul (2003)	*N* = 35 individuals with psychosis spectrum disorder	10 samplings/day over 6-day period	Voice-hearing patients with more effective coping strategies (e.g. not following the voices) experienced more distress.
Myin-Germeys, Krabbendam, Delespaul, & Van Os (2004)	*N* = 42 patients with schizophrenia in remission	10 samplings/day over 6-day period	Female participants exhibited greater emotional reactivity (increased NA & decreased PA) to every daily life stresses compared to male participants.
Myin-Germeys, Delespaul, & Van Os (2005)	*N* = 42 psychosis spectrum patients in remission, 47 first degree relatives, & 49 non-psychiatric controls	10 samplings/day over 6-day period	An increase in subjective stress (activity & event-related stress) was associated with an increase in the intensity of psychotic experiences in the patient group.
Kimhy, Delespaul, Corcoran, Ahn, Yale, & Malaspina (2006)	*N* = 10 patients with schizophrenia and 10 healthy controls	10 samplings/day over 6-day period	The patient group and healthy control group did not differ in their ratings of stress.

Table 1. Summary of ESM Studies in Psychosis

Authors	**Sample size and characteristics**	**Sampling Method**	**Results**
Gard, King, Gard, Horan, & Green (2007)	*N* = 15 patients with schizophrenia and 12 healthy controls	7 samplings/day over 7-day period	Patient group exhibited a more reduced anticipatory pleasure towards goal-directed activities (*e.g.* work & studying) compared to the healthy controls
Morrens, Krabbendam, Bak, Delespaul, Mengelers, Sabbe, Hulstijn, Van Os, & Myin-Germeys (2007)	*N* = 25 patients with psychosis spectrum disorder	10 samplings/day over 6-day period	In some instances cognitive functioning was not associated with stress sensitivity while in other instances, the former was inversely related to the latter.
Henquet, Rosa, Delespaul, Papiol, Fananas, Van Os, & Myin-Germeys (2009)	*N* = 31 patients with psychosis spectrum disorder & 25 healthy controls	10 samplings/day over 6-day period	COMT Val(158)Met genotype moderates the association between cannabis use and psychotic experiences in everyday life.
Lataster, Collip, Lardinois, Van Os, & Myin-Germeys (2010)	*N* = 40 patients with psychosis spectrum disorder & 47 healthy controls (siblings of the patient group)	10 samplings/day over 6-day period	Stress reactivity in patient group and healthy controls was significantly associated. Positive psychotic symptoms and stress reactivity in healthy controls were also significantly associated.
Kimhy, Delespaul, Ahn, Cai, Shikhman, Lieberman, Malaspina, & Sloan (2010)	*N* = 20 patients with psychosis spectrum disorder	10 samplings/day over 6-day period	Momentary increases in stress had a negative correlation with concurrent parasympathetic activity and positive correlation with sympathovagal balance.
Ben-Zeev, Morris, Swendsen, & Graholm (2010)	*N* = 113 patients with schizophrenia and schizoaffective disorder	Unknown sampling rate. 7-day period.	Negative self-esteem predicted delusional experiences while hallucination predicted delusions of control. Frequency of delusions of control was associated with reduced ability to gather information.

Table 1. Summary of ESM Studies in Psychosis

Authors	**Sample size and characteristics**	**Sampling Method**	**Results**
Henquet, Van Os, Kuepper, Delespual, Smits, Campo, & Myin-Germeys (2010)	*N* = 42 patients with psychosis spectrum disorder & 38 healthy controls	10 samplings/day over 6-day period	Daily cannabis intake in the patient group predicted increases in positive affect and decreases in negative affect.
Thewissen, Bentall, Oorschot, Campo, Van Lierop, Van Os, & Myin-Germeys (2011)	*N* = 82 patients with schizophrenia and schizoaffective disorder & 37 healthy controls	10 samplings/day over 6-day period	An increase in anxiety and a decrease in self-self esteem predicted the onset of paranoid experiences.
Swendsen, Ben-Zeev, & Graholm (2011)	*N* = 145 patients with schizophrenia & schizoaffective disorder	Unknown sampling rate. 7-day period	A bi-directional relationship was found between substance use and psychotic symptoms.
Palmier-Claus, Taylor, Gooding, Dunn, & Lewis (2011)	*N* = 27 individuals at ultra high risk of developing psychosis	10 samplings/day over 6-day period	Ultra high risk individuals who previously reported suicidal ideation exhibited greater affective variability.
Varese, Udachina, Myin-Germeys, Oorschot, & Bentall (2011)	*N* = 42 patients with schizophrenia spectrum disorder & 23 healthy controls	10 samplings/day over 6-day period	Dissociation was associated with auditory hallucinations during highly stressful situations.
Lardinois, Lataster, Mengelers, Van Os, & Myin-Germeys (2011)	*N* = 50 non-affective psychosis individuals	10 samplings/day over 6-day period	Childhood trauma was associated with greater affective and psychotic reactivity to the stresses of everyday life.

variability has already been found in individuals with psychosis (Delespaul & de Vries, 1987; Myin-Germeys *et al*., 2000), the lack of a control group in Palmier-Claus *et al.*'s study (2011) made the interpretation of results quite difficult.

The ESM studies on stress reactivity, on the hand, demonstrated that the healthy controls were just as sensitive to the minor stresses in everyday life as the individuals affected by psychosis (Kimhy *et al*., 2006; Lataster *et al*., 2006). Such findings were unexpected as a previous study has indicated that the increase in the intensity of psychotic symptoms in this particular group was associated with the increase in the subjective stress caused by the minor strains in everyday life (Myin-Germeys, 2005). A year prior to this, Myin-Germeys and colleagues (2004) also found that across the psychosis spectrum disorder, sensitivity to stress was greater in females than males. Intriguingly, no link was found between stress sensitivity and the incidence of recent life events in patients with a diagnosis of schizophrenia (Myin-Germeys *et al*., 2003). Instead, life events were found to be associated with greater affective variability in this particular group (Myin-Germeys *et al*., 2003). However, Myin-Germeys and colleagues (2003) pointed out that the incidence of life events did moderate the effect of minor stresses in everyday life on mood.

Overall, results of the previous ESM studies on affective and stress reactivity have important implications for the concept of cognitive reactivity to hopeless and suicidal thoughts as proposed by the Differential Activation Hypothesis of suicidal relapse (DAH; Lau *et al*., 2004). First, the unstable affectivity of individuals affected by psychosis, particularly the higher instability and intensity in positive affectivity (PA) than negative affectivity (NA), might suggest that the individuals with psychosis are at a greater risk for suicidal relapse. The more unstable and intense PA is than NA, the more likely the reactivation of hopeless or suicidal thoughts may occur amongst those with histories of suicidal attempt or deliberate self-harm. Second, the mediating effect of traumatic life events

on the individual's affective responses to minor stresses in everyday life, sustains the idea that early psychosis individuals will be more vulnerable to suicidal relapses. It is now established that life following the initial episode of psychosis can be distressing for many individuals. The traumatic experience of the illness itself, along with the other life events associated with the illness (*e.g.* hospitalisation, leaving work or school due to psychosis, stigma, & many others), will render this particular group of individuals more vulnerable to affective variability when confronted with the everyday life stresses. Again, following the assumption of the DAH, the more unstable PA, the more likely it may lead to NA reactivating hopeless thoughts in previously suicidal individuals.

2.4. The ESM: A potential tool to test the DAH

The last 26 years has demonstrated the competence of the ESM to capture data that were otherwise impossible to obtain from any laboratory setting. The ability of the ESM to assess momentary fluctuations in mood, along with the changes in contextual factors, makes this research technique an ideal tool to test the assumptions of the DAH for suicidal relapse. Since the core idea of the DAH rests on the interactive relationship between mood and hopeless/suicidal thoughts, it is vital to examine this relationship over a prolonged period of time and in its most natural context. Whereas a number of laboratory procedures nowadays can induce the appropriate emotional context necessary to elicit certain responses (whether it is affective, cognitive, or behavioural), these procedures are by no means comparable to what happens in real life. Although it can be argued that there are certain behaviours and psychological processes that can be successfully studied within the premises of a laboratory, there are also behaviours and processes which can only be meaningfully studied in their natural context. Suicidal thinking has already been established to occur in the context of a depressed mood and hopeless cognition (Lau *et al*., 2004). Such contexts are not only

unethical and precarious to replicate, these are also complicated emotional states that involve a number of other contextual factors. For example, persistent social isolation and lack of structured activities can both trigger feelings of despair. These are some of the contextual factors that only exist in the context of the individual's "natural habitat". This is when research techniques like the ESM is most needed. In testing the assumptions of the DAH, the use of ESM not only makes it possible to understand that interaction between affectivity and hopeless/suicidal cognitions, but also the interaction between the individual and his/her natural, day to day environment. The repeated sampling over a period of time (typically 6 days) will help establish the pattern of fluctuations in mood and hopelessness across a range of contexts (e.g. people, places, activities, & events).

2.5. Overview of Thesis

The overarching aim of this thesis is to investigate the mechanism of suicidal thinking in early psychosis. The central aim is to examine if the reoccurrence of suicidal or hopeless thoughts over time can be explained within the framework of the DAH of suicidal relapse (Lau *et al*., 2004). To do this, two contrasting methodological approaches were employed. First, in Chapter 3, an Experience Sampling Method (Delespaul, 1995; de Vries, 1992) is employed to assess the momentary fluctuations in hopelessness in response to the changes in mood over time. Second, in Chapters 4 and 5, a mood induction procedure is conducted in order to induce feelings of sadness, a context that is necessary to illustrate the mechanism of suicidal thinking as proposed by the DAH of suicidal relapse. In chapter 4, the Means-End Problem Solving (Platt & Spivack, 1975) task is carried out before and after the mood challenge in order to test if the change in mood altered the interpersonal problem ability, a behavioural marker that is closely linked with hopelessness. In Chapter 5, the Future Thinking Task (MacLeod *et al*., 1993) is also carried out before and after the mood challenge

(alongside the task in chapter 4), in order to test if the change in mood will reduce fluency for positive events, a signature characteristic of suicidality or hopelessness.

2.6. Note on Collaboration

The author completed the research presented in this thesis in collaboration with a number of other individuals. The author's supervisors, Professor Max Birchwood and Dr. Chris Jackson provided input on research development, design and write-up, and are therefore recognised as co-authors. Dr. Inez Myin-Germeys and Margreet Oorschot are recognised as co-authors on Chapters 3, where they contributed to the design of the ESM questionnaire and the analyses of data. Recruitment was solely carried out by the author of this thesis in collaboration with the team managers and care coordinators of the Early Intervention Service in Birmingham. All of the analyses were undertaken solely by the author of this thesis, with information and advice provided by the author's supervisors. All write-ups were solely the work of the author of this thesis, with the author's supervisors providing input in terms of feedback on drafts and ideas.

CHAPTER 3

The Mechanism of Hopelessness Linked to the Mood Fluctuations in Everyday Life: An ESM Study

3.0. Introduction

Empirical research into the underlying mechanisms of the suicidal thinking process in the first episode psychosis sample is limited. Over the last decade, studies on suicidality in psychosis have been mainly focused on the incidence and risk factors of suicidal behaviour. So far, we know "what" makes these individuals want to end their own lives, and to a certain extent, we understand "why" they have come to feel this way. And yet, we know very little about the 'how' and the 'when' of this complex phenomenon. How does one acquire a suicidal mind? When and how does it start? The answers to these questions are especially crucial in the FEP sample as the stage of post-psychotic recovery is often characterised by a rapid increase in suicidal attempts (Power, 2010). The aim of this study is to address this gap in the literature by investigating the suicidal thinking process using the Differential Activation Hypothesis of suicidal relapse (Lau et al., 2004) framework. Specifically, the core idea was to uncover the relationship between positive and negative affectivity, and hopelessness by employing the Experience Sampling Method (Delespaul & de Vries, 1987).

As discussed in Chapter 1, the DAH of suicidal relapse (Lau *et al*., 2004) suggests that hopeless or suicidal thoughts occur as a feature of the maladaptive and dysfunctional thinking process during a severe episode of depression. The key idea of the hypothesis is that repeated episodes of depression will strengthen the link between the suicidal/hopeless thoughts and the depressed mood. The stronger the link, the *easier* it will be for a subsequent depressed mood to reactivate these suicidal/hopeless thoughts. Such *ease* in the reactivation

process is referred to as the "cognitive reactivity" to hopelessness (Lau *et al*., 2004). To date, CR to hopelessness as a proximal risk to suicidal thinking has only been validated in a sample of healthy and previously depressed individuals. So far, previous studies have only examined CR to hopelessness using a laboratory-based, experimental method called the "mood priming" or "mood induction procedure". The MIP as its name suggests, is a procedure where a certain type of mood is *induced* or *primed* in an individual in order to examine occurrences (*e.g.* behavioural or cognitive) that can only be studied under a certain mood state. While the MIP has been established as an effective way to alter mood in healthy and previously depressed individuals (Hepburn *et al*., 2006; Williams *et al*., 2005; Williams *et al*., 2006 & 2007; Hepburn *et al*., 2009), the extent to which it can mimic the natural mechanism of mood in real life is subject to speculations. Data from mood priming studies are especially difficult to interpret if the behavioural or cognitive occurrences under study have a known functional relationship with real life contexts. For example, suicidal ideation is a cognitive phenomenon that has been established to interact with the constantly dynamic individual and circumstantial or contextual factors. This is especially true in the case of the FEP sample as simple day to day activities (*i.e.* reading, socialising, & others) can be a struggle due to the persistence of cognitive impairments following the psychotic episode (Power & McGowan, 2011). Along with the lack of activity, social isolation/alienation, stigmatisation, and discrimination also characterise the everyday life of this particular clinical group. These circumstantial factors, together with the appropriate combination of distal and proximal risks, have been recognised to lead to a suicidal state (Power & Robinson, 2009). It is for this reason why the data collected via experimental methods such as the MIP become problematic. The lack of ecological validity in laboratory-based experimental procedures draws attention to the fact that naturally occurring phenomenon such as the suicidal thinking

cannot be effectively measured via *artificial* means, within the realms of a *simulated* environment.

To complement the methodological limitations of the MIP (see studies on chapter 4 & 5), a naturalistic yet highly systematic approach was employed in the current study. The Experience Sampling Method (Delespaul, 1995; de Vries, 1992), or also known as the *Ecological Momentary Assessment* (Stone & Shiffman, 1994), is a "structured diary keeping" technique that collects data on the individual's real-time experiences in real-life contexts. In brief, the ESM entails keeping a record of the momentary changes in thoughts, mood, and contexts (*e.g.* places, people, events, & activities) whenever prompted by a signalling device (usually 10 times a day), over a period of time (*e.g.* 6 days). Unlike the traditional diary keeping method, the ESM is not merely a record of events but more importantly, it is a structured assessment of the individual's everyday life experiences. Due to the highly subjective nature of the ESM data and its reliance on self-report measures, the ESM has been mainly criticised for its validity and reliability. As the purpose of the ESM is to measure how certain individuals perceive their experiences in everyday life, the validity of the ESM mainly depends on how correlated variables interact. For example, it is conceptually (and intuitively) logical to observe greater positive affectivity when the individuals are confronted with events that are more pleasant in nature. If similar studies replicate such a pattern of results, then the reliability of the ESM questionnaire is assumed. The validity and reliability of the ESM as a research tool in psychosis have already been demonstrated in a number of studies (Delespaul *et al*. 2002; Delespaul & de Vries, 1987; Hurlburt & Melancon, 1987; Myin-Germeys *et al*., 2000; Myin-Germeys *et al*., 2001; Myin-Germeys *et al*., 2002; Myin-Germeys *et al*., 2003; Lardinois *et al.*, 2003, & many others). Previous studies have shown that individuals with psychosis are characterised by unstable affectivity (Delespaul & de Vries, 1987; Myin-Germeys *et al*., 2000; Palmier-Claus *et al*., 2011). Myin-Germeys and colleagues (2000) have

indicated that patients with chronic schizophrenia are characterised by a less variable and a less intense positive affectivity and a more variable and a more intense negative affectivity. The affective variability of patients with chronic schizophrenia has also been found to be associated with the incidence of recent traumatic life events (Myin-Germeys *et al*., 2003).

In order to measure the relationship between mood and hopelessness as proposed by the DAH of suicidal relapse (Lau *et al*., 2004), the ESM questionnaire in this study was specifically devised to measure positive and negative affectivity, hopelessness, and the corresponding contexts of the captured experiences (*e.g.* places, people, activities, & events at the time of sampling). The key intention is to examine the *ease* to which negative affectivity will trigger hopeless thoughts, or also known as the *CR to hopelessness*. Williams and colleagues (2006) first attempted to measure CR to hopelessness using the newly added subscale in the Leiden Index of Depression Scale (*i.e.* hopelessness/suicidality subscale), which was specifically devised to measure the individual's susceptibility to hopeless thoughts when in a sad mood. The results of the study showed that individuals who had higher scores on the LEIDS' hopelessness/suicidal ideation subscale also admitted to having suicidal ideations in the past when feeling depressed. Further, the results also indicated that the LEIDS' hopelessness/suicidality subscale was predictive of the changes in positive future fluency, a behavioural outcome that is associated with hopelessness. By employing the LEIDS' hopelessness subscale in the present study, mood-linked hopelessness data from the ESM can confirm if the CR to hopelessness, as measured by the LEIDS, is predictive of the individual's vulnerability to hopeless thoughts in everyday life.

As suggested at the beginning of this chapter, until now, there is a lack of understanding on the suicidal thinking process in individuals with early psychosis. Not knowing *when* and *how* suicidal thinking starts makes it difficult for clinicians to understand and manage suicidal behaviour in this particular group of individuals who are at a greater risk

of killing or hurting themselves. Although the DAH of suicidal relapse (Lau *et al*., 2004) provides a potentially valuable framework for the mechanism of suicidal thinking, previous investigations have only illustrated the application of this framework in a sample of healthy and previously depressed individuals by employing a laboratory-based mood priming procedure. The lack of real-life contextual factors in the previous experimental studies on the DAH, along with the lack of literature on suicidal thinking process within the FEP sample, prompted the use of the ESM in the present study. By employing the ESM, the present study will be able to investigate if the assumption of the DAH on hopelessness as a mood-dependent cognition holds true for the FEP sample with a history of suicidal attempt or deliberate self-harm. To the best of the author's knowledge, this is the first study to investigate the suicidal thinking *process* in FEP. This is also the first to apply the DAH framework and the ESM to explore the suicidal thinking mechanism in psychosis.

To ensure clarity of the terminologies used in this chapter, the term *momentary hopelessness* is used to refer to the ESM-measured hopelessness, while *generalised hopelessness* is used to refer to the global hopelessness as measured by the Beck Hopelessness Scale (Beck & Steer, 1988). The term *cognitive reactivity* or *CR to hopelessness*, on the other hand, is used to refer to the propensity of the individual to hopeless thoughts when in a sad mood.

The first aim of this study is to examine the differences between the suicidal history group (those *with* a lifetime history of suicidal attempt & deliberate self-harm) and non-suicidal group (those *without* a lifetime history of suicidal attempt & deliberate self-harm) by looking into their level of *momentary hopelessness* as measured by the hopelessness items in the ESM diary. Specifically, the present study intends to determine the effect of affectivity (positive & negative) and daily hassles/minor irritations (activity- & event-related) on the individual's *momentary hopelessness*.

The second aim of the study is to investigate the effects of the minor stresses in everyday life on the individual's positive and negative affectivity. Further, the incidence of recent life events will also be compared between groups.

The final aim of this study is to assess the validity of the LEIDS' hopelessness or suicidality subscale as a measure of *CR to hopelessness*. In particular, the present study examines if the *CR to hopelessness* as measured by the LEIDS will be predictive of the individual's vulnerability to *momentary hopelessness* in everyday life when faced with unpleasant events and challenging activities.

3.1. Hypotheses

Momentary Experiences in Everyday Life as Measured by the ESM

In keeping with the assumptions of the DAH –

1. The suicidal history group will exhibit significantly higher levels of *momentary hopelessness* than the non-suicidal group.

Compared to the non-suicidal group, the suicidal history group will -

2. Demonstrate greater *momentary hopelessness* linked to negative affectivity, and less *momentary hopelessness* linked to positive affectivity.

3. Display greater *momentary hopelessness* when dealing with unpleasant events and challenging activities

4. Show greater negative affectivity and less positive affectivity when confronted with unpleasant events and challenging activities.

The Validity of LEIDS' Hopelessness Subscale as a Measure of *CR to hopelessness*

5. Compared to the non-suicidal group, the suicidal history group will exhibit higher levels of *cognitive reactivity to hopelessness* as measured by the LEIDS' hopelessness subscale.

6. The individual's *cognitive reactivity to hopelessness*, as measured by the LEIDS', will be predictive of his/her susceptibility to *momentary hopelessness* when affectivity is negative.

Finally,

7. The individual's *cognitive reactivity to hopelessness*, as measured by the LEIDS', will be predictive of his/her susceptibility to *momentary hopelessness* when faced with unpleasant events and challenging activities.

3.2. Method

3.2.1. Sampling

The inclusion criteria for the study were: (a) able to give fully informed consent as judged by their care coordinator or other appropriate healthcare professional, (b) fluent in English, (c) have had their first episode of psychosis and fulfilled the ICD10 criteria for schizophrenia and schizophrenia related disorder (F20 F21 F22 F23), and (c) have a lifetime history of deliberate self- harm (DSH) or suicide attempt (as verified from historical risk assessments and as assessed using the Columbia Suicide History Form or CSHF). Participants were excluded if: (a) their diagnosis of psychosis was due to an organic disease, (b) have moderate to severe learning disability, and (c) they were severely suicidal (as assessed using the InterSept for Suicidal Thinking Scale) at the time of assessment.

Two groups of participants were identified within this sample: those with a lifetime history of suicidality and those without. The *suicidal history group* consisted of individuals

who had a lifetime history of *deliberate self-harm* (DSH) or *suicidal attempt* whilst the *non-suicidal group* consisted of those who neither have a history of suicidal attempt nor DSH. In keeping with the criteria of the Columbia Suicide History Form (Oquendo, Halbestam, & Mann, 2003), an act was identified as a suicidal attempt if it was carried out with the intent to die, or the severity of the act itself posed a lethal threat to the individual's life (*e.g.* severe physical damage or prolonged hospitalisation due to the act). Alternatively, an act was identified as a DSH if the individual deliberately engaged in a "self-poisoning or self-injurious" behaviour without the intent to die, or the severity of the act itself was by no means life-threatening (Kreitman, 1977).

3.2.2. Measures

Columbia Suicide History Form (CSHF; Oquendo, Halbestam, & Mann, 2003; Appendix 6)

The CSHF is a semi-structured interview, which accounts the number of lifetime suicide attempts and instances of the incident (*e.g.* method, medical lethality, & others). It has a very good inter-rater reliability correlation of .97 for identifying the history, number, and fatality of suicide attempts (Oquendo, Bongiovi-Garcia, Galfalvy, *et al.*, 2007). Several clinical cross-sectional studies that used CSHF to document previous suicide attempts found that the recorded attempts correlate with more hopelessness, suicidal thinking, and subjective depression regardless of psychiatric diagnosis (Rush, First, & Blacker, 2008).

The Leiden Index of Depression Sensitivity - Revised version (LEIDS-R; Van der Does & Williams, 2003; Appendix 7)

The LEIDS is a self-report measure, which was specifically devised to assess for the individual's *cognitive reactivity* to sad mood. In order to measure CR, the conditional questions in the LEIDS questionnaire require individuals to imagine how they would feel,

think, or react if they are feeling sad or low (*e.g. "When in a low mood, I take fewer risks"*). Individuals rate their answers on a 5-point Likert scale (1 = *not at all* & 5 = *very strongly*). The revised scale has six subscales including: (1) hopelessness/suicidality, (2) acceptance/coping, (3) aggression, (4) control/perfectionism, (5) harm avoidance, and (6) rumination (Van der Does and Williams, 2003). In keeping with the aim of the present study, only the LEIDS' hopelessness/suicidality subscale was used in the analyses. The LEIDS' hopelessness/suicidality subscale has a high internal consistency of .89 Cronbach's alpha. Higher scores in this subscale indicate a greater CR to hopeless/suicidal thoughts (Van der Does & Williams, 2003).

The Calgary Depression Scale for Schizophrenia (CDSS; Addington et al., 1993; Appendix 8)

The CDSS is a 9-item semi-structured interview scale, which was purposely developed to assess for the severity of depressive symptoms in individuals with schizophrenia. Compared to the other depression scales (*e.g.* Hamilton Depression Rating Scale), the overall CDSS rating has the minimum amount of overlap with the negative symptoms of schizophrenia (Collins *et al.*, 1996). The superior ability of the CDSS to discriminate the depressive symptoms from the negative and extrapyramidal symptoms has made the CDSS a widely used depression scale for schizophrenia amongst many researchers and clinicians (Collins, Remington, Coulter, & Birkett, 1996; Lancon, Auquiere, Reine, *et al*., 1999). The CDSS has a good internal consistency (Cronbach's alpha=0.79) and a high test-retest reliability (intraclass correlation coefficient = .90; Addington *et al*., 1993).

Beck Hopelessness Scale (BHS; Beck & Steer, 1988; Appendix 9)

The BHS is a self-report inventory which was devised to measure three main aspects of hopelessness: feelings about the future, loss of motivation, and expectations. It consists of

20 true/false items, 11 items of which are negatively phrased whilst the remaining nine items are positively phrased. Overall, the BHS is a well-constructed and validated instrument with an average reliability coefficient of .92 and test-retest reliability of .69 (Beck & Steer, 1988).

InterSept Scale for Suicidal Thinking (ISST; Lindenmayer, Czobor, Alphs, Nathan, Anand, Islam, & Chou, 2003; Appendix 10)

The ISST is a 12-item semi-structured interview schedule, which was designed to assess for suicidal ideation in schizophrenia and schizo-affective disorder. It has a very good psychometric properties including a high test re-test reliability (intraclass correlation coefficient = 0.90) and a very good internal consistency (Cronbach's alpha=0.88; Lindenmayer, Czobor, Alphs, Nathan, Anand, Islam, & Chou, 2003).

The Experience Sampling Method (ESM; Delespaul, 1995; de Vries, 1992)

The ESM Wristwatch

The ESM is a structured diary keeping procedure that utilises semi-random time sampling method. The ESM in this study was conducted using a paper and pen diary method with a programmable digital wristwatch as a signalling device. The ESM wristwatch was set to emit 10 semi-random signals per day (between 7.30am and 10.30pm) over six consecutive days. The wristwatches (Timex Ironman USA) used in this study were all password-protected to ensure that the time sampling schedule were free from any alterations. The author pre-programmed each watch with randomly allocated (drawn from a hat) time sampling schedule at least a day before the start of the ESM task. The time sampling schedule or TSS is a list of pre-determined, semi-random times upon which the watches are set to emit a signal or a bleep. The researcher adopted the three routinely used TSS's, which were originally created by a team of ESM researchers at the University of Maastricht (Appendix 11). The times in

the TSS were pre-determined so that it is known exactly how long after the bleep the participants complete their diary assessments. Diary entry times are vital to assessing moment-to-moment changes in an individual's thoughts, moods, events and activities as these experiences are all transitory in nature. The semi-randomness of the times in the TTS was equally important to ensure that the captured thoughts, feelings, and events are a part of the individual's natural, day to day routine. By setting the bleep times at a schedule that is harder to predict, the participants were not be able to pre-plan their activities around the ESM schedule. The semi-random sampling times meant that each time the watch bleeped, participants were expected to have paused from their activities (only when it was possible and safe to do so) to complete one ESM questionnaire.

The ESM Diary

The ESM diary consisted of 12 identical sets of self-report ESM questionnaires (1 ESM questionnaire = 2 diary pages) attached together in the form of an A6-size booklet. Each booklet had two spare sets of questionnaires in case additional assessments were completed on mistaken bleeps. Each participant received a total of 7 diary booklets, one diary per day over the 6-day ESM period and an extra diary in case of loss or accidental damage.

All of the ESM items (affectivity, activity & events) used in the present study, with the exception of the hopelessness items, were adopted from the ESM questionnaire that was developed by Delespaul (1995). This questionnaire has been validated in a sample of psychiatric patients in numerous studies (*e.g.* Delespaul *et al*., 2002; Lataster *et al*., 2010; Myin-Germeys *et al.*, 2000; 2003; 2005; 2009, & many others).

Affectivity/Mood

As the word *affectivity* suggests, items under this section of the ESM diary questionnaire consisted of words that describe how positive or negative the individual's mood is at the time of his/her diary entry. To help create a mindset that was relevant to that specific moment of time when the diary entry was made, this section was prefaced with "*Right now, I feel…*". Questionnaire items measuring positive affectivity included four positively worded adjectives (*"cheerful"*, "*content", "energetic"*, & *"enthusiastic"*) whilst items measuring negative affectivity (NA) included six negatively worded adjectives (*"lonely", "anxious", "insecure", "low", "irritated",* & *"guilty"*). All of the items were rated using the 7-point Likert scale (1 = *not* & 7 = *very*), which is in keeping with the original, standardized ESM questionnaire used in previous studies (Delespaul *et al*., 2003; Lataster *et al*., 2010; Myin-Germeys *et al.*, 2000, 2001, 2002, 2003, 2004 & many others).

Hopelessness

Given that this is the first ESM study that investigated the concept of hopelessness vulnerability, items for this construct were initially tested in a pilot study conducted by Luke Brown in 2008 as a part of his Master of Science dissertation. Brown's pilot study collected data from a sample of both healthy and first-episode of psychosis individuals with the aim of: (a) testing the feasibility of the ESM in a clinical sample in the UK, (b) validate the link between mood and hopelessness proposed by the Differential Activation Hypothesis (DAH) for suicidal relapse, and (c) pilot the newly added *hopelessness* items on the ESM questionnaire.

Items under the *'hopelessness'* section of the ESM diary questionnaire was formulated to mimic the concept of *positive future thinking*, which is a feature of hopelessness (see future thinking study in Chapter 5). The questionnaire items were a

combination of words and phrases that describe the individual's feelings and expectations about the future. This section was divided into two sets. The first set of questions was prefaced with *"Right now, I feel the future is…"* followed by items on future expectations (*"bright"* & *"hopeful"*). The second set of questions was prefaced by the phrase *"I feel…" followed* by items on feelings about the future (*"supported"* & "*the future has possibilities"*). Similar to the *affectivity* section, all *hopelessness* items were rated using the 7-point Likert scale. In keeping with the term *hopelessness,* all of the ratings were reverse coded (1=7, 2=6, 3=5, 4=4, 5=3, 6=2, & 7=1) as the questionnaire items were all originally *positively* worded.

Daily Hassles or Minor Everyday Stresses: Challenging Activities vs. Unpleasant events

Challenging Activities

The activity section of the ESM diary questionnaire was split into two parts. The first part is the *activity type*, which asks individuals to describe the activity that they were involved in prior to being prompted by the watch (*"What am I doing just before the bleep went off?"*). The second part is the *activity appraisal*, which asks the individuals to rate the degree of difficulty of their activity (*"I prefer doing something else", "I am active", "This activity requires a lot of effort", "This activity is challenging",* & *"I'm good at this activity"*). The open-ended question was coded using the *ESM coding manual* developed by a group of researchers at the University of Maastricht, whilst the activity appraisal items were rated using the 7-point Likert scale employed in the earlier sections of the ESM questionnaire. All of the activity items were adopted from the standardized ESM questionnaire used in previous studies (Delespaul *et al*., 2003; Lataster *et al*., 2010; Myin-Germeys *et al.*, 2000, 2001, 2002, 2003, 2004 & many others). In keeping with the hypotheses, only the data from the *activity appraisal* section were used in the analyses.

Unpleasant Events

Similar to the activity section, items under the event section of the ESM diary questionnaire were also split into two parts. The first part is the *event type*, which consists of an open-ended question asking individuals to describe the most significant event that occurred to them since their previous diary entry (*"Since the last bleep, the most important event that happened to me was…"*). The second part is the *event appraisal*, which asks the individuals to rate the pleasantness/unpleasantness of the event (*"It was…"*) using a 7-point Likert scale (-3 = very unpleasant, 0 = neutral, 3 = very pleasant). Similar to the activity items, the event items were also adopted from the standardized ESM questionnaire used in previous studies (Delespaul *et al*., 2003; Lataster *et al*., 2010; Myin-Germeys *et al.*, 2000, 2001, 2002, 2003, 2004 & many others). In line with the hypotheses, only the data from the *event appraisal* was used. For the sake of clarity, all of the positive ratings were recoded as "0" whilst all of the negative ratings were re-coded as positive values. Recoding was applied so that *higher* ratings would signify *more unpleasant* events.

Please refer to figure 1 for an illustration of the ESM questionnaire.

3.2.3. Procedure

3.2.3. a. *Case Identification*

The participants in this study were recruited from the Early Intervention Service (EIS) in Birmingham from March 2009 to March 2011. The author of this study approached every care coordinator within EIS to identify service users who conformed to the inclusion criteria. As established in the earlier section, two groups of participants were identified: (1) suicidal history group, and (2) non-suicidal group. In order to ensure that all of the participants fulfil both the inclusion and exclusion criteria, care coordinators were provided with a leaflet that

Figure 1. The ESM questionnaire on Affectivity (A), Momentary Hopelessness (B), Activity (C), and Event (D).

A. Affectivity appraisal items

Right now, I feel...	**Not**			**Moderately**			**Very**
• cheerful	1	2	3	4	5	6	7
• content	1	2	3	4	5	6	7
• lonely	1	2	3	4	5	6	7
• energetic	1	2	3	4	5	6	7
• enthusiastic	1	2	3	4	5	6	7
• anxious	1	2	3	4	5	6	7
• insecure	1	2	3	4	5	6	7
• low	1	2	3	4	5	6	7
• irritated	1	2	3	4	5	6	7
• guilty	1	2	3	4	5	6	7

B. Hopelessness appraisal items

Right now, I feel the future is...	**Not**			**Moderately**			**Very**
• bright	1	2	3	4	5	6	7
• hopeful	1	2	3	4	5	6	7
I feel...							
• supported	1	2	3	4	5	6	7
• the future has possibilities	1	2	3	4	5	6	7

C. Activity appraisal items

What am I doing just before the bleep went off?_____
_____
_____

	Not			**Moderately**			**Very**
• I prefer doing something else	1	2	3	4	5	6	7
• I'm active	1	2	3	4	5	6	7
• I'm good at this activity	1	2	3	4	5	6	7
• This activity requires a lot of effort	1	2	3	4	5	6	7
• This activity is challenging	1	2	3	4	5	6	7

C. Event- appraisal items

Since the last beep, the most important event that happened to me was_____
_____
_____

	Very unpleasant			Neutral			Very pleasant
It was...	-3	-2	-1	0	1	2	3

briefly explained the study and its recruitment criteria. Following referral, participants were approached over the phone or in person, depending on their preference. During the initial meeting, the research was presented a three-part study [ESM, Problem-solving (MEPS), & Future Thinking (FT)], with each study investigating the mechanism of hopeless thinking in contrasting methodologies – the ecological and experimental approach. In order to counterbalance the order to which the two sets of methodologies were conducted, the three studies were split into two sets. Set A consisted of the ecological methodology (Study 1: the ESM) and set B consisted of the experimental methodology (Studies 2 & 3: MEPS & FT studies). Those participants who agreed to take part in all the three studies were randomly allocated to sets AB or BA. Following written consent, the Columbia Suicidal History Form was conducted in order to determine lifetime histories of suicide attempt or deliberate self-harm. An audit on the participant's clinical case notes at EIS was also carried out in order to check for any historical records of suicidal behaviour.

3.2.3. b. *Pilot Feasibility Study of the ESM*

Prior to conducting this ESM study, a feasibility pilot research was conducted by Luke Brown, a Master's student from the University of Birmingham who was also supervised by two of the co-authors of this PhD study (Prof Max Birchwood & Dr Chris Jackson). One of the main aims of the pilot study was to investigate the feasibility of the ESM in a UK-based clinical sample of FEP patients with a history of suicidal behaviour. The standard 10 bleeps/day sampling frequency was employed for over a period a 6 consecutive days. Following completion of the data collection, a focus group discussion was held to discuss the practicality of the ESM. "Irritation" due to the frequency of the prompts/bleeps and the overall diary keeping task being relatively "demanding/challenging" were amongst the prominent themes of the discussion. However, on the whole, everyone agreed that the ESM

was not an exceedingly difficult task to do because of the very little amount of time it takes to complete each diary entry. Overall results indicated that the ESM was a valid and feasible research tool for a UK-based FEP sample.

3.2.3. c. The Experience Sampling Method

The initial session involved completing all of the clinical measures and briefing the participant about the diary keeping procedure. Prior to consenting to take part in this study, all of the participants were provided with an information sheet (Appendix 1) that was reviewed and approved by the National Research Ethics Committee. Pre-ESM clinical measures consisted of the Calgary Depression Scale for Schizophrenia, Beck's Hopelessness Scale, and InterSePT Scale for Suicidal Thinking. Upon completion of all of the measures, a 20-minute briefing session was carried out to explain the details of the ESM procedure. In keeping with the ESM protocol, participants were only informed of the "general" aim of the study, which was to examine the nature of their everyday life experiences. The specific aims of the study were only revealed in the debriefing session in order to avoid potential measurement biases.

During the briefing session, participants were asked to complete an ESM questionnaire as a form of practice to confirm that they have understood all of the items in the questionnaire and the overall ESM procedure. They were advised not to back-fill their diaries for signals or bleeps that they missed or falsify their diary entry times during the 6-day ESM period. More importantly, the researcher gave emphasis on the importance of completing their diary questionnaires immediately after the watch bleeped, without disclosing the time frame upon which entries must be made. A valid diary entry in this study must be completed less than 5minutes before but no more than 15 minutes after the bleep. This time frame was

adopted from previous ESM studies conducted in a similar clinical sample (Delespaul, 1995; Myin-Germeys et al., 2005).

During the six-day ESM period, the researcher telephoned the participants on three separate occasions (end of the 1st, 3rd and 6th day) to help keep up their motivation, and also to check how they had been getting on so far with the diary keeping task. Throughout the 6-day ESM period, participants were also free to contact the researcher between the hours of 9am to 5pm (Monday to Sunday). Upon completion of the ESM task, participants met with the researcher for a 20-minute debriefing session. The purpose of the debriefing was to: (a) check the completed diaries for any unintelligible entries, (b) count the total number of valid diary questionnaires (valid data must be ≥ 20 valid entries; Delespaul, 1995), (c) explain the specific aims of the study, (d) give participants an opportunity to ask questions, and (e) complete the ESM debriefing questionnaire (Appendix 12). Participants who had 20 or more valid diary questionnaires received a payment of £30 as an appreciation of their time and effort. Those who dropped out in the middle of the study or failed to meet the minimum number of valid entries required were paid according to the amount of time they have spent doing the study.

3.2.4. Analysis Strategy

The ESM data consisted of two levels: (1) participant level and, (2) day level, which simply means that there are multiple observations nested within each participant. The nesting of the ESM data meant that it violated the assumption of independent observations. To satisfy this assumption, a multi-level linear regression analysis was employed using Stata version 11.0 (Stata Corp, USA). The main variables of interest were analysed using the stata *xtreg* command with *mle* (maximum likelihood estimation) option. The interpretation of results in multi-level regression is similar to that of a simple linear regression model. Both

models assume that the effect of each independent variable is always the same. However, both also recognise that the effect of one variable may depend on another (interaction effect). The interpretation of the β coefficients in multi-level linear regression analysis is also identical to that of standard linear regression, where beta (β) quantifies the degree and direction of the relationship between the independent (predictor) variables and the dependent (response) variables. An alpha level of .05 was used for all statistical tests.

The data was analysed in collaboration with Professor Myin-Germeys, one of the leading ESM researchers in psychosis at the University of Maastricht, the Netherlands.

3.3. Results

3.3.1. Factor Analyses on the ESM Questionnaire Items

As discussed in the earlier section (The ESM Diary), all of the items used in the ESM questionnaire for this study, with the exception of the hopelessness items, were adopted from the ESM questionnaire that was developed and validated by Delespaul in 1995 and employed in many other ESM studies since then (Myin-Germeys *et al*., 2000, 2001, 2002, 2003, 2004, & 2005). However, in order to ensure a more robust hypotheses testing, factor analyses were carried out on the entire questionnaire items that were later used in the multi-level regression (MLR) analyses. Specifically, a Principal Component Analysis (PCA) with orthogonal varimax rotations was conducted to determine how strongly each ESM questionnaire item (variable) was associated with the constructs (factors) that this study intended to measure. Three independent PCA's were conducted for each of the variable groups: affect/mood, hopelessness, and challenging activities. The Kaiser's eigenvalue-greater-than-one or K1 rule was employed in determining which factors to retain. In other words, only factors with eigenvalues greater than one were retained for the MLR analysis.

Positive and negative affectivity/mood

The PCA analysis yielded two factors, which accounted for 93.24% of the total variance in mood. The first factor, which accounted for 55.63% of the variance, was labelled as *positive affectivity* (PA) due to the high loadings of variables which altogether strongly characterise a positive and bright mood. The variables under this construct include: *Right now, I feel "cheerful", "content", "energetic", and "enthusiastic"*. The second factor, which accounted for 37.62% of the variance, was labelled as *negative affectivity* (NA) due to the high loadings of variables that characterise a type of mood that is negative and depressed. The variables under this construct include: *Right now, I feel "insecure", "low", and "irritated".* On the other hand, variables such as: *Right now, I feel "guilty", "anxious", and "lonely"* did not correlate well with the construct of NA and were therefore removed from the factor and excluded from the multi-regression analysis. Table 2 displays the results of the factor analysis on affectivity items.

Hopelessness

In agreement with the results of the pilot study (Brown, 2008), the PCA analysis in the present study yielded only one factor, which accounted for 94.4% of the total variance in the data. This factor was labelled as *hopelessness* due to the high loadings of variables, which when *reverse-coded*, define pessimistic thoughts about the future. The variables under this construct include: *Right now, I feel the future is* "*bright*", "*hopeful*", and *I feel* "*the future has possibilities*". Alternatively, the variable *I feel "supported"* did not correlate well with the hopelessness construct and was therefore removed from the factor and excluded from the multi-regression analysis. Table 3 displays the results of the factor analysis on hopelessness items.

Table 2. Results of the Factor Analysis on the Affective Items

Affective Items	**Factor 1**** Positive Affectivity	**Factor 2**** Negative Affectivity	**Factor 3** Guilt/Anxiety	**Uniqueness**
Right now I feel...				
Cheerful	0.7251			0.1684
Content	0.6907			0.2195
Energetic	0.8761			0.2092
Enthusiastic	0.8904			0.1779
Right now I feel...				
insecure		0.6583		0.4442
low		0.7217		0.2569
irritated		0.5945		0.5236
Guilty			-0.0566	0.6525
anxious			-0.1781	0.7573
lonely			-0.0439	0.6586

******Factors with eigenvalues that are greater than 1. Items under these factors constitute the components of *cheerful* and *dysphoric* variables used in the multi-level regression analyses.

Table 3. Results of the Factor Analysis on the Hopelessness Items

Hopelessness Items	**Factor 1**	**Uniqueness**
Right now, I feel the future is...		
Bright	0.932*	0.110
Hopeful	0.930*	0.116
I feel...		
Supported	0.550	0.651
the future has possibilities	0.861*	0.243

*****Items that constitute the components of the *hopelessness* variable used in the multi-level regression analyses *(hopefulness items were reverse coded to describe hopelessness)*.

Daily Hassles: Challenging Activities

The results of the PCA analysis identified one factor, which accounted for 107.3% of the variance in the data. This factor was labelled as "challenging activities" due to the high loadings of variables that characterise a difficult activity. The variables under this construct consist of: "*this activity requires a lot of effort*" and "*this activity is challenging"*. The variables "*I prefer doing something else*", "*I'm active*", and "*I'm good at this activity*", on the other hand, did not correlate with the challenging activities construct and was therefore removed from the factor and excluded from the multi-regression analysis. Table 4 displays results of the factor analysis.

In keeping with K1 rule mentioned earlier, only factors with eigenvalues greater than one were retained. In order to determine how well the variables that reflect the same construct/factor yield similar results, the cronbach alpha was calculated for all of the extracted factors. With the exception of negative affectivity, which has a good internal reliability, the rest of the factors (positive affectivity, hopelessness, & challenging activities)

have an excellent level of internal consistency. The data on descriptive statistics are summarised in Table 5.

Table 4. Results of the Factor Analysis on the Activity Appraisal Items

Activity Appraisal Items	**Factor 1**** Activity-related stress	**Factor 2** Undefined	**Uniqueness**
Preface: *What I am doing just before the bleep went off?....*			
I prefer doing something else		-0.2325	0.9459
I'm active		0.2878	0.8591
I'm good at this activity		0.1828	0.9664
This activity requires a lot of effort	0.8572		0.2633
This activity is challenging	0.8474		0.2819

******Factor with eigenvalues that are greater than 1. Items under factor 1 constitute the components of the *challenging activities* variable used in the multi-level regression analyses

Table 5. Summary of Descriptive Statistics for the Key ESM Factors

Factors	**No. of items**	**Eigenvalue**	**Alpha**	***M* (*SD*)**
Positive Affectivity	4	2.984	0.92	4.17 (1.45)
Negative Affectivity	3	2.018	0.82	1.82 (1.12)
Hopelessness	3	2.475	0.94	3.35 (1.63)
Challenging Activities	2	1.511	0.90	4.74 (3.25)

3.3.2. Sample Characteristics

Of the 105 individuals who were approached, only 5 individuals responded with an outright refusal. Out of the 100 recruited participants, a subsample of 4 (4%) changed their mind about participating (those who did the pre-ESM assessments but did not start the ESM diary task), 5 (5%) dropped out within the 6-day ESM assessment period whilst 16 (16%) failed to meet the minimum number of valid ESM diary entries required (>20; Delespaul, 1995). In total, the final sample consisted of 75 participants (29 females and 46 males) of which, 35 (46%) were identified to have had a history of suicidal behaviour whilst 40 (54%) have had no history of suicidal behaviour.

Altogether, the final sample of 75 participants completed a total of 2661 valid ESM observations (min = 20, max = 58, avg = 35.30), with the suicidal history group significantly completing more valid ESM observations than the non-suicidal group [mean (*SD*) = 39.61 (11.1) and 38.33 (11.8) observations, respectively; $t\ (2660) = 2.90$, $p = 0.003$].

3.3.3. Descriptive Statistics and T-tests

Prior to starting the ESM study, all of the participants completed assessments on suicidal thinking (ISST), hopelessness (BHS), and depression (CDSS). Means, standard variation (*SD*), minimum (min) scores, maximum (max) scores, and t-statistics for age and key clinical symptoms are presented in Table 6.

3.3.4. Hypotheses Testing

To test the hypotheses, independent t-tests on the main variables of interest and a series of Multilevel Regression (MLR) analyses were carried out using the Stata statistical software version 11 (Stata Corp, USA). For many social scientists, the MLR is often called as the *multilevel/nested model analysis* whilst many statisticians referred to it as *mixed model*

Table 6. Descriptive and T-test Statistics for Age and Key Clinical Symptoms

Measured Variables	Groups	Min	Max	Mean	SD	SE	t-statistics
Age	Non-suicidal	17	47	23.97	5.40	.86	-.47
	Suicidal History	17	37	23.46	4.96	.84	
Hopelessness vulnerability							-5.95**
(LEIDS – hopelessness subscale)	Non-suicidal	1	19	5.97	4.63	0.76	
	Suicidal History	2	20	12.77	5.04	0.85	
Hopelessness							-4.34**
(Beck Hopelessness Scale)	Non-suicidal	0	19	4.64	4.65	0.74	
	Suicidal History	1	19	9.71	5.34	0.90	
Suicidal thinking							-3.10**
(InterSept for Suicidal Thinking)	Non-suicidal	0	12	0.56	2.20	0.35	
	Suicidal History	0	15	3.31	4.82	0.82	
Depression							-3.63**
(Calgary Depression Scale for	Non-suicidal	0	14	1.82	3.06	0.49	
Schizophrenia)	Suicidal History	0	15	5.34	4.96	0.84	

*p<0.05, **p<0.001

analysis. For most people in education, the MLR is referred to as the Hierarchical Linear Model. As discussed earlier, the MLR is best suited to cross-sectional time-series data such as that of the ESM because it satisfies the assumption of independent observation, which is violated by the nesting of multiple ESM observations within the subjects or participants.

In Stata, multilevel (xt) regression (reg) was carried out using the "xtreg" command. The basic syntax for the "xtreg" command using the maximum likelihood estimation (*mle*) model is: **xtreg y x1, i (varname) mle**. Similar to the basic regression formula, the "**y**" (dependent/outcome variable) is followed by the "**x**" (independent/predictor variable). Following the principle of multiple regression, the number of independent or predictor variables depends on the variables of interest in the hypothesis [e.g. xtreg y x1 x2 x3, i (varname) mle]. The "**i**" (individual) is the identification variable where the multiple observations are nested, which is the participant level (variable name: subj_no) in the case of our analyses. The "**mle**" option (maximum likelihood estimation), as the name suggests, fully maximizes the likelihood of the random effects model. The random effects model assumes that the differences across cases are random and not correlated with the predictor variables. An alpha level of .05 was used for all statistical tests.

Momentary Experiences in Everyday Life as Measured by the ESM

In keeping with the assumptions of the DAH –

1. The suicidal history group will exhibit significantly higher levels of *momentary hopelessness* than the non-suicidal group.

To test this hypothesis, an independent t-test was conducted to compare the magnitude of *momentary hopelessness* that was experienced by each group (suicidal history group vs. non-suicidal group) on a day to day basis. As predicted, the suicidal history group

(*M* = 3.56, *SD* = 1.37) showed significantly higher *momentary hopelessness* mean score than the non-suicidal [*M* = 3.16, *SD* = 1.86, *t* (2319.37) = 6.17, *p* <.001].

2. Compared to the non-suicidal group, the suicidal history group will demonstrate greater *momentary hopelessness* linked to negative affectivity, and less *momentary hopelessness* linked to positive affectivity.

Prior to testing this hypothesis, preliminary analyses were conducted to ensure that the Experience Sampling Method was able to detect the fluctuations in *momentary hopelessness* linked to both the negative affectivity and positive affectivity as suggested by the DAH for suicidal relapse. To do this, NA and PA ("**x**" or predictor variables) were separately fitted into the model predicting momentary hopelessness ("**y**" or outcome variable). To test if momentary hopelessness is linked to NA, multilevel regression was carried out using the syntax:

xtreg y(momentary hopelessness) **x**(NA), **i**(subj_no) **mle**

To test if momentary hopelessness is linked to PA, the same form of syntax was employed but using PA as the predictor variable:

xtreg y(momentary hopelessness) **x**(PA), **i**(subj_no) **mle**

The results showed that both NA and PA significantly predicted *momentary hopelessness* (statistics are shown in Table 7).

To test the hypothesis, analyses were performed in two stages: First, the *group* (suicidal history group & non-suicidal group) variable was added as an independent predictor in the model predicting *momentary hopelessness.* The interaction term between group and affectivity (NA & PA) was also included to check if NA and PA remained as significant predictors. The syntax employed to carry out this initial stage of the analysis was:

xtreg y (momentary hopelessness) **x1**(NA/PA) **x2**(group) **x3**(NA/PA*group),

i(subj_no) **mle**

The results showed a significant main effect of NA and PA, and also interaction effects for both *NA x group* and *PA x group* combinations. Second, given the significant results for both NA and PA from the initial analyses, stratified analyses were conducted to determine the differences between each group.

xtreg y (momentary hopelessness) **x1**(NA/PA) if **group** = non-suicidal group,

i(subj_no) **mle**

xtreg y (momentary hopelessness) **x1**(NA/PA) if **group** = suicidal history group,

i(subj_no) **mle**

The results revealed that the suicidal history group had a greater increase in *momentary hopelessness* linked to NA than the non-suicidal group. The suicidal history group also had the greater reduction in *momentary hopelessness* in relation to PA compared to the non-suicidal group. Table 7 displays summary of results.

To control for the possible effects of the key clinical symptoms, scores from CDSS (depression), BHS (generalised hopelessness), and ISST (suicidal thinking) were separately added as covariates. Both NA and PA remained as significant predictors of *momentary hopelessness* after controlling for the previously identified key clinical symptoms.

In summary, the results were found to be consistent with the hypothesis as the suicidal history group exhibit greater *momentary hopelessness* linked to negative affectivity and reduced *momentary hopelessness* linked to positive affectivity compared to the non-suicidal group.

Table 7. Summary of Multiple Regression Analysis on *Affectivity* and *Suicidality* as Predictors of *Momentary Hopelessness* (*N* = 75)

Predictor Variables	χ_2	**β**	**SE**	***p*-value**	**Lower CI**	**Upper CI**
Negative affectivity (NA)	.000	0.47	0.02	0.000	0.43	0.51
NA*Group	.000					
NA		0.34	0.04	0.000	0.25	0.42
Group		-0.14	0.28	0.622	-0.69	0.41
NA x Group		0.18	0.05	0.000	0.08	0.28
NA if group = non-suicidal	.000	0.34	0.42	0.000	0.25	0.42
NA if group = suicidal	.000	0.52	0.03	0.000	0.46	0.57
Positive Affectivity (PA)	.000	-0.48	0.02	0.000	-0.52	-0.45
PA*Group	.000					
PA		-0.42	0.02	0.000	-0.47	-0.37
Group		0.70	0.25	0.005	0.21	1.20
PA x Group		-0.12	0.03	0.000	-0.18	-0.05
PA if group = non-suicidal	.000	-0.42	0.02	0.000	-0.46	-0.37
PA if group = suicidal	.000	-0.54	0.02	0.000	-0.58	-0.50

χ_2 = F-statistic of the regression model

3. Compared to the non-suicidal group, the suicidal history group will display greater *momentary hopelessness* when dealing with *unpleasant events* and *challenging activities*.

Prior to testing this prediction, initial analyses were conducted to verify if unpleasant events and challenging activities in everyday life are linked to *momentary hopelessness*. To do this, *unpleasant events* and *challenging activities* ("**x**" or predictor variables) were separately fitted into the model predicting momentary hopelessness ("**y**" or outcome variable). To test if momentary hopelessness is linked to *unpleasant events*, multilevel regression was carried out using the syntax:

xtreg y(momentary hopelessness) **x**(unpleasant events), **i**(subj_no) **mle**

To test if momentary hopelessness is linked to *challenging activities*, the same form of syntax was employed but using *challenging activities* as the predictor variable:

xtreg y(momentary hopelessness) **x**(challenging activities), **i**(subj_no) **mle**

Results from this initial analyses indicated that *unpleasant events* but not *challenging activities* significantly predicted *momentary hopelessness* (statistics are shown in Table 8).

Similar to the analyses in hypothesis 2, a two-fold analysis was carried out to test the hypothesis.

Unpleasant events

For first part of the analysis, the *group* (suicidal & non-suicidal) variable was added as an independent predictor in the model predicting *momentary hopelessness*. The interaction term between group and *unpleasant events* was also included to determine whether *unpleasant events* remain as a significant predictor. The syntax employed to carry out this initial stage of the analysis is:

xtreg y (momentary hopelessness) **x1**(unpleasant events) **x2**(group)

x3(unpleasant events*group), **i**(subj_no) **mle**

A significant main effect of *unpleasant events* and an interaction *event* x *group* was found. In the second part of the analysis, a stratified analysis was carried out to identify which *group* had greater increase in *momentary hopelessness* in relation to the *unpleasant events*.

xtreg y (momentary hopelessness) **x1**(unpleasant events) if **group** = non-suicidal group, **i**(subj_no) **mle**

xtreg y (momentary hopelessness) **x1**(unpleasant events) if **group** = suicidal history group, **i**(subj_no) **mle**

As predicted, a greater increase in *momentary hopelessness* was found in the suicidal history group compared to the non-suicidal group when confronted with *unpleasant events*. The results remain unchanged after the key clinical symptoms, scores from CDSS (depression), BHS (generalised hopelessness), and ISST (suicidal thinking) were separately added as covariates. Table 8 displays summary of results.

Challenging activities

Whereas the results of the preliminary analyses earlier showed that *challenging activities* did not significantly predict *momentary hopelessness* on the whole, adding the *group* variable in the regression model might yield different results. Following the two-step analysis conducted previously, first, the *group* (suicidal & non-suicidal) variable was added in the model predicting *momentary hopelessness*. Similarly, the interaction term between group and *challenging activities* was also included to determine whether *challenging activities* remain as a significant predictor. The syntax employed to carry out this initial stage of the analysis is:

xtreg y (momentary hopelessness) **x1**(challenging activities) **x2**(group) **x3**(challenging activities*group), **i**(subj_no) **mle**

No significant main effect of *challenging activities* and *activity* x *group* interaction effect were found. No further analysis was made as *challenging activities* did not significantly predict *momentary hopelessness* both on the whole and even after the *group* variable was added in the model. Table 8 displays summary of results.

In summary, it was found that *unpleasant events* but not *challenging activities* predicted *momentary hopelessness*. Stratified analyses for each group showed that when faced with *unpleasant events,* the suicidal history group had a greater increase in *momentary hopelessness* compared to the non-suicidal group. The results hold true after controlling for depression (CDSS), generalised hopelessness (BHS), and suicidal thinking (ISST).

4. Compared to the non-suicidal group, the suicidal history group will show greater negative affectivity and less positive affectivity when confronted with unpleasant events and challenging activities.

Similar to item 3, initial analyses were conducted to verify if the daily hassles (unpleasant events & challenging activities) are linked to mood or affectivity (NA & PA) prior to testing the hypothesis. To do this, *unpleasant events* and *challenging activities* ("**x**" or predictor variables) were separately fitted into the model predicting positive and negative affectivity ("**y**" or outcome variable). To test if affectivity (NA/PA) is linked to daily hassles (*challenging activities*/*unpleasant events*), multilevel regression was carried out using the syntax:

xtreg y(NA/PA) **x**(unpleasant events/challenging activities), **i**(subj_no) **mle**

The results revealed that *unpleasant events* were a significant predictor for both negative affectivity and positive affectivity. Unlike the *unpleasant events, challenging activities*

Table 8. Summary of Multiple Regression Analysis on *Daily Hassles* (unpleasant events & challenging activities) and *Suicidality* as Predictors of *Momentary Hopelessness* (N = 75)

Predictor Variables	χ_2	**β**	**SE**	***p*-value**	**Lower CI**	**Upper CI**
Unpleasant events (UE)	.000	0.48	0.03	0.000	0.42	0.53
UE*Group	.000					
UE		0.31	0.04	0.000	0.22	0.40
Group		0.18	0.28	0.516	-0.37	0.74
UE x Group		0.24	0.05	0.000	0.14	0.35
UE if group = non-suicidal	.000	0.31	0.04	0.000	0.23	0.40
UE if group = suicidal	.000	0.56	0.03	0.000	0.49	0.62
Challenging activities (CA)	.228	0.01	0.01	0.228	-0.01	0.03
CA*Group	.052					
CA		-0.01	0.01	0.389	-0.04	0.01
Group		0.17	0.31	0.596	-0.45	0.78
CA x Group		0.04	0.02	0.073	0.01	0.07
CA if group = non-suicidal[a]	n/a	n/a	n/a	n/a	n/a	n/a
CA if group = suicidal[a]	n/a	n/a	n/a	n/a	n/a	n/a

χ_2 = F-statistic of the regression model. [a] = Stratified Analyses were not carried out because main effect of ARS was not significant in the analysis using 2nd model on the table.

significantly predicted NA but not PA (statistics are shown in Table 9).

To test the hypothesis, a two-fold analysis was carried out separately for each of the daily hassles:

Unpleasant events

First, the *group* (suicidal history group & non-suicidal group) variable was added as an independent predictor to the models predicting NA and PA. In order to find out if *unpleasant events* will remain as significant predictor of mood, an interaction term between affectivity and *unpleasant events* was also added in the model.

xtreg y (NA/PA) **x1**(unpleasant events) **x2**(group) **x3**(unpleasant events *group), **i**(subj_no) **mle**

The results of these further tests showed significant main effects of *unpleasant events* in predicting both the NA and PA. It also revealed significant *event* x *group* interaction effect in both models predicting NA and PA.

Second, independent stratified analyses for models predicting NA and PA were carried out to determine which group was more emotionally sensitive to *unpleasant events*.

xtreg y (NA/PA) **x1**(unpleasant events) if **group** = non-suicidal group/suicidal history group, **i**(subj_no) **mle**

As expected, stratified analysis in the model predicting NA revealed that the suicidal had a significantly greater increase in NA when confronted with *unpleasant events* compared to the non-suicidal group. On the other hand, stratified analysis in the model predicting PA also confirmed the hypothesis with the suicidal history group showing significantly greater decrease in PA when confronted with *unpleasant events* compared to the non-suicidal group. The results remained unchanged after depression (CDSS), generalised hopelessness (BHS), and suicidal thinking (ISST) were entered as covariates (statistics are shown in Table 9).

Challenging activities

Although the results of the preliminary analyses earlier indicated that *challenging activities* were significant predictors of NA, adding the *group* variable in the regression model might reveal different results. Following the two-step analyses conducted in the previous section; first, the *group* (suicidal & non-suicidal) variable was added an independent predictor to the models predicting NA and PA. An interaction term between *group* and *challenging activities* was also added in the model in order to validate whether *challenging activities* will remain as a significant predictor for NA and PA.

xtreg y (NA/PA) **x1**(challenging activities) **x2**(group) **x3**(challenging activities *group), **i**(subj_no) **mle**

The results of this analysis indicated that there is a significant main effect of *challenging activities* and an *activity* x *group* interaction effect in both models predicting NA and PA. Table 9 displays summary of results.

Second, individual stratified analyses were carried out for each models predicting NA and PA to determine which group is more emotionally sensitive to *challenging activities*.

xtreg y (NA/PA) **x1**(challenging activities) if **group** = non-suicidal group/suicidal history group, **i**(subj_no) **mle**

As expected, the results of stratified analyses in the model predicting NA revealed that the suicidal history group had a significantly greater increase in NA when faced with *challenging activities* compared to the non-suicidal group. These results remained unchanged after depression (CDSS), generalised hopelessness (BHS), and suicidal thinking (ISST) were entered as covariates. The results of the stratified analyses in the model predicting PA, on the other hand, were unable to discriminate the differences between each group. *Challenging activities* as a significant predictor of PA was only found in the non-suicidal group but not the suicidal history group. Such confounding outcome may be due to the fact that *challenging*

activities did not significantly predict PA in the preliminary analysis. Table 9 displays summary of results.

In summary, the outcome was in keeping with the hypothesis as the suicidal history group exhibited greater NA and less PA when faced with *unpleasant events* compared to the non-suicidal group. In contrast, when faced with *challenging activities*, the suicidal history group only exhibited greater NA than the non-suicidal group. Stratified analysis on PA between groups produced incompatible results, thus making it unfeasible to discriminate the differences between the suicidal history group and the non-suicidal group. This may be due to *challenging activities* significantly predicting NA, but not PA in the preliminary analysis. Similar results were found after controlling for depression (CDSS), generalised hopelessness (BHS), and suicidal thinking (ISST).

The Validity of LEIDS' Hopelessness Subscale as a Measure of *CR to hopelessness*

5. Compared to the non-suicidal group, the suicidal history group will exhibit higher levels of *cognitive reactivity to hopelessness* as measured by the LEIDS' hopelessness subscale.

In line with our hypothesis, the suicidal history group (M = 12.7, SD = 5.0) scored significantly higher on the Leiden Index of Depression Scale or LEIDS' hopelessness subscale than the non-suicidal group (M = 6.1, SD = 4.6), $t(71) = 5.90$, $p < .001$. Similar results were found after controlling for depression (CDSS), generalised hopelessness (BHS), and suicidal thinking (ISST).

Table 9. Summary of Multiple Regression Analysis on *Daily Hassles* (unpleasant events & challenging activities) and *Suicidality* as Predictors of Changes in *Affectivity* (N = 75)

Response Variable	Predictor Variables	χ_2	β	SE	*p*-value	Lower CI	Upper CI
Negative	**Unpleasant events (UE)**	.000	0.56	0.02	0.000	0.51	0.60
Affectivity	**UE *Group**	.000					
	UE		0.22	0.04	0.000	0.14	0.29
	Group		0.19	0.17	0.274	-0.15	0.52
	UE x Group		0.51	0.05	0.000	0.42	0.60
	UE if group = non-suicidal	.000	0.21	0.03	0.000	0.15	0.27
	UE if group = suicidal	.000	0.72	0.03	0.000	0.66	0.79
	Challenging Activities (CA)	.000	0.05	0.01	0.000	0.66	0.79
	CA*Group	.041					
	CA		0.02	0.01	0.023	0.00	0.05
	Group		0.21	0.21	0.330	-0.21	0.63
	CA x Group		0.05	0.02	0.002	0.02	0.08
	CA if group = non-suicidal	.002	0.02	0.01	0.002	0.01	0.04
	CA if group = suicidal	.000	0.07	0.01	0.000	0.05	0.10
Positive	**Unpleasant events (UE)**	.000	-0.53	0.03	0.000	-0.59	-0.47
Affectivity	**UE*Group**	.000					
	UE		-0.40	0.06	0.000	-0.51	-0.30
	Group		-0.17	0.24	0.478	-0.64	0.30
	UE x Group		-0.19	0.07	0.005	-0.32	-0.06
	UE if group = non-suicidal	.000	-0.40	0.04	0.000	-0.51	-0.30
	UE if group = suicidal	.000	-0.59	0.02	0.000	-0.67	-0.51
	Challenging Activities (CA)	.342	0.01	0.01	0.342	-0.01	0.03
	CA*Group	.052					
	CA		0.03	0.02	0.034	-0.70	0.40
	Group		-0.14	0.28	0.596	-0.70	0.40
	CA x Group		-0.04	0.02	0.044	-0.12	-0.00
	CA if group = non-suicidal	.022	0.03	0.01	0.022	0.00	0.06
	CA if group = suicidal	.536	-0.01	0.02	0.536	-0.04	0.02

χ_2 = F-statistic of the regression model

6. The individual's *cognitive reactivity to hopelessness*, as measured by the LEIDS, will be predictive of his/her susceptibility to *momentary hopelessness* when affectivity is negative.

To test the hypothesis, a two-step analysis similar to hypothesis 4 was carried out. First, NA, scores on the LEIDS' hopelessness subscale, and an interaction term between these two were added as independent predictors to the model predicting *momentary hopelessness*.

xtreg y (momentary hopelessness) **x1**(LEIDS) **x2**(NA) **x3**(LEIDS*NA),

i(subj_no) **mle**

As expected, the LEIDS predicted *momentary hopelessness* when affectivity is negative. Second, the LEIDS variable was dichotomised into upper and lower halves to identify if high and low scorers will differentially predict *momentary hopelessness* when affectivity is negative. Separate analyses were then carried out for the upper half and the lower half.

xtreg y (momentary hopelessness) **x**(NA) if dichotomised LEIDS = upper

half/lower half, **i**(subj_no) **mle**

High *LEIDS* scorers or those with higher *CR to hopelessness* had a greater increase in *momentary hopelessness* when affectivity is negative compared to the low *LEIDS* scorers or those with lower *CR to hopelessness.* Table 10 displays the summary of results.

In summary, the outcome was in keeping with the hypothesis as those with higher *CR to hopelessness* as measured by the *LEIDS' hopelessness subscale* exhibited a greater increase in *momentary hopelessness* when affectivity is negative compared to the low scorers or those with lower *CR to hopelessness.* Similar results were found after controlling for depression (CDSS), generalised hopelessness (BHS), and suicidal thinking (ISST).

Table 10. Summary of Multiple Regression Analysis on *LEIDS Score on Hopelessness Subscale* and *Negative Affectivity* as a Predictor of *Momentary Hopelessness* (*N* = 75)

Predictor Variables	χ_2	**β**	**SE**	***p*-value**	**Lower CI**	**Upper CI**
LEIDS-hopelessness subscale * NA	.000	0.03	0.00	0.000	0.03	0.04
NA if LEIDS score = lower half	.000	0.40	0.03	0.000	0.04	0.47
NA if LEIDS score = upper half	.000	0.51	0.03	0.000	0.45	0.57

χ_2 = F-statistic of the regression model

Table 11. Summary of Multiple Regression Analysis on *LEIDS score on Hopelessness Subscale* and *Daily Hassles* as a Predictor of *Momentary Hopelessness* (*N* = 75)

Predictor Variables	χ_2	**β**	**SE**	***p*-value**	**Lower CI**	**Upper CI**
LEIDS-hopelessness subscale * unpleasant events	.000	0.02	0.00	0.000	0.02	0.02
Unpleasant events if LEIDS score = lower half	.000	0.11	0.02	0.000	0.07	0.07
Unpleasant events if LEIDS score = upper half	.000	0.31	0.02	0.000	0.27	0.34
LEIDS-hopelessness subscale *challenging activities	.626	0.01	0.02	0.626	-0.06	0.03
Challenging activities if LEIDS score = lower half	.297	0.00	0.01	0.297	-0.02	0.02
Challenging activities if LEIDS score = upper half	.998	0.01	0.01	0.998	-0.01	0.04

χ_2 = F-statistic of the regression model

Finally,

7. The individual's *cognitive reactivity to hopelessness*, as measured by the LEIDS, will be predictive of his/her susceptibility to *momentary hopelessness* when faced with unpleasant events and challenging activities.

To test the hypothesis, a two-step analysis similar to hypothesis 6 was carried out separately for each type of daily hassles (*unpleasant events & challenging activities*).

Unpleasant events

First, *unpleasant events*, scores on LEIDS' hopelessness subscale, and the interaction term between these two variables were added as independent predictors to the model predicting hopelessness.

xi: xtreg y (momentary hopelessness) **x1**(unpleasant events) **x2**(LEIDS) **x3**(unpleasant events*LEIDS), **i**(subj_no) **mle**

A significant *LEIDS x unpleasant events* interaction effect was found, which indicated that scores on LEIDS' hopelessness subscale predicted *momentary hopelessness* when dealing with unpleasant events.

Second, the LEIDS variable was dichotomised into upper and lower halves to identify if high and low scorers will differentially predict *momentary hopelessness* when faced with *unpleasant events*. Separate analyses were then carried out for the upper half and the lower half.

xi: xtreg y (momentary hopelessness) **x**(unpleasant events) if dichotomised LEIDS = upper half/lower half, **i**(subj_no) **mle**

In keeping with the hypothesis, high LEIDS' hopelessness subscale scorers or those with higher *CR to hopelessness* had a greater increase in *momentary hopelessness* when faced with

unpleasant events compared to the low scorers or those with lower *CR to hopelessness*. Table 11 displays the summary of results (please see page 76).

Challenging activities

Following the two-step analyses-- first, *challenging activities*, scores on LEIDS' hopelessness subscale, and the interaction term between these two variables were added as independent predictors to the model predicting hopelessness.

xi: xtreg y (momentary hopelessness) **x1**(challenging activities) **x2**(LEIDS)

x3(challenging activities *LEIDS), **i**(subj_no) **mle**

Contrary to the hypothesis, *CR to hopelessness* as measured by the LEIDS' hopelessness subscale did not predict *momentary hopelessness* during *challenging activities*. Due to this non-significant result, no further analyses were conducted. Table 11 displays the summary of results (please see page 76).

In summary, the individual's *CR to hopelessness* as measured by the LEIDS' hopelessness subscale was found to be predictive of his/her susceptibility to *momentary hopelessness* when faced with unpleasant events but not with challenging activities. This pattern of results was unaffected after controlling for depression (CDSS), suicidal thinking (ISST), and generalised hopelessness (BHS).

3.4. Discussion

This study set out to test the Differential Activation Hypothesis of suicidal relapse in early psychosis through the use of the Experience Sampling Method, a systematised diary keeping method, which semi-randomly samples affective, cognitive, and behavioural data as they occur in an individual's everyday environment. Specifically, this study aimed to explore the link between *momentary hopelessness* and affectivity (positive vs. negative) in

individuals with a lifetime history of suicidal behaviour vs. without. Although the compliance rate of 59% (number of valid observations per participant = 35.3) was slightly lower than the reported rate in schizophrenia (66%; Oorschot *et al*., 2009), it is important to note that the sample in this present study were still at a difficult stage of recovery following the initial episode of psychosis (Harrison & Fowler, 2004).

Given that this is the first study to have explored the occurrence, amplitude, and fluctuation of hopelessness in everyday life, findings from laboratory-based studies that investigated the link between hopelessness and suicidal behaviour will only be comparable to a certain extent. Unlike the mood-primed data on hopelessness from previous laboratory-based cross-sectional studies, the ESM data on *momentary hopelessness* were repeatedly sampled from the individual's natural environment for a prolonged period of time. For this reason, only indirect comparisons were made in some parts of the discussions.

Consistent with the hypothesis, the suicidal history group exhibited greater amplitude of *momentary hopelessness* on a day to day basis compared to the non-suicidal group. This finding was consistent with other studies, which indicated a strong link between hopelessness and suicidality in the FEP sample (Cohen *et al*., 1994; Klonksy *et al.*, 2012; Nordentoft *et al*., 2002; Robinson *et al*., 2009).

Also in keeping with the hypothesis, the suicidal history group also showed significantly larger increase in *momentary hopelessness* linked to negative affectivity and larger decrease in *momentary hopelessness* linked to positive affectivity. The pattern of results also indicated that *momentary hopelessness* was more strongly linked with NA than PA, which was in keeping with the DAH for suicidal relapse (Lau *et al*., 2004). Closer inspection of the changes in *momentary hopelessness* linked to affectivity revealed that the amount of increase in *momentary hopelessness* linked to NA in the suicidal history group (β = 50) was 32% greater than the non-suicidal group (β=38). In contrast, the difference in the

amount of reduction in *momentary hopelessness* linked to PA in the suicidal history group (β = 59) was 28% greater than the non-suicidal group (β = 46). This pattern of results was in agreement with the findings on Hepburn *et al*.'s mood-priming study (2006) which indicated that only the *negative*, but not the positive mood induction, prompted a change in the individual's positive future fluency (a behavioural feature of hopelessness).

Unexpectedly, the data on daily hassles (unpleasant events & challenging activities) as a predictor of *momentary hopelessness* and affectivity (positive & negative) produced a mixed outcome. Contrary to hypothesis, the suicidal history group only exhibited greater increase in *momentary hopelessness* when confronted with *unpleasant events* but not with challenging activities. One possible explanation is that a good number of the participants were unemployed and had very limited range of social activities on a day to day basis. The data from the ESM diary revealed that most commonly reported activities included "watching telly or listening to music" and "sleeping or napping", which accounts to 28% and 12% of the total reported activity respectively. Given that the ESM items on the *activity appraisal* section were devised to measure the subjective difficulty of the task, the nature of the activities that most of the participants engaged themselves in seemed to be quite relaxing, less varied, and less difficult as opposed to being challenging and complicated. In other words, the reported activities were simply not stressful enough to trigger significantly different amplitudes of hopelessness between the suicidal history group and non-suicidal group. The most commonly reported events, on the other hand, included experiences or happenings that were more personal to the participants such as face to face conversations, telephone calls, or visits by family members or friends (31%). Given that the ESM item on *event appraisal* was devised to measure the unpleasantness or pleasantness of the event, it is possible that displeasing *personal* events were likely to be perceived as more unpleasant by the individual. The significantly higher increase in *momentary hopelessness* in the suicidal history group

suggests that those with a history of suicidal behaviour were more prone to the activation of attenuated hopeless cognitions when faced with unpleasant events in everyday life compared to those without any history of suicidal behaviour.

As expected, further analyses revealed that unpleasant events not only impacts on *momentary hopelessness*, but also on the positive and negative affectivity of the individual. The results have shown that the suicidal history group had a significantly greater NA and less PA than the non-suicidal group when confronted with *unpleasant events*. However, when confronted with *challenging activities*, the suicidal history group only exhibited greater NA than the non-suicidal group while the groups did not differ at all on their PA. The pattern of results illustrating the significant impact of *unpleasant events* on the individual's affectivity and *momentary hopelessness* was in keeping with the assumption of the DAH for suicidal relapse (Lau *et al*., 2004). Recalling the assumptions of the DAH for suicidal relapse, affectivity/mood and hopelessness are strongly associated to each other such that the previous determines the mechanism of the latter (Lau *et al*., 2004). It was therefore unsurprising that the changes in affectivity (greater NA & less PA) and *momentary hopelessness* in the suicidal history group were more distinct than the non-suicidal group. Interestingly, the affective reactivity to *unpleasant events* in the suicidal history group was found to be stronger in NA than PA. When faced with unpleasant events, the suicidal history group showed a bigger increase in NA than the non-suicidal group. Specifically, the results have indicated that the increase in NA in the suicidal history group was 70.83% greater than the non-suicidal group. In contrast to this, the decrease in PA in the suicidal history group was only 32.20% more than the non-suicidal group. In effect, this distinctly stronger link between *unpleasant events* and NA in the suicidal history group supports the validity of the DAH framework in the context of everyday life. It also Unlike the artificial setting of laboratory-based studies, the real-life context of the ESM studies allows contextual factors such as the daily hassles (*e.g.*

unpleasant events) to influence the natural mechanism of affectivity. The results of the present study illustrating the role of daily hassles (unpleasant events) as a predictor of NA and *momentary hopelessness* extends the application of the DAH framework in the everyday life of the FEP sample. In particular, the link between affective variability (e.g. increase in NA or decrease in PA) and unpleasant events have important implications for the concept of cognitive reactivity to hopeless and suicidal thoughts as proposed by the DAH of suicidal relapse (DAH; Lau *et al*., 2004). First, the distinctly greater sensitivity to unpleasant events of FEP individuals from the suicidal-history group (as illustrated by the increase in their NA) than those from the non-suicidal group suggest that FEP individuals with a history of suicidal behaviour are at a greater risk for *future* suicidal behaviour. On a day to day basis, it simply means that unpleasant events are more likely to elicit negative affective responses amongst individuals with histories of suicidal behaviour. These negative affective responses then reactivate a network of maladaptive thinking patterns which, given the right intensity and context, could potentially trigger reactivation of hopeless or suicidal thoughts. On the whole, the pattern of results suggests that the occurrence of unpleasant events in the everyday lives of FEP individuals with a history of suicidal behaviour can therefore act as a precursor to a more negative mood/affect, which according to the DAH of suicidal relapse can potentially trigger the recurrence of hopeless/suicidal cognitions.

Second, the evidence suggesting the mediating effect of psychosis as a traumatic life experience on the affective responses to minor stresses in everyday life (e.g. unpleasant events), supports the previous findings that FEP individuals were more vulnerable to suicidal relapses. Dealing with the traumatic experience of psychosis and adjusting to changes brought by the psychotic illness can be difficult for many individuals. Having to confront one or both of these challenges at the same time is enough to render this particular group of individuals more vulnerable to the effects of minor stresses in everyday life. As evidenced by

the pattern of results discussed previously, such vulnerability is even intensified when the individual has previously felt hopeless/suicidal. Recalling the assumption of the DAH, the individual's vulnerability to suicidal relapse is determined by how strong the link is between negative affect (e.g. depressed mood) and hopeless/suicidal thoughts. Given the enhanced affective sensitivity to unpleasant events as moderated by the experience of psychosis as a traumatic life event, and the susceptibility of FEP individuals with a history of suicidal behaviour to hopeless/suicidal thoughts when affect is intensely negative (e.g. depressed), the occurrence of *severely* unpleasant events to the lives of this group of individuals is almost tantamount to the reactivation of hopeless/suicidal thoughts.

The pattern of results on *challenging activities* as a predictor of affectivity, on the other hand, was more difficult to explain. The results from an earlier analysis indicated that *challenging activities* did not significantly predict *momentary hopelessness*. However, when *challenging activities* were tested as a predictor of affectivity, it predicted greater NA in the suicidal history group than the non-suicidal group. It is possible that due to the lack of complexity in the daily activities of the participants in the present study, the impact may have simply been too subtle to reactivate hopeless thoughts, but enough to alter negative affectivity. This further substantiates the concept of "differential activation" as the effects of the daily hassles can vary greatly from one event/activity to another. Similarly, this may also be the reason why *challenging activities* did not significantly predict greater reduction in PA in the suicidal history group as hypothesised. It was noted earlier that there was a general lack of complexity and variety in the day to day activities of the participants in the present study. It is therefore possible that the activities that were particularly challenging were simply not strong enough to predict differential reduction in PA between the two groups. It is plausible that a similar pattern of relationship found between *unpleasant events* and affectivity also

applies to the relationship between *challenging activities* and affectivity, which suggests that *challenging activities* might also have a stronger link with NA than PA.

As hypothesised, the suicidal history group scored higher in the LEIDS' hopelessness subscale than the non-suicidal group. This outcome is in agreement with the results by Williams and colleagues (2008), who found that those who had suicidal thoughts when feeling depressed in the past scored higher on the LEIDS hopelessness subscale. In keeping with the assumption of the DAH of suicidal relapse (Lau *et al*., 2004), the *cognitive reactivity (CR) to hopelessness* as measured by the LEIDS' hopelessness subscale was predictive of the individual's susceptibility to *momentary hopelessness* when affectivity is negative. Further analyses specifically showed that those who scored higher in the LEIDS' hopelessness subscale predicted greater increase in *momentary hopelessness* when affectivity is negative compared to those who scored lower. This confirms the results found in previous mood-priming studies (Hepburn *et al*., 2006; Williams *et al*., 2005, 2006, & 2007).

Finally, the data for the final hypothesis of this study revealed dissimilar results. It was found that compared to those who have lower CR to hopelessness, those who have higher levels of *CR to hopelessness* as measured by the LEIDS' hopelessness subscale exhibited greater increase in *momentary hopelessness* when confronted with unpleasant events but not with challenging activities. These findings replicate the data on daily hassles as a predictor of *momentary hopelessness*. Earlier it was found that when faced with unpleasant events, the suicidal history group experienced greater increase in *momentary hopelessness* than the non-suicidal group. Similarly, when faced with the same unpleasant events, those who scored higher in LEIDS' hopelessness subscale experienced a greater increase in *momentary hopelessness* than those who scored lower. On the other hand, the same pattern of results was observed with the data on challenging activities. Earlier it was found that when faced with challenging activities, the changes in *momentary hopelessness* did not differ

between groups. Correspondingly, when faced with the same challenging activities, the changes in *momentary hopelessness* also did not differ between the high- and low-scorers in the LEIDS' hopelessness subscale. Overall, these comparable results support the notion that suicidality is strongly associated with higher *CR to hopelessness*, which is in keeping with the assumptions of the DAH for suicidal relapse. It also supports the potential of the LEIDS' hopelessness subscale as a measure of the individual's *CR to hopelessness*. More importantly, the results are also indicative of the potential of the ESM as a reliable measure of vulnerability to hopelessness in everyday life. Unlike the LEIDS which is completed on the basis of how the individual would react/behave when he/she is feeling sad, the ESM data are collected from the individual's real-time responses within his/her real-life environment. In other words, the ESM data are based on naturally occurring behaviour in everyday life as opposed to the imagined behaviour based on hypothetical mood condition. The ability of the ESM to capture real-life contextual factors also makes the ESM a better measure than the LEIDS.

All in all, the results of this study extend the relevance of the DAH of suicidal relapse from being a model of suicidal vulnerability in a previously depressed sample to a potentially feasible model of suicidal relapse in an FEP sample. It also brings to light the role of daily hassles (e.g. minor unpleasant events & challenging activities) in the momentary changes in affect, which determines the reactivation of low-level attenuated hopelessness. Finally, the outcome of this study also adds an important contribution to the literature by illustrating the DAH as a valid cognitive model of suicidal vulnerability in psychosis that can be tested via a structured diary technique.

3.4.1. Strengths and limitations

To date, this is the first study to have used the ESM to investigate the validity of the DAH for suicidal relapse in a sample of first episode psychosis individuals. More importantly, this is also the first study to have investigated the underlying mechanism of suicidal thinking process by looking into the ebb and flow of *momentary hopelessness* in relation to the fluctuations of affectivity in everyday life. In addition, this is the very first study which examined the use of the Leiden Index of Depression Scales' hopelessness subscale as a measure of *CR to hopelessness* in a sample of previous suicide attempters in FEP. This is also the first move which examined the use of the ESM as a measure of vulnerability to hopelessness (or *momentary hopelessness*) in everyday life.

A number of limitations have to be considered in understanding the findings of the present study. First, the use of ESM had a number of methodological issues. Whereas most of the participants did not find the ESM particularly difficult, a number of participants found the task inconvenient and slightly irritating, which was mainly due to the overall duration of the task (6 days) and the daily frequency of time sampling (total = 10). Even though a good number of individuals thought that ESM was a good way of keeping them more mindful of their mood/feelings and thoughts, only a few individuals remained keen to take part again if given the opportunity. Due to the challenging nature of the ESM task, it simply dissuades the participants from doing it again. Some of the participants in the present study found the ESM quite interruptive to their activities, most especially outdoor activities (such as commuting on a bus & shopping) as it meant that they had to fill in their ESM diaries in public places. Whereas some took part for purely altruistic reasons, a lot of the participants were motivated by the monetary incentive upon successful completion of the task. Although these factors had no detrimental effect on the results of the present study, it may have contributed to the second limitation of this study, which is the slightly lower compliance rate (59%) compared to the

previously reported rate of 66% (Oorschot *et al*., 2009). However, it is important to consider that this is only speculative and there may be other reasons why the compliance rate was slightly lower in this study. As noted earlier, it is also possible that undertaking the ESM during a particularly difficult period (recovery following the FEP) might have been too challenging for the participants in general. It is also possible that the lower compliance rate might have been influenced by the time frame during which the sampling is conducted (7.30 until 22.30). The early start meant that the participants might have missed most of the early samplings as majority of them start their day between the hours of 10am to 12 noon.

Finally, the data on challenging activities were not conclusive and should be treated with some caution. As the participants in the present study were still at the recovery stage following their first psychotic episode, their typical day were therefore limited to unstructured and solitary activities such as "watching telly, listening to music, sleeping or napping". Altogether, these types of activities simply do not characterise challenging daily hassles. It is also important to note that there was a lack of activity appraisal items as only two out of five questionnaire items factored in the principal component analysis. The lack of questionnaire items might have caused the appraisal of challenging activities to be less effective.

The present study has a number of implications. First, the results of this research demonstrated the link between *momentary hopelessness* and organic mood fluctuations in everyday life, which confirmed the application of the DAH of suicidal relapse in psychosis. With the link between *momentary hopelessness* and negative affectivity stronger in the suicidal history group than the non-suicidal group, it therefore suggests that although hopeless/suicidal thoughts are attenuated when the individuals are not currently suicidal, low levels of hopeless/suicidal thoughts remain *reactive* to subtle changes in NA.

Second, the feasibility of the ESM as an effective assessment tool for the individual's vulnerability to hopelessness in everyday life, particularly in the FEP sample, may provide future researches an alternative means to further explore the mechanism of suicidal thinking in a context that is more organic to the individuals.

Third, the confirmation of LEIDS' hopelessness subscale as a valuable measure of hopelessness or suicidal vulnerability may create a platform for both researchers and clinicians to further pursue the potential of this scale and along with it, develop more effective ways to manage and prevent suicidal behaviour.

In conclusion, the current study found that in there is a stronger link between NA and *momentary hopelessness* in the suicidal history group than the non-suicidal group in the context of everyday life, which is in keeping with the core idea of the Differential Activation Hypothesis of suicidal relapse. It also identified the LEIDS' hopelessness subscale as an effective measure of *CR to hopelessness* in the FEP sample. The findings of this study may represent a platform for both researchers and clinicians to further explore the mechanism of suicidal thinking in everyday life and develop interventions for suicidal behaviour in psychosis, which remains a serious challenge for clinical services.

CHAPTER 4

Assessing the Link between Low Mood and Lack of Problem Solving Skills as a Behavioural Feature of Hopelessness: A Mood Priming Study

4.0. Introduction

Hopelessness, according to MacLeod and his colleagues (2005) is a "multi-faceted construct". If defined literally, hopelessness is simply the absence of hope. As a symptom of depression, hopelessness is a negative view of oneself and the future. In simpler words, it is a belief that nothing is good enough, nothing will get better, and everything will only get worse. The more severe hopelessness becomes, the worse the depression is, and the higher the risks of a suicidal attempt. A number of studies have suggested that hopelessness is the link between depression and suicidal behaviour (Dyer & Kreitman, 1984; Minkoff, Bergman, *et al*., 1973; Nekanda-Trepka, Bishop, & Blackburn, 1983; Salter & Platt, 1990; Wetzel, Margulies, Davies *et al*., 1980). Of the significant risk factors identified for suicidal behaviour in both healthy and psychosis samples, hopelessness was found to be closely linked to both completed and attempted suicide (Abramson, Alloy, Hogan et al., 1998; Beck, Steer, Kovac *et al*., 1985; Beck, Brown, Berchick, Stewart, & Steer, 1990; Beck et al., 1993; Cohen *et al*., 1994; Conner, Duberstein, Conwell *et al*., 2001; Hawton & van Heeringen, 2009; Klonksy *et al*., 2012; Nordentoft *et al*., 2002; Pinto & Whisman, 1996; Robinson *et al*., 2009), along with greater insight (Barret *et al*., 2010; Crumlish *et al*., 2005; Flanagan & Compton; 2012; Foley *et al*., 2008). Whereas a grave physical illness represents an obvious threat to a person's life, hopelessness characterises a more subtle yet often a very fatal killer. Over the years, a huge amount of effort has been made to understand this complex construct of hopelessness but there has been only a limited success in finding ways to effectively

manage it. There are two main reasons for this: One, the mechanism of hopelessness is so complex that it is still not yet fully understood. Two, there is a limited amount of information regarding the behavioural outcomes of hopelessness, which can be of practical use to both the clinician and the sufferer. In other words, what makes it hard for a person who is feeling hopeless to see alternative solutions to his/her problem besides pure pessimism? On a practical level, what are the day to day things that most people do that a person who is feeling hopeless struggles to do besides finding a reason to live? The present study aims to demonstrate that hopelessness can be a measured precursor to suicidal thinking.

The relationship between hopelessness and problem solving in a psychiatric sample was first explored by Schotte and Clum (1982). The results of their study prompted the conception of the diathesis – stress model, which suggests that chronic experiences of stress accompanied by lack of problem solving skills increases the individual's vulnerability to depression, hopelessness, and suicidal ideation (Schotte & Clum, 1982). To date, a number of studies have shown that hopelessness is in fact, associated with a lack of problem solving skills in a sample of suicidal individuals. Williams and his colleagues (2005) described the relationship between hopelessness and problem solving impairment as that of a "vicious circle". The vicious circle starts with problem solving impairment triggering suicidal ideation, the outcome of the combined effects between hopelessness, helplessness, and entrapment prompted by the inability to think of alternative solutions to a problem, and suicidal ideation further impairing the individual's problem solving ability (Williams *et al.*, 2005). The most commonly used procedure to examine real life problem solving is Platt and Spivack's (1975) Means Ends Problem Solving task. The MEPS task employs a social context for all of its problem scenarios, which makes the procedure relevant to the everyday life context of a wide range of research samples. The MEPS was initially developed in 1972 (Platt & Spivack) to examine the problem solving abilities and adjustment of normal

adolescents. It is apparent that Schotte and Clum's (1982) initial attempt to examine problem solving in a psychiatric sample through the use of the MEPS procedure played a vital role in establishing two findings in the literature of suicidal behaviour to date: (1) the link between problem solving and suicidal behaviour, (2) the use of MEPS procedure as a valid and reliable procedure to test problem solving impairment in a sample of suicidal individuals. Studies that looked into the problem solving abilities of individuals with histories of suicidal behaviour have consistently found a significantly impaired problem solving ability in this particular sample. For example, the initial study conducted by Schotte and Clum (1982) confirmed that suicidal individuals generated fewer numbers of relevant solutions in the MEPS task compared to the non-suicidal individuals. Similarly, Sadowsky and Kelly (1993) found when that previous suicide attempters exhibited greater problem solving impairment than the psychiatric controls who had never attempted. They also found that whereas both groups showed reduced problem solving abilities compared to healthy controls, problem solving in previous attempters was far more impaired than the psychiatric controls. Consistent with these findings, Pollock and Williams (2001) indicated that the severity of problem solving impairment in suicidal psychiatric patients was significantly greater compared to a sample of patients with a similar symptom level and after controlling for the effects of depression in both groups. In 2004, Williams and Pollock obtained a similar pattern of results as problem solving impairment was, once again, found to be greater in the suicidal patients than the psychiatric and healthy controls. Whereas these studies provide useful contributions to the literature, Williams and his colleagues (2005) pointed out the difficulty in interpreting these results. To date, the majority of the studies that have investigated the role of problem solving in suicidal behaviour had largely employed a retrospective approach where problem solving impairment was measured following the incidence of a suicidal behaviour. By using this approach, it is simply impossible to conclude whether problem

solving impairment was a stable trait that naturally characterises individuals with histories of suicidal behaviour, or a mere state or crisis – dependent response that causes individuals to behave in a certain way. Contrary to the popular belief that problem solving impairment is a stable trait (Schotte & Clum, 1982), a growing number of evidence suggest otherwise (Schotte *et al.*, 1990; Ivanoff Smyth, Grochowski *et al.*, 1992; Biggam & Power, 1999). For instance, results from Ivanoff *et al*.'s (1992) study showed that the history of suicidal behaviour had no effect on the problem solving performance of incarcerated offenders. Despite their findings confirming that problem solving impairment is not a trait phenomenon, Ivanoff and his colleagues (1992) suggested that "the role of problem solving deficits in suicidal behaviour may be more complex and interactive than dichotomous – that is, neither state nor trait". With the trait phenomenon becoming increasingly contentious, Williams and his colleagues (2005) pointed out a question that is of critical value for future clinical work - "How can we determine which individuals remain vulnerable to future suicidal crises even when they appear to have completely recovered?"

The concept of "cognitive reactivity" to hopelessness is at the heart of the Differential Activation Hypothesis of suicidal relapse and is defined as the vulnerability to hopeless thinking or thoughts. In brief, the DAH of suicidal relapse suggests that during the early episodes of depression, a link is formed between low mood and a pattern of negative and maladaptive thoughts, of which hopelessness becomes a part of as a result of an intensely negative self-referential thinking during a severe episode of depression (Malone, Oquendo, Haas *et al*., 2000; Lam, Schuck, Smith, Farmer, & Checkley, 2003). The link that is formed between low mood and hopelessness is then reinforced every time the individual experiences a depressive episode. The stronger the link between depressed mood and hopelessness is, the more vulnerable the individual is to hopeless thoughts when feeling particularly low in mood. According to authors of the DAH for suicidal relapse, "it is not the resting level of

hopeless/suicidal cognitions that is important in rendering someone vulnerable to future suicidal crises... it is the ease with which these patterns of thinking can be activated that is important" (Williams *et al.,* 2006). Such ease refers to the individual's level of *cognitive reactivity* to hopelessness. Given that the precondition to testing cognitive reactivity requires an appropriate trigger (depressed mood), mood priming techniques were previously used to test the assumptions of the DAH.

In order to determine who remains vulnerable to suicidal relapse amongst the recovered attempters, the present investigation attempts to replicate the mood priming study conducted by Williams and colleagues (2005) in sample of previously depressed patients. The key objective was to employ the DAH framework of suicidality to a sample whose diagnosis is psychosis. Specifically, the sample consists of first episode psychosis individuals who were within the first 3 years of psychosis onset. Studies have previously shown that the risk of suicidal attempts and deliberate self-harm was usually highest during the first 5 years following the onset of psychosis (Brown, 1997; Harris & Barraclough, 1997; Hawton *et al*., 2005; Palmer *et al*., 2005). The first aim of the study is to examine suicidal vulnerability amongst FEP patients by looking into their ability to generate solutions to real-life problems. More importantly, it is the study's particular interests to compare the effects of the experimentally induced feelings of sadness on the problem solving ability of those at high risk of suicidal relapse (with histories of lifetime suicidal attempt/s or DSH) and those at low risk (without any history of suicidal attempt/s or DSH). The second aim of the study is to assess the use of the Leiden Index of Depression Scale's hopelessness subscale as a measure of cognitive reactivity to hopelessness and test if scores on this subscale will be associated with the pre- to post-induction change in problem solving performance. During the conception of the DAH of suicidal relapse, the LEIDS' hopelessness subscale was devised in

order to measure the individual's susceptibility to hopeless/suicidal thoughts when in a sad mood (see chapter 3's "measures" section).

4.1. Hypotheses

Effects of the Mood Challenge on Problem Solving Ability

In keeping with the DAH, the impact of the sad mood induction procedure will be more evident in the suicidal history group than the non-suicidal group. Specifically,

1. Compared to the non-suicidal group, the suicidal history group will exhibit a greater pre- to post- induction decrease in the number of problem-solving solutions.

2. Compared to the non-suicidal group, the suicidal history group will show a greater pre- to post-induction decrease in the effectiveness ratings of problem solving solutions.

Effects of the Mood Challenge on Happiness and Despondence Ratings

Also in line with the assumption of the DAH,

3. The suicidal history group will exhibit a greater pre- to post-induction decrease in happiness ratings and a greater pre- to post-induction increase in despondence ratings compared to the non-suicidal group.

The Validity of LEIDS as a Measure of Cognitive Reactivity to Hopelessness

Prior to the mood challenge, measurements of cognitive reactivity to hopelessness were taken using the LEIDS' hopelessness subscale. Measured CR to hopelessness will be tested using the DAH framework. Consistent with the DAH,

4. The suicidal history group will also show significantly greater CR to hopelessness as measured by the LEIDS compared to the non-suicidal group.

4.2. Method

4.2.1. Sampling

N.B. The same sampling procedure described in Chapter 3 was also employed in this study.

4.2.2. Measures

N.B. The measures described in the Chapter 3 (CHSF, LEIDS-R, CDSS, BHS, and ISST) were also employed in this study.

In order to avoid contamination of answers, the BHS was always administered first followed by the Calgary Depression Scale for Schizophrenia and InterSept for Suicidal Thinking. These measures for depression (CDSS) and suicidal thinking (ISST) may potentially evoke feelings of hopelessness by bringing to mind certain thoughts and feelings associated with the individual's previous depressive experience.

Visual Analogue Scale - Mood Rating (McCormack, Horne, & Sheather, 1988; Appendix 13)

As the name suggests, the mood rating VAS measures the participant's subjective mood through the use of an analogue scale (a 10cm continuous line between end points "not at all" and "extremely"). For the purpose of this study, only the two VAS items were used: (1) happiness, and (2) hopelessness. Each item is preceded by a statement printed above the 10cm line "*At this moment, I feel...*" and a description of mood printed just under the line "happy" or "hopeless". Participants rate their agreement/disagreement to each of the VAS mood rating items by marking a position (vertical line) along the 10cm continuous line that best represents how they feel. In keeping with the methodology used in Williams *et al.*'s study (2005), the VAS mood rating was administered on four different time points during the testing session: once prior to starting the testing session, once before the sad mood induction

procedure, once immediately after the sad MIP, and once at the end of the mood priming task.

Means-End Problem Solving Task (Platt & Spivack, 1975; Appendix 14)

The MEPS task consists of 10 short stories or social problem scenarios where each scenario is presented with its own beginning and ending. The MEPS task aims to assess the participant's social problem skills by measuring his or her ability to generate step-by-step means or solutions to the hypothetical social problem scenarios. Scoring is based on the number of relevant and effective solutions generated for each of the problem scenarios. Due to its good construct validity and internal consistency (from 0.80 to 0.84; Platt & Spivack 1972, 1975), the MEPS task remains as a widely used social problem solving skills test in many depression studies. Having adopted the MEPS procedure used in Williams *et al.*'s mood priming study (2005), this study only used six out of the original ten social problem scenarios (numbers 2, 3, 4, 6, 8 &10). The version of the MEPS items used was determined mainly by the gender of the participant. The female version was administered only to the female participants while the male version was administered only to the male participants. The MEPS items on both versions were identical with the exception of the names of the protagonists.

4.2.3. Procedure

4.2.3. a. *Case Identification*

The participants in this study were recruited from the Early Intervention Service in Birmingham from March 2009 to March 2011. The author of this study approached every care coordinator within EIS to identify service users who conformed to the inclusion criteria.

As established in the earlier section, two groups of participants were identified: (1) suicidal history group, and (2) non-suicidal group. In order to ensure that all of the participants fulfil both the inclusion and exclusion criteria, care coordinators were provided with a leaflet that briefly explained the study and its recruitment criteria. Following referral, participants were approached over the phone or in person, depending on their preference. During the initial meeting, the research was presented a three-part study [ESM, Problem-solving (MEPS), & Future Thinking (FT)], with each study investigating the mechanism of hopeless thinking by employing contrasting methodologies – the ecological and experimental approach. In order to counterbalance the order to which the two sets of methodologies were conducted, the three studies were split into two sets. Set A consisted of the ecological methodology (ESM) and set B consisted of the experimental methodology (MEPS & FT studies). Those participants who agreed to take part in all the three studies were randomly allocated to sets AB or BA. Following consent, the participant was asked to complete the Columbia Suicidal History Form in order to confirm any history of suicidal attempt or deliberate self-harm. In addition, the author also conducted an audit on the participant's clinical case notes at EIS in order to check for any historical entries of DSH or suicidal attempt. The LEIDS questionnaire was also conducted immediately following consent, which was on average at least a week prior to the testing session, in order to avoid two possible sources of contamination: (1) contamination from responses to other measures administered prior to the testing session (*e.g.* BHS or CDSS), one of these measures might evoke an emotional response which could potentially influence their responses on LEIDS or vice versa, and (2) contamination from any residual effects of the sad mood induction procedure.

Prior to starting the testing session, participants were briefed about the details of the study and given an opportunity to ask questions. Following this, a set of questionnaires measuring hopelessness (BHS), depression (CDSS), and suicidal thinking (ISST) was

completed. The MEPS and Future Thinking tasks (chapter 5) were both carried out on two occasions, once after the completion of questionnaires which is just prior to the sad mood induction procedure (pre-induction) and once after the sad MIP (post-induction). In line with Williams *et al.*'s study (2005), the tasks were completed in the same order for both pre-and post-induction, with the MEPS task first followed by the FT task. A debriefing was carried out at the end of the testing session to discuss the actual purpose of the MEPS task and more importantly, to check if the participant's mood had returned to its normal level. Participants who remained upset at the end of the testing session were offered a Happy Mood Induction Procedure to counteract the effects of the sad MIP. In keeping with what was agreed in the consent form, participants were also informed that their care coordinators will be requested to closely monitor on their mood for as long as they think it is necessary to do so. Out of the three participants who reported feeling upset, only two agreed to complete the happy MIP. All three participants consented to have their care coordinators informed in order to ensure that their mood will be monitored closely until deemed necessary. As an appreciation of their time and contribution, all of the participants received a payment of £20 at the end of the testing session.

4.2.3. b. *The Sad Mood Induction Procedure*

The sad MIP used in this study was adopted from Williams *et al.*'s mood priming study in 2005. Their version of the sad MIP employed the combined techniques of the Velten procedure and musical mood induction procedure. Prior to starting the sad MIP, participants were briefed about the purpose and details of this procedure. The researcher explained that the sad MIP will induce them to feel sad by reading a set of 30 Velten negative statement cards (Appendix 15) while listening to a sad music playing in the background. The music used in this procedure was Prokofiev's *Russia Under the Mongolian Yoke,* which was re-

mastered at half-speed using Wavepad Sound Editor version 5.13. Participants were instructed to read each card carefully and internalize the thoughts and feelings evoked by the negative statement written on each card (e.g. "*I am discouraged and unhappy about myself.*"). While doing this, participants were asked to identify the cards which they felt were more effective in making them feel sad and to put these cards on a separate pile. This set of cards was then later used in the two booster versions of the sad MIP, one prior to post-mood induction MEPS and another one prior to the post-mood induction Future Thinking task (chapter 5). The booster sad MIP was simply a shorter version of the original sad MIP with fewer negative Velten statement cards to go through.

4.2.3. c. *Means-Ends Problem Solving Task*

The MEPS task was presented to the participants as a 'story-telling' task, which aims to explore their creativity. Six problem scenarios were split into two sets of three. Set 1 consisted of scenarios about 'relationship difficulties with boyfriend/girlfriend', 'finding a lost wristwatch', and 'making friends in a new neighbourhood' (MEPS items 2, 3, & 4). Set 2 consisted of scenarios about 'starting relationship ', 'difficulties with friends', and 'difficulties with supervisor at work' (MEPS items 6, 8, & 10). Each participant was randomly allocated to sets 1/2 or 2/1 in order to counterbalance the presentation of MEPS items before (pre) and after (post) the sad mood induction procedure.

The participants were given one problem scenario to solve at a time. The researcher read each problem scenarios to the participants who, at the same time, followed what was being read on a separate card. Each scenario begins with a brief description of the protagonist facing a problem and ends with the protagonist successfully solving it while leaving the middle part of the scenario unknown. The participants were then given a time limit of 2 minutes to supply the middle part of the story by describing what they thought had happened,

which led to the successful ending of the story. All of the MEPS tasks were recorded using a dictaphone in order to allow the raters to score the task at a later point. In keeping with Williams *et al.*'s study (2005), each scenario was scored two ways: (1) for the number of relevant means/solutions, and (2) for the effectiveness of the solutions. The scoring was completed separately by two blind raters. The blind raters were psychology undergraduate students who were properly trained by the author of the study prior to scoring the MEPS task. A solution/mean was rated as "relevant" if the course of action led to the desired ending of the story (Platt & Spivack, 1975). Only actions that were taken by the protagonist were rated as valid. On the other hand, a 7-point Likert scale (1 = *not at all* & 7 = *extremely effective*) was employed to rate the effectiveness of the solutions for each of the stories. The intra-class correlation between the ratings of the two independents raters for the *number of solutions* was $r = .81$, $p < .001$ whilst the intra-class correlation for the *effectiveness ratings* was $r = .92$, $p < .001$. The two raters reviewed all of the recorded tasks again until 100% agreement was reached on the number of solutions and effectiveness ratings. The average number of solutions and effectiveness ratings for each task (pre- & post-induction MEPS) were calculated by adding the scores of the three problem scenarios divided by three.

4.2.4. Analysis Strategy

To test the hypotheses, a mixed between/within repeated measures analysis of variance was conducted using an IBM SPSS Statistics software version 21 for Windows. In order to control for the possible effects of the key clinical symptoms (*e.g.* generalised hopelessness, depression, and suicidal thinking), two sets of analysis of covariance using the repeated measures design were conducted. The purpose of the initial ANCOVA was to test for any clinical symptom that significantly interacts with the main outcome variable on the whole. If a significant interaction is found, the ANCOVA was repeated between groups with

the specific clinical symptom entered as a covariate. An alpha level of .05 was used for all statistical tests.

4.3. Results

4.3.1. Sample Characteristics

Of the 105 individuals who were approached, only 3 individuals responded with an outright refusal. Out of the recruited 102 participants, a subsample of 3 (2.94%) changed their mind about participating in the study (those who previously completed the LEIDS screening measure but refused to do the mood-priming study) while the other 2 (1.96) opted out from the MEPS task (but carried on completing the other task in the mood-priming study). In total, the final sample consisted of 97 participants (37 females and 60 males) of which, 48 (48.98%) had a lifetime history of suicidal behaviour while 49 (50%) had no history of suicidal behaviour in their lifetime. The participants' age and key symptom scores are summarised in Table 12.

Table 12. Means and Standard Deviations of Age and Key Symptom Scores for the Non-Suicidal Group and Suicidal History Group

	Non-suicidal group (*N* = 49)		Suicidal history group (*N* = 48)	
Variable	*M*	*SD*	*M*	*SD*
Demographic				
Age	23.86	5.00	23.16	4.66
Symptom Score				
BHS	5.61	4.43	9.92	5.90
CDSS	1.73	2.47	3.96	3.99
ISST	.39	1.52	1.77	3.12

Note: BHS = Beck Hopelessness Scale, CDSS = Calgary Depression Scale, and ISST = InterSept Scale for Suicidal Thinking

4.3.2. Descriptive Statistics and T-tests

Generalised Hopelessness

Current levels of generalised hopelessness were measured using the Beck Hopelessness Scale. An independent t-test revealed a significant difference between groups, with the suicidal history group (M = 9.92, SD = 5.90) showing a higher level of generalised hopelessness compared to the non-suicidal group (M = 5.61, SD = 4.43), $t(95) = 3.92$, $p < .001$, $d = .82$.

Depression

Symptoms of depression were assessed using the 10-item Calgary Depression Scale for Schizophrenia. Scores between the two groups were compared and an independent t-test revealed a significant difference between the suicidal history group (M = 3.96, SD = 3.99) with the non-suicidal group (M = 1.73, SD = 2.47) with the suicidal history group showing higher levels of depression than the non-suicidal group, $t(95) = 3.23$, $p = .002$, $d = .67$.

Suicidal Thinking

Levels of suicidal ideation a week prior to testing were measured using the InterSept Scale for Suicidal Thinking. Scores from both groups were compared using an independent t-test, which revealed a significant difference between the suicidal history group (M = 1.77, SD = 3.12) and the non-suicidal group (M = .39, SD = 1.52) with the suicidal history group showing higher levels of suicidal ideation than the non-suicidal group, $t(95) = 2.91$, $p = .005$, $d = .56$.

4.3.3. Hypotheses Testing

Data transformation was carried out on all of the continuous variables (e.g. dependent & covariates) prior to conducting the ANOVA in order to satisfy the assumption of normality and equality of variances. The data were transformed using the square root conversion following Tabachnick and Fidell's (2007) and Howell's (2007) suggested guideline in data transformation. The guideline suggests that square root transformation was more appropriate if the data distribution was moderately skewed (positive or negative skewness). Also, the use of square root employs the minimum amount of transformation to improve normality compared to the other transformation procedures (*e.g*. logarithmic & inverse). This was evident when a set of data was converted using square root and logarithmic transformation for the purpose of contrast. Overall, data transformed via square root had better improvement in normality when contrasted against data transformed via logarithmic method.

In keeping with Tabachnick and Fidell (2007) and Howell (2007), all means and standard deviations reported in the following analyses were original values from the untransformed data.

An alpha level of .05 was used for all statistical tests. All analyses were carried out with *group* (suicidal history group vs. non-suicidal group) as a between-subjects factor.

<u>Effects of the Mood Challenge on Problem Solving Ability</u>

In keeping with the DAH, the impact of the sad mood induction procedure will be more evident in the suicidal history group than the non-suicidal group. Specifically,

1. Compared to the non-suicidal group, the suicidal history group will exhibit a greater pre- to post-induction decrease in the number of problem-solving solutions.

To test this hypothesis, a two-fold analysis was employed. First, independent t-tests were conducted to compare the MEPS scores of each group (suicidal history group vs. non-suicidal group) before and after the sad mood induction procedure. Second, a mixed repeated measure ANOVA was conducted to examine the effect of the sad mood induction procedure on the problem solving ability of the suicidal history group and the non-suicidal group. To conduct the mixed-repeated measure ANOVA, the variable *group* (suicidal vs. non-suicidal) was entered as a between-subjects factor and *mood* (*mood 1* = pre-induction & *mood 2* = post-induction) as within factor. The main aim of employing an ANOVA was to look into the interaction effect between *mood* (pre- & post-induction) and *group* (suicidal & non-suicidal) on problem solving ability.

Results of the independent t-test on the pre-mood induction MEPS task showed that the suicidal history group (M = 6.44, SD = 2.02) generated fewer relevant means than the non-suicidal group (M = 7.37, SD = 1.79), t (95) = 2.40, p = 0.018, d = .31. Similar results were found on the post-mood induction task as the suicidal history group (M = 4.17, SD = 1.80), once again, generated less number of relevant means than the non-suicidal group (M = 6.22, SD = 1.57), t (95) = 6.00, p < .001; d = .73. Summary of means and standard deviations are displayed in Table 13.

In line with the hypothesis, a *mood* x *group* interaction effect was observed as the suicidal history group had a greater pre- to post-induction decrease in the number of problem solving means compared to the non-suicidal group [F(1, 95) = 13.19, p <.001, partial η^2 = .12]. There was also a significant within-subjects main effect of *mood* brought by the decrease in the overall MEPS scores following the mood-induction procedure [F (1, 95) = 80.78, p <.001, partial η^2 = .46], and a significant between-subjects main effect of *group* due to the fewer problem solving solutions in the suicidal history group than the non-suicidal group [F(1, 95) = 21.73, p <.001, partial η^2 = .19]. The results remained significant after

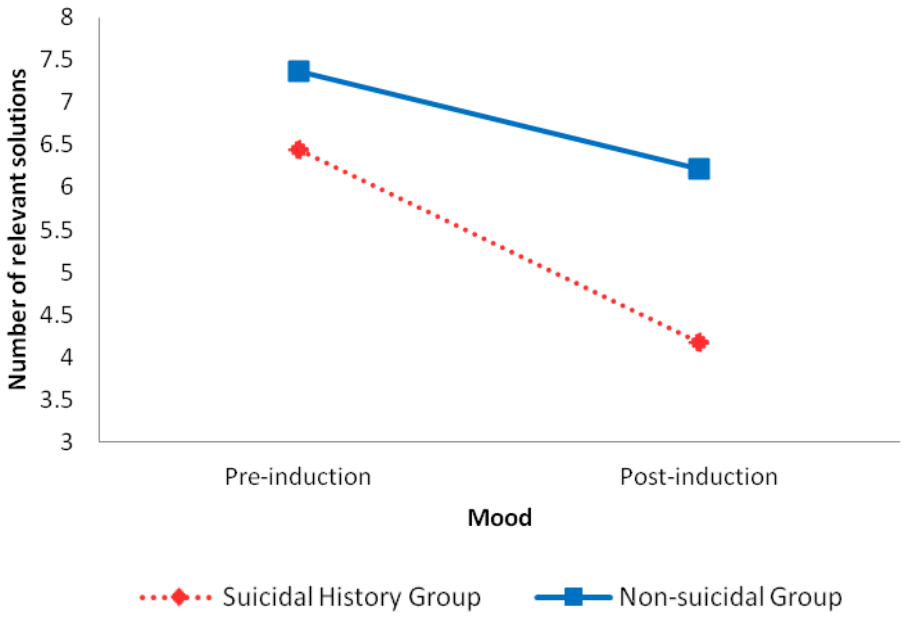
controlling for *generalised hopelessness* (BHS), *depression* (CDSS), and *suicidal thinking* (ISST).

Table 13. Means and Standard Deviations of the Pre- and Post- Mood Induction Number of Problem Solving Solutions

	Non-suicidal group (*N* = 49)		Suicidal history group (*N* = 48)	
Variable	*M*	*SD*	*M*	*SD*
Pre-induction	7.37	1.79	6.44	2.02
Post-induction	6.22	1.57	4.17	1.80

In summary, the results confirmed the hypothesis as the suicidal history group exhibited a greater pre- to post-induction decrease in the number of problem solving solutions compared to the non-suicidal group. Figure 2 illustrates the average number of solutions generated by the suicidal history group and the non-suicidal group before and after the sad mood induction procedure.

Figure 2. Average Pre- and Post-Induction Number of Problem Solving Solutions for the Suicidal History Group and Non-Suicidal Group



2. Compared to the non-suicidal group, the suicidal history group will show a greater pre- to post-induction decrease in the effectiveness ratings of problem solving solutions.

Following the analysis in hypothesis 1, independent t-tests were conducted in order to compare the effectiveness of the problem solving means generated by each group before and after the mood induction. A mixed repeated measure ANOVA was also conducted to determine if the mood challenge had a differential effect on the effectiveness ratings of the problem solving solutions generated by the suicidal history group and the non-suicidal group. Similar to the repeated measures ANOVA conducted in hypothesis 1, *group* was entered as a between-subjects factor and *mood (mood 1* = pre-induction & *mood 2* = post-induction) as a within-subjects factor. Again, the interaction effect between *mood* (pre- & post-mood induction) and *group* (suicidal & non-suicidal) was of key interest in this analysis.

Results of independent t-test on the pre-mood induction effectiveness ratings showed no significant difference between the suicidal group (M = 5.16, SD = 1.45) and the non-

suicidal group (M = 5.99, SD = 1.90), t (95) = 1.30, p = .196. In contrast, t-test results on the post-mood induction effectiveness ratings showed that the suicidal group (M = 3.91, SD = 2.01) scored significantly lower than the non-suicidal group (M = 5.06, SD = 1.96), t (95) = 2.43, p = .017, d = .50. Table 14 displays summary of means and standard deviations.

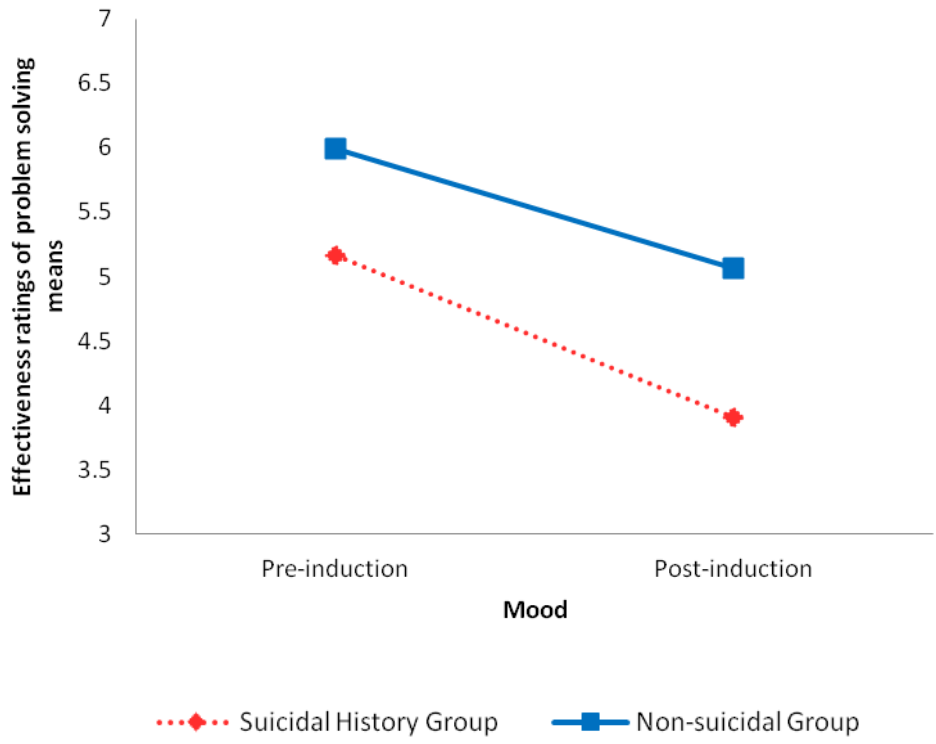
Table 14. Means and Standard Deviations of the Pre- and Post- Mood Induction Effectiveness Ratings of Problem Solving Solutions

	Non-suicidal group (N = 49)		Suicidal history group (N = 48)	
Variable	*M*	*SD*	*M*	*SD*
Pre-induction	5.99	1.90	5.16	1.45
Post-induction	5.06	1.96	3.91	2.01

Contrary to the hypothesis, no significant *group* x *mood* interaction effect was found [F(1, 95) = 1.42, p = .237]. However, a significant within-subjects main effect on *mood* was found as caused by the decrease in the effectiveness ratings following the mood induction [F(1, 95) = 16.25, p <.001, partial η^2 = .15]. Between-subjects main effect of *group* was also found as caused by the considerably lower effectiveness ratings in the suicidal history group than the non-suicidal group [F(1, 95) = 5.70, p =.019, partial η^2 = .06].

In summary, results of the repeated measures ANOVA did not support the hypothesis. The suicidal history group did not show a greater pre- to post-induction decrease in the effectiveness ratings of problem solving solutions as predicted. Figure 3 displays the average effectiveness ratings for each group before and after the sad mood induction procedure.

Figure 3. Average Pre- and Post-Induction Effectiveness Ratings of Problem Solving Solutions for the Suicidal History Group and Non-Suicidal Group



Effects of the Mood Challenge on Happiness and Despondence Ratings

Also in line with the assumption of the DAH,

3. The suicidal history group will exhibit a greater pre- to post-induction decrease in happiness ratings and a greater pre- to post-induction increase in despondence ratings compared to the non-suicidal group.

Replicating the two-step analysis in hypothesis 1 and 2, independent t-tests were conducted in order to compare the levels of momentary happiness and hopelessness in each group before and after the mood induction. A mixed repeated measure ANOVA was also conducted to determine if the effect of the sad mood induction procedure on the levels of happiness and despondence and whether the effect will vary between the suicidal history group and the non-suicidal group. Following the ANOVA analyses in hypotheses 1 and 2, the

group variable was entered as the between-subject factor while *mood* (*mood 1* = pre-induction & *mood 2* = post-induction) was entered as the within-subject factor. Again, the interaction effect between *mood* (pre- & post-mood induction) and *group* (suicidal & non-suicidal) was of key significance in this hypothesis testing.

Happiness Ratings

Independent t-test on pre-mood induction happiness ratings revealed no significant difference between the suicidal history group and the non-suicidal group [mean (*SD*) = 5.33 (2.09) & 5.73 (2.00), respectively; t (95) = .96, p = .337]. In contrast, independent t-test on post-mood induction happiness ratings showed a significant difference with the suicidal history group scoring lower than the non-suicidal group [mean (*SD*) = 4.06 (1.72) & 5.04 (1.98), respectively; t (95) = 2.48, p = .015; d = .50]. Summary of means and standard deviations are displayed in Table 15.

As predicted, results indicated a significant *time* x *group* interaction effect due to the greater pre- to post-induction decrease in happiness ratings within the suicidal history group in comparison to the non-suicidal group following the mood induction [F(1, 95) = 4.723, p =.082, partial η^2 = .032]. Results also showed a significant within-subjects main effect of *mood* as caused by the decrease in the happiness ratings following the mood induction [F(1, 95) = 42.68, p <.001, partial η^2 = .31]. There was, however, no significant between-subjects main effect of *group* [F(1, 95) = 3.091, p =.082]. The results remained significant after controlling for *generalised hopelessness* (BHS), *depression* (CDSS), and *suicidal thinking* (ISST).

Despondence Ratings

Independent t-test on pre-mood induction momentary despondence ratings revealed no significant difference between the suicidal history group and the non-suicidal group [mean (*SD*) = 3.28 (2.34) & 2.80 (2.51), respectively; *t* (95) = 1.10, *p* = .276]. In contrast, independent t-test on post-mood induction hopelessness ratings showed a significant difference with the suicidal history group scoring lower than the non-suicidal group [mean (*SD*) = 4.87 (2.44) & 3.36 (2.48), respectively; *t*(95) = 2.78, *p* = .007; *d* = .56]. Table 15 displays summary of means and standard deviations.

Table 15. Means and Standard Deviations of the Pre- and Post- Mood Induction Happiness and Despondence Ratings

	Non-suicidal group (*N* = 49)		Suicidal history group (*N* = 48)	
Variable	*M*	*SD*	*M*	*SD*
Happiness Ratings				
Pre-induction	5.73	2.00	5.33	2.09
Post-induction	5.04	1.98	4.06	1.72
Despondence Ratings				
Pre-induction	2.80	2.51	3.28	2.34
Post-induction	3.36	2.48	4.87	2.44

In agreement with the hypothesis, a significant *group* x *time* interaction effect [*F* (1, 95) = 4.48, *p* =.037, partial η^2 = .04] was found due to the greater pre- to post- induction increase in despondence ratings within the suicidal history group in comparison to the non-suicidal group. A within-subjects main effect of *mood* was also found due to the decrease in post-mood induction despondence ratings [*F*(1, 95) = 32.71, *p* <.001, partial η^2 = .26].

Additionally, a significant between-subjects main effect of *group* was found, with the suicidal history group showing higher despondence ratings compared to the non-suicidal group [$F(1, 95) = 4.18$, $p = .044$, partial $\eta^2 = .04$]. The results remained significant after controlling for *generalised hopelessness* (BHS), *depression* (CDSS), and *suicidal thinking* (ISST).

In summary, the results were consistent with the hypothesis as the suicidal history group exhibited a greater pre- to post-induction decrease in happiness ratings and a greater pre- to post-induction increase in hopelessness ratings compared to the non-suicidal group. Figure 4 illustrates the fluctuation of happiness ratings and despondence throughout the testing session.

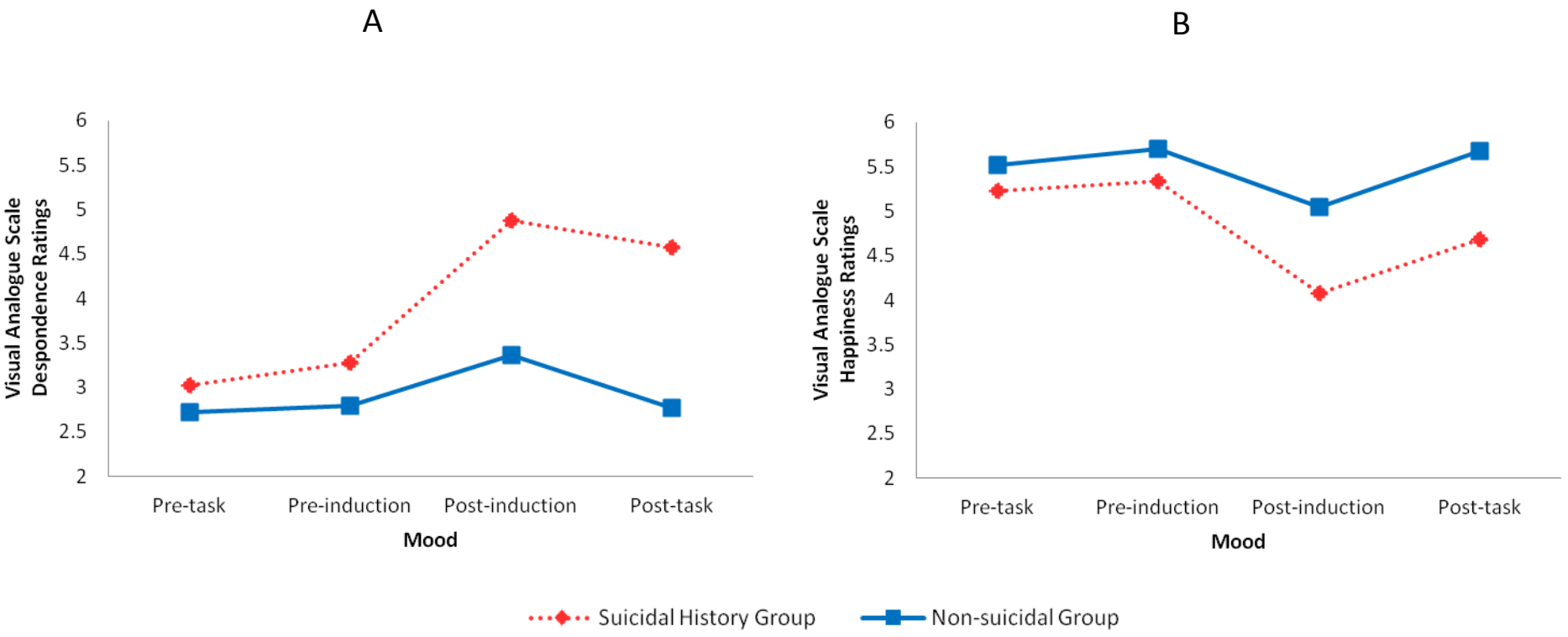
The Validity of LEIDS as a Measure of Cognitive Reactivity to Hopelessness

Prior to the mood challenge, measurements of cognitive reactivity to hopelessness were taken using the LEIDS' hopelessness subscale. Measured CR to hopelessness will be tested using the DAH framework. Consistent with the DAH,

4. The suicidal history group will also show significantly greater CR to hopelessness as measured by the LEIDS compared to the non-suicidal group.

An independent t-test was conducted in order to compare the means of the two groups on LEIDS' hopelessness subscale. As hypothesised, the suicidal history group ($M = 12.63$, $SD = 5.25$) showed significantly higher mean score than the non-suicidal group ($M = 6.20$, $SD = 4.13$), $t(95) = 6.34$, $p < .001$, $d = 1.36$).

Figure 4. Average VAS Despondence (A) and Happiness (B) Ratings on the Pre- and Post-Induction Tasks for the Suicidal History Group and the Non-Suicidal Group



The DAH of suicidal relapse suggests that the occurrence of low mood will trigger hopelessness. As a behavioural feature of hopelessness,

5. The deterioration in problem solving ability following the mood challenge will be correlated with greater levels of CR to hopelessness as measured by the LEIDS.

To test this hypothesis, a *difference* score was first calculated by subtracting the pre-mood induction number of problem solving means (PSM) from the post-mood induction number of PSM. Next, a bivariate correlation was carried out on the *difference* score (or the pre- to post-induction change in the number of problem solving means) and the LEIDS' hopelessness subscale scores. Contrary to the hypothesis, there was no significant correlation between scores on LEIDS' hopelessness subscale and the pre- to post-induction decrease in the number of problem solving solutions (r = -.11, N = 97, p = .280). Similar results were found when correlation was conducted on the original data.

4.4. Discussion

The key objective of this study was to explore the applicability of the DAH of suicidal relapse in understanding the suicidal thinking mechanism in FEP individuals, who are at high risks of suicidality as a result of their history of suicidal attempt or DSH. Encouraged by the studies conducted by a group of researchers who developed the idea of the DAH (e.g. Teasdale, Williams, Lau, Segal, & Barnhofer) along with the aspiration to make a valuable contribution to the literature of suicidal behaviour, the current study was conducted with the aim of shedding light on the phenomenon of suicide in a clinical group which is at a higher risk of hurting or killing themselves. Previous studies have shown that suicide in schizophrenia was highest during the early phase of the illness, typically during the first five years after the initial psychotic episode (Brown, 1997; Harris & Barraclough, 1997; Palmer *et*

al., 2005). But in keeping with suicide in other high risk groups, understanding who and when individuals may choose to harm themselves, remains a major challenge for clinicians.

In line with the literature on social problem solving as a behavioural marker associated with suicidal behaviour, this study employed the Means Ends Problem Solving task (Platt & Spivack, 1975) with the aim of comparing the performances of a high risk suicidal history group and low risk non-suicidal group, in a baseline mood (pre-induction) vs. sad induced mood condition (post-induction). The use of the sad mood induction procedure played a crucial part in assessing if the assumption of the DAH on cognitive vulnerability to suicidal relapse was applicable to the FEP sample.

As predicted, the results indicated that the suicidal history group had a significantly greater pre- to post-induction decrease in the problem-solving means compared to the non-suicidal group. The same findings were found when current levels of hopelessness (BHS), depression (CDSS), and suicidal thinking (ISST) were used as covariates. This suggests that the decrease in the post-induction number of relevant solutions in the suicidal history group was mainly due to the downward shift in mood and the group's pre-existing CR to hopelessness as suggested by the DAH framework. These findings were consistent with previous studies (Sadowsky & Kelly 1993, Pollock & Williams, 2001; Pollock & Williams, 2004) but were at variance with the data from Williams *et al.*'s mood priming study (2005), which reported no significant difference in the number of post-induction problem-solving solutions between those with a history of mood depressive disorder and suicidal ideation, those with MDD but without the history of suicidal ideation, and those with neither MDD or suicidal ideation. These conflicting results might be partially due to the dissimilar sample characteristics. Firstly, whereas their study only recruited those who were symptom-free from depression for at least 8 weeks, this study only excluded those who were severely depressed and suicidal at the time of assessment; this was because low mood is a prevalent feature of

psychosis at all phases of the disorder (Birchwood *et al*., 2000). However, it is important to note that due to the active involvement of the care coordinators in the recruitment process of this study, only those who were relatively stable in mood were actually referred for recruitment. Secondly, whereas Williams *et al.*'s (2005) previous study included the experience of suicidal ideation as part of the criteria for suicidal behaviour, the current study's criteria for suicidality were strictly limited to actual suicidal attempts or incidents of deliberate self-harm. Thirdly, whereas the main clinical diagnosis of the sample in their study was MDD, the clinical diagnosis and focus of this study was early psychosis and schizophrenia. It is vital to note, however, that the particular characteristics of the sample used in this study was key to extending the use of the DAH from being a general theory of suicidal relapse in previously depressed individuals to a framework that can potentially elucidate suicidal vulnerability in early psychosis, a particularly crucial period for young individuals who are still trying to come to terms with the trauma of the initial episode (Harrison & Fowler, 2004; Jackson & Iqbal, 2000; Jackson, *et al.*, 2004; Riedesser, 2004; Tarrier, Khan, Cater, & Picken, 2007) and the subjective distress associated with this experience (Brunet, Birchwood, Upthegrove, Michail, & Ross, 2012; McGorry, Patrick, Chanen *et al.*, 1991). Whereas depression in its severe form can develop into psychosis, depression can also develop out of the traumatic experience that an episode of psychosis can bring (Birchwood, Iqbal, Trower *et al*., 2000). Hafner and his colleagues (1998) have suggested that the adolescence of young people with schizophrenia is characterised by periods of low mood and crises of self-esteem. By using the first-episode of psychosis sample, the present study was able to explore if the DAH also applies to psychosis. The DAH suggests that suicidal relapse occurs when depressed mood and hopelessness are strongly linked to each other such that the experience of low mood will trigger hopelessness, which is a known risk factor for suicidal behaviour. If this link between low mood and hopelessness

were assumed to develop through repeated depressive episodes, how many episodes are sufficient enough to create such a robust link between the two? Do traumatic life events (*i.e.* psychotic experiences & hospitalisation) provide a context that hastens the formation of a strong link between the depressed mood and feelings of hopelessness? Whereas the answers to this question remain unknown, the fact that the present study found significantly fewer numbers of relevant means compared to the non-suicidal group following the mood challenge and Williams *et al.*'s (2005) study did not find any differences in a sample of MDD patients, suggests that there seems to be a greater vulnerability to hopeless thinking within the psychosis sample when mood is relatively low.

Contrary to the hypothesis, there was no significant difference in the degree of pre- to post-induction change in the effectiveness ratings of the problem-solving means generated in both groups. Although the effectiveness ratings were considerably reduced following the sad MIP and the effectiveness ratings of the suicidal history group in general was significantly lower than the non-suicidal group, the effect of the sad MIP on the effectiveness ratings simply did not differ between groups. These results suggest that although the difference in the *post-induction* effectiveness ratings between the suicidal history group and the suicidal history group was not substantial enough to be detected, the *overall* effectiveness ratings of the suicidal history group was significantly lower than the non-suicidal group. Interestingly, this significant between-group distinction on the effectiveness of their problem-solving solutions was not simply caused by their differences in current levels of generalised hopelessness (BHS), depression (CDSS), or suicidal thinking (ISST), as the results were re-tested with these key clinical symptoms as covariates. Intriguingly, it remains a mystery as to why the groups did not differ in their effectiveness ratings following the sad mood induction procedure. The only possible reason for this is that the pre-existing group differences on the pre-induction effectiveness scores caused the decrease in post-induction effectiveness scores

to diminish. Such a possibility was demonstrated when the groups significantly differed in the post-mood induction effectiveness ratings *after* controlling for the effects of the pre-mood induction effectiveness ratings. However, should pre-existing differences need controlling when the groups were naturally different to start with? Whereas pre-existing differences are customarily controlled for in standard pre-post experimental designs, the current study embraced the notion that the suicidal history group and non-suicidal group have naturally occurring, if not acquired, intrinsic differences. The fact that one group of individuals have attempted to kill or hurt themselves at some point in their lives when the other group of individuals have *not*, underlines that the two groups were distinct in significant ways. For instance, a number of previous studies have already illustrated the differential problem-solving abilities between those with and without histories of suicidal behaviour in a psychiatric sample (Curry *et al*., 1992; Reinecke *et al*., 2001; Watkins & Baracaia, 2002; Williams *et al*., 2005; Arie, Apter, Orbach *et al.*, 2008).

Also in agreement with the predictions of the present study, the suicidal history group exhibited a greater pre- to post-induction decrease in happiness ratings and a greater pre- to post- induction increase in despondence ratings as measured by the Visual Analogue Scale compared to the non-suicidal group. Importantly, these distinctly greater degree of changes in the pre- to post-induction mood ratings (e.g. greater decrease in happiness & greater increase in despondence) exhibited by the suicidal history group were not just consequences of higher levels of generalised hopelessness (BHS), depression (CDSS), and suicidal thinking (ISST) as appropriate tests were made to check if the results remain significant after controlling for the key symptoms. Overall, this pattern of results was consistent with the findings in Williams *et al.*'s (2005) study where participants with mood depressive disorder and histories of suicidal ideation exhibited less happiness and more despondence following the sad mood induction procedure. The present study confirms the results of the previous investigation but

in a sample of first-episode of psychosis whose vulnerability to suicide is not only at high risk (Brown, 1997; Harris & Barraclough, 1997; Palmer *et al*., 2005), but also largely unpredictable at the individual level (Power, 2010). Current findings indicate that despite the particularly difficult and emotionally stressful post-psychotic period currently experienced by *both* groups, only those with histories of suicidal behaviour exhibited greater sensitivity to the sad MIP as evidenced by their considerably greater degree of changes in their pre- to post-induction happiness and despondence ratings. However, it is also important to consider that the differential effects of the sad MIP on both groups may only be due to the natural, pre-existing group differences in mood prior to the mood induction. It can be argued that the suicidal-history group might already had significantly greater despondence ratings prior to the sad MIP than the non-suicidal group and was therefore more likely to respond with greater despondence than the latter group to the sad MIP. Results of independent t-tests, however, revealed that the groups did not differ in their overall despondence and happiness ratings. In other words, there were no pre-existing group differences in the pre-induction despondence ratings that could have biased the data in favour of the suicidal-history group. As the DAH focuses on the individual's *cognitive vulnerability* to hopelessness, it was crucial that the results of independent t-tests have established that the degree of change in pre- to post-induction mood ratings was <u>not</u> simply due to the pre-existing *vulnerability* to hopeless thinking during the pre-induction stage. Due to this, it was easier to determine that the degree of change in the pre- to post-induction problem-solving abilities was mainly due to the individual's cognitive vulnerability to hopelessness when in a sad mood and *not* simply due to the worsening of a pre-existing vulnerability or mood state.

In line with the assumption of the DAH, the suicidal history group exhibited greater cognitive reactivity to hopelessness by scoring higher in the hopelessness subscale of the Leiden Index of Depression Scale – Revised version. However, contrary to the hypothesis,

the CR to hopelessness as measured by the LEIDS's hopelessness subscale did not correlate well with the number of problem-solving solutions following the mood induction. One possible reason is that a number of participants (conservative estimate of less than 10) reported filling in the LEIDS questionnaire to be a difficult challenge. This particular group of participants expressed some difficulty imagining a hypothetical sad mood state, which was necessary if the LEIDS was to measure CR to hopelessness properly. Nevertheless, this group of participants was relatively small in number and cannot account for the lack of association between CR to hopelessness and number of relevant problem solving solutions. It is also possible that the lack of association between the two was due to the fact that experimentally induced change in number of problem solving solutions does not accurately represent suicidal vulnerability in real life thus, was unable to demonstrate a detectable link with CR to hopelessness. Finally, there is also a possibility that the LEIDS' hopelessness subscale was simply not able to effectively capture the key elements that embody CR to hopelessness in this particular sample.

In conclusion, the results of this study were consistent with previous findings that individuals with histories of suicidal behaviour were more impaired at solving problems particularly when mood is low, which were in keeping with the assumptions of the Differential Activation Hypothesis of suicidal relapse. This significantly noticeable problem solving impairment found in participants with histories of suicidal behaviour, especially following the sad mood induction, suggest that a subtle shift in mood (from neutral to sad mood induced) can impair the problem solving ability of this sample and reactivate some low level feelings of hopelessness. All in all, the results of this study support the assumptions of the Differential Activation Hypothesis in a number of ways. First, it illustrated the that DAH, as a hypothesis of suicidal relapse in a previously depressed sample, is also a valid model of suicidal relapse in a sample whose primary diagnosis is psychosis instead of depression.

Second, this study contributes more evidence to the literature that supports the DAH's as a valuable model of suicidal vulnerability by confirming that the DAH is not just a mere cognitive paradigm, but also a model that can be tested concretely via quantifiable behavioural markers (*e.g.* problem solving ability).

4.4.1. Strengths and limitations

This study has some limitations which need to be borne in mind. First, there was only one manipulated treatment variable (sad MIP) employed in this study, which meant that the comparison of problem-solving abilities between the suicidal and non-suicidal groups were only limited to the effect of this particular manipulation. Whereas the DAH only accounts for the individual's CR to hopelessness when in a depressed mood, other manipulations (*i.e.* happy or neutral MIP) could have illustrated the mechanism of hopelessness when the individual's mood is happy or neutral. Although the absence of a neutral or a happy mood induction did not have an unfavourable effect in the results of the present study, the neutral mood, in particular, could help establish if the changes in the number of relevant solutions following the mood induction were indeed due to shift in mood and not from other undesirable factors (*e.g.* boredom or loss of interest in the study, tiredness, & possible participant bias). Second, the results for the effectiveness ratings of the relevant means showing no difference between the suicidal history group and non-suicidal group following the mood induction contradicted previous research (Williams *et al.*, 2005). It is vital to consider, however, that the suicidal history group showed significantly lower effectiveness ratings than the non-suicidal group after controlling for the pre-induction effectiveness ratings. Finally, although the key predictions in the study were confirmed and in keeping with the assumptions of the DAH as a model for suicidal relapse, this study was only able to illustrate the effects of minor shifts in mood on the problem solving ability of an individual.

Although the ESM study (chapter 3) suggests that the DAH is ecologically valid and the results of the present study are consistent with the ESM data, a follow study is still needed in order to verify if the observed suicidal vulnerability as measured in the problem-solving task following the mood induction will predict suicidal relapse in real life. To date, no studies were able to demonstrate this and should therefore also be seen as a useful avenue for future research.

This study has a number of strengths. First, to the best of the author's knowledge, this study is the first to explore the mechanism of suicidal thinking in psychosis using the mood priming technique. Second, the sample is of a reasonably size compared to the sample size of a similar study conducted by Williams *et al.*'s study (N = 34); having recruited nearly three-fold of the sample size of a clinical group that is often not easy to engage, this is a positive achievement. Third, Birmingham as a culturally diverse city offered this study an excellent opportunity to investigate a sample that was of a good mix in terms of their ethnicity and social backgrounds (*i.e.* religion & family structures).

Overall, the findings of this study have important clinical implications. The prevention and management of suicidal behaviour in psychosis have not been greatly successful so far. To date, this is the first study to have explored the suicidal thinking mechanism in early psychosis and the significant results from this study present two valuable implications: (1) that the mood priming technique is a safe and effective method for studying the suicidal thinking processes, and (2) that the use of behavioural measures (*e.g.* problem solving tasks) following a mood challenge is a useful way to compare suicidal/hopeless thoughts relative to mood. Further, the findings of this study could serve as a platform for other researchers to further explore problem solving ability as one of the key behavioural markers for suicidal vulnerability in psychosis. Most importantly, the results supporting the assumption of the DAH for suicidal relapse could also serve as a platform for other

researchers to further investigate the application of the DAH as a framework of suicidality in psychosis. Specifically, extending the DAH as a guide to suicide risk assessments in first episode psychosis could be of great value to clinicians. Previous studies have shown that the stage following the initial psychotic episode is particularly crucial as the risks for both attempted and completed suicide are not only high but also largely unpredictable (Brown, 1997; Harris & Barraclough, 1997; Palmer *et al*., 2005; Power, 2010).

CHAPTER 5

Assessing the Link between Low Mood and Lack of Positive Future Fluency as a Behavioural Feature of Hopelessness: A Mood Priming Study

5.0. Introduction

Individuals who are at the early stages of psychosis, especially those who are still recovering from an initial psychotic episode, have been found to have a high level of suicidal ideations (Birchwood, Mason, MacMillan, & Healy, 1993; Rooke & Birchwood, 1998; Iqbal, Birchwood, Chadwick, & Trower, 2000) and suicidal attempts (Brown, 1997; Harris & Barraclough, 1997; Heila Isometsa, Henriksson *et al*., 1997, 1999; King, Baldwin, Sinclair *et al*., 2001; Nordentoft *et al*., 2002; Palmer *et al*., 2005; Power, 2010; Walsh *et al*., 2001). The role of hopelessness as a risk factor for suicidal behaviour (both ideations & attempts) in early psychosis has already been illustrated in previous studies (Nordentoft *et al*., 2002; Hawton *et al*., 2005; Pompili, Lester, Grispini *et al.*, 2009). Theoretically, the function of hopelessness as a part of the suicidal thinking mechanism has also been demonstrated in different ways (Schotte & Clum, 1987; Williams *et al.*'s, 2005; Johnson, Gooding, &Tarrier, 2008). Empirically, hopelessness has been found to be associated with certain cognitive and behavioural characteristics, such as deficits in autobiographical memory (Williams, 1996; Goddard, Dritschel, & Burton, 1996; Pollock & Williams, 2001; Arie *et al*., 2008), impaired interpersonal problem solving (O'Connor, R., O'Connor, D. *et al*., 2004; Pollock & Williams, 1998; Pollock & Williams, 2001; Williams, 1996; Goddard *et al*., 1996; Williams *et al*., 2005), and lack of fluency for positive events (Hepburn *et al*., 2006; MacLeod *et al*., 1993; 1997; 2005; MacLeod & Cropley, 1995; MacLeod & Byrne, 1996; O'Connor, Connery, & Cheyne, 2000).

Over the last two decades, the conceptualisation of hopelessness has changed somewhat. A growing number of evidence suggests that hopelessness is more than just an expectation of more negative events instead; it is an expectation of fewer positive events happening in someone's future (MacLeod & Byrne, 1996). Until the beginning of the 1990's, the characterisation of hopelessness as a risk factor for suicidal behaviour was somewhat vague. Despite numerous attempts to examine this multifaceted construct, hopelessness remained as something whose pernicious effects have been seen and heard of, but was never quite fully understood amongst clinicians and researchers alike. In 1993, MacLeod and his colleagues devised a task-based measure called the "Future Thinking Task" in order to explore the individual's ability of to generate examples of positive and negative, personal future events. The FT task's procedure was originally based from the verbal future fluency task (Lezak, 2004) except in the FT task; fluency was based on the generation of future expectations or example of future events rather than words. The initial version of the FT task involved asking participants to think of as many examples of future events as they can, across various time periods (next week, next year, & next 5 – 10 years). The task was performed under two conditions: (a) negative and (b) positive. In the positive condition, participants were asked to think of examples of pleasurable future events (e.g. "things that they are looking forward to") while in the positive condition, they were asked to think of examples of unpleasant future events (*e.g.* "things that they are not looking forward to"; MacLeod *et al*., 1993). Findings from the initial use of the FT task indicated that the previously suicidal group generated more examples of positive events than the control group. However, the groups did not differ in their number of negative future events (MacLeod *et al.*, 1993). Similar results were found in MacLeod & Byrne's study in 1996 on a sample of depressed individuals, which indicated a markedly reduced fluency for positive events in the depressed group compared to the control group. However, whereas the groups did not differ in the number of

negative events in MacLeod et al.'s study (1993), the depressed group showed more fluency for negative events than the control group (MacLeod & Byrne, 1996). A year later, MacLeod and colleagues (1997) found the same pattern of results that was illustrated in MacLeod & Byrne's study (1996). Intriguingly, an *opposite* pattern of results was revealed when the FT task was conducted in a sample of non-clinical adolescents with symptoms of depression and anxiety. Specifically, Miles, MacLeod and Pote's study (2004) indicated that the participants with greater depressive and anxiety symptoms exhibited *more fluency for negative events* than the control group, but both groups did not differ in their fluency for positive events. Despite the inconsistent findings, the link between depression and reduced fluency for positive events as a proxy for hopelessness remained evident (MacLeod *et al*., 1996, 1998, 2005; Sidley, Calam, Wells, Hughes, & Whitaker, 1999). Then again, it is important to note that a large number of these previous studies on future thinking and hopelessness have focused mainly on healthy, or clinically depressed, sometimes in-patient, previously suicidal individuals. Most of these studies also measured future fluency following identification of suicidal behaviour (ideations & attempts), which suggest that interpretations are leaning towards the idea that the lack of positive future fluency is a stable trait of previously suicidal individuals. However, it also a fact that the life circumstances of the clinically depressed and suicidal individuals are characterised by a number of emotional, social, and economic difficulties, and traumatic events (Hawton *et al*., 2005; Isometsa, Heikkinen, Henriksson, Aro, & Lonqvist, 1995; Leverich, Altshuler Frye, Suppes *et al*., 2003; O'Connor, 2011; Rihmer, 2005, 2007). Altogether, these difficult circumstances represent a context that renders positive future fluency impairment as a state-phenomenon in this particular sample. Having combined the trait and state features of suicidality, the Differential Activation Hypothesis of suicidal relapse (Lau *et al*., 2004) suggests a model that puts emphasis on the role "cognitive reactivity" to hopelessness (trait) when in a sad mood (state). As already

discussed in chapter 1, the DAH framework proposes that the occurrence of a sad mood determines the mechanism of suicidal/hopeless thoughts (Lau *et al*., 2004).

As a behavioural outcome that is closely linked with hopelessness, it is important for clinicians to understand how positive future fluency responds to negative shifts in mood. It is equally crucial to find out if positive future fluency remains reactive to mood changes following a full recovery from the depression that facilitated the occurrence of hopeless thoughts. By employing a mood priming technique, the present study will be able to test if the assumption of the Differential Activation Hypothesis on hopelessness as a sad mood-dependent cognition holds true for the first episode psychosis sample with a history of suicidal attempt or deliberate self-harm. The present study will therefore explore if the experience of psychosis will influence the relationship between mood and hopeless thoughts as suggested by the DAH.

The first aim of this study is to examine the link between hopelessness and future fluency in psychosis using the assumptions of the DAH of suicidal relapse (Lau *et al*., 2004). Specifically, the present study seeks to examine the effect of mood on the positive and negative future fluency of FEP individuals, with and without a history of suicidal attempt or deliberate self-harm, by employing the mood challenge in order to evoke a sad mood in the participants. The mood challenge is crucial in testing the assumptions of the DAH as the post-induction future fluency will provide a valuable contrast to the future fluency prior to the effects of the "induced" sadness. Whereas Williams and his colleagues have already tested the DAH of suicidal relapse in both healthy and previously depressed samples with histories of suicidal ideations, to date, this is the very first study to test the application of the DAH as a model of suicidal vulnerability in a sample of FEP patients.

The second aim of the study is to look into the effects of the mood challenge on the perceived valence and likelihood of future events. The study also intends to look into the effects of the mood challenge on the levels of momentary happiness and hopelessness.

The final aim of this study is to assess the use of the Leiden Index of Depression Scale's (Van der Does & Williams, 2003) hopelessness subscale as a measure of cognitive reactivity to hopelessness and test if scores on this subscale will be associated with the pre- to post-induction change in positive future fluency. As mentioned in chapter 4, the LEIDS' hopelessness subscale was devised during the conception of the DAH for suicidal relapse in order to measure the individual's susceptibility to hopeless/suicidal thoughts when in a sad mood (chapter 3).

5.1. Hypotheses

Effects of the Mood Challenge on Future Fluency

In keeping with the DAH, the impact of the sad mood induction procedure will be more evident in the suicidal history group than the non-suicidal group. Specifically,

1. The suicidal history group will exhibit a greater pre- to post-induction decrease in the number of positive events than the non-suicidal group. However, the degree of change in the pre- to post-induction number of negative events will not differ between the two groups.

Effects of the Mood Challenge on the Perceived Valence and Likelihood of Future Events

Compared to the non-suicidal group, the suicidal history group will –

2. Demonstrate a greater pre- to post-induction decrease in the positive valence ratings on good events (positive events) and a greater pre- to post-induction increase in the negative valence ratings on bad events (negative events).

3. Exhibit a greater pre- to post-induction decrease in the likelihood ratings of good events and a greater pre- to post-induction increase in the likelihood ratings of bad events.

Effects of the Mood Challenge on Happiness and Despondence ratings

In keeping with the assumption of the DAH,

4. The suicidal history group will reveal a greater pre- to post-induction decrease in happiness ratings and a greater pre- to post-induction increase in despondence ratings.

The Validity of LEIDS as a Measure of Cognitive Reactivity to Hopelessness

Prior to the mood challenge, measurements of cognitive reactivity to hopelessness using the LEIDS' hopelessness subscale were taken. Measured CR to hopelessness will be tested using the DAH framework. In line with the DAH,

5. The suicidal history group will exhibit greater CR to hopelessness, as measured by the LEIDS, compared to the non-suicidal group.

The DAH suggests that the occurrence of low mood will trigger hopelessness. As a behavioural feature of hopelessness,

6. The decline in fluency for positive events following the mood challenge will be associated with greater levels of cognitive reactivity to hopelessness as measured by the LEIDS.

5.2. Method

5.2.1. Sampling

N.B. The sampling procedure of the present study was identical to the one employed in the Experience Sampling Method study in Chapter 3.

5.2.2. Measures

N.B. Measures described in Chapter 3 (CHSF, LEIDS-R, CDSS, BHS, and ISST) were also employed in this study.

Visual Analogue Scale - Mood Rating

N.B. The mood rating VAS described in the Chapter 4 was also employed in this study.

Future Thinking Task (MacLeod et al., 1993)

The Future Thinking Task (MacLeod *et al.*, 1993, 1998) is a verbal task where participants are instructed to generate examples of personal experiences or events that they think are likely to happen in their future. In the original FT task developed by MacLeod *et al.* (1993), participants were asked to generate examples of future events in two different conditions (positive and negative) over three different time periods (next week, next year, and next five to ten years). In the positive condition, participants were asked to generate examples of pleasurable future events, or "experiences that they were looking forward to". In the negative condition, participants were asked to generate examples of unpleasant future events, or "experiences that they were not looking forward to". In keeping with the version of the FT task employed in Hepburn *et al*.'s (2006) mood-priming study, the FT task in this study was conducted over four different time periods (next week including today, next month, next year, and next 5 to 10 years) as opposed to the standard 3 time periods (next week, next year, & next 5 to 10 years). The reason for this was to achieve an equal number of time periods for the pre- and post-induction tasks. For example, the pre-induction FT task covers the *next week* and the *next month* time periods while the post-induction FT task covers the *next year* and the *next 5 to 10-year* time periods.

5.2.3. Procedure

5.2.3. a. *Case Identification*

The current study and the Means Ends Problem Solving task (Chapter 4) were both conducted in a single testing session, using exactly the same sample. However, the sample sizes of these two studies were slightly different as two participants opted out from the MEPS task, but both agreed to complete the current study (MEPS study $N = 97$, FT study $N = 99$). The two participants who opted out of the MEPS agreed to complete the FT task simply because they felt that the FT task is less challenging than the MEPS task. As previously discussed in the MEPS study (see chapter 5), the participants in this study were recruited from the Early Intervention Service in Birmingham from March 2009 to March 2011. The participants were split into two groups: (1) suicidal history group, and (2) non-suicidal group. Care coordinators were informed about the inclusion and exclusion criteria of the study in order to ensure that only eligible service users were approached. Following referral from the care coordinators, participants were approached over the phone or in person, depending on their preference. Once consent was obtained, the Columbia Suicidal History Form was conducted to assess for the individual's lifetime histories of suicide attempt or DSH. In addition, the author of this study also carried out an audit on the participant's clinical case notes at EIS in order to check for any historical records of suicidality.

As explained in the testing procedures of the MEPS study in the previous chapter, the testing session began with a briefing about the details of the study. Participants were given an opportunity to ask questions and/or clarify any issues or concerns about their participation and/or the nature of the study. Following this, a set of questionnaires measuring hopelessness, depression, and suicidal thinking (BHS, CDSS, & ISST respectively) was completed. The Future Thinking and the MEPS tasks (chapter 5), as mentioned earlier, were both carried out on two occasions, once after the completion of questionnaires which was prior to the sad

mood induction procedure (pre-induction) and once immediately after the sad MIP (post-induction). Having based the present investigation on Hepburn and colleagues' study (2005), the tasks were completed in exactly the same order for both pre and post-sad MIP. The MEPS task was always presented first followed by the FT task. As mentioned in the previous chapter, a debriefing was carried out at the end of the testing session for two main purposes: (1) to discuss the actual purpose of the FT task (and the MEPS), and (2) to check if the participant's mood had returned to its normal level. Participants who remained upset at the end of the testing session were offered a Happy Mood Induction Procedure to counteract the effects of the sad MIP. Of the three participants who reported feeling upset, only two completed the happy MIP. Participants were also informed that their care coordinators will be requested to closely monitor on their mood for as long as they think it is necessary to do so. This issue on risk overruling confidentiality was carefully discussed with the participants prior to them signing the consent form. All three participants agreed to have their care coordinators informed and all of them recovered well without any further deterioration of their mental health.

5.2.3. b. *Sad Mood Induction Procedure*

As the FT task and MEPS tasks were both conducted in one testing session, the participants undertook the same sad MIP procedure described in chapter 5.

5.2.3. c. *Future Thinking Task*

As the current study was a replication of Hepburn and her colleagues' (2006) mood priming study on future fluency, the FT task was also conducted in two blocks of trials, one prior to and another one following the sad mood induction procedure. Each block of trials contained equal numbers of conditions over four different time periods (Block A = positive

week, negative month, positive year, negative 5–10 years & Block B = negative week, positive month, negative year, positive 5–10 years). Each participant was randomly allocated to blocks A/B or B/A in order to counterbalance the presentation of conditions before (pre) and after (post) the sad mood induction procedure. The time periods were presented one at a time in chronological order. The participants were given a time limit of 1 minute to generate as many future events as they can think of within the time period and condition specified by the researcher. Examples of future events generated were then recorded by the researcher on an FT task response sheet while making sure that the participant remained focused in finishing the task. Upon completion of all time periods, the researcher read each example of future events and asked the participant to rate it in two ways: (1) perceived valence, and (2) likelihood. Valence ratings were obtained by asking the participants to rate how positive/negative they would feel if the events were to actually happen using a 7-point Likert scale (1 = *not at all* positive/negative & 7 = *extremely* positive/negative). Alternatively, likelihood ratings were obtained by asking participants to rate the probability that their future expectations were to occur using a similar 7-point Likert scale (1 = *not at all likely* & 7 = *extremely likely*). In keeping with Hepburn et al.'s (2005) rating procedures, future expectations were all rated first for positivity and then negativity. According to Hepburn's and her colleagues (2005), ratings for positivity (positive valence) and negativity (negative valence) should not be performed concurrently as participants might rate negativity as an inverse of positivity or vice versa. By rating them separately, we were able to measure negativity and positivity as two separate dimensions of affect. A number of studies have already demonstrated that negativity is not merely the opposite equivalent of positivity (MacLeod & Byrne, 1996). However, it is important to note that the hypotheses of the present study only examined the *positive valence* of good events and *negative valence* of bad events.

In keeping with hypotheses and for the sake of brevity, results and discussion were therefore limited only to the valences specified previously.

Overall, a set of three scores were calculated upon completion of the future thinking task (FT task). Calculations were based on the formulae used in Hepburn *et al*.'s study. First, the total future fluency scores were calculated by summing the total number of future events generated in each of the four time periods within the specified condition (positive or negative FT task) and mood state (pre- & post-induction). Examples of future events across all time periods must be unique and any repeated examples were only counted the first time they were cited. Second, the valence scores were calculated by summing the total valence ratings divided by the total number of future events generated within the specified condition and mood. Third, following the calculation of the valence scores, the average likelihood scores were calculated by adding the total likelihood ratings of each future event divided by the total number of future expectations within the specified condition and mood state. The analyses in the hypotheses testing focused mainly on the post-mood induction scores for future fluency (positive & negative) and the associated features of future thinking (valence & likelihood). The key objective was to compare the effects of the sad mood induction procedure on the overall performance of the suicidal history group and the non-suicidal group in the FT task. Although examples of future events were not identical on the pre- and post-mood induction tasks (due to alternating positive & negative conditions within the 4 time periods), comparisons on pre- and post-induction valence and likelihood scores were therefore interpreted with caution. Instead of examining how each group of participants re-rated the same events on two varying mood states, analyses in the current study were mainly focused on comparing the general level of perceived valence (positive & negative) and likelihood ratings between groups prior to and after the mood induction procedure.

5.2.4. Analysis Strategy

To test the hypotheses, a mixed between/within repeated measures analysis of variance was conducted using an IBM SPSS Statistics software version 21 for Windows. In order to control for the possible effects of the key clinical symptoms (*e.g.* generalised hopelessness, depression, and suicidal thinking), an analysis of covariance using the repeated measures design were conducted.

5.3. Results

5.3.1. Sample Characteristics

Of the 105 individuals who were approached, only 3 individuals responded with an outright refusal. Out of the recruited 102 participants, only a subsample of 2 (1.96%) changed their mind about participating in the study (those who previously completed the LEIDS screening measure, but refused to do the mood-priming study). In total, the final sample consisted of 99 participants of which, 49 (49.49%) had a lifetime history of suicidal behaviour while 50 (50.51%) had no history at all of suicidal behaviour in their lifetime. Of the 49 participants with a lifetime history of suicidal behaviour, 27 (55.10%) were males and 22 (44.90%) were females. Alternatively, of the 50 participants without a lifetime history of suicidal behaviour, 35 (70%) were males and only 15 (30%) were females. Due to the relatively small discrepancy in the sample size between the study discussed in the Chapter 4 (N = 97) and the present study (N = 99), the mean age and key symptom scores were almost identical. However, for the sake of accuracy, the participants' age and key symptom scores in the present study are summarised in Table 16.

Table 16. Means and Standard Deviations of Age and Key Clinical Symptoms for the Non-Suicidal Group and Suicidal History Group

	Non-suicidal group (N = 50)		Suicidal history group (N = 49)	
Variable	*M*	*SD*	*M*	*SD*
Demographic				
Age	23.86	4.95	23.08	4.65
Symptom Score				
BHS	5.58	4.39	9.96	5.84
CDSS	1.70	2.46	3.88	3.99
ISST	0.38	1.51	1.73	3.10

Note: BHS = Beck Hopelessness Scale, CDSS = Calgary Depression Scale, and ISST = InterSept Scale for Suicidal Thinking

5.3.1. Descriptive Statistics and T-tests

Generalised hopelessness

Current levels of generalised hopelessness were measured using the Beck Hopelessness Scale. An independent t-test revealed a significant difference between groups, with the suicidal (M = 9.96, SD = 5.84) group showing a higher level of generalised hopelessness compared to the non-suicidal group (M = 5.58, SD = 4.39), $t(97) = 4.07$, $p < .001$, $d = .85$. The BHS scores for each group are shown in Table 16.

Depression

Symptoms of depression were assessed using the 10-item Calgary Depression Scale for Schizophrenia. Scores between the two groups were compared and an independent t-test revealed a significant difference between the suicidal history group (M = 3.88, SD = 3.99) and the non-suicidal group (M = 1.70, SD = 2.46), with the previous group showing higher

levels of depression than the latter group, $t(97) = 3.21$, $p = .002$, $d = .66$. The CDSS scores for each group are shown in Table 16.

Suicidal Thinking

Levels of suicidal ideation during the past 7 days prior to testing were measured using the InterSept Scale for Suicidal Thinking. Scores from both groups were compared using an independent t-test, which revealed a significant difference between the suicidal history group ($M = 1.73$, $SD = 3.10$) and the non-suicidal group ($M = .38$, $SD = 1.51$), with the previous group showing higher levels of suicidal ideation than the latter group, $t(97) = 2.92$, $p = .004$, $d = .61$. The ISST scores for each group are also shown in Table 16.

5.3.2. Hypotheses Testing

Following the data conversion in the previous chapter, square root data transformation was also employed on all of the continuous dependent variables and covariates prior to conducting the analysis of variance in order to satisfy the assumption of normality and equality of variances. Again, in keeping with Tabachnick and Fidell (2007) and Howell (2007), all means and standard deviations reported in this chapter were original values from the untransformed data.

An alpha level of .05 was used for all statistical tests. All analyses were carried out with *group* (suicidal history group vs. non-suicidal group) as a between-subjects factor.

<u>Effects of the Mood Challenge on Future Fluency</u>

In keeping with the DAH, the impact of the sad mood induction procedure will be more evident in the suicidal history group than the non-suicidal group. Specifically,

1. The suicidal history group will exhibit a greater pre- to post-induction decrease in the number of positive events than the non-suicidal group. However, the degree of change in the pre- to post-induction number of negative events will not differ between the two groups.

To test this hypothesis, a two-step analysis was conducted. To test this hypothesis, a three-step analysis was conducted. First, independent t-tests were conducted on future fluency scores to test the difference between the means of each group in both conditions (positive & negative events) conducted on two separate mood states (pre- & post-mood induction). Future event scores were obtained by summing the total number of expectations generated in each condition (positive & negative) during the two testing time points (pre- & post-mood induction). Second, a mixed repeated measures ANOVA was carried out to examine the effect of the sad mood induction procedure (sad MIP) on positive and negative future fluency, and most importantly, to determine if the effect of the sad MIP differed between the suicidal history group and the non-suicidal group. The hypothesis will be validated on the basis of a significant interaction effect. To conduct the ANOVA, the variable *mood* (pre- vs. post-induction future fluency scores) was entered as the within-subject factor and *group* (suicidal history group vs. non-suicidal group) as the between-subject factor. Third, an Analysis of Covariance using the repeated measure design was conducted in order to test if the key clinical symptoms (*e.g.* generalised hopelessness, depression, and suicidal thinking) have an effect of the *mood* x *group* interaction. To perform the ANCOVA, *mood* (pre- vs. post-mood induction) was entered as the dependent variable, *group* (suicidal history group vs. non-suicidal group) as the fixed factor, while *generalised hopelessness* (as measured by the BHS), *depression* (as measured by the CDSS), and *suicidal thinking* (as measured by the ISST) were entered as covariates. Separate ANCOVA's were conducted for each of the covariates to ensure better accuracy.

Positive events

Results of independent t-test on pre-mood induction positive Future Thinking Task (FTT) scores showed that the suicidal history group (M = 8.86, SD = 2.43) had significantly fewer number of positive events than the non-suicidal group (M = 10.02, SD = 2.68), $t(97) = 2.10$, $p = .031$, $d = .44$). Similar results were found from the independent t-test on post-mood induction positive event scores as the suicidal history group (M = 6.78, SD = 2.18) had significantly less number of positive events than the non-suicidal group (M = 9.26, SD = 3.73), $t(84.70) = 3.55$, $p = .001$; $d = .72$). The Levene's test for the post-induction t-test indicated unequal variances ($F = 7.48$, $p = .007$) so degrees of freedom were adjusted from 97 to 84.70. Summary of means and standard deviations are displayed in Table 17.

Consistent with the hypothesis, there was a significant *group* x *mood* interaction effect with the suicidal history group showing a greater pre- to post-induction decrease in the number of positive events compared to the non-suicidal group [$F(1, 97) = 4.91$, $p = .029$, partial $\eta^2 = .05$]. This finding held true after controlling for *generalised hopelessness* (BHS), *depression* (CDSS), and *suicidal thinking* (ISST).

The ANOVA also confirmed a significant within-subjects effect of *mood* as caused by the decrease in post-induction number of positive events [$F(1, 97) = 35.62$, $p < .001$, partial $\eta^2 = .27$]. There was also a between-subjects main effect of *group* due to the suicidal history group showing significantly fewer examples of positive events compared to the non-suicidal group [$F(1, 97) = 11.12$, $p = .001$, partial $\eta^2 = .10$]. The pattern of results remained unaffected after controlling for the previously identified key clinical symptoms.

Negative events

The independent t-test on the negative Future Thinking Task (FTT) scores showed no significant difference between the suicidal history group and non-suicidal group on both the

pre-mood induction [mean (*SD*) = 7.49 (3.21) and 6.54 (3.22), respectively; $t(97) = 1.59$, $p = .114$] and post-mood induction number of negative events [mean (*SD*) = 8.04 (3.56) and 6.92 (2.70), respectively; $t(97) = 1.66$, $p = .101$]. Table 17 displays summary of means and standard deviations.

Also in agreement with the hypothesis, there was no significant *mood* x *group* interaction effect [$F(1, 97) = 3.30$, $p = .072$]. There was also no between-subjects main effect of *group* as the number of negative events did not differ between the suicidal history group and non-suicidal group [$F(1, 97) = .09$, $p = .080$]. In contrast, there was a significant within-subject effect of *mood* due to the decrease in the number of negative events following the mood challenge [$F(1, 97) = 4.30$, $p = .041$, partial $\eta^2 = .04$]. The pattern of results was unaffected following an ANCOVA to control for *generalised hopelessness* (BHS), *depression* (CDSS), and *suicidal thinking* (ISST).

Table 17. Means and Standard Deviations of the Pre- and Post- Mood Induction Number of Positive and Negative Events

	Non-suicidal group (*N* = 50)		Suicidal history group (*N* = 49)	
Variable	*M*	*SD*	*M*	*SD*
Positive Events				
Pre-induction	10.02	2.68	8.86	2.43
Post-induction	9.26	3.73	6.78	2.18
Negative Events				
Pre-induction	6.54	3.22	7.49	3.21
Post-induction	6.92	2.70	8.04	3.56

In summary, the results confirmed the hypothesis as the suicidal history group exhibited a significantly greater pre- to post-induction decrease in the number of positive events than the non-suicidal group. Also as predicted, both groups did not differ in their pre- to post-induction changes in their number of negative events. Figure 5 illustrates the number of positive and negative events for each group.

Effects of the Mood Challenge on the Perceived Valence and Likelihood of Future Events

Compared to the non-suicidal group, the suicidal history group will –

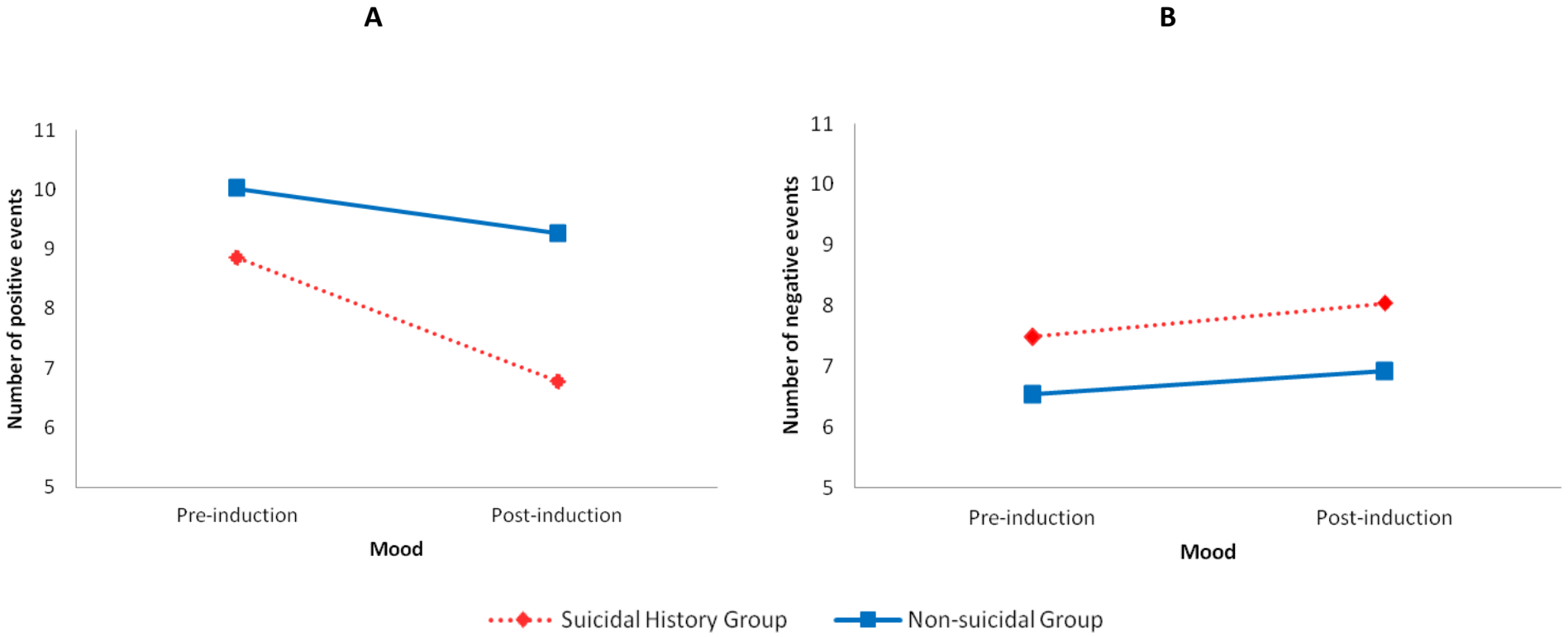
2. Demonstrate a greater pre- to post-induction decrease in the positive valence ratings on good events (positive events) and a greater pre- to post-induction increase in the negative valence ratings on bad events (negative events).

Following the three-step analysis in the hypothesis 1, independent t-tests, ANOVA, and ANCOVA were conducted to test this assumption. The ANOVA and ANCOVA variables were all identical to the ones used in hypothesis 1 with exception of the within-subjects factor levels for *mood* as the current analyses requires pre- and post-induction *valence* scores. The valence scores were obtained by asking the participants to rate how positive or negative they would feel if their future expectations (positive & negative future events) were to occur. The positive and negative valence ratings were calculated by summing the individual valence ratings of each future event divided by the total number of future events in each of the condition (positive & negative).

Positive Valence Ratings on Good Events

The independent t-tests showed that the suicidal history group had significantly lower positive valence ratings on good events compared to the non-suicidal group on both the pre-

Figure 5. Average Pre- and Post-Induction Number of Positive Events (A) and Negative Events (B) for the Suicidal History Group and Non-Suicidal Group



mood induction [mean (*SD*) = 5.52 (.94) and 6.24 (.64), respectively; $t(97) = 4.31$, $p < .001$; $d = .83$] and post-mood induction tasks [mean (*SD*) = 4.47 (1.03) & 5.72 (1.02), respectively; $t(97) = 5.90$, $p < .001$; $d = 1.19$]. Summary of means and standard deviations are displayed in Table 18 below.

As predicted, there was a *mood* x *group* interaction effect as caused by the significantly greater pre- to post-induction decrease in the positive valence ratings on good events in the suicidal history group compared to the non-suicidal group [F (1, 97) = 7.56, $p = .007$, partial $\eta^2 = .07$]. The significant *mood* x *group* interaction held true after controlling for *depression* (CDSS) and *suicidal thinking* (ISST). However, controlling for *generalised hopelessness* (BHS) reduced the *mood* x *group* interaction effect to non-significance [F (1, 95) = 2.14, $p = .147$].

Similarly, the initially significant main effect of *mood* [F (1, 97) = 60.65, $p < .001$, partial $\eta^2 = .38$] was also reduced to non-significance after controlling for *generalised hopelessness* as measured by the BHS [F (1, 95) = 1.31, $p = .255$]. However, the significant finding was unaffected after controlling for *depression* (CDSS) and *suicidal thinking* (ISST). On the other hand, there was a significant between-subjects main effect of *group* as caused by the considerably lower positive valence ratings on good events in the suicidal history group compared to the non-suicidal group, and this held true after controlling for the previously named key clinical symptoms [$F(1, 97) = 37.70$, $p < .001$, partial $\eta^2 = .28$].

Negative Valence Ratings on Bad Events

Results of independent t-tests indicated significantly higher negative valence ratings on good events in the suicidal history group than the non-suicidal group on both the pre–mood induction [mean (SD) = 1.65 (.80) & 1.30 (.82), respectively; $t(97) = 2.54$, $p = .013$; d

= .52] and post-mood induction tasks [mean (SD) = 1.85 (.94) & 1.47 (.81), respectively; $t(97) = 2.30$, $p = .024$; $d = .45$]. Table 18 displays summary of means and standard deviations.

Again as predicted, there was a significant *mood* x *group* interaction effect due to the suicidal history group exhibiting greater pre- to post-induction increase in the negative valence ratings on bad events compared to the non-suicidal group [$F(1, 97) = 7.20$, $p = .009$, partial $\eta^2 = .07$]. This finding remained significant after controlling for *generalised hopelessness* (BHS), *depression* (CDSS), and *suicidal thinking* (ISST).

The results also revealed a significant within-subjects main effect *mood* as caused by the significantly higher negative valence ratings following the post-mood induction [$F(1, 97) = 21.67$, $p < .001$, partial $\eta^2 = .18$]. There was also a significant between-subjects main effect of *group* as the suicidal history group had considerably higher negative valence ratings compared to the non-suicidal group [$F(1, 97) = 38.55$, $p < .001$, partial $\eta^2 = .28$]. Again, the results remained significant after controlling for the identified key clinical symptoms.

Table 18. Means and Standard Deviations of the Pre- and Post- Mood Induction Valence Ratings on Positive and Negative Events

	Non-suicidal group (N = 50)		Suicidal history group (N = 49)	
Variable	*M*	*SD*	*M*	*SD*
Positive Valence on Good Events				
Pre-induction	6.24	.64	5.92	.94
Post-induction	5.72	1.02	4.47	1.03
Negative Valence on Bad Events				
Pre-induction	1.30	.82	1.65	.80
Post-induction	1.47	.81	1.85	.94

In summary, although the suicidal history group initially exhibited significantly greater pre- to post-induction decrease in the positive valence ratings on good events than the non-suicidal group as predicted, the groups failed to differ after controlling for *generalised hopelessness*. In contrast, results of on negative valence ratings on bad events were consistent with the hypothesis as the suicidal history group showed a greater pre- to post-induction increase in the negative valence ratings on bad events compared to the non-suicidal group. Figure 6 illustrates the pre- and post-induction positive valence ratings on good events and negative valence ratings on bad events for the suicidal history group and non-suicidal group.

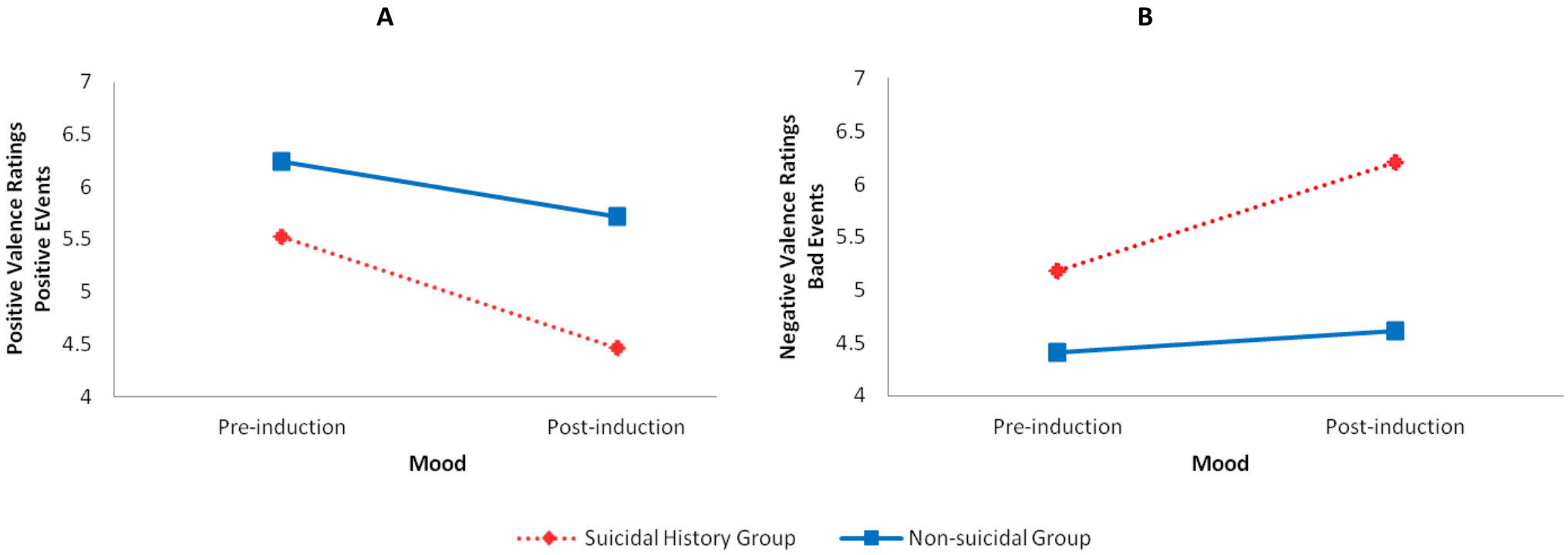
3. Exhibit a greater pre- to post-induction decrease in the likelihood ratings of good events and a greater pre- to post-induction increase in the likelihood ratings of bad events.

To test the hypothesis, the three-step analysis employed in hypotheses 1 and 2 was carried out. The ANOVA and ANCOVA variables match the ones used in hypothesis 1 and 2 with the exception of the within-subjects factor levels for *mood* as the current analyses requires pre- and post-induction *likelihood* ratings. The likelihood ratings were obtained by asking the participants how likely do they think their future expectations were to actually happen. The overall likelihood score of good/positive events were calculated by summing the individual likelihood ratings of all the good events divided by the number of good events generated. The overall likelihood score of bad/negative events, on the other hand, were calculated by summing the individual valence ratings of all the bad events divided by the total number of bad events generated.

Likelihood Ratings on Good Events

Results of independent t-tests confirmed that the suicidal history group in general had lower likelihood ratings on good events than the non-suicidal group on both pre-mood

Figure 6. Average Pre- and Post-Induction Positive Valence Ratings of Good Events (A) and Negative Valence Ratings of Bad Events (B) for the Suicidal History Group and Non-Suicidal Group



induction [mean (*SD*) = 5.01 (.94) & 6 (.67), respectively; *t*(81.01) = 5.91, *p* <.001; *d* = 1.19] and post-mood induction tasks [mean (*SD*) = 3.98 (.81) and 5.27 (1.16), respectively; *t*(97) = 6.60, *p* <.001; *d* = 1.35]. Levene's test indicated unequal variances on pre-mood induction t-test (*F* = 6.89, *p* = .010) so degrees of freedom were adjusted from 97 to 81.01. Summary of means and standard deviations are presented in Table 19.

As expected, *mood* x *group* interaction effect was found as the suicidal history group showed a significantly greater pre- to post-induction decrease in the likelihood ratings of good events [*F*(1, 97) = 5.42, *p* =.022, partial η^2 = .05]. The interaction effect remained significant after controlling for *generalised hopelessness* (BHS), *depression* (CDSS), and *suicidal thinking* (ISST). A significant main effect of *mood* was also found due to the particularly lower likelihood ratings of good events following the mood induction [*F*(1, 97) = 98.06, *p* <.001, partial η^2 = .50]. Similarly, a significant between-subjects main effect of *group* was found due to the considerably lower likelihood ratings in the suicidal history group compared to the non-suicidal group [*F*(1, 97) = 3.50, *p* <.001, partial η^2 = .34]. The results remained unaffected after the key clinical symptoms were controlled for.

Likelihood Ratings on Bad Events

Independent t-tests confirmed that the suicidal history group had higher likelihood ratings on bad events or negative future expectations than the non-suicidal group on both pre-mood induction [mean (*SD*) = 4.56 (1.20) & 3.36 (1.44), respectively; *t*(83.70) = 4.23, *p* <.001; *d* = .84] and post-mood induction tasks [mean (*SD*) = 5.48 (1.13) and 4.53 (1.40), respectively; *t*(97) = 3.65, *p* <.001; *d* = .75]. Levene's test indicated unequal variances on pre-mood induction t-test (*F* = 6.55, *p* = .012) so degrees of freedom were adjusted from 97 to 83.70. Table 19 displays summary of means and standard deviations.

The predicted *mood* x *group* interaction effect was found as the suicidal history group exhibited a significantly greater pre- to post-induction increase in the likelihood ratings of bad events compared to the non-suicidal group [$F(1, 97) = 4.00$, $p = .048$, partial $\eta^2 = .04$]. This finding held true after controlling for *generalised hopelessness* (BHS), *depression* (CDSS), and *suicidal thinking* (ISST).

A significant within-subjects main effect of *mood* was also found due to the substantially lower likelihood ratings of bad events following the sad mood induction procedure [$F(1, 97) = 94.78$, $p < .001$, partial $\eta^2 = .49$]. Likewise, a significant between-subjects main effect of *group* was found as caused by the higher likelihood ratings of bad events in the suicidal history group compared to the non-suicidal group [$F(1, 97) = 18.16$, $p < .001$, partial $\eta^2 = .16$]. This pattern of results held true after controlling for the key clinical symptoms.

Table 19. Means and Standard Deviations of the Pre- and Post- Mood Induction Likelihood Ratings on Positive and Negative Events

	Non-suicidal group (N = 50)		Suicidal history group (N = 49)	
Variable	*M*	*SD*	*M*	*SD*
Likelihood Ratings on Good Events				
Pre-induction	6.00	.67	5.01	.94
Post-induction	5.27	1.16	3.98	.81
Likelihood Ratings on Bad Events				
Pre-induction	3.36	1.44	4.56	1.20
Post-induction	4.53	1.40	5.48	1.13

In summary, the pattern of results were consistent with the hypothesis as the suicidal history group had a significantly greater pre- to post-induction decrease in the likelihood ratings of good events and a significantly greater pre- to post-induction increase in the likelihood ratings of bad events in comparison to the non-suicidal group. Figure 7 demonstrates the pre- and post-induction likelihood ratings for both good and bad events for the suicidal history group and the non-suicidal group.

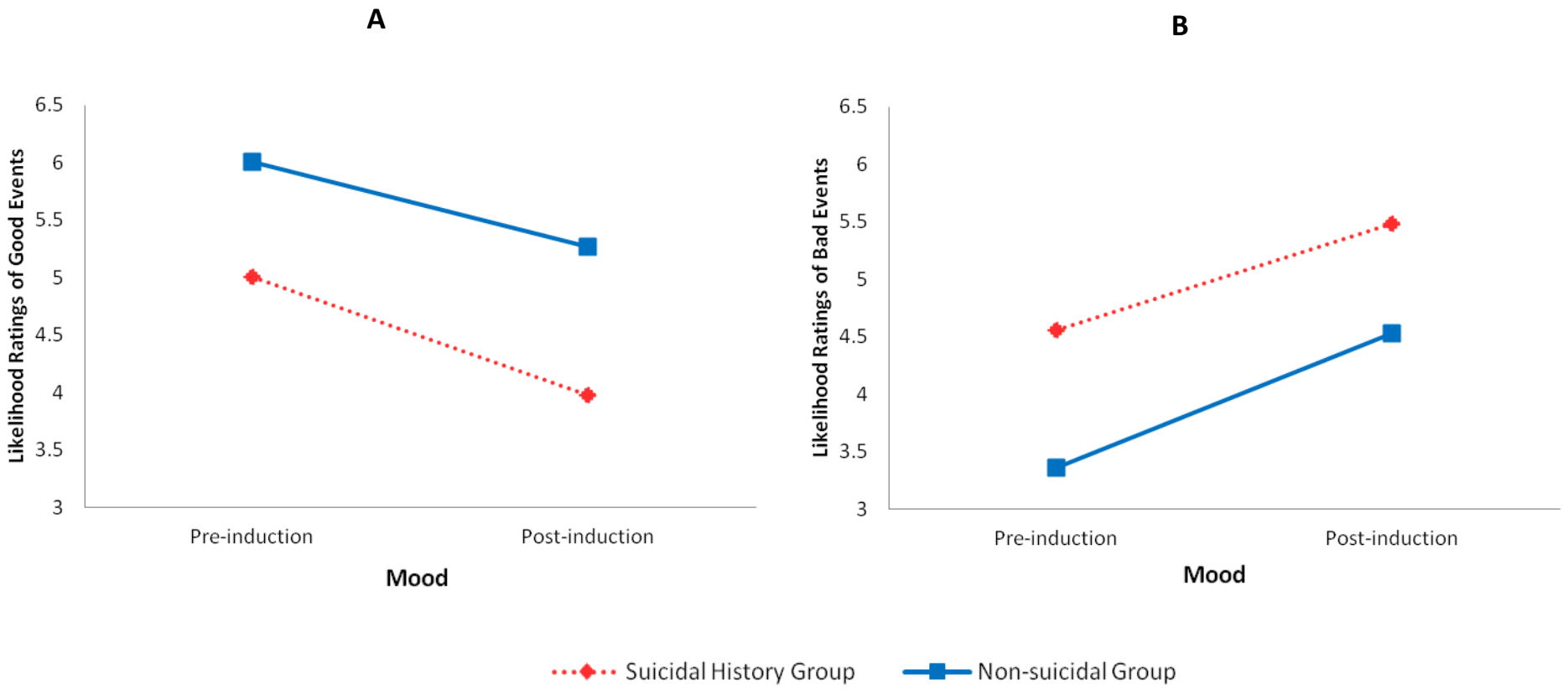
Effects of the Mood Challenge on Happiness and Despondence Ratings

In keeping with the assumption of the Differential Activation Hypothesis (DAH),

4. The suicidal history group will reveal a greater pre- to post-induction decrease in happiness ratings and a greater pre- to post-induction increase in despondence ratings.

In keeping with the three-step analysis conducted in the previous hypotheses, first, independent t-tests were conducted on the happiness and despondence ratings (as measured by the Visual Analogue Scale) to test if the means of each group differed on both testing time points (pre- & post-mood induction). Second, a mixed repeated measure ANOVA was carried out to examine the effect the sad MIP on the happiness and despondence ratings and to check if the effects of the sad MIP differed between groups. Third, an ANCOVA was conducted to check for any statistically relevant covariates that could possibly account for the significant interaction effect between the *mood* (dependent variable) and *group* (independent variable). Again, the variables for the ANOVA and ANCOVA analyses were kept identical to the variables in the previous analyses with the exception of within-subjects levels of *mood* as the current hypothesis examines the pre- and post-induction *mood ratings* (happiness & despondence).

Figure 7. Average Pre- and Post-Induction Likelihood Ratings of Good Events (A) and Likelihood Ratings of Bad Events (B) for the Suicidal History Group and Non-Suicidal Group



Happiness Ratings

Independent t-test on pre-mood induction happiness ratings confirmed no significant difference between the means of the suicidal history group (M = 5.34, SD = 2.09) and the non-suicidal group (M = 5.73, SD = 2.00), $t(97) = .96$, $p = .377$. In contrast, independent t-test on post-mood induction happiness ratings showed a significant difference as the suicidal history group (M = 4.09, SD = 1.71) in general scored lower than the non-suicidal group (M = 5.04, SD = 1.98), $t(97) = 2.42$, $p = .017$; $d = .48$). Summary of means and standard deviations are shown in Table 20.

In agreement with the hypothesis, there was a significant *mood* x *group* interaction effect due to the significantly greater pre- to post-induction decrease in happiness ratings in the suicidal history group compared to the non-suicidal group [$F(1, 97) = 4.38$, $p = .039$, partial $\eta^2 = .04$]. The same held true after controlling for *generalised hopelessness* (BHS), *depression* (CDSS), and *suicidal thinking* (ISST).

There was also a significant within-subjects main effect of *mood* due to the decrease in happiness ratings following the mood induction [$F(1, 97) = 44.25$, $p < .001$, partial $\eta^2 = .31$]. The main effect of *mood* remained significant after controlling for the key clinical symptoms. Interestingly, there was no significant between-subjects main effect on *group* [$F(1, 97) = 3.35$, $p = .070$] therefore, no further analyses were conducted although the p-value was only marginally over the conventional .05 significance level.

Despondence Ratings

Independent t-test on pre-mood induction momentary hopelessness ratings revealed no significant difference between the suicidal group (M = 3.29, SD = 2.32) and the non-suicidal group (M = 2.78, SD = 2.49), $t(97) = 1.19$, $p = .239$. In contrast, independent t-test on post-mood induction hopelessness ratings showed the suicidal group (M = 4.95, SD = 2.38)

scoring significantly higher than the non-suicidal group (M = 3.38, SD = 2.46), $t(97) = 3.01$, p = .003, d = .61). Table 20 displays summary of means and standard deviations for both happiness and despondence ratings.

Also consistent with the hypothesis, there was a significant *mood* x *group* interaction effect due to the significantly greater pre- to post-induction increase in despondence ratings in the suicidal history group compared to the non-suicidal group [$F(1, 97) = 4.90$, p =.029, partial η^2 = .05]. The interaction effect remained significant after controlling for *generalised hopelessness* (BHS), *depression* (CDSS), and *suicidal thinking* (ISST).

Table 20. Means and Standard Deviations of the Pre- and Post- Mood Induction Happiness and Despondence Ratings

	Non-suicidal group (N = 50)		Suicidal history group (N = 49)	
Variable	*M*	*SD*	*M*	*SD*
Happiness Ratings				
Pre-induction	5.73	2.00	5.34	2.09
Post-induction	5.04	1.98	4.09	1.71
Despondence Ratings				
Pre-induction	2.78	2.49	3.29	2.32
Post-induction	3.38	2.46	4.95	2.38

The ANOVA showed a significant within-subjects effect of *mood* due to the increase in despondence ratings following the mood induction [$F(1, 97) = 37.08$, p <.001, partial η^2 = .28]. There was also a between-subjects main effect of *group* as caused by the higher despondence ratings in the suicidal history group in comparison to the non-suicidal group

[$F(1, 97) = 4.90$, $p = .029$, partial $\eta^2 = .05$]. The main effects of *mood* and *group* remained unaffected after controlling for the key clinical symptoms.

In summary, overall results were in agreement with the hypothesis as the suicidal history group exhibited a significantly greater pre- to post-induction decrease in happiness ratings and a significantly greater pre- to post-induction increase in despondence ratings in comparison to the non-suicidal group. Figure 8 illustrates the fluctuation of momentary happiness and despondence for the suicidal history group and the non-suicidal group.

The Validity of LEIDS as a Measure of Cognitive Reactivity to Hopelessness

Prior to the mood challenge, measurements of cognitive reactivity to hopelessness using the LEIDS' hopelessness subscale were taken. Measured CR to hopelessness will be tested using the DAH framework. In line with the DAH,

5. The suicidal history group will exhibit greater CR to hopelessness, as measured by the LEIDS, compared to the non-suicidal group.

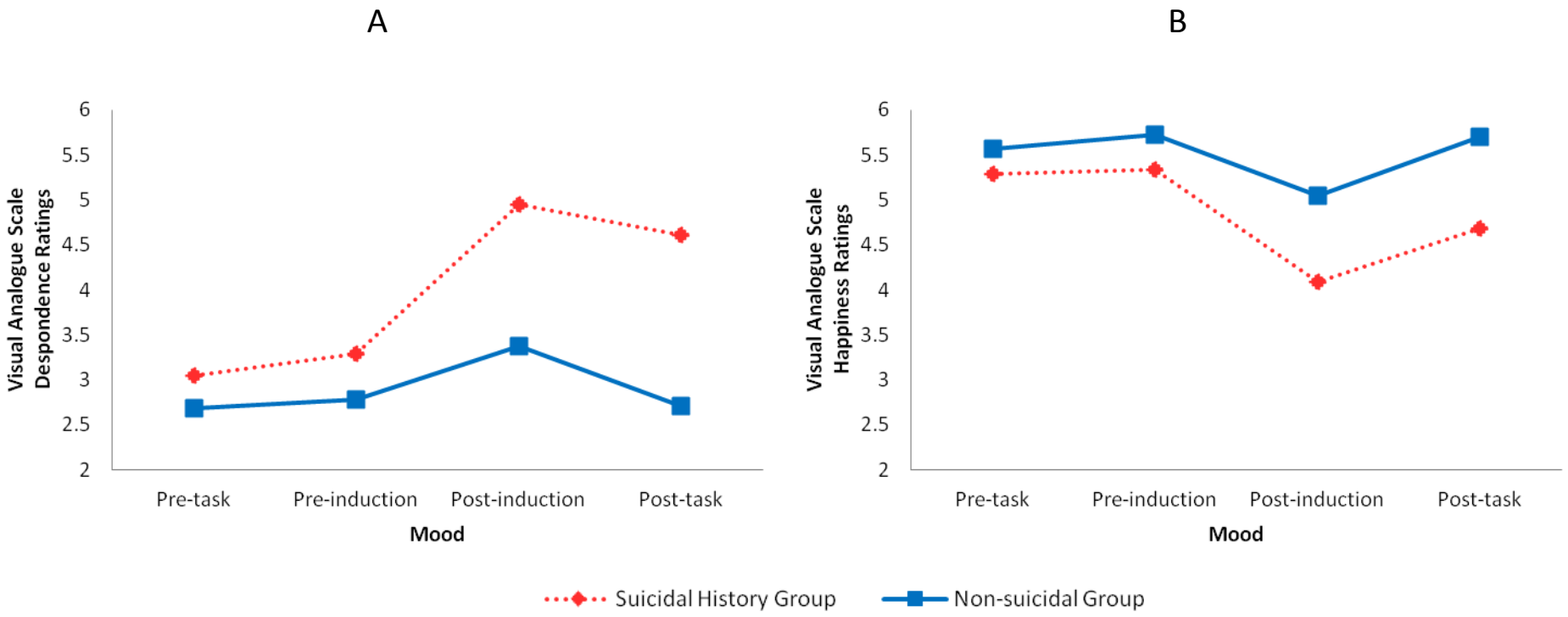
As predicted, the suicidal history group ($M = 12.67$, $SD = 5.20$) showed significantly higher cognitive reactivity to hopelessness as measured by the hopelessness subscale of the Leiden Index of Depression Scale – revised version (LEIDS) than the non-suicidal group ($M = 6.40$, $SD = 4.32$), $t(97) = 6.21$, $p < .001$, $d = 1.31$).

The DAH suggests that the occurrence of low mood will trigger hopelessness. As a behavioural feature of hopelessness,

6. The decline in fluency for positive events following the mood challenge will be associated with greater levels of cognitive reactivity to hopelessness as measured by the LEIDS.

To test this hypothesis, first, an overall positive future fluency *difference score* was calculated by subtracting the pre-induction number of positive events from the post-induction

Figure 8. Average VAS Despondence (A) and Happiness (B) Ratings on Pre-Task, Pre-Induction, Post-Induction, and Post-Task Mood States in the Suicidal History Group and Non-Suicidal Group



number of positive events. Second, a bivariate correlation was carried out on the overall *difference score* of positive future fluency and scores from the LEIDS' hopelessness subscale.

Contrary to the hypothesis, there was no significant correlation between the *difference score* of positive future fluency and scores on LEIDS' hopelessness subscale (r = .01, N = 99, p = .936). In other words, the pre- to post-induction change in fluency for positive events was not associated with the level of cognitive reactivity as measured by the LEIDS' hopelessness subscale.

5.4. Discussion

The main aim of this study was to investigate the application of the DAH framework in understanding the suicidal thinking process of FEP individuals with or without a lifetime history of suicidal attempts or DSH. Specifically, the intent was to examine if the future fluency of those with a history of suicidal behaviour was influenced by the subtle changes in mood as caused by the sad MIP. A number of previous studies have indicated that the lack of positive future fluency is strongly associated with hopelessness, which is a key risk factor for suicidal behaviour (MacLeod & Byrne, 1996; MacLeod, *et al.*, 1997, Hunter & O'Connor, 2003; Hepburn *et al.*, 2006). The design of this study was based from the previous mood priming study on future fluency conducted by Hepburn and her colleagues in 2006.

In agreement with the key hypothesis of this study, the shift in mood as caused by the sad MIP significantly reduced the positive future fluency or the individual's ability to generate examples of positive/good future events, with a particularly more pronounced effect in the suicidal history group than the non-suicidal group. In contrast, although the shift in mood increased the negative future fluency or the ability to generate examples of negative/bad future events of the entire sample following the sad MIP, the degree of pre- to post-induction

change did not significantly differ between groups as expected. This pattern of results was consistent with the data from Hepburn *et al.*'s (2006) study, which indicated a reduced positive future fluency and an unchanged negative future fluency following the sad MIP in a sample of non-depressed participants. Such a pattern of results was also found in a number of studies that examined future fluency as a behavioural feature of hopelessness in individuals who were suicidal and depressed (MacLeod *et al*., 1993; MacLeod, Tata, Kentish, & Jacobsen, 1997; MacLeod, Pankhania, Lee, & Mitchell, 1997; MacLeod & Salaminiou, 2001; Conaghan & Davidson, 2002; Hunter & O'Connor, 2003). According to MacLeod and his colleagues (2005), the lack of pre- to post-induction change in the number of negative events may be attributed to the ceiling effect on the affective impact of the bad events in general. Due to the limited affective impact of the individual *positive events*, the intensity of its collective impact largely relies on its quantity. Unlike the positive events, the affective impact of the individual *negative events* is more intense and thus, requiring less to achieve its maximum possible effect or "impact threshold". In line with this idea from MacLeod *et al.* (2005), it is possible that the generation of negative future events did not vary between the suicidal history group and the non-suicidal group across the mood conditions (pre- & post-induction) simply because the "impact threshold" of the negative events has already been reached prior to the mood challenge. It is also possible that the pre- and post-induction number of negative events did not differ due to the aversive nature of the events overall. Aversive events are likely to be perceived as more negative in terms of its *affective* impact. In order to further explore this possibility, a thorough examination of the score sheets for the negative future thinking task (pre- and post-sad MIP) was carried out. Based on careful observation, issues about mental health emerged as the predominant theme of the negative future events generated before and after the mood induction. Issues surrounding mental health

mainly included relapsing (*e.g.* being sectioned & hospitalisation), medication (*e.g.* 'being on it' & 'not being able to get off it'), worsening of other related symptoms (e.g. 'becoming more depressed, anxious, paranoid, or afraid' & 'voices getting worse'), not recovering from their mental illness (*e.g.* 'being stuck', 'being the same', & 'being just as I am now'), isolation (e.g. 'losing contact with friends' & 'not having any friends'), and having the stigma (*e.g.* 'being seen as different', or 'not being normal'). Jackson and colleagues (2004) have indicated that hospitalisation and treatment experiences during the initial episode of psychosis were predictive of post-traumatic stress. It is possible that due to the aversive nature of these negative events, the extent to which individuals can tolerate the emotional impact of these events was already at its maximum prior to the mood challenge. It is also possible that the groups did not differ in their fluency for negative events simply because they both shared comparable worries and fears regarding their future mental health.

On the other hand, a number of studies have suggested that the impaired fluency for positive events in the suicidal and depressed individuals were mainly due to the elevated feelings of hopelessness (MacLeod *et al*., 1993; MacLeod, Tata, *et al*., 1997; MacLeod, Pankhania, *et al*., 1997; Sidley *et al.*, 1999; Hepburn, *et al*., 2006). Recalling the assumptions of the DAH, low mood is believed to be linked together with feelings of hopelessness through repeated episodes of depression. The stronger the link, the easier it becomes for low mood to reactivate these feelings of hopelessness. While previous studies have already established the link between the lack of positive future fluency and hopelessness in suicidal and depressed individuals, the present study indicates that the fluency-hopelessness link is also evident in FEP individuals with histories of suicidal attempts and DSH. The evidence of such a link supports the assumptions of the DAH, which suggests that once hopelessness is already embedded within the network of negative thinking process, even a slight dampening in mood

can impair the individual's fluency for future events. More importantly, further analyses showed that this observed impairment in fluency for positive events following the sad MIP was not merely a marker of current generalised hopelessness (BHS), depression (CDSS), and suicidal thinking (ISST). However, the fact that life circumstances following the initial psychotic episode can be very traumatic for many individuals (Harrison & Fowler, 2004; Jackson & Iqbal, 2000; Jackson, Trower, Reid *et al.* 2009; Riedesser, 2004; Tarrier *et al*., 2007), there remains a possibility that these particularly distressing contextual factors moderated the effect of the mood challenge on positive future fluency in this particular sample. It is reasonable to speculate that individuals who are in distress are less likely to have a positive view of their future. In a study conducted by O'Connor and Cassidy (2007), they found that distress was strongly linked with reduced fluency for positive events in high-stress optimists and low-stress pessimists.

Contrary to the hypothesis, the suicidal history group and the non-suicidal group did not differ on the positive valence ratings of good events following the mood challenge. Although the initial analysis indicated that the suicidal history group showed significantly lower positive valence ratings of good events following the mood induction compared to the non-suicidal group, controlling for generalised hopelessness reduced the initial finding to non-significance. Intriguingly, controlling for generalised hopelessness also caused the overall positive valence ratings of good events before and after the mood induction (within-subjects main effect) not to differ. However, the positive valence ratings remained different between the two groups (between-subjects main effect). This pattern of results seemed to suggest that the perceived valence of future good events was not sensitive enough to the subtle changes in transitory mood. According to the Hopelessness theory (Abramson, Metalsky, & Alloy, 1989), generalised hopelessness is sustained by a faulty thinking processes (i.e. magnification

& overgeneralization), which in this case has possibly caused the perceived valence appraisal of good events to operate in an entirely systemic and stable mode as opposed to reactive. It is worthy to note, however, that despite the lack of difference in the post-induction positive valence ratings of good events between groups, the suicidal history group exhibited lower positive valence ratings than the non-suicidal group. Consistent with the hypothesis, the suicidal history group had considerably higher negative valence ratings of bad (or negative) events following the sad MIP. Despite the lack of change in the number of bad events following the mood induction, this finding seemed to suggest that the transitory shift in mood caused the participants to perceive negative events as more unpleasant. In keeping with the assumptions of the DAH, the subtle dampening in mood triggered a hopeless thinking style, which in this case was a more negative perception of the affective impact of bad events. Overall, this finding is consistent with the "impact threshold" that was discussed earlier. In the initial speculation it was suggested that the number of post-induction bad events did not differ due to the possibility that the perceived affective impact of bad events was already at its maximum prior to the mood induction. The observed increase in the perceived negative valence of bad events, however, suggest otherwise. This finding seems to suggest that the "impact threshold" was only facilitated by the shift in transitory mood, which occurred as an effect of the mood induction. The increase in the perceived negative valence of bad events following the mood induction enhanced the perceived *affective impact* of the bad events *collectively*, which justifies the lack of difference in the pre- and post-induction number of bad events. In other words, the number of bad events generated across mood states (pre- & post-induction) did not differ simply because the overall affective impact of bad events, albeit the quantity was unchanged, was perceived to be a lot more unpleasant.

As predicted, the suicidal history group had significantly lower likelihood ratings for good events and higher likelihood ratings for bad events. This pattern of results was consistent with the findings of previous studies that examined the link between the depressed mood and future thinking in non-psychosis sample, which indicated that a depressed mood was associated with lower likelihood of good/positive events (MacLeod & Cropley, 1995) and higher likelihood of bad/negative events (Andersen, Spielman, & Bargh, 1992; MacLeod *et al*., 1997). Similarly, a study on the previously suicidal but non-psychosis sample indicated that lower likelihood ratings were significantly associated with generalised hopelessness as measured by the BHS (MacLeod *et al.*, 2005). One of the possible explanations for this mood-linked perception of likelihood was explained in Tversky and Kahneman's (1974) study on heuristics and biases when judging the likelihood of uncertain events. According to Tversky and Kahneman (1974), the likelihood of an uncertain event occurring is determined by the perceived *ease* with which an individual can remember occurrences of similar events, a judgemental heuristic that is also referred to as "availability". If such *ease* of recollection is facilitated by the mood congruence effect (Bower, 1981), it is therefore logical that the suicidal history group, as being more vulnerable to the effect of the mood challenge, remembered more events whose emotional content matches the sad emotional state that they were in. In other words, individuals who are in a negative or sad mood will tend to rate the likelihood of a good event as less likely simply because it is harder for them to recall occurrences of similar events whose emotional content is in conflict with their current mood. It is for this exact reason why the likelihood of bad events was greater in the suicidal history group. Due to the negative shift in mood following the mood challenge, bad events were seen as more likely simply because it was easier for the individuals to recall occurrences of similar events whose emotional content matches their negative or sad mood state.

As also hypothesised, following the mood challenge, the suicidal history group exhibited lower levels of happiness ratings and higher levels of despondence ratings as measured by the Visual Analogue Scale than the non-suicidal group. This pattern of results were consistent with that of the mood priming study conducted by Hepburn and her colleagues (2006), who found that the sad mood induction procedure was an effective method to alter levels of happiness and despondence in a sample of non-depressed volunteers. Interestingly, the suicidal history group and the non-suicidal group did not differ on their levels of happiness and despondence prior to the mood challenge. The similarity in the groups' pre-induction mood ratings suggests that there were no pre-existing group differences that could have biased the data in favour of the suicidal history group (e.g. as being more despondent and less happy than the non-suicidal group). As the DAH focuses on the individual's *cognitive vulnerability* to hopelessness, it was crucial that the results of independent t-tests have established that the greater degree of change in pre- to post-induction mood ratings in the suicidal-history group was not simply due to the pre-existing *vulnerability* to hopeless thinking during the pre-induction stage. Due to this, it was easier to determine that the degree of change in the pre- to post-induction future fluency was mainly due to the individual's cognitive reactivity to hopelessness when in a sad mood and *not* simply due to the worsening of a pre-existing vulnerability or mood state.

This pattern of data suggests that although the suicidal history group had significantly higher levels of *generalised hopelessness* than the non-suicidal group on the whole, the suicidal history group's *momentary feelings of despondence* were more differentially active. This finding is in keeping with the results of the ESM study in chapter 3, which revealed that compared to the non-suicidal group, the suicidal history group had a greater fluctuation of momentary hopelessness in response to the shifts in transitory mood (decrease of positive

affectivity & increase of negative affectivity) caused by the relatively stressful minor events in everyday life.

As expected, the suicidal history group exhibited higher cognitive reactivity to hopelessness as measured by the hopelessness subscale of the Leiden Index of Depression Scale – revised version (LEIDS). Intriguingly, however, the CR to hopelessness as measured by LEIDS' hopelessness subscale did not correlate with the pre- to post-induction change in positive future fluency. The lack of association between CR to hopelessness and change in positive future fluency in the non-suicidal group, whose number of positive events was also significantly altered following the mood challenge, is not particularly easy to explain. It is possible that the lack of association was due to the fact that experimentally induced changes fluency for positive events did not accurately represent suicidal vulnerability in real-life situations thus, not showing a detectable link with CR to hopelessness as measured by the LEIDS' hopelessness subscale. It is also possible that the hopelessness subscale of the LEIDS was simply not able to effectively capture the key elements that embody cognitive vulnerability to hopelessness in this particular sample.

In summary, the results of this study indicate that overall, the suicidal history group had significantly fewer positive events to look forward to than the non-suicidal group, which is in agreement with previous studies. More importantly, the data from the present study also suggest that the change in positive future fluency in the suicidal history group is a marker of greater sensitivity to the subtle changes in mood following the mood challenge, which confirms the assumption of the Differential Activation Hypothesis (DAH). As expected, the mood challenge did not alter the negative future fluency in both groups, which was also illustrated in the findings of a similar mood priming study (Hepburn *et al.*, 2006). Whereas the suicidal history group failed to exhibit less positive valence of good events, the group

exhibited greater negative valence of bad events as predicted. However, results on the likelihood ratings showed a more consistent pattern of results with previous studies as the suicidal history group illustrated lower likelihood ratings for good events and higher likelihood ratings for bad events.

In keeping with the DAH, the suicidal history group exhibited notably reduced momentary feelings of happiness and substantially elevated momentary feelings of despondence in response to the sad mood induction procedure. Results on the use of the LEIDS' hopelessness subscale as a measure of cognitive vulnerability to hopelessness produced a mixed pattern of results. As hypothesised, the suicidal history group had significantly higher levels of CR to hopelessness than the non-suicidal group. The CR to hopelessness as measured by LEIDS' hopelessness subscale, however, did not correlate with the pre- to post-induction change in positive future fluency as expected.

All in all, the results of this study extend the relevance of the DAH of suicidal relapse from being a model of suicidal relapse in a previously depressed sample to a potentially workable model of suicidal vulnerability in a sample whose diagnosis is psychosis. It also adds an important contribution to the literature by illustrating the DAH as a valid cognitive model of suicidal vulnerability in psychosis that can be tested via a concrete behavioural marker (*e.g.* future fluency).

5.4.1. Strengths and limitations

The results of the present study are subject to a number of limitations. The fact that the FT and the MEPS tasks were both conducted in one single testing session, it means that the present study shares the same methodological limitations that were discussed in great detail in the MEPS study (chapter 5). Whereas the absence of a neutral or a happy mood induction did

not have an unfavourable effect in the results of the present study, understanding the link between hopelessness and different mood states might be of significant value for future clinical work. The lack of difference between groups on the positive valence ratings of good events was also not in agreement with the previous similar study (Hepburn *et al*., 2006). Finally, given that mood challenge was intended to induce subtle changes in mood, the results of this study must be interpreted with caution. Although the ESM study (chapter 3) suggests that the DAH is ecologically valid and the results of the present study are consistent with ESM data, a follow-up study will provide a valuable confirmation if the observed suicidal vulnerability as measured by the lack of fluency for positive events following the mood induction will predict a future suicidal behaviour in real life. Where there are a number of limitations, there are also a number of strengths to this study. To the best of the author's knowledge, this is the first study to have examined the suicidal thinking process in psychosis using the mood priming technique. The sample size of the study is also seen as one its strengths. Compared to the previous studies (*e.g.* Hepburn *et al*., 2006 where $N = 52$ non-depressed volunteers; Williams *et al*., 2007 where $N = 32$ volunteers with & without histories of depression), the sample of 99 is relatively large, especially given a clinical group that is often not easy to engage, let alone recruit for a study that can be potentially upsetting or emotionally challenging. Also, the culturally diverse population of Birmingham made it possible for this study to obtain a sample with a good mix of ethnicity and social backgrounds (*i.e.* religion & family structures) underlining the generalizability of the findings.

Given that both problem solving impairment (as measured by the MEPS task) and reduced fluency for positive events (as measured by the FT task) are considered as behavioural outcomes closely linked with hopelessness, the clinical implications of the present study are therefore very much comparable to the study in the chapter 4 (MEPS

study). It remains the case that the management of suicidal behaviour in young people with psychosis is difficult and challenging for many clinicians. The results of this study, offer a potentially effective way to explore the mechanism of suicidal relapse in psychosis. Specifically, by employing the mood priming technique and the FT task to illustrate the differences between the suicidal history group and the non-suicidal group, the present study was able to demonstrate two important things: (1) that mood challenge is a safe and effective mood priming technique even for a sample of individuals with psychosis and histories of suicidal behaviour, and (2) that positive future fluency as a behavioural marker of hopelessness may be of potentially useful value for future studies on suicidal behaviour in early psychosis.

CHAPTER 6

General Discussion

6.0. Introduction

The overarching aim of this thesis is to investigate the mechanism of suicidal thinking in early psychosis when the suicide rate is at its highest. The core objective is to examine if the recurrence of suicidal or hopeless thoughts over time can be understood within the framework of the DAH of suicidal relapse (Lau *et al*., 2004). In order to achieve this, this thesis employed two contrasting methodologies: (1) the ecological approach of the ESM, and (2) the experimental approach of the sad mood induction procedure. The overall results from this thesis support the DAH of suicidal relapse (Lau et al., 2004), and provide recommendations for the application of the DAH framework in order to further explore suicidal thinking in early psychosis.

6.1. Summary of findings

In the initial chapter it was noted that there was a lack of theoretical model to explain suicidal behaviour in general psychotic disorders, especially in FEP when the risks of suicide are greater (Brown, 1997; Harris & Barraclough, 1997; Palmer *et al*., 2005). Despite the enormous amount of information about the risk factors of suicidal behaviour in early psychosis, there is a limited amount of information about the underlying mechanisms of the suicidal thinking process in this clinical group. In order to address this gap, the framework of the DAH of suicidal relapse (Lau et al., 2004) was employed. The central idea of this hypothesis suggests that once suicidal or hopeless thoughts are featured in an earlier

depressive episode, these hopeless thoughts form a link with the depressed mood, along with the network of maladaptive cognition. Repeated depressive episodes strengthen this link such that subsequent occurrences of depressed mood will trigger these hopeless/suicidal thoughts. To empirically test the *differential activation* process, two contrasting methodologies were employed. In chapter 3, the ESM (de Vries, 1992) was conducted in order to capture the *differential activation* of hopeless or suicidal thoughts in the context of the individual's everyday life. The ESM is a systematic diary keeping method, which requires individuals to fill in a self-report questionnaire at predetermined times of the day within his/her real-life environment (de Vries, 1992). The key advantage of the ESM is that it measures key variables of interest in real-life contexts as they occur. Overall, the findings of the ESM study were largely in line with the hypotheses. In comparison to the non-suicidal group, the suicidal history group exhibited higher levels of *momentary hopelessness* in everyday life as expected. The suicidal group also exhibited greater *momentary hopelessness* linked to negative affectivity (NA) and reduced hopelessness linked to positive affectivity (PA), compared to the non-suicidal group. When confronted with unpleasant events, the suicidal group had a greater increase in *momentary hopelessness* and NA, and a greater decrease in PA, compared to the non-suicidal group. However, when confronted with challenging activities, the suicidal history group exhibited greater NA than the non-suicidal group. However, the groups did not differ in their *momentary hopelessness* and PA when faced with difficult activities. In the discussion it was noted that there were a lack of structured activities in this group on a day to day basis, and the main events of their typical weekly routines were face to face conversations, telephone calls, or visits by family members or friends, which may explain why event-related stress had more meaningful interactions with affectivity and *momentary hopelessness*.

As expected, measures of *cognitive reactivity to hopelessness* were found to be higher in the suicidal history group than the non-suicidal group. *Cognitive reactivity to hopelessness* was measured using the hopelessness subscale of the Leiden Index of Depression Scale – revised version (Van der Does & Williams, 2003). Consistent with the hypothesis, higher *CR to hopelessness* as measured by the LEIDS' hopelessness subscale was found to be predictive of the individual's susceptibility to *momentary hopelessness* when affectivity is negative. Similarly, higher *CR to hopelessness* as measured by the LEIDS was also found to be predictive of the individual's propensity to *momentary hopelessness* when faced with unpleasant events. However, *CR to hopelessness* as measured by the LEIDS did not predict *momentary hopelessness* when faced with stressful activities. Overall, the pattern of results suggests that *momentary hopelessness* is more strongly linked with NA than PA, which is consistent with the assumption of the DAH for suicidal relapse.

In chapters 4 and 5, the sad mood induction procedure was conducted in order to test the *differential activation* of hopeless or suicidal thoughts by inducing individuals to certain feelings of sadness, prior to being re-tested using the same sets of behavioural tasks from baseline (prior to the mood challenge). The first task was the Means-Ends Problem Solving task (MEPS; Platt & Spivack, 1975). The MEPS task is a verbal task, which was devised to measure interpersonal problem solving ability. Previous studies have shown that an impaired problem solving ability is a behavioural feature of hopelessness (Pollock & Williams, 2001; Sadowsky & Kelly, 1993; Schotte & Clum, 1982). The purpose of the mood challenge was to test if the change in mood will alter the interpersonal problem ability as suggested by the DAH framework. The results of the study were consistent with this hypothesis as the suicidal history group exhibited a more impaired problem solving performance following the mood challenge. Further, compared to the non-suicidal group, the suicidal history group also

exhibited higher levels of despondence and lower levels of happiness as measured by the Visual Analogue Scale (McCormick, Horne, & Sheather, 1988) following the sad mood induction. However, contrary to the hypothesis, individuals' *CR to hopelessness* as measured by the LEIDS' hopelessness subscale was not correlated with the pre- to post-induction change in problem solving ability. Overall, the pattern of data from this problem solving study replicated the results of the ESM, which indicated that negative affectivity reactivates hopeless thoughts. Intriguingly however, the lack of association between vulnerability to hopelessness (or the pre- to post-induction change in problem solving ability) and *CR to hopelessness* (as measured by the LEIDS' hopelessness subscale) is in conflict with the apparent link between the LEIDS and *momentary hopelessness* when affectivity is negative.

Following the MEPS task, the Future Thinking (FT; MacLeod et al., 1993) task was conducted. The FT task is also a verbal task, which was devised to measure fluency for future expectations (also referred to as future events). Previous studies have illustrated that the lack of fluency for positive events is also a behavioural feature of hopelessness (MacLeod et al., 1993). As predicted, the suicidal history group had significantly fewer numbers of positive events to look forward to than the non-suicidal group, which is in agreement with the findings of previous studies. More importantly, the data from the present study also indicated that the subtle downward shift in mood significantly reduced the positive future fluency in the suicidal history group, which confirms the assumption of the DAH of suicidal relapse. As expected, the downward shift in mood did not alter the negative future fluency in both groups, which was also illustrated in the findings of a similar mood priming study (Hepburn *et al.*, 2006). Whereas the suicidal history group failed to exhibit less positive valence ratings for good events, the suicidal history group exhibited greater negative valence ratings for negative events as predicted. On the other hand, the data on the likelihood ratings showed a more

consistent pattern of results with previous studies as the suicidal history group illustrated lower likelihood ratings for positive events and higher likelihood ratings for negative events (Andersen et al., 1992; MacLeod et al., 1997; MacLeod & Cropley, 1995). Overall, the pattern of data from this future thinking study was in keeping with the results of the problem solving and ESM study, which indicated that the mechanism of suicidal/hopeless thoughts is mood-dependent.

In summary, the results from the mood priming and ESM studies have both confirmed that previously suicidal individuals are more "differentially active" to suicidal or hopeless thoughts when in a low or negative mood, compared to the non-suicidal individuals. However, whereas the *CR to hopelessness* as measured by the LEIDS' hopelessness subscale predicted vulnerability to *momentary hopelessness* when affectivity is negative in everyday life, the vulnerability to hopelessness as measured by the MEPS and FT tasks did not correlate with the *CR to hopelessness* as measured by the LEIDS. The reason for this remains unclear and only further research will help establish the validity and reliability of the LEIDS' hopelessness subscale as a measure of *CR to hopelessness*.

6.2. Limitations

The studies reported in this thesis are the first to have taken both the experimental and ecological approach, to investigate the suicidal thinking process in FEP using the DAH of suicidal relapse framework. For this reason, these studies only represent the starting point for further investigation of the suicidal thinking mechanism in psychosis. Specifically, there are three areas they could extend. First, future research could employ a follow-up study in order to examine if the observed vulnerability to hopeless or suicidal thoughts (as measured from either the ESM, or behavioural problem solving & future fluency tasks) will be predictive of

subsequent suicidal behaviours in real life. The studies conducted in this thesis were a combination of cross-sectional (chapter 4 & 5) and longitudinal (chapter 3) methods, and the inclusion of a follow-up was simply not feasible due to time constraints.

Second, future research could investigate the suicidal thinking process in other psychosis populations. The studies in this thesis were restricted to FEP individuals only. Due to the particularly high incidence of suicidal behaviour during this early stage of the illness, the results may not be transferrable to individuals who are at a much later stage of the psychotic illness.

Third, future research could explicitly investigate suicidal relapse via the ESM by adding items that are specifically formulated to measure the severity of suicidal ideation and intent. The questionnaire employed in the ESM study in this thesis was only limited to assessing hopeless thoughts and feelings. The addition of items that specifically measures the severity of suicidal thinking and intent could help uncover the extent of the relationship between mood and hopelessness, and the contextual factors that can potentially trigger suicidal relapse in everyday life.

6.3. Observations from the Research: Recommendations for future studies on suicidality in psychosis

In this thesis it has been suggested that the interaction between the individual and his/her natural context is crucial in understanding the underlying mechanism of suicidal thinking. One of the important issues that arose from employing the ESM was that a number of participants found the diary keeping task inconvenient and slightly irritating. The 6-day duration of the ESM study and the daily frequency of sampling (total = 10) were perceived to be quite intrusive and challenging. In the debriefing, when participants were asked if they

would take part again in a similar study, only a few were keen to do it. As noted in chapter 3, the monetary incentive seemed to be the main motivation for taking part in the study. As much as monetary incentives helped in the recruitment, there was no guarantee whether the task was completed to the best standard possible, or simply to a standard that was acceptable enough to earn the incentive. This speculation was mainly based on the fact the average number of valid ESM reports per participant (59%) was slightly lower than the reported compliance rate in other ESM studies of psychosis (66%; Oorschot *et al*., 2009). However, there was also a possibility that due to the distressing and traumatic experiences following the initial episode of psychosis (Harrison & Fowler, 2004; Jackson & Iqbal, 2000; Jackson et al. 2009; Riedesser, 2004; Tan et al., 2012; Tarrier *et al*., 2007), the participants were less able to cope with a demanding task such as the ESM.

Having taken all of the methodological issues of the ESM into consideration, it is possible that these issues will present potential ethical and practical difficulties for future research. However, there are ways to minimise the difficulty of the ESM in this particular group. First, the number of questions in the ESM diary could be simplified by focusing solely on the mood, hopelessness, and contexts (*i.e.* people, places, & activities/events). A questionnaire that is more straightforward and quicker to complete might reduce the "burden" of doing it more frequently. Second, the use of electronic devices (*i.e.* PDA's or smart phones) could offer a more efficient way of filling in the ESM questionnaires. The option to customise the sampling signals or prompts, from the irritating beeping sound of a digital wristwatch to a more discrete mode in PDA's, might present a more attractive diary keeping method to the participant. Although previous electronic ESM studies have indicated that some of the participants found the use of handheld devices slightly difficult (Kimhy et al., 2006), the compliance rate was increased and overall feedback was positive (Graholm et al., 2008).

Finally, the irritation from frequent sampling could also be minimised by decreasing the sampling frequency per day (*e.g.* 6 samplings per day instead of 10) and increasing the duration of the ESM study (*e.g.* 10 days instead of 6). By doing this, equal number of ESM reports (60) are generated at a less intense sampling rate, albeit over a longer period of time.

On the other hand, the only issue that arose from the mood priming studies was the risk of residual feelings of unhappiness at the end of the testing session. Although it was noted that only 3 of the 99 individuals who undertook the sad mood induction procedure (chapter 4) reported some residual feelings of sadness at the end of the testing session, it is possible that this could present a more serious issue in future research. This issue is particularly crucial if the study involves individuals who are at higher suicidal risk (*i.e.* previous attempters or self-harmers). Whereas it is difficult to predict the impact of the mood challenge on an individual level, there are ways to minimise the risks of residual effects from escalating into feelings of hopelessness. First, a happy mood induction could be offered to counteract the effects of the sad mood induction procedure. Teasdale, Taylor, and Fogarty (1980) have demonstrated the effectiveness of such procedure in inducing feelings of elation to facilitate retrieval of happy memories. Second, frequent monitoring could be coordinated with the participant's care team. Third, as a responsible researcher, a leaflet with information about agencies/organisations that could be contacted during out of working hours should be given to the participants at the end of the session.

6.4. Clinical Implications

Results of the mood priming studies suggesting a link between an induced sad mood and hopelessness is consistent with the pattern of data from the ESM study. The confirmation of such link between the natural fluctuation of mood in everyday life and hopeless thoughts

conveys implications that are crucial to understanding the suicidal thinking process in FEP. More specifically, it supports the assumptions of the DAH of suicidal relapse, which suggests that the mechanism of hopeless/suicidal thinking is mood-dependent. From a clinical point of view, the results of this study present potentially valuable inputs that will help manage and prevent suicidal relapse in FEP more effectively. First, the application of the DAH for suicidal relapse as a framework of suicidality in psychosis could provide clinicians a better understanding of the suicidal thinking process, and a better insight for a more effective risk assessment. Unlike the traditional suicidal risk assessment which mainly relies on historical information (distal) and/or the immediate (proximal) risk factors, recognition of the interaction between the distal and proximal risk factors as suggested by the DAH framework could help establish a more effective way to assess suicidal vulnerability. Second, the appraised "reactivity" to *momentary hopelessness* linked to changes in negative affectivity in everyday life suggests that low-level hopelessness remains even though the individuals with a history of suicidal behaviour were not "currently" suicidal. The absence of suicidal attempts despite the activation of suicidal ideation supports the idea that attenuated hopelessness persists on a day to day basis for those with histories of suicidal behaviour and this may be speculated that if this was a target for intervention, this might act to interrupt the mood-hopeless-suicidal attempt cycle. In view of this, the use of the ESM as a tool for assessing the individual's vulnerability to hopeless thoughts in everyday life could potentially offer a more effective form of risk assessment. As the ESM was devised to sample data from the individual's natural environment, the data from the ESM could present a better understanding of how hopelessness reacts to the natural fluctuations of mood in real life. For this reason, the ESM could also function as an alternative measure of cognitive reactivity to hopelessness in everyday life. Third, the ability of the ESM data to provide real life contexts (*e.g.* people,

places, activities, & events) to the interaction between mood and hopelessness could also provide a better insight on the role of contextual factors in suicidal thinking. Further, identification of good and problematic contexts could be a useful input in the development of new interventions for suicidality. More importantly, the ESM could also be a valuable tool for both the clinician and the individual by: (1) providing clinicians a way to assess the efficacy of the interventions for suicidality, and (2) educating the individual to be more mindful of his/her mood along with the context that he/she is in. Fourth, the impairment of problem solving following a downward shift in mood suggests that the development of problem solving abilities could be an important focus of interventions for suicidality. The development of problem solving ability could facilitate a better coping mechanism and enhance the self-esteem/confidence of the individual. A study on resilience to suicidality has indicated that positive attributional style was one of the psychological factors that act as a "buffer" to suicidality (Johnson, Wood, Gooding, & Tarrier, 2011). Finally, the decrease in fluency for positive events following the sad mood induction suggests that the development of goal specificity could be another important focus on interventions for suicidality. A study on the effect of Mindfulness-Based Cognitive Therapy on the specificity of goals in a sample of previously suicidal individuals with chronic depression has indicated that being mindful facilitated identification of more specific goals (Crane, Winder, Hargus, Amarasinghe, & Barnhofer, 2012). There is every reason to suppose that this may be successful in the early phase of psychosis where suicide is at its highest and is a very positive avenue for further research.

6.5. Conclusion

In conclusion, the results of the studies in this thesis illustrated that low mood triggers the "differential activation" of hopeless/suicidal thoughts as proposed by the DAH of suicidal relapse. Importantly, mood-linked impairments in problem solving and positive future fluency, along with reactivity to *momentary hopelessness* in everyday life were all demonstrated to be significantly more evident in the suicidal history group than the non-suicidal group. Thus, it is indicated that mood-dependent problem solving deficit and dysfluency for positive events, along with increased reactivity to *momentary hopelessness* linked to negative affectivity are significant characteristics of a greater suicidal vulnerability in FEP individuals with a history of suicidal behaviour. Therefore, the application of the DAH as a framework for understanding the suicidal thinking in FEP warrants further studies, in order to improve existing interventions for suicidality and reduce the likelihood of subsequent suicidal relapse. Specifically, the use of the ESM as a potential tool for assessing suicidal vulnerability also requires further research in order to improve existing risk assessment procedures. Further, the mindfulness-based interventions used to prevent depression relapse in MDD may well have utility in preventing escalation from momentary changes in hopelessness linked to daily life experiences, in this most difficult and clinically challenging area of psychosis.

References

Abramson, L. Y., Metalsky, G. I., & Alloy, L. B. (1989). Hopelessness depression: A theory-based subtype of depression. *Psychological Review, 96*, 358–372.

Abramson, L.Y., Alloy, A. B., Hogan, M. E., Whitehouse, W. G., Cornette, M., Akhavan, S., *et al*. (1998). Suicidality and cognitive vulnerability to depression among college students: A prospective study. *Journal of Adolescence, 21,* 473–487.

Addington, D., Addington, J., and Maticka-Tyndale, D. (1993) Assessing depression in schizophrenia: The Calgary Depression Scale. *British Journal of Psychiatry, 163* (22), 39-44.

Addington, J., Williams, J., Young, J., Addington, D. (2004). Suicidal behaviour in early psychosis. *Acta Psychiatrica Scandinavica, 109* (2), 116–120.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders (4th ed.)*. Text Revision. Washington, DC.

Andersen, S.M., Spielman, L.A., & Bargh, J.A. (1992). Future-event schemas and certainty about the future: Automaticity in depressives' future-event predictions. *Journal of Personality and Social Psychology*, *63,* 711–723.

Arie, M., Apter, A., Orbach, I., Yefet, Y., & Zalzman, G. (2008). Autobiographical memory, interpersonal problem solving, and suicidal behavior in adolescent inpatients. *Comprehensive Psychiatry*, *49* (1), 22–29.

Bakst, S., Rabinowitz, J., Bromet, E.J. (2010). Is poor premorbid functioning a risk factor for suicide attempts in first-admission psychosis*? Schizophrenia Research, 116* (2–3), 210–216.

Barrett, E.A., Sundet, K., Faerden, A., Nesvag, R., Agartz, I., Fosse, R., Mork, E., Steen, N.E., Andreassen, O.A., Melle, I. (2010). Suicidality before and in the early phases of first episode psychosis. *Schizophrenia Research*. *119* (1–3), 11–17.

Barton K., & Jackson C. (2008). Reducing the impact of trauma amongst carers. *Australia and New Zealand Journal of Psychiatry*, *42,* 693-701.

Baumeister, R. E (1990). Anxiety and deconstruction: On escaping the self. **In J. M. Olson & M. P. Zanna.** *Self-inference processes: The Ontario Symposium* (Vol. 6, pp. 259-291). Hilisdale, NJ: Erlbaum.

Beck, A.T., Weissman, A., Lester, D., & Trexler, L. (1974). The measurement of pessimism: The Hopelessness Scale. *Journal of Consulting and Clinical Psychology, 42* (86), 1-865.

Beck, A.T., Kovac, S.M., & Weissman, A. (1975). Hopelessness and suicidal behaviour: An overview. *Journal of the American Medical Association, 234,* 1146-1 149.

Beck, A.T., Steer, R.A., Kovacs, M., *et al.* (1985). Hopelessness and eventual suicide: a 10-year prospective study of patients hospitalized with suicidal ideation. *American Journal Psychiatry*, *142,* 559—563

Beck, A.T. & Steer, R.A. (1988). *Manual for the Beck Hopelessness Scale*. San Antonio, Texas Psychological Corp.

Beck, A. T., Brown, G., Berchick, R. J., Stewart, B. L, & Steer, R. A. (1990). Relationship between hopelessness and ultimate suicide: A replication with psychiatric patients. *American Journal of Psychiatry, 147,* 190–195.

Beck, A. T., Steer, R. A., & Brown, G. (1993). Dysfunctional attitudes and suicidal ideation in psychiatric outpatients. *Suicide and Life Threatening Behavior, 23,* 11–20. *Psychology*, *109*, 504–511.

Beck, A. T., Brown, G. K., Steer, R. A., Dahlsgaard, K. K., & Grisham, J. R. (1999). Suicide ideation at its worst point: A predictor of eventual suicide in psychiatric outpatients. *Suicide and Life-Threatening Behavior, 29,* 1-9.

Ben-Zeev, D., Morris, S., Swendsen, J., & Granholm, E. (2011). Predicting the occurrence, conviction, distress, and disruption of different delusional experiences in the daily life of people with schizophrenia. *Schizophrenia Bulletin,* E-pub ahead of print.

Bertelsen M, Jeppesen P, Petersen L. (2007). Suicidal behaviour and mortality in first-episode psychosis: the OPUS trial. *British Journal Psychiatry, 191* (Suppl. 51), s140–s146.

Biggam, F. H., & Power, K. G. (1999). Suicidality and the state-trait debate on problem-solving deficits: A re-examination with incarcerated young offenders. *Archives of Suicide Research, 5,* 27–42.

Birchwood, M., Smith, J., MacMillan, F. *et al*. (1989). Predicting relapse in schizophrenia: the development and implementation of an early signs monitoring system using patients and families as observers. *Psychological Medicine*, *19,* 649–656.

Birchwood, M. J., Mason, R., MacMillan, F., & Healy J. (1993). Depression, demoralisation and control over psychotic illness: A comparison of depressed and non-depressed patients with a chronic psychosis. *Psychological Medicine, 23,* 387–395.

Birchwood, M., Fowler, D., & Jackson, C. (2001). *Early intervention in psychosis.* Chichester: John Wiley and Son.

Birchwood, M., and MacMillan, J.F. (1993a). Early intervention in schizophrenia. *Australian and New Zealand Journal of Psychiatry, 27*, 374-378.

Birchwood, M., Mason, R., MacMillan, F., & Healy, J. (1993b). Depression, demoralisation and control over illness: A comparison of depressed and non-depressed patients with a chronic psychosis. *Psychological Medicine, 23*, 387–395.

Birchwood, M., McGorry, P., and Jackson, H. (1997). Early Intervention in Schizophrenia. *British Journal of Psychiatry, 170,* 2 – 5

Birchwood, M., Iqbal, Z., Trower, P., *et al*. (2000). Cognitive approach to depression and suicidal thinking in psychosis, I. Ontogony of post psychotic depression. *British Journal of Psychiatry, 177,* 516–521.

Birchwood, M., Fowler, D., & Jackson, C. (2001). Early intervention in psychosis. Chichester: John Wiley and Son.

Bourgeois M, Swendsen K, Young F, Amador X, Pini S, Cassano GB, *et al*. (2004). Awareness of disorder and suicide risk in the treatment of schizophrenia: Results of the International Suicide Prevention Trial. *American Journal of Psychiatry, 161*, 1494–1496.

Bower, G. H. (1981). Mood and memory. *American Psychologist, 36*, 129-148.

Bresnahan M, Begg M, Brown AS, Schaefer C, Sohler N, Insel B, Vella L, Susser E (2007). Race and Schizophrenia in a US birth cohort: Another example of health disparity? *International Journal of Epidemiology, 36* (4), 751-8.

Brown, S., 1997. Excess mortality of schizophrenia. A meta-analysis. *British Journal of Psychiatry 171,* 502–508.

Brunet, K., Birchwood, M., Upthegrove, R., Michail, M., & Ross, K. (2012). A prospective study of PTSD following recovery from first-episode psychosis: The threat from persecutors, voices, and patienthood. *British Journal of Clinical Psychology, 51*, 418–433.

Carver, C. S., & Scheier, M. F. (1999). Themes and issues in the self-regulation of behavior. **In R. S. Wyer, Jr. (Ed.)**, *Advances in social cognition, 12*, (pp. 1-105). Mahwah, NJ: Lawrence Erlbaum.

Ceskova, E., Prikryl, R., & Kasparek, T. (2011). Suicides in males after the first episode of schizophrenia. *Journal of Nervous Mental Disease, 199* (1), 62–64.

Christensen, T. C., Barrett, L. F., Bliss-Moreau, E., Lebo, K. & Kaschub, C. (2003). A practical guide to experience-sampling procedures. *Journal of Happiness Studies, 4*, 53-78.

Clarke, M., Whitty, P., Browne, S., Mc Tigue, O., Kinsella, A., Waddington, J.L., Larkin, C., & O'Callaghan, E. (2006). Suicidality in first episode psychosis. *Schizophrenia Research*, *86* (1–3), 221–225.

Cohen, S., Lavelle, J., Rich, C.L., & Bromet, E. (1994). Rates and correlates of suicide attempts in first-admission psychotic patients. *Acta Psychiatrica Scandinavica, 90* (3), 167–171.

Collins, A.A., Remington, G., Coulter, K., & Birkett, K. (1996). Depression in schizophrenia: a comparison of three measures. *Schizophrenia Research, 20*, 205–209

Conaghan, S., & Davidson, K.M. (2002). Hopelessness and the anticipation of positive and negative future experiences in older parasuicidal adults. *British Journal of Clinical Psychology, 41* (3). 233-242.

Conner, K.R., Duberstein, P.R., Conwell, Y., Seidlitz, L., & Caine, E.D. (2001). Psychological vulnerability to completed suicide: A review of empirical studies. *Suicide Life Threatening Behaviour, 31,* 367–385.

Cotton, S.M., Lambert, M., Schimmelmann, B.G., Foley, D.L., Morley, K.I., McGorry, P.D., & Conus, P. (2009). Gender differences in premorbid, entry, treatment, and outcome characteristics in a treated epidemiological sample of 661 patients with first episode psychosis. *Schizophrenia Research, 114* (1–3), 17–24.

Craig, T.K., Garety P., & Power P. (2004). The Lambeth Early Onset (LEO) Team: randomised controlled trial of the effectiveness of specialised care for early psychosis. *British Medical Journal, 329,* 1067–1067.

Crumlish, N., Whitty, P., Kamali, M., Clarke, M., Browne, S., McTigue, O., Lane, A., Kinsella, A., Larkin, C., & O'Callaghan, E., (2005). Early insight predicts depression and attempted suicide after 4 years in first-episode schizophrenia and schizophreniform disorder. *Acta Psychiatrica Scandinavica, 112* (6), 449–455.

Csikszentmihalyi, M., & Schneider, B. (2001). Conditions for optimal development in adolescence: An experiential approach. *Applied Developmental Science, 5,* 122-124.

Curry, J. F., Miller, Y., Waugh, S., & Anderson, W. B. (1992). Coping responses in depressed, socially maladjusted, and suicidal adolescents. *Psychological Reports, 71,* 80–82.

De Hert, M., McKenzie, K., & Peuskens, J. (2001). Risk factors for suicide in young people suffering from schizophrenia: a long-term follow-up study. *Schizophrenia Research, 47* (2–3), 127–134.

Delespaul, P., & deVries, M. W. (1987). The daily life of ambulatory chronic mental patients. *Journal of Nervous and Mental Disease*, *175*, 537–544.

Delespaul, P. (1995). *Assessing Schizophrenia in Daily Life—The Experience Sampling method.* Maastricht, the Netherlands: Maastricht University Press

Delespaul, P., deVries, M., & van Os, J. (2002). Determinants of occurrence and recovery from hallucinations in daily life. *Social Psychiatry and Psychiatric Epidemiology*, *37*, 97–104.

DeVries, M. (1992) *The Experience of Psychopathology. Investigating Mental Disorders in Their Natural Settings.* Cambridge: England, Cambridge University Press.

Dictionary.com Unabridged. Retrieved February 07, 2013, from Dictionary.com website: http://dictionary.reference.com/browse/-less

Dyer J.A, & Kreitman, N. (1984). Hopelessness, depression, and suicide intent in parasuicide. *British Journal of Psychiatry, 144*, 127—133.

Fialko, L., Freeman, D., Bebbington, P.E., Kuipers, E., Garety, P.A., Dunn, G., *et al*. (2006). Understanding suicidal ideation in psychosis: Findings from the Psychological Prevention of Relapse in Psychosis (PRP) Trial. *Acta Psychiatrica Scandanavica, 114*, 117–186.

Flanagan, P. & Compton, MT. (2012). A comparison of correlates of suicidal ideation prior to initial hospitalization for first-episode psychosis with prior research on correlates of suicide attempts prior to initial treatment seeking. *Early Intervention Psychiatry,* 6 (2), 138-44.

Foley, S., Jackson, D., McWilliams, S., Renwick, L., Sutton, M., Turner, N., Kinsella, A., & O'Callaghan, E. (2008). Suicidality prior to presentation in first-episode psychosis. *Early Intervention Psychiatry, 2*, 242–246.

Gaebel, W. and Woelwer, W. (1992) Facial expression and emotional face recognition in schizophrenia and depression. *European Archives of Psychiatry and Clinical Neurosciences, 242*, 46-52.

Gard, D. E., Kring, A. M., Gard, M., Horan, W. P., & Green, M. F. (2007). Anhedonia in schizophrenia: Distinctions between anticipatory and consummatory pleasure. *Schizophrenia Research, 93*, 253-360.

Goddard, L., Dritschel, B. & Burton, A. (1996). Role of autobiographical memory in social problem solving and depression. *Journal of Abnormal Psychology, 105,* 609-616.

Granholm, E., Loh, C., & Swendsen, J. (2008). Feasibility and validity of computerized ecological momentary assessment in schizophrenia. *Schizophrenia Bulletin, 34,* 507–514.

Gumley, A., O'Grady, M., Power, K. & Schwannauer, M. (2004). Negative beliefs about self and illness: A comparison of socially anxious and non-socially anxious individuals with psychosis. *Australian and New Zealand Journal of Psychiatry, 38,* 960-964.

Gumley, A. I., Karatzias, A., Power, K. G., Reilly, J., McNay, L., & O'Grady, M. (2006). Early inter-vention for relapse in schizophrenia: Impact of cognitive behavioural therapy on negative beliefs about psychosis and self-esteem. *British Journal of Clinical Psychology, 45*, 247–260.

Haahr, U., Friis, S., Larsen, T.K., Melle, I., Johannessen, J.O., Opjordsmoen, S., Simonsen, E., Rund, B.R., Vaglum, P., & McGlashan, T. (2008). First-episode psychosis: diagnostic stability over one and two years. *Psychopathology 41,* (5), 322–329.

Hafner, H., Maurer, K., Loffler, W., & Riecher-Rossler, A. (1993). The influence of age and sex on the onset and early course of schizophrenia. *British Journal of Psychiatry, 162,* 80-86.

Hafner, H., Riecher-Rossler, A., Maurer, K., Fatkenheuer, B., & Loffler, W. (1992). First onset and early symptomatology of schizophrenia: A chapter of epidemiological and neurobiological research into age and sex differences. *European Archives of Psychiatry and Clinical Neurosciences, 242,* 109-118.

Hafner, H., Maurer, K., Loffler, W., an der Heiden, W., Munk-J0rgensen, P., Hambrecht, M., & Riecher-Rb'ssler, A. (1998). The ABC schizophrenia study: A preliminary overview of the results. *Social Psychiatry and Psychiatric Epidemiology, 33,* 380-386.

Harkavy-Friedman, J.M. (2006). Can early detection of psychosis prevent suicidal behavior? *American Journal of Psychiatry, 163,* 768-70.

Harkavy-Friedman, J.M., Restifo, K., Malaspina, D., Kaufmann, C.A., Amador, X.F., Yale, S.A., & Gorman, J.M. (1999). Suicidal behavior in schizophrenia: characteristics of individuals who had and had not attempted suicide. *American Journal of Psychiatry, 156* (8), 1276–1278.

Harris, E.C., & Barraclough, B. (1997). Suicide as an outcome for mental disorders. A meta-analysis. *British Journal of Psychiatry 170,* 205–228.

Harrison, C. L., & Fowler, D. (2004). Negative symptoms, trauma, and autobiographical memory: An investigation of individuals recovering from psychosis. *The Journal of Nervous and Mental Disease, 192,* 745-753.

Harvey, S.B., Dean, K., Morgan, C., Walsh, E., Demjaha, A., Dazzan, P., Morgan, K., Lloyd, T., Fearon, P., Jones, P.B., & Murray, R.M. (2008). Self-harm in first-episode psychosis. *British Journal of Psychiatry, 192* (3), 178–184.

Hawton, K. (1997). Attempted suicide. **In D.M. Clarke & C.G. Fairburn (Eds.)**. *Science and Practice of Cognitive Behaviour Therapy* (pp. 285 – 312). Oxford, Oxford University Press.

Hawton, K., Sutton, L., Haw, C., Sinclair, J., & Deeks, J.J. (2005). Schizophrenia and suicide: systematic review of risk factors. *British Journal of Psychiatry, 187,* 9–20.

Hawton, K., Sutton, L., Haw, C., Sinclair, J., & Deeks, J.J. (2005). Schizophrenia and suicide: Systematic review of risk factors. *British Journal of Psychiatry, 187*, 9–20.

Hawton, K. & van Heeringen, K. (2009). Suicide. *Lancet, 373*, 1372–1381.

Heinrichs, D.W. & Carpenter, W.T. Jr. (1985). Prospective study of prodromal symptoms in schizophrenic relapse. *American Journal of Psychiatry, 142*, 371-373.

Heila, H., Isometsa, E.T.,Henriksson,M.M. *et al* (1997) Suicide and schizophrenia: a nationwide psychological autopsy study on age- and sex-specific clinical characteristics of 92 suicide victims with schizophrenia. *American Journal of Psychiatry, 154,* 1235-1242.

Hektner, J. M., Schmidt, J. A., & Csikszentmihalyi, M. (2007). *Experience sampling method: Measuring the quality of everyday life.* Thousand Oaks, California, Sage Publications.

Henquet, C., Rosa, A., Delespaul, P., Papiol, S., Fananas, L., van Os, J., & Myin-Germeys, I. (2009). COMT ValMet moderation of cannabis-induced psychosis: a momentary assessment study of 'switching on' hallucinations in the flow of daily life. *Acta Psychiatrica Scandanavica, 119,* 156-60.

Henquet, C., van Os, J., Kuepper, R., Delespaul, P., Smits M., Campo, J.A., & Myin-Germeys, I. (2010). Psychosis reactivity to cannabis use in daily life: an experience sampling study. *British Journal of Psychiatry, 196,* 447-53.

Hepburn, S.R., Barnhofer, T., & Williams, J.M.G. (2006). Effects of mood on how future events are generated and perceived. *Personality and Individual Differences, 41,* 801–811.

Hor, K. & Taylor, M. (2010). Suicide and schizophrenia: a systematic review of rates and risk factors. *Journal Psychopharmacol, 24* (4 Suppl), 81–90.

Hunter, E.C., O'Connor, R.C., 2003. Hopelessness and future thinking in parasuicide: the role of perfectionism. *British Journal of Clinical Psychology, 42,* 355–365.

Hurlburt, R. T. & Melancon, S. M. (1987). "Goofed-up" images: Thought sampling with a schizophrenic woman. *Journal of Nervous and Mental Disease, 175,* 575–578.

Iqbal, Z., Birchwood, M., Chadwick, P., & Trower P. (2000). Cognitive approach to depression and suicidal thinking in psychosis. 2. Testing the validity of a social ranking model. *British Journal of Psychiatry, 177, 522*–528.

Isometsa, E., Heikkinen, M., Henriksson, M., Aro, H. & Lonqvist, J. (1995). Recent life events and completed suicide in bipolar affective disorder: A comparison with Major Depressive Disorder in Finland. *Journal of Affective Disorder, 33,* 99-106.

Ivanoff, A., Smyth, N. J., Grochowski, *S.*, Jang, S. J., & Klein, K. E. (1992). Problem solving and suicidality among prison inmates: Another look at state versus trait. *Journal of Consulting and Clinical Psychology, 60*, 970-973.

Jackson, H.J., McGorry, P.D., & McKenzie, D. (1994). The reliability of DSM-III prodromal symptoms in first episode psychotic patients. *Acta Psychiatrica Scandinavica, 90,* 375-378.

Jackson, C. & Iqbal, Z. (2000). Psychological adjustment to early psychosis. **In M. Birchwood, D. Fowler, & C. Jackson (Eds.)**, *Early intervention in psychosis: A guide to concepts, evidence and interventions* (pp.64-99). England: John Wiley & Sons.

Jackson, C., Knott, C., Skeate, A., *et al.* (2004). The trauma of first episode psychosis: The role of cognitive mediation. *Australian and New Zealand Journal of Psychiatry, 38,* 327–333.

Jackson, C., Trower, P., Reid, I., Smith, J., Hall, M., Townend, M., *et al.* (2009). Improving psychological adjustment following a first episode of psychosis: A randomised controlled trial of cognitive therapy to reduce post psychotic trauma symptoms. *Behaviour Research and Therapy, 47,* 454-462.

Johnson, J., Tarrier, N., & Gooding, P.A. (2008). An investigation of aspects of the cry of pain model of suicide risk: the role of defeat in impairing memory. *Behaviour Research and Therapy, 46* (8), 968-975.

Kikuchi, H., Yoshiuchi, K., Miyasaka, N., Ohashi, K., Yamamoto, Y., Kumano, H., Kuboki, T. & Akabayashi, A. (2006). Reliability of recalled self-report on headache intensity:

Investigation using ecological momentary assessment technique. *Cephalalgi, 26*, 1335-1343.

Kim, C.H., Jayathilake, K., & Meltzer, H.Y. (2002). Hopelessness, neurocognitive function, and insight in schizophrenia: Relation to suicidal behavior. *Schizophrenia Research, 60*, 71–80.

Kimhy, D., Delespaul, P., Corcoran, C., Ahn, H., Yale, S., & Malaspina, D. (2006). Computerized experience sampling method (ESMc): Assessing feasibility and validity among individuals with schizophrenia. *Journal of Psychiatric Research, 40*, 221–230.

Kimhy, D., Delespaul, P., Ahn, H., Cai, S., Shikhman, M., Lieberman, J.A., Malaspina, D., & Sloan, R.P. (2010). Concurrent measurement of "real-world" stress and arousal in individuals with psychosis: assessing the feasibility and validity of a novel methodology. *Schizophrenia Bulletin, 36*, 1131-1139.

King, E. A., Baldwin, D. S., Sinclair, J. M., et al. (2001). TheWessex Recent In-Patient Suicide Study, 1. Case-control study of 234 recently discharged psychiatric patient suicides. *British Journal of Psychiatry, 178*, 531-536.

Kirch, D.G., Lieberman, J.A., & Matthews, S.M. (1992). First-episode psychosis: Part I. Editors' introduction. *Schizophrenia Bulletin, 18* (2), 177-178.

Kiviniemi, M. T. & Rothman, A. J. (2006). Selective memory biases in individuals' memory for health-related information and behavioural recommendations. *Psychology & Health, 21* (2), 247-272.

Klonsky, E. D., Kotov, R., Bakst, S., Rabinowitz, J., & Bromet, E. J. (2012). Hopelessness as a predictor of attempted suicide among first admission patients with psychosis: A 10-year cohort study. *Suicide & Life Threatening Behavior, 42* (1), 1-10.

Kreitman, N. (1977). *Parasuicide*. London: Wiley.

Kring, A. M., Kerr, S. L., Smith, D. A. & Neale, J. M. (1993). Flat affect in schizophrenia does not reflect diminished subjective experience of emotion. *Journal of Abnormal Psychology, 102* (4), 507-517.

Kring, A. M. & Neale, J. M. (1996). Do schizophrenic patients show a disjunctive relationship among expressive, experiential, and psychophysiological components of emotion? *Journal of Abnormal Psychology, 105,* 249-257.

Lam, D., Schuck, N., Smith, N., Farmer, A. & Checkley, S. (2003). Response style, interpersonal difficulties and social functioning in major depressive disorder. *Journal of Affective Disorders, 75*, 279-283.

Lamph, G. (2010) Early psychosis: raising awareness among non-mental health nurses. *Nursing Standard. 24, 47,* 35-40.

Lancon, C., Auquier, P., Reine, G., Toumi, M., & Addington, D. (1999). Evaluation of depression in schizophrenia: psychometric properties of a French version of the calgary depression scale. *Psychiatry Research., 89,* 123–132

Lardinois, M., Myin-Germeys, I., Bak, M., Mengelers, R., van Os J., & Delespaul, P.A. (2003). The dynamics of symptomatic and non-symptomatic coping with psychotic symptoms in the flow of daily life. *Acta Psychiatrica Scandanavica, 116,* 71-5.

Lardinois, M., Lataster, T., Mengelers, R., Van Os J., & Myin-Germeys, I. (2011). Childhood trauma and increased stress sensitivity in psychosis. *Acta Psychiatrica Scandanavica, 123,* 28-35.

Lardinois, M., Lataster, T., Mengelers, R., Van Os J., & Myin-Germeys, I. (2011). Childhood trauma and increased stress sensitivity in psychosis. *Acta Psychiatrica Scandanavica, 123,* 28-35.

Lataster, T., Collip, D., Lardinois, M., van Os J., & Myin-Germeys, I. (2010). Evidence for a familial correlation between increased reactivity to stress and positive psychotic symptoms. *Acta Psychiatrica Scandanavica, 122,* 395-404.

Lau, M. A., Segal, Z. V., & Williams, J. M. G. (2004). Teasdale's differential activation hypothesis: implications for mechanisms of depressive relapse and suicidal behaviour. *Behaviour Research and Therapy, 42,* 1001–1017.

Leverich, G.S., Altshuler Frye, M.A., Suppes, T., Keck, P.E., McElroy, S.L., Denicoff, K.D., Obrocea, G., Nolen, W.A., Kupka, R., Walden, J., Grunze, H., Perez, S., Luckenbaugh, D.A., & Post, R.M. (2003). Factors associated in suicide attempts in 684 patients with bipolar disorder in the Stanley Foundation Bipolar Network. *Journal of Clinical Psychiatry, 64,* 506 - 515.

Levine, S.Z., Bakst, S., & Rabinowitz, J. (2010). Suicide attempts at the time of first admission and during early course schizophrenia: a population based study. *Psychiatry Research, 177* (1–2), 55–59.

Lezak, M. D. (2004) *Neuropsychological assessment (4th ed.).* New York: Oxford University Press.

Lindenmayer, J.P., Czobor, P., Alphs, R., Anand, R., Islam, Z., & Pestreich, L. (2001). The InterSept Scale for Suicidal Thinking (ISST): A new assessment instrument for suicidal patients with schizophrenia. *Schizophrenia Research, 49* (suppl. 1-2), 5.

Lindenmayer JP., Czobor P., Alphs L., Nathan AM., Anand R., Islam Z., & Chou JC. (2003). The InterSePT scale for suicidal thinking reliability and validity. *Schizophrenua Research, 63,* 161-170

Linehan, M. M., Goodstein, J. L., Nielsen, S. L., & Chiles, J. A. (1983). Reasons for staying alive when you are thinking of killing yourself: The Reasons for Living Inventory. *Journal of Consulting and Clinical Psychology, 51* (2), 276-286.

Limosin F, Loze JY, Philippe A, Casadebaig F, et al. (2007). Ten-year prospective follow-up study of the mortality by suicide in schizophrenic patients. *Schizophrenia Research 94,* (1-3), 23-28.

MacLeod, A. K., Rose, G., & Williams, J. M. G. (1993). Components of hopelessness about the future in parasuicide. *Cognitive Therapy and Research, 17,* 441–455.

MacLeod, A. K., & Cropley, M. L. (1995). Depressive future-thinking: The role of valence and specificity. *Cognitive Therapy and Research, 19,* 35–50.

MacLeod, A. K., Byrne, A., & Valentine, J. D. (1996). Affect, emotional disorder, and future-directed thinking. *Cognition and Emotion, 10,* 69–85.

MacLeod, A.K., Tata, P., Kentish, J., & Jacobsen, H. (1997). Retrospective and prospective cognitions in anxiety and depression. *Cognition and Emotion, 11,* 467-479.

MacLeod, A. K., Pankhania, B., Lee, M. & Mitchell, N. (1997). Parasuicide, depression and the anticipation of positive and negative future experiences. *Psychological Medicine, 27,* 973-977.

MacLeod, A. K., Tata, P., Evans, K., Tyrer, P., Schmidt, U., Davidson, K., Thornton, S., & Catalan, J. (1998). Recovery of positive future thinking within a high-risk parasuicide group: Results from a pilot randomized controlled trial. *British Journal of Clinical Psychology, 37,* 371–379.

MacLeod, A. K., & Salaminiou, E. (2001). Reduced positive future-thinking in depression: Cognitive and affective factors. *Cognition and Emotion, 15,* 99–107.

MacLeod, A.K., Tata, P., Tyrer, P., Schmidt, U., Davidson, K., & Thompson, S., (2005). Hopelessness and positive and negative future thinking in parasuicide. *The British Journal of Clinical Psychology 44,* 495–504.

MacLeod, A. K., Pankhania, B., Lee, M., & Mitchell, D. (1997). Parasuicide, depression and the anticipation of positive and negative experiences. *Psychological Medicine, 27,* 973–977.

Malla, A.K. & Norman, R.M. Prodromal symptoms in schizophrenia. (1994). *British Journal of Psychiatry, 164,* 487-493.

Malone, K. M., Oquendo, M. A., Haas, G. L., Ellis, S. P., Li, S. H., & Mann, J. J. (2000). Protective factors against suicidal acts in major depression: Reasons for living. *American Journal of Psychiatry, 157,* 1084–1088.

Mangalore, R. & Knapp, M. (2007). Cost of schizophrenia in England. *Journal of Mental Health Policy and Economics, 10,* 23-41.

Mann, J. J., Waternaux, C., Haas, G. L., & Malone, K. M. (1999). Towards a clinical model of suicidal behaviour in psychiatric patients. *American Journal of Psychiatry, 156,* 181–189.

Marshall, M., Lewis, S., Lockwood, A., Drake, R., Jones, P., & Croudace, T. (2005). Association between duration of untreated psychosis and outcome in cohorts of first-episode patients: a systematic review. *Archives of General Psychiatry, 62* (9), 975-983.

McCormack, H.M., Horne, D.J., & Sheather, S. (1988). Clinical applications of visual analogue scales: a critical review. *Psychological Medicine, 18,* 1007-1019.

McGorry, P. D., Singh, B. S., Copolov, D. L. *et al.* (1990). Royal Park Multidiagnostic Instrument for Psychosis: Part II. Development, Reliability, and Validity. *Schizophrenia Bulletin, 16,* 517-536.

McGorry, P., & Jackson. H. (1999). Recognition and management of early psychosis. A Preventative Approach. Cambridge. Cambridge University Press.

McGorry, P.D., Chanen, A., McCarthy, E., Van Riel, R. *et al.* (1991). Posttraumatic stress disorder following recent-onset psychosis: An unrecognized postpsychotic syndrome. *Journal of Nervous and Mental Disease, 179* (5), 253-258.

Melle, I., Johannesen, J.O., Friis, S., Haahr, U., Joa, I., Larsen, T.K., Opjordsmoen, S., Rund, B.R., Simonsen, E., Vaglum, P., & McGlashan, T. (2006). Early detection of the first episode of schizophrenia and suicidal behavior. *American Journal of Psychiatry, 163* (5), 800–804.

Miles, H., MacLeod, A. K., & Pote, H. (2004). Retrospective and prospective cognitions in adolescents: Anxiety, depression, and positive and negative affect. *Journal of Adolescence, 27,* 691–701.

Minkoff, K., Bergman, E., Beck, A.T., *et al.* (1973). Hopelessness, depression, and attempted suicide. *American Journal of Psychiatry, 130,* 455—459

Montross, L., Kasckow, J., Golshan, S., Solorzano, E., Lehman, D., & Zisook, S. (2008). Suicidal ideation and suicide attempts among middle-aged and older patients with schizophrenia spectrum disorders and concurrent sybsyndromal depression. *The Journal of Nervous and Mental Disease, 196* (12), 884-890.

Morrens, M., Krabbendam, L., Bak, M., Delespaul, P., Mengelers, R., Sabbe, B., Hulstijn, W., van Os J., & Myin-Germeys I. (2007). The relationship between cognitive dysfunction and stress sensitivity in schizophrenia: a replication study. *Social Psychiatry & Psychiatric Epidemiology, 42,* 284-7.

Myin-Germeys, I., Delespaul, P.A., & deVries, M.W. (2000). Schizophrenia patients are more emotionally active than is assumed based on their behavior. *Schizophrenia Bulletin, 26,* 847-54.

Myin-Germeys, I., Nicolson, N.A., & Delespaul, P.A. (2001). The context of delusional experiences in the daily life of patients with schizophrenia. *Psychological Medicine, 31,* 489-98.

Myin-Germeys, I., Krabbendam, L., Jolles, J., Delespaul, P.A., & van Os, J. (2002). Are cognitive impairments associated with sensitivity to stress in schizophrenia? An experience sampling study. *American Journal of Psychiatry, 159,* 443-9.

Myin-Germeys, I., Krabbendam, L., Delespaul, P., & van Os, J. (2003). Can cognitive deficits explain differential sensitivity to life events in psychosis? *Social Psychiatry & Psychiatric Epidemiology, 38,* 262-8.

Myin-Germeys, I., Krabbendam, L., Delespaul, P.A., & van Os, J (2004). Sex differences in emotional reactivity to daily life stress in psychosis. *Journal of Clinical Psychiatry, 65,* 805-9.

Myin-Germeys, I., Delespaul, P., & van Os, J. (2005). Behavioural sensitization to daily life stress in psychosis. *Psychological Medicine, 35,* 733-41.

Myin-Germeys, I., Oorschot, M., Collip, D., Lataster, J., Delespaul, P., & van Os, J (2009). Experience sampling research in psychopathology: opening the black box of daily life. *Psychological Medicine, 39,* 1533-47.

National Institute for Health and Clinical Excellence. (2009). Schizophrenia: Core Interventions in the Treatment and Management of Schizophrenia. London: National Institute for Health and Clinical Excellence.

Nekanda-Trepka, C.J.S., Bishop, S., & Blackburn, M. (1983). Hopelessness and depression. *British Journal of Clinical Psychiatry, 132,* 954—956

Nordentoft, M., Jeppesen, P., Abel, M., Kassow, P., Petersen, L., Thorup, A., Krarup, G., Hemmingsen, R., & Jorgensen, P. (2002). OPUS study: suicidal behaviour, suicidal ideation and hopelessness among patients with first-episode psychosis. One-year follow-up of a randomised controlled trial. *British Journal of Psychiatry Supplement, 43,* 98–106.

Nordentoft, M., Laursen, T.M., Agerbo, E., Qin, P., Høyer, E.H. & Mortensen, P.B. (2004). Change in suicide rates for patients with schizophrenia in Denmark, 1981–97: Nested case-control study. *British Medical Journal, 329,* 261.

O'Connor, R.C., O'Connor, D.B., O'Connor, S.M., Smallwood, J. & Miles, J. (2004). Hopelessness, stress and perfectionism: the moderating effects of future thinking. *Cognition and Emotion, 18,* 1099-1120.

O'Connor, R.C. (2011). Towards a Motivational–Volitional Model of Suicidal Behaviour. **In R.C. O'Connor, S. Platt, & J. Gordon (Eds.)**, *The International Handbook of Suicide Prevention: Research, Policy and Practice* (p.181-198). Chichester: John Wiley & Sons.

O'Connor, R.C. & Cassidy, C. (2007). Predicting hopelessness: the interaction between optimism/pessimism and specific future expectancies. *Cognition and Emotion, 21,* 596–613.

O'Connor, R.C., Connery, H. & Cheyne,W. (2000). Hopelessness: The role of depression, future directed thinking and cognitive vulnerability. *Psychology, Health and Medicine, 5,* 155-161.

Office of National Statistics. (2000). Psychiatric morbidity among adults living in private households. London.

Office of National Statistics. Suicide Rate in the United Kingdom 2011. Retrieved on 15 Jan 2012, from http://www.ons.gov.uk/ons/dcp171778_295718.pdf.

Oorschot, M., Kwapil, T., Delespaul, P., & Myin-Germeys, I. (2009).Momentary assessment research in psychosis. *Psychological Assessment, 21,* 498-505.

Oquendo, M. A., Halberstam, B., & Mann, J. J. (2003). Risk factors of suicidal behavior: The utility and limitations of research instruments. **In M. B. First (Ed.),** *Standardized evaluation in clinical practice* (pp. 103-130). Washington, DC: American Psychiatric Publishing.

Oquendo, M., Bongiovi-Garcia, M., Galfalvy, H., Goldberg, P., Grunebaum, M., Burke, A., & Mann, J. (2007). Sex Differences in Clinical Predictors of Suicidal Acts After Major Depression: A Prospective Study. *American Journal of Psychiatry, 164,* 134-141.

Orbach, I., Bar-Joseph, H., & Dror, N. (1990). Styles of problem solving in suicidal individuals. *Suicide and Life-Threatening Behaviour, 20,* 56 – 64.

Palmer, B.A., Pankratz, V.S., & Bostwick, J.M. (2005). The lifetime risk of suicide in schizophrenia: a re-examination. *Archive of General Psychiatry, 62* (3), 247–253.

Palmier-Claus, J., Taylor, P.J., Gooding, P., Dunn. G., & Lewis, S. (2011). Affective variability predicts suicidal ideation in individuals at ultra-high risk of developing psychosis: An experience sampling study. *British Journal of Clinical Psychology, in press.*

Pinto, A. & Whisman, M. A. (1996). Negative affect and cognitive biases in suicidal and nonsuicidal hospitalized adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 35,* 158–165.

Pirkis, J. & Burgess, P. (1998). Suicide and recency of health care contacts. A systematic review. *The British Journal of Psychiatry, 173*, 462–74.

Platt, J.J., & Spivack, G. (1972). Problem-solving thinking of psychiatric patients. *Journal of Consulting and Clinical Psychology, 39*, 148-151.

Platt, J.J., & Spivack, G. (1975). *Manual for the means-ends problem solving procedure.* Philadelphia: Department of Mental Health Services, Hahnemann Community Mental Health/Mental Retardation Center.

Pollock, L. R., & Williams, J. M. G. (2001). Effective problem solving in suicide attempters depends on specific autobiographical recall. *Suicide and Life-Threatening Behavior, 31,* 386–396.

Pollock, L. & Williams, J.M.G. (2004). Problem solving in suicide attempters. *Psychological Medicine, 34,* 163-167.

Pompili, M., Lester, D., Grispini, A., Innamorati, M., Calandro, F., Iliceto, P. *et al.* (2009). Completed suicide in schizophrenia: Evidence from a case-control study. *Psychiatry Research, 167,* 251-257.

Power, P. (2010). Suicide prevention in early psychosis. **In French, P., Smith, J., Shiers, D., Reed, M. and Rayne, M. (Eds.)** *Promoting Recovery in Early Psychosis: A Practice Manual.* London: Wiley Blackwell

Power, P. & Robinson, J. (2009). Suicide prevention in first-episode psychosis. **In McGorry, P. & H. Jackson (Eds),** *The Recognition and Management of Early Psychosis: A Preventative Approach.* Cambridge University Press.

Reinecke, M.A., DuBois, D.L., & Schultz, T.M. (2001). Social problem solving, mood, and suicidality among inpatient adolescents. *Cognitive Therapy Research, 25* (6),743–756.

Rihmer, Z. (2005). Prediction and prevention of suicide in bipolar disorder. *Clinical Neuropsychiatry, 2,* 48 - 54.

Rihmer, Z. (2007). Suicide in mood disorders. *Current Opinion in Psychiatry, 20,* 17 – 22.

Riedesser, P. (2004). Psychosis as a traumatic event. **In D. Burgin & Heinermeng (Eds.),** *Childhood and adolescent psychosis* (pp.61-66). Switzerland: Karger.

Robinson, J., Harris, M.G., Harrigan, S.M., Henry, L.P., Farrelly, S., Prosser, A., Schwartz, O., Jackson, H., & McGorry, P.D. (2010). Suicide attempt in first-episode psychosis: A 7.4 year follow-up study. *Schizophrenia Research, 116* (1), 1–8.

Rooke, O. & Birchwood. M. (1998). Loss, humiliation and entrapment as appraisals of schizophrenic illness: A prospective study of depressed and non-depressed patients. *British Journal of Clinical Psychology, 37*, 259–268.

Rush Jr, J., First, M.B., & Blacker, D. (2008). *Handbook of Psychiatric Measures. (2nd ed.)*. Washington, DC. American Psychiatric Publishing, Inc

Sadowski, C. & Kelly, M. (1993). Social problem solving in suicidal adolescents. *Journal of Consulting and Clinical Psychology, 61,*121–127.

Saha, S., Chant, D., & McGrath, J. (2007). A systematic review of mortality in schizophrenia: is the differential mortality gap worsen over time? *Archive of General Psychiatry, 64*, 1123-1131.

Salter, D. & Platt, S. (1990). Suicidal intent, hopelessness, and depression in a parasuicide population: The influence of social desirability and elapsed time. *British Journal of Clinical Psychology, 27*, 247-258.

Schotte, D. E. & Clum, G. A. (1982). Suicide ideation in a college population: A test of a model. *Journal of Consulting and Clinical Psychology, 50*, 690-696.

Schotte, D. E. & Clum, G. A. (1987). Problem-solving skills in suicidal psychiatric patients. *Journal of Consulting and Clinical Psychology, 55*, 49–54.

Sharpley, M., Hutchinson, G., McKenzie, K., & Murray, R.M. (2001) Understanding the excess of psychosis among the African–Caribbean population in England. Review of current hypotheses. *British Journal of Psychiatry Supplement, 40,* 60–8.

Sidley G. L, Calam, R., Wells, A., Hughes, T., & Whitaker, K. (1999). The prediction of parasuicide repetition in a high-risk group. *British Journal of Clinical Psychology, 38,* 375-386.

Stone, A. A., & Shiffman, S. (1994). Ecological momentary assessment (EMA) in behavioral medicine. *Annals of Behavioral Medicine, 16,* 199-202.

Swendsen, J., Ben-Zeev, D., & Granholm, E. (2011). Real-time electronic ambulatory monitoring of substance use and symptom expression in schizophrenia. *American Journal of Psychiatry, 168,* 202-9.

Tarrier, N., Khan, S., Cater, J., & Picken, A. (2007). The subjective consequences of suffering a first episode psychosis: trauma and suicide behaviour. *Social Psychiatry and Psychiatric Epidemiology, 42,* 29–35.

Teasdale, J. D. (1988). Cognitive vulnerability to persistent depression. *Cognition and Emotion, 2,* 247–274.

Teasdale, J.D. & Barnard, P.J. (1993). *Affect, cognition and change: Re-modelling depressive thought*. Hove, UK: Lawrence Erlbaum Associates Ltd.

Thewissen, V., Bentall, R.P., Oorschot, M., Campo, J.A., van Lierop, T., van Os, J., & Myin-Germeys, I. (2011). Emotions, self-esteem, and paranoid episodes: an experience sampling study. *British Journal of Clinical Psychology, 50,* 178-195.

Tiihonen, J., Wahlbeck, K., Lonnqvist, J. *et al.* (2006). Effectiveness of antipsychotic treatments in a nationwide cohort of 2230 patients in community care after first

hospitalisation due to schizophrenia and schizoaffective disorder: Observational follow up study. *British Medical Journal, 333,* 224.

Tversky, A. & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases. *Science, New Series, 185* (4157), 1124-1131.

Upthegrove, R., Birchwood, M., Ross, K., Brunett, R., McCollum, R., & Jones, L. (2010). The evolution of depression and suicidality in first episode psychosis. *Acta Psychiatrica Scandinavica 122* (3), 211-218.

Van der Does, A.J.W. & Williams, J.M.G. (2003). The Leiden Index of Depression Sensitivity, Revised version (LEIDS-R). http://www.dousa.nl/publications

Varese, F., Udachina, A., Myin-Germeys, I., Oorschot, M., & Bentall,R. (2011). The relationship between dissociation and auditory verbal hallucinations in the flow of daily life of patients with psychosis. *Psychosis, 3,* (1), 14-28.

Velten, E. (1968). A laboratory task for induction of mood states. *Behaviour Research and Therapy, 6,* 473–482.

Verdoux, H., Liraud, F., Gonzales, B., Assens, F., Abalan, F., & van Os, J., (2001). Predictors and outcome characteristics associated with suicidal behaviour in early psychosis: A two-year follow-up of first-admitted subjects. *Acta Psychiatrica Scandinavica, 103* (5), 347–354.

Verma, S., Subramaniam, M., Abdin, E., Poon, L. Y., & Chong, S. A. (2012). Symptomatic and functional remission in patients with first-episode psychosis. *Acta Psychiatrica Scandinavica, 126,* 282–289.

Walsh, E., Harvey, K., White, I., *et al.* (2001) Suicidal behaviour in psychosis: prevalence and predictors from a randomised controlled trial of case management: report from the UK700 trial. *British Journal of Psychiatry, 178,* 255-260.

Watkins, E. & Baracaia, S. (2002). Rumination and social problem-solving in depression. *Behaviour Research and Therapy, 40,* 1179-1189.

Wetzel, K.D., Margulies, T., Davis, R. *et al.* (1980). Hopelessness, depression, and suicide intent. *Journal of Clinical Psychiatry, 41,* 159—160.

Williams, J. M. G. (1996). Depression and the specificity of autobiographical memory. **In** *Remembering Our Past: Studies in Autobiographical Memory* (ed. D. Rubin) (pp. 244-267). Cambridge University Press: Cambridge.

Williams, J. M. G. (2001). *Suicide and attempted suicide. Understanding the cry of pain*. London: Penguin.

Williams, J.M.G., Barnhofer, T., Crane, C., & Beck A.T. (2005). Problem solving deteriorates following mood challenge in formerly depressed patients with a history of suicidal ideation. *Journal of Abnormal Psychology, 114* (3), 421–431.

Williams, J. M., Crane, C., Barnhofer, T., Van der Does, A. J., & Segal, Z. V. 2006. Recurrence of suicidal ideation across depressive episodes. *Journal of Affective Disorders, 912* (3), 189-194.

Williams, J. M. G., Van der Does, A. J.W., Barnhofer, T., Crane, C., & Segal, Z. V. (2008). Cognitive reactivity, suicidal ideation and future fluency: investigating a differential activation theory of suicidality. *Cognitive Therapy and Research, 32,* 83–104.

World Health Organization. (2012). Public Health Action For the Prevention of Suicide. Retrieved on January 20, 2012, from http://apps.who.int/iris/bitstream/10665/75166/

1/9789241503570_eng.pdf.

Wunderink, L., Sytema, S., Nienhuis, F.J., & Wiersma, D. (2009). Clinical recovery in first-episode psychosis. *Schizophrenia Bulletin, 35* (2), 362-369.

Zahl, D.L. & Hawton, K. (2004). Repetition of deliberate self-harm and subsequent suicicde risk: Long-term follow-up study of 11,583 patients. *British Journal of Psychiatry, 185*, 70-75.

Appendices

APPENDIX 1. PARTICIPANT INFORMATION SHEET

Participant Information Sheet

UNIVERSITY OF BIRMINGHAM

Study Title

The association between daily hassles, low mood, and hopelessness in patients with psychosis: A move towards validating the Differential Activation Hypothesis of suicidal relapse and recurrence using the Experience Sampling Method

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You are being invited to take part in a research study. Before you decide whether or not to take part, it is important to understand why this research study is being carried out and also what it involves. Please take time to read the following information carefully and discuss it with others if you wish. You are welcome to ask us any questions and our contact details are available at the end of this information sheet.

What is the purpose of the study?
There are two main aims to this study. First, is to examine the effect of mood on the way we look into our future and how we solve common day to day problems. Second, is to look at the effect of daily life hassles on your day to day mood and thoughts.

Do I have to take part?

Participation in this study is completely *voluntary*. You are free to – (a) decline to participate, (b) refuse to answer any individual question, or (c) withdraw your participation at any time without giving a reason, and without my medical care or legal rights being affected.

What will I have to do, if I take part?

This research involves two separate studies. You may choose to take part only in study 1, study 2, or both. If you do not wish to take part at all then there is no need to return the reply form from your letter of invitation.

Study 1 – Future Thinking (FT) task and Means Ends Problem Solving (MEPS) tasks

Assessments: Before the main part of the experiment starts you will undergo a series of assessments. These will measure your current level of depression, suicidal thinking, hopelessness and future thinking. The assessments are conducted in the form of questionnaires and interview. Each test will take between 10-15 minutes to complete.

Future Thinking Task**:** You will be asked to think of possible future experiences that will occur over 3 different time periods (next week including today, next year, & next 5 to 10 years). You will then be asked to think of future experiences under two different conditions (negative and positive). You will be given 1 minute to generate as many responses as you can for each of the time period and conditions. (Total duration: 15 minutes)

Means-Ends Problem Solving Task: You will be presented with problem scenarios on cards which will be simultaneously read aloud by the experimenter. Each scenario will outline an initial situation in which there is a problem to be solved and a desired endpoint. You will be given 2 minutes to describe the most effective strategy for solving the problem. (Total duration: 20 minutes)

Note: There are no right and wrong answers for the FT & MEPS tasks, they are both relatively easy to complete.

Musical Mood Induction Procedure: After completing the FT and MEPS tasks, a musical mood induction procedure will then be performed. This will consist of listening to a sad music and reading cards containing sad statements. The purpose of the procedure is to induce a sad mood. (Total duration: 8-10 minutes)

Following this procedure, you will be asked to complete the same tasks that you did prior to the mood induction procedure.

Study 2 - Experience Sampling Method (ESM)

Assessments: Before the main part of the experiment starts you will undergo a series of assessments. These will measure your current level of depression, suicidal thinking, hopelessness and future thinking, mood, rumination, response style, and life events. The assessments are conducted in the form of questionnaires and interview. Each test will take between 10-15 minutes to complete. (*Note: Some of the assessments completed on study 1 will not be repeated.*)

ESM procedure: You will be asked to assess your mood, thoughts, and activities in your day to day environment (e.g. at home, at work). You will be given a digital wrist watch and 6 ESM questionnaire diaries; one diary for each day of the study. Over the 6 days of study, the digital watch will emit 10 randomised beeps between the hours of 07.30am – 10.30pm, to inform you to fill out the corresponding page in the ESM questionnaire diary. It takes about *2 minutes* to complete *each questionnaire*. The questionnaire assesses your current thought, mood, self-worth, future thinking, psychotic experience, location, activity, physical needs and substance use. (Total duration: Each diary questionnaires = 2 minutes; 10 questionnaire per day (10 x 2min) = 20 minutes; 6 days of diary assessments (6 X 20min) = 120 minutes).

Note: You will only be expected to complete the diary assessments whenever it is possible & safe to do so. For instance, if you usually get up at around 10am and do not want to be disturbed when the watch emits a beep sound, you could put the watch in another room, or hide it in a drawer. The same thing applies should you wish to go to bed earlier than 10.30pm. Also, you will not be expected to pause from your day to day activity to fill in your diary unless it is safe and possible to do so (e.g. cycling & driving).

What about my expenses?

If you take part in the experiment your transportation costs to and from the pre-assessment venue will be met. Unfortunately, we cannot refund petrol costs for your own personal vehicle, but can reimburse you for public transport cost (on provision of a receipt/bus or train tickets).

This sounds really complicated, will I get any help?

Yes, when you have expressed an interest in taking part in the study, we will contact you, allowing you to ask any questions and address any concerns or worries you have about the study. You will be given a brief session on how you take part in the Experience Sampling Method study. A researcher

will guide you through a sample questionnaire, briefing you in how to use the watch, and provide all the guidance you will require. In the case of an emergency during the experiment, the researcher will be contactable by phone (e.g. problems with watch, diary loss)

What are the possible benefits of taking part?

You will be paid £20 upon completion of Study 1 (MEPS & FT study) and £30 upon completion of Study 2 (ESM study) in appreciation of your time and effort.

When your participation is complete, you will be given an opportunity to learn about this research, which may be useful in understanding yourself and others. By keeping a diary for 6 days (study 2), you may gain some insight on how your thoughts, activities, and events could make you feel a certain way (e.g. sad, cheerful, etc.). We do not, however, guarantee that everyone would benefit from the study as the daily life experiences of each individual will vary from person to person.

All in all, whilst we cannot promise that this study will help you, we hope that our results will add to the knowledge about daily life hassles, hopelessness, and low mood.

What are the possible risks of taking part?

When filling out questionnaires (for study 1 & 2), you may come across a question(s) that you find unpleasant. For instance, for study 1 you will be asked to think about possible negative events in your future. A couple of our questionnaires have questions about past events or occasions when you were feeling quite low, which you might also find uncomfortable.

Some of you may find study 2 slightly challenging or demanding as you will be need to complete your diary assessments at random times of the day. The diary assessments are especially challenging during the first day but once you get used to doing it, each questionnaire should only take no more than 2 minutes to complete.

If you want to seek help or wish to discuss your concerns further, support and assistance will be available via your Early Intervention Service (EIS) key worker. Counselling from an appropriate professional will also be offered if required.

What will happen once I have finished taking part in the study?

You will firstly be given an in depth debrief of the aims of the study, and when the data analysis is completed, a copy of the report will be issued to you.

Will my taking part keep confidential?

We recommend that your GP should know that you are taking part in this research. If you are happy for us to tell them, we will write them a letter. Nobody else will know about your participation in the study, and all results will be made anonymous (that is, your name will not be on them).

You will be assigned a code number which will protect your identity. All data will be kept in secured files, in accord with the standards of the NHS Research Ethics. Only the researchers involved in this study and those responsible for research oversight will have access to the information you provide. There will no identifying information (e.g. name, address, & telephone number) in your questionnaires so no one will be able to know how you did in your assessments. Your signed consent form will be kept completely separate from your paper-based assessments.

Finally, it is no individual person's responses that interest us; we are studying the association between low mood, hopelessness, and daily life hassles between clinical groups in general, so your name and any other identifying information will not appear on the final report.

What will happen to the results of the study?

The results of the study will be published as an internal and external report, being made available to the educational supervisors of the student conducting this research at the University of Birmingham. The study may also be external published through publication to a scientific journal. However, your anonymity will be preserved at all stages of this process.

Who is organising and funding the research?

This research is organised jointly by the University of Birmingham and Birmingham and Solihull Mental Health Trust: Early Intervention Service. The study has been reviewed by Birmingham South Research Ethics Committee and has been ethically approved (Insert Ethics Approval/Ref Number).

What happens now?

Think about all the information on this sheet and tell your Early Intervention Service (EIS) key worker or the person who sent you the sheet (please see reply form on the letter of invitation) whether you want to learn more about the research. If you do, we will telephone you at home and offer you an appointment for an assessment visit. If you are not sure about anything, you can ask questions at that first visit. At the first visit, we will go through all the information on this sheet to make sure that you understand it. We will then ask you to sign a consent form to agree to the research.

Where can I get more information?

If you have any further questions about this study, please feel free to contact any members of the researcher team below:

- **Donna Back**
  PhD Psychology Student
  School of Psychology
  University of Birmingham, Edgbaston, B15 2TT
  ☎0121 414 7209
  ✆ 07985 882 878
  ✉ dbb759@bham.ac.uk

- **Dr Chris Jackson**
  Consultant Clinical Psychologist
  Early Intervention Services
  1 Miller Street, Aston Birmingham, B6 4NF
  ☎ 0121 301 1850 Fax: 0121 301 1851
  ✉ Chris.Jackson@bsmht.nhs.uk

- **Prof Max Birchwood**
  Director of Early Intervention Services
  1 Miller Street, Aston Birmingham, B6 4NF,
  ☎ 0121 301 1850, Fax: 0121 301 1851
  ✉ M.j.birchwood.20@bham.ac.uk

Important contact points DURING the study:

If you have any concerns about the conduct of this study please contact:

- **Dr Paul McDonald**
  Manager of Research and Development Unit
  Birmingham & Solihull Mental Health NHS Trust
  Suite P, Radclyffe House, 66/68 Hagley Road
  Birmingham, B16 8PF
  ☎ 0121 678 4326
  ✉ paul.mcdonald@bsmht.nhs.uk

For ESM diary study-related enquiries/concerns (e.g. faulty watch, missing diaries, etc.), please contact:

- **Donna Back** *(between 9am – 5pm only)*
  ☎ 0121 414 7209
  ✆ (Work mobile – tbc)
  ✉ dbb759@bham.ac.uk

For support and assistance (should you feel upset, unhappy, or have any concerns about your mental health during and after the study), please contact your Early Intervention Service (EIS) key worker on:

- **Early Intervention Services** *(between 9am – 5pm only)*
  ☎ 0121 301 1850

For out of hours or 24 hours advice and support, please contact:

- **24 hours - Mental Health Services Switchboards**

  North or Heart of Birmingham
  ☎ 0121 685 7300 or 0121 623 5500

  QEPH and South Birmingham
  ☎ 0121 678 2000

  Solihull Patients
  ☎ 0121 424 2000

- **PALS (Patient Advice & Liaison Service)**
  ☎ 0800 953 0045

- **Birmingham Focus Line**
  ☎ 0800 027 2127

THANK YOU for taking time to read this.

APPENDIX 2. PARTICIPANT'S LETTER OF INVITATION

School of Psychology
513 Frankland Bldg
Edgbaston
Birmingham
B15 2TT

Tel No. 0121 414 7209
✉ dbb759@bham.ac.uk

UNIVERSITY OF BIRMINGHAM

>Patient's Name<
>Patient's Address<

>Date<

Dear _____,

My name is Donna Back. I am a postgraduate student at the University of Birmingham. I am conducting a research study on *"The association between daily hassles, low mood, and hopelessness"* as part of the requirements of my PhD in Psychology, and I would like to invite you to participate. This study is jointly sponsored by the University of Birmingham and Birmingham and Solihull Mental Health Trust. The main aim of the study is to explore the relationship between daily life hassles and mood. If you do decide to participate, you will be asked to complete several questionnaires and participate in the experiments explained in the attached information sheet.

Your participation is *confidential*. The data collected from this study will be kept in a secure location at the University of Birmingham, which only the research team has access to. The results of the study may be published or presented at professional meetings, but your identity will *not* be revealed. Your participation is also anonymous, which means that no one (not even the research team) will know what your answers are. So, please do not write your name or any other identifying information on any of the questionnaires.

You will receive a total of £50.00 as an appreciation for your time and participation (Study 1 = £20.00 & Study 2 = £30.00). Your travel expenses will also be reimbursed upon proof of travel receipts or tickets (bus or train). If you withdraw from the study prior to the conclusion, your reimbursement will be pro-rata (total amount due will be divided by the number of hours spent).

Taking part in this study is *voluntary*. You are free to withdraw at anytime during the study without giving any reason.

If you would like to participate, please read the attached information sheet for full details of the study. If you have any questions about it or would like to discuss participating, please contact me using the details listed below. Alternatively, you may complete and sign the attached reply form and hand it back to your key worker or send it to the address given below. You do not need to reply if you do not want to participate in the study.

Thank you for your consideration.

With kind regards,

Donna Back

APPENDIX 3. LETTER TO THE PARTICIPANT'S GP

UNIVERSITY OF BIRMINGHAM

School of Psychology
513 Frankland Bldg
Edgbaston
Birmingham
B15 2TT

Tel No. 0121 414 7209

>GP's Name<
>GP's Address<

Dear Dr …….,

Re: **Patient's Name**_____
Date of Birth _____
NHS No _____

Study Title: "The association between daily life hassles, low mood, and hopelessness in patients with psychosis"

Your patient is participating in the above study on daily life hassles, low mood, and hopelessness. The study will involve completion of a number of questionnaires, simple problem-solving and future directed thinking tasks, but will not involve any changes in their treatment. A copy of the participant information sheet is enclosed for your reference.

If you require any further information, please contact me on the numbers above, or the Principal Investigator, Prof Max Birchwood on 0121 301 1850.

Yours sincerely,

Donna Back
Chief Investigator/PhD Student

(On behalf of the study investigators)

Cc: >Patient's name<

APPENDIX 4. PARTICIPANT CONSENT FORM (MEPS & FT STUDY)

UNIVERSITY OF BIRMINGHAM

Participant Consent Form

Study title: <u>The association between daily hassles, low mood, and hopelessness in patients with psychosis: A move towards validating the Differential Activation Hypothesis of suicidal relapse and recurrence using the Experience Sampling Method</u>

By signing this informed consent form you are indicating that you understand the nature of the research study and that you agree to participate in the research.

1. I confirm that I have read and understood the information sheet dated 25th March 2009 (version 2) for the above study and have had the opportunity to discuss the details with …… and ask questions. ☐

2. I understand that my participation is voluntary and that I am <u>free to withdraw</u> at any time, without giving any reason, and without my medical care or legal rights being affected. ☐

3. I understand that my participation will be anonymous (that is, my name will not be linked with any data I give) and that all information I provide will remain confidential. ☐

4. I also understand that relevant sections of my medical notes and data collected during the study may be looked at by members of the research team, from regulatory authorities or from the NHS Trust where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records. ☐

5. I agree to communication with my GP about my participation in the research. ☐

5.a. I would like to be copied in to all such correspondence ☐

6. I hereby fully and freely consent to participate in the above Study 1- **Future Thinking Task** and **Means Ends Problem Solving task**, which has been fully explained to me. ☐

I have read and understood the statements above, and voluntarily sign this form. I further acknowledge that I have received an offer of a copy of this consent form.

Volunteer _____

Signature _____ Date _____

**If you wish to be told the results of this research, please tick here* ☐ *and provide your contact details at the back of this form.*

Investigator <u>Donna Back</u>

Signature _____ Date _____

Person taking consent _____

Signature _____ Date _____

APPENDIX 5. PARTICIPANT CONSENT FORM (ESM STUDY)

UNIVERSITY OF BIRMINGHAM

Participant Consent Form

Study title: <u>The association between daily hassles, low mood, and hopelessness in patients with psychosis: A move towards validating the Differential Activation Hypothesis of suicidal relapse and recurrence using the Experience Sampling Method</u>

By signing this informed consent form you are indicating that you understand the nature of the research study and that you agree to participate in the research.

1. I confirm that I have read and understood the information sheet dated 25th March 2009 (version 2) for the above study and have had the opportunity to discuss the details with ……. and ask questions. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, and without my medical care or legal rights being affected. ☐

3. I understand that my participation will be anonymous (that is, my name will not be linked with any data I give) and that all information I provide will remain confidential. ☐

4. I also understand that relevant sections of my medical notes and data collected during the study may be looked at by members of the research team, from regulatory authorities or from the NHS Trust where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records. ☐

5. I agree to communication with my GP about my participation in the research. ☐

   5.a. I would like to be copied in to all such correspondence ☐

6. I hereby fully and freely consent to participate in the above Study 2- The Experience Sampling Method, which has been fully explained to me. ☐

I have read and understood the statements above, and voluntarily sign this form. I further acknowledge that I have received an offer of a copy of this consent form.

Volunteer Signature _____ Date _____

**If you wish to be told the results of this research, please tick here* ☐ *and provide your contact details at the back of this form.*

Investigator Signature <u>Donna Back</u> _____ Date _____

Person taking consent Signature _____ Date _____

APPENDIX 6. COLUMBIA SUICIDE HISTORY FORM

HISTORY OF SUICIDAL IDEATION

Have you ever thought of committing suicide? _____ Yes _____ No
How often? _____Rarely _____Sometimes _____Often _____Almost Always
When was the last time? _____ DATE: _ _/_ _/

Have you ever tried to make a suicide attempt but did not follow through because you or someone else stopped you?

Yes_____ No_____

HISTORY/CHRONOLOGY OF SUICIDE ATTEMPTS

1. (IF NOT KNOWN) Did _____ ever attempt suicide?

   [DETERMINE whether there is evidence of any form of 1 2

   self-injurious act with the intent to commit suicide.] **YES NO**

(INTERVIEWER: if no evidence of possible suicide attempt, STOP, GO TO Scale of Suicidal Ideation (SSI). IF YES, CONTINUE.)

2. **Total number of lifetime suicide attempts (only self injurious behavior with intent to die)**

3. When was the first time he/she ever made an attempt? Please tell me about each, beginning with the first attempt. (TO QUALIFY AS AN ATTEMPT, it is essential to ascertain that there was an intent to die. IF UNCERTAIN, RECORD RELEVANT INFORMATION.)

FOR EACH EVENT ASK: "Tell me exactly what he/she did. What, if any, medical treatments did he/she receive? The aim here is to assess the method used, to obtain an estimate of lethality, and to identify the first, the most lethal, as well as the most recent attempt. [If more than 6 events, be sure to describe it: (1) FIRST ATTEMPT; (2) MOST LETHAL ATTEMPT, and (3) MOST RECENT ATTEMPT.] [In addition, please ask about all suicide events, including those that were aborted, interrupted, ambiguous, and actual.]

BEGIN WITH THE FIRST ATTEMPT:
ATTEMPT #___ DATE: __ /__ /__ Date Accuracy:___ LETHALITY: __ (See Leth. Rating Scale attached)
METHOD code(s):_ _,_ _,_ _ (Number/letter code, see Method code in Leth. Rating Scale; e.g., 1h, 2c, 3e)
ATTEMPT TYPE: 1=Actual 2=Ambiguous 3=Interrupted 4=Aborted

(a) Please describe for me exactly what happened.

(b) If overdose, include names and amount of all substances or drugs:

(c) Was he/she alone at the time? **1 =YES 2 =NO**

(d) What led up to this event?
If any specific external events appeared to "trigger" the attempt, describe the events and categorize the type of events:

EXTERNAL TRIGGER CATEGORY: ___ (1 to 7 scale)(St. Paul-Ramsey Life Experience Scale) to determine which category the most significant event falls into (1=conjugal, 2= other interpersonal, 3=occupational, 4=living situation, 5=health, 6=other, 7=cannot be assessed, 8=sexual abuse, 9=physical abuse)

SECONDARY TRIGGER (category):___

(e) What do you think he/she was feeling at the time?

(f) Describe any medical consequences of the event (i.e. type of medical damage, including drowsiness, state of consciousness, medical treatment, and response to treatment, and duration of acute condition).

ATTEMPT #___ DATE: __ /__ /__ Date Accuracy:___ LETHALITY: __ (See Leth. Rating Scale attached)
METHOD code(s):_ _,_ _,_ _ (Number/letter code, see Method code in Leth. Rating Scale; e.g., 1h, 2c, 3e)

ID#:_ _ _ _ BS#:
RATER:
DATE:

ATTEMPT TYPE: 1=Actual 2=Ambiguous 3=Interrupted 4=Aborted

(a) Please describe for me exactly what happened.

(b) If overdose, include names and amount of all substances or drugs:

(c) Was he/she alone at the time? **1 =YES 2 =NO**

(d) What led up to this event?
If any specific external events appeared to "trigger" the attempt, describe the events and categorize the type of events:

EXTERNAL TRIGGER CATEGORY: ___ (1 to 7 scale)(St. Paul-Ramsey Life Experience Scale) to determine which category the most significant event falls into (1=conjugal, 2= other interpersonal, 3=occupational, 4=living situation, 5=health, 6=other, 7=cannot be assessed, 8=sexual abuse, 9=physical abuse)

SECONDARY TRIGGER (category):___

(e) What do you think he/she was feeling at the time?

(f) Describe any medical consequences of the event (i.e. type of medical damage, including drowsiness, state of consciousness, medical treatment, and response to treatment, and duration of acute condition).

ATTEMPT #___ DATE: __ /__ /__ Date Accuracy:___ LETHALITY: __ (See Leth. Rating Scale attached)
METHOD code(s):_ _,_ _,_ _ (Number/letter code, see Method code in Leth. Rating Scale; e.g., 1h, 2c, 3e)
ATTEMPT TYPE: 1=Actual 2=Ambiguous 3=Interrupted 4=Aborted

(a) Please describe for me exactly what happened.

(b) If overdose, include names and amount of all substances or drugs:

(c) Was he/she alone at the time? **1 =YES 2 =NO**

(d) What led up to this event?
If any specific external events appeared to "trigger" the attempt, describe the events and categorize the type of events:

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SECONDARY TRIGGER (category):___

(e) What do you think he/she was feeling at the time?

(f) Describe any medical consequences of the event (i.e. type of medical damage, including drowsiness, state of consciousness, medical treatment, and response to treatment, and duration of acute condition).

ATTEMPT #___ DATE: __ /__ /__ Date Accuracy:___ LETHALITY: __ (See Leth. Rating Scale attached)
METHOD code(s):_ _,_ _,_ _ (Number/letter code, see Method code in Leth. Rating Scale; e.g., 1h, 2c, 3e)

ATTEMPT TYPE: 1=Actual 2=Ambiguous 3=Interrupted 4=Aborted

(a) Please describe for me exactly what happened.

(b) If overdose, include names and amount of all substances or drugs:

(c) Was he/she alone at the time? **1 =YES 2 =NO**

(d) What led up to this event?
If any specific external events appeared to "trigger" the attempt, describe the events and categorize the type of events:

EXTERNAL TRIGGER CATEGORY: ___ (1 to 7 scale)(St. Paul-Ramsey Life Experience Scale) to determine which category the most significant event falls into (1=conjugal, 2= other interpersonal, 3=occupational, 4=living situation, 5=health, 6=other, 7=cannot be assessed,8=sexual abuse, 9=physical abuse)

SECONDARY TRIGGER (category):___

(e) What do you think he/she was feeling at the time?

(f) Describe any medical consequences of the event (i.e. type of medical damage, including drowsiness, state of consciousness, medical treatment, and response to treatment, and duration of acute condition).

ATTEMPT #___ DATE: __ /__ /__ Date Accuracy:___ LETHALITY: __ (See Leth. Rating Scale attached)
METHOD code(s):_ _,_ _,_ _ (Number/letter code, see Method code in Leth. Rating Scale; e.g., 1h, 2c, 3e)
ATTEMPT TYPE: 1=Actual 2=Ambiguous 3=Interrupted 4=Aborted

(a) Please describe for me exactly what happened.

(b) If overdose, include names and amount of all substances or drugs:

(c) Was he/she alone at the time? **1 =YES 2 =NO**

(d) What led up to this event?

If any specific external events appeared to "trigger" the attempt, describe the events and categorize the type of events:

EXTERNAL TRIGGER CATEGORY: ___ (1 to 7 scale)(St. Paul-Ramsey Life Experience Scale) to determine which category the most significant event falls into (1=conjugal, 2= other interpersonal, 3=occupational, 4=living situation, 5=health, 6=other, 7=cannot be assessed, 8=sexual abuse, 9=physical abuse)

SECONDARY TRIGGER (category):___

(e) What do you think he/she was feeling at the time?

(f) Describe any medical consequences of the event (i.e. type of medical damage, including drowsiness, state of consciousness, medical treatment, and response to treatment, and duration of acute condition).

ATTEMPT #___ DATE: __ /__ /__ Date Accuracy:___ LETHALITY: __ (See Leth. Rating Scale attached)
METHOD code(s):_ _,_ _,_ _ (Number/letter code, see Method code in Leth. Rating Scale; e.g., 1h, 2c, 3e)

ID#:_ _ _ _ BS#:
RATER:
DATE:

ATTEMPT TYPE: 1=Actual 2=Ambiguous 3=Interrupted 4=Aborted

(a) Please describe for me exactly what happened.

(b) If overdose, include names and amount of all substances or drugs:

(c) Was he/she alone at the time? **1 =YES 2 =NO**

(d) What led up to this event?
If any specific external events appeared to "trigger" the attempt, describe the events and categorize the type of events:

EXTERNAL TRIGGER CATEGORY: ___ (1 to 7 scale)(St. Paul-Ramsey Life Experience Scale) to determine which category the most significant event falls into (1=conjugal, 2= other interpersonal, 3=occupational, 4=living situation, 5=health, 6=other, 7=cannot be assessed, 8=sexual abuse, 9=physical abuse)

SECONDARY TRIGGER (category):___

(e) What do you think he/she was feeling at the time?

(f) Describe any medical consequences of the event (i.e. type of medical damage, including drowsiness, state of consciousness, medical treatment, and response to treatment, and duration of acute condition).

ATTEMPT #___ DATE: __ /__ /__ Date Accuracy:___ LETHALITY: __ (See Leth. Rating Scale attached)
METHOD code(s):_ _,_ _,_ _ (Number/letter code, see Method code in Leth. Rating Scale; e.g., 1h, 2c, 3e)
ATTEMPT TYPE: 1=Actual 2=Ambiguous 3=Interrupted 4=Aborted

(a) Please describe for me exactly what happened.

(b) If overdose, include names and amount of all substances or drugs:

(c) Was he/she alone at the time? **1 =YES 2 =NO**

(d) What led up to this event?
If any specific external events appeared to "trigger" the attempt, describe the events and categorize the type of events:

EXTERNAL TRIGGER CATEGORY: ___ (1 to 7 scale)(St. Paul-Ramsey Life Experience Scale) to determine which category the most significant event falls into (1=conjugal, 2= other interpersonal, 3=occupational, 4=living situation, 5=health, 6=other, 7=cannot be assessed,8=sexual abuse, 9=physical abuse)

SECONDARY TRIGGER (category):___

(e) What do you think he/she was feeling at the time?

(f) Describe any medical consequences of the event (i.e. type of medical damage, including drowsiness, state of consciousness, medical treatment, and response to treatment, and duration of acute condition).

<u>NOTE: ADD EXTRA SUICIDE HISTORY PAGES TO INCLUDE ALL SUICIDE ATTEMPTS</u>

APPENDIX 7. LEIDEN INDEX OF DEPRESSION SCALE – REVISED

Instructions

Below are a number of statement that may apply to you to a lesser or greater extent.

Almost every statement concerns your thoughts about a certain matter at time when you feel down or when you are in a low mood. This does not mean a seriously depressed mood or true depression. Your task is to indicate the extent to which the statements apply to you when you feel somewhat sad.

Try to imagine the following situation when filling out this questionnaire.

It is certainly not a good day, but you don't truly feel down or depressed.

Perhaps your mood is an early sign of something worse, but things might improve in the next day or two.

On a scale of 0 to 10 (0 = not at all; 10 = extremely sad; 6 and above = a truly depressed mood), you would choose 3 or 4 to describe your mood.

This scale looks like this:

1	2	3	4	5	6	7	8	9	10
not at all sad		somewhat sad			depressed				extremely sad

Please try to imagine yourself in the above situation, for instance by thinking back to the last time you felt somewhat sad (score 3 or 4).

{Now take some time to imagine such a situation}

To what extent are you able to imagine such a situation?

O well
O somewhat
O not at all

Now proceed to the next question (even if you find it difficult to imagine yourself in such a situation).

Behaviour Research & Therapy 40; 105-120 (2002)

This applies to me..... (please circle)

		not at all	a bit	mode-rately	strongly	very strongly
1	I can only think positive when I am in a good mood.	0	1	2	3	4
2	When in a low mood, I take fewer risks.	0	1	2	3	4
3	When I feel sad, I spend more time thinking about what my moods reveal about me as a person.	0	1	2	3	4
4	When in a sad mood, I am more creative than usual.	0	1	2	3	4
5	When I feel down, I more often feel hopeless about everything.	0	1	2	3	4
6	When I feel down, I am more busy trying to keep images and thoughts at bay.	0	1	2	3	4
7	In a sad mood, I do more things that I will later regret.	0	1	2	3	4
8	When I feel sad, I go out and do more pleasurable things.	0	1	2	3	4
9	When I feel sad, I feel as if I care less if I lived or died.	0	1	2	3	4
10	When I feel sad, I am more helpful.	0	1	2	3	4
11	When I feel sad, I am less inclined to express disagreement with someone else.	0	1	2	3	4
12	When I feel somewhat depressed, I think I can permit myself fewer mistakes.	0	1	2	3	4
13	When I feel down, I more often feel overwhelmed about things.	0	1	2	3	4
14	When in a low mood, I am more inclined to avoid difficulties or conflicts.	0	1	2	3	4
15	When I feel down, I have a better intuitive feeling for what people really mean.	0	1	2	3	4
16	When in a sad mood, I become more bothered by perfectionism.	0	1	2	3	4
17	When I feel sad, I more often think that I can make no one happy.	0	1	2	3	4
		not at all	a bit	Mode-rately	strongly	very strongly

Please continue to the next page.

This applies to me..... (please circle)

		not at all	a bit	mode-rately	strongly	very strongly
18	When I feel bad, I feel more like breaking things.	0	1	2	3	4
19	I work harder when I feel down.	0	1	2	3	4
20	When I feel sad, I feel less able to cope with everyday tasks and interests.	0	1	2	3	4
21	In a sad mood, I am bothered more by aggressive thoughts.	0	1	2	3	4
22	When I feel down, I more easily become cynical (blunt) or sarcastic.	0	1	2	3	4
23	When I feel down, I feel more like escaping everything.	0	1	2	3	4
24	When I feel sad, I feel more like myself.	0	1	2	3	4
25	When I feel down, I more often neglect things.	0	1	2	3	4
26	When I feel sad, I do more risky things.	0	1	2	3	4
27	When I am sad, I have more problems concentrating.	0	1	2	3	4
28	When in a low mood, I am nicer than usual.	0	1	2	3	4
29	When I feel down, I lose my temper more easily.	0	1	2	3	4
30	When I feel sad, I feel more that people would be better off if I were dead.	0	1	2	3	4
31	When I feel down, I am more inclined to want to keep everything under control.	0	1	2	3	4
32	When I feel sad, I spend more time thinking about the possible causes of my mood.	0	1	2	3	4
33	When in a sad mood, I more often think about how my life could have been different.	0	1	2	3	4
34	When I feel sad, more thoughts of dying or harming myself go through my mind.	0	1	2	3	4
		not at all	a bit	Mode-rately	strongly	very strongly

Please check whether all items are answered. Thank you.

APPENDIX 8. CALGARY DEPRESSION SCALE FOR SCHIZOPHRENIA

CALGARY DEPRESSION SCALE

1. DEPRESSION.
How would you describe your mood over the last two weeks?
Do you keep reasonably cheerful or have you been very depressed or low spirited recently?
In the last two weeks how often have you (own words) every day? all day?

0	**Absent**	
1	**Mild**	Expressed some sadness or discouragement on questioning.
2	**Moderate**	Distinct depressed mood persisting up to half the time over last two weeks, present daily.
3	**Severe**	Markedly depressed mood persisting daily over half the time, interfering with normal motor and social functioning.

2. HOPELESSNESS.
How do you see the future for yourself?
Can you see any future or has life seemed quite hopeless?
Have you given up or does there still seem some reason for trying?

0	**Absent**	
1	**Mild**	Has at times felt hopeless over the last week but still has some degree of hope for the future.
2	**Moderate**	Persistent, moderate sense of hopelessness over last week. Can be persuaded to acknowledge possibility of things being better.
3	**Severe**	Persisting and distressing sense of hopelessness.

3. SELF-DEPRECIATION.
What is your opinion of yourself compared to other people?
Do you feel better or not as good or about the same as most?
Do you feel inferior or even worthless?

0	**Absent**	
1	**Mild**	Some inferiority; not amounting to feelings of worthlessness.
2	**Moderate**	Subject feels worthless, but less than 50% of the time.
3	**Severe**	Subject feel worthless more than 50% of the time. May be challenged to acknowledge otherwise.

4. GUILTY IDEAS OF REFERENCE.
Do you have the feeling that you are being blamed for something or even wrongly accused?
What about ? (Do not include justifiable blame or accusations; exclude delusions of guilt).

0	**Absent**	
1	**Mild**	Subject feels blamed but not accused less than 50% of the time.
2	**Moderate**	Persisting sense of being blamed, and/or occasional sense of being accused.
3	**Severe**	Persistent sense of being accused. When challenged acknowledges that it is not so.

5. PATHOLOGICAL GUILT.
Do you tend to blame yourself for little things you may have done in the past?
Do you think you deserve to be so concerned about this?

0	**Absent**	
1	**Mild**	Subject sometimes feels over guilty about some minor peccadillo, but less than 50% of the time.
2	**Moderate**	Subject usually, (over 50% of time) feels guilty about past, actions, the significance of which he/she exaggerates.
3	**Severe**	Subject usually feels he/she is to blame for everything that has gone wrong, even when not his/her fault.

6. MORNING DEPRESSION.
When you have felt depressed over the last two weeks, have you noticed the depression being worse at any particular time of day?

0	**Absent**	No depression.
1	**Mild**	Depression present but no diurnal variation.
2	**Moderate**	Depression spontaneously mentioned to be worse in the morning.
3	**Severe**	Depression markedly worse in morning, with impaired functioning which improved in afternoon.

7. EARLY WAKENING.
Do you wake earlier in the morning than is normal for you?
How many times a week does this happen?

0	**Absent**	No early wakening.
1	**Mild**	Occasionally wakes (up to twice weekly) one hour or more before normal time to wake or alarm time.
2	**Moderate**	Often wakes early (up to five times weekly) one hour or more before normal time to wake or alarm
3	**Severe**	Daily wakes one hour or more before normal time.

8. SUICIDE.
Have you felt that life wasn't worth living?
Did you ever feel like ending it all?
What did you think you might do?
Did you actually try?

0	**Absent**	
1	**Mild**	Frequently thought of being better of dead, or occasional thoughts of suicide.
2	**Moderate**	Deliberately considered suicide with a plan, but made no attempt.
3	**Severe**	Suicidal attempt apparently designed to end in death (i.e. accidental discovery or inefficient means).

9. OBSERVED DEPRESSION.
Based on interviewer's observations during the entire interview.
The question "do you feel like crying?" used at an appropriate point in the interview, may elicit information useful to this observation.

0	**Absent**	
1	**Mild**	Subject appears sad and mournful even during parts of the interview involving effectively neutral discussion.
2	**Moderate**	Subject appears sad and mournful throughout the interview, with gloomy monotonous voice and is tearful or close to tears at times.
3	**Severe**	Subject chokes on distressing topics, frequently sighs deeply and cries openly, or is persistently in a state of frozen misery.

APPENDIX 9. BECK HOPELESSNESS SCALE

This questionnaire consists of 20 statements. Please read the statements carefully one by one. If the statement described your attitude for the **past week including today**, mark the "T" indicating TRUE in the column next to the statement. If the statement does not describe your attitude, mark the "F" indicating FALSE in the column next to this statement. Please be sure to read each statement carefully.

Please be sure to read each statement carefully.

	True	**False**
1. I look forward to the future with hope and enthusiasm.	T	F
2. I might as well give up because there is nothing I can do about making things better for myself.	T	F
3. When things are going badly, I am helped by knowing that they can't stay that way forever.	T	F
4. I can't imagine what my life would be like in ten years.	T	F
5. I have enough time to accomplish the thing I most want to do.	T	F
6. In the future, I expect to succeed in what concerns me most.	T	F
7. My future seems dark to me.	T	F
8. I happen to be particularly lucky and I expect to get more of the good things in life than an average person.	T	F
9. I just don't get the breaks, and there's no reason to believe that I will in the future.	T	F
10. My past experiences have prepared me well for my future.	T	F
11. All I can see ahead is unpleasantness rather than pleasantness.	T	F
12. I don't expect to get what I really want.	T	F
13. When I look ahead to the future, I expect to be happier than I am now.	T	F
14. Things just won't work out the way I want them to.	T	F
15. I have great faith in the future.	T	F
16. I never get what I want, so it's foolish to want anything.	T	F
17. It is very unlikely that I will get any real satisfaction in the future.	T	F
18. The future seems vague and uncertain to me.	T	F
19. I can look forward to more good times than bad times.	T	F
20. There's no use in really trying to get something I want because I probably won't get it.	T	F

APPENDIX 10. INTERSEPT SCALE FOR SUICIDAL THINKING

	0	1	2	Score (1 to 2)
1. Wish to die	None	Weak	Moderate to strong	
2. Reasons for living vs. dying	For living outweigh for dying	About equal	For dying outweigh for living	
3. Desire to make active suicide attempt	None	Weak	Moderate to strong	
4. Passive suicidal desire	Would take precautions to save lives	Would leave life/death to chance	Would avoid steps necessary to save or maintain life	
5. Frequency of suicidal ideation	Rare or occasional	Intemittent	Accepting	
6. Attitude towards ideation/wish	Rejecting	Ambivalent or indifferent	Has no ability to control impulses	
7. Control over suicidal/acting out or delusions/ hallucinations of self-harm	Has complete ability to control impulses	Unsure of ability to control impulses	Has no ability to control impulses	
8. Deterrents to active attempt (e.g. religious values, family)	Would not attempt because of deterrents	Some concerns about deterrents	Minimal or no deterrents	
9. Reason for contemplating attempt	To maintain the environment, revenge; get attention	Combination of 0 and 2	Escape, solve problems	
10. Method: Specificity/planning of contemplated attempt	Not considered or not applicable	Considered but details not worked out	Details worked out; well formulated plan	
11. Expectancy/anticipation by patient of actual attempt	None	Uncertain	Yes	
12. Delusions/Hallucinations of self-harm (including command hallucinations)	None	Occasional	Frequent	
TOTAL SCORE				

Semi-Structured Interview

InterSePT Scale for Suicical Thinking

1. The items assess the extent of suicidal thoughts and their characteristics as well as the patient's attitude towards them.
2. The scale should be rated on the basis of all information available to the rater.
3. Depending on the psychiatric status of the patients as well as the degree to which he/she is articulate, the rater has the option to follow different lines f inquiry than those suggested by the questions provided below.
4. The general time frame for rating each of the items is the last 7 days.
5. If there is ambiguity, rate the highest rating for the week.

Possible Questions:

1. How are you feeling this week?
2. In the past week, have you ever thought about taking your life?
3. If so, how strong have these thoughts been?
4. How frequently have you had this thoughts this past week?
5. How strong would you say your wish to die is?
6. This past week, have you looked forward to taking your life?

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7. Which has been stronger this past week – your reasons for living or your reasons for dying?
8. If you had been in a dangerous or life-threatening situation this past week, what actions would you have taken to save your life?
9. In this past week, have you been able to control your suicidal thinking or might you have made an attempt at any time?
10. Is there anything in your life that would have made taking your life this past week seem like a bad idea, for example, your religion, family, etc.?
11. **(IF PATIENT WAS SUICIDAL IN PAST WEEK)** What have reasons been for thinking about taking your life during this past week? Do you think there reasons are good ones?
12. If you have committed sucide this past week, how would you have done it?
13. In the past week, have you heard voices, commands or others telling you to take your life?

APPENDIX 11. THE ESM TIME SAMPLING SCHEDULE

DAY No.	TS1	TS2	TS3
DAY 1	08:46:00	08:13:00	08:39:00
	09:45:00	10:20:00	09:56:00
	11:21:00	10:56:00	11:49:00
	13:25:00	13:09:00	12:20:00
	14:55:00	14:54:00	14:54:00
	15:23:00	16:29:00	15:26:00
	16:49:00	17:02:00	17:39:00
	19:14:00	18:58:00	18:27:00
	20:04:00	19:56:00	20:30:00
	21:40:00	21:20:00	21:49:00
DAY 2	08:43:00	07:59:00	08:53:00
	10:06:00	09:50:00	09:17:00
	11:41:00	11:38:00	11:55:00
	13:23:00	13:15:00	13:14:00
	14:14:00	14:57:00	14:35:00
	16:26:00	16:28:00	15:50:00
	17:53:00	17:13:00	17:45:00
	18:46:00	19:22:00	19:15:00
	20:20:00	19:46:00	20:32:00
	21:41:00	22:01:00	21:54:00
DAY 3	08:09:00	08:39:00	08:37:00
	10:24:00	09:18:00	09:18:00
	11:08:00	11:57:00	11:52:00
	12:38:00	13:22:00	13:06:00
	13:45:00	14:27:00	14:48:00
	16:16:00	15:59:00	15:17:00
	17:19:00	17:36:00	17:00:00
	18:22:00	19:22:00	18:18:00
	20:02:00	20:05:00	20:27:00
	21:37:00	21:49:00	21:56:00

DAY No.	TS1	TS2	TS3
DAY 4	08:24:00	08:51:00	07:57:00
	09:31:00	09:58:00	10:30:00
	11:52:00	10:56:00	11:58:00
	12:19:00	13:04:00	12:36:00
	14:27:00	14:02:00	14:34:00
	15:42:00	15:18:00	16:22:00
	16:55:00	17:28:00	17:59:00
	18:25:00	18:58:00	18:53:00
	20:46:00	20:48:00	20:15:00
	21:49:00	21:40:00	21:41:00
DAY 5	08:16:00	08:33:00	08:07:00
	10:13:00	09:18:00	09:17:00
	11:38:00	11:36:00	11:03:00
	13:26:00	12:57:00	13:20:00
	14:40:00	14:13:00	14:14:00
	16:14:00	15:55:00	15:24:00
	16:47:00	16:52:00	17:43:00
	18:30:00	19:23:00	18:42:00
	19:50:00	20:13:00	20:17:00
	21:56:00	21:40:00	21:24:00
DAY 6	08:03:00	08:48:00	08:06:00
	10:00:00	09:45:00	09:27:00
	11:18:00	11:31:00	11:58:00
	12:34:00	12:59:00	12:19:00
	14:16:00	14:56:00	14:06:00
	16:15:00	15:51:00	15:32:00
	16:47:00	17:26:00	17:11:00
	19:01:00	19:28:00	18:48:00
	20:16:00	20:56:00	20:16:00
	21:22:00	22:06:00	21:47:00

APPENDIX 12. THE ESM DEBRIEFING FORM

Participant Number

Date: _____
Interviewer: _____

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1. Did the Experience Sampling influence…

•Your mood Yes/No
If so, how?

•Your activities Yes/No
If so, how?

•Your thoughts Yes/No
If so, how?

•Your contact with other people Yes/No
If so, how?

2. Did the Experience Sampling disturb you Yes/No
If so, how?

3. Was this an ordinary week (with respect to the complaints) Yes/No
If not, what was different?

4. Were there special events or problems during this week? Yes/No
If so, what?

5. Were there difficult items in the booklets? Yes/No
If so, which item/s?

6. Could you give a good reflection of your experiences?
Yes/No
If not, why not?

7. Is there anything you missed in the booklets? Yes/No
If so, what?

8. Did you take your medication during this period?
Yes/No
If not, what medication and why not?

Remarks:

_____

_____

_____

_____

_____

APPENDIX 13. VISUAL ANALOGUE SCALE

VAS Mood Rating

Participant Number	
Date	

Place a vertical mark on the line below to indicate how you feel right now.

At this moment, I feel...

not at all _____ extremely

Happy

not at all _____ extremely

Despondent

APPENDIX 14. THE MEPS TASK – PROBLEM SCENARIOS

Item no.	Problem scenario
2	Heather loved her boyfriend very much, but they had many arguments. One day, he (the boyfriend) left her. Heather wanted things to be better. The story ends with everything fine between her and her boyfriend. Please begin your story when her boyfriend left after an argument.
3	Mrs Philips came home after shopping and found that she had lost her watch. She was very upset about it. The story ends with Mrs Philips finding her watch and feeling good about it. Please begin your story when Mrs Philips realised that she had lost her watch.
4	Caroline had just moved in that day to a new neighbourhood and didn't know anyone. Caroline wanted to have friends in this new neighbourhood. The story ends with Caroline having many good friends and feeling at home in the neighbourhood. Please begin your story with Caroline in her room, unpacking boxes.
6	One day, Alice saw a beautiful man she had never seen before while eating in a restaurant. She was immediately attracted to him. The story ends when they get married. Please begin your story when Alice first sees the man in the restaurant.
8	Jane noticed that her friends seemed to be avoiding her. Jane wanted to have friends and be liked. The story ends when Jane's friends like her again. Please begin your story when Jane first notices her friends avoiding her.
10	Jenny is having trouble getting along with her supervisor at work. Jenny is very unhappy about this. The story ends with Jenny's supervisor liking her. Please begin your story when Jenny wasn't getting along well with her supervisor at work.

APPENDIX 15. VELTEN NEGATIVE STATEMENTS

1. It seems such an effort to do anything.
2. I feel pessimistic about the future.
3. I have too many bad things in my life.
4. I have very little to look forward to.
5. I'm drained of energy, worn out.
6. I'm not as successful as other people.
7. Everything seems futile, pointless.
8. I just want to curl up and go to sleep.
9. There are things about me that I don't like.
10. It's too much of an effort even to move.
11. I'm absolutely exhausted.
12. The future seems just one string of problems.
13. My thoughts keep drifting away.
14. I get no satisfaction from the things I do.
15. I've made so many mistakes in the past.
16. I've got to really concentrate just to keep my eyes open.
17. Everything I do turns out badly.
18. My whole body has slowed down.
19. I regret some of the things I've done.
20. I can't make the effort to liven myself up.
21. I feel depressed with the way things are going.
22. I haven't any real friends anymore.
23. I do have a number of problems.
24. There's no one I can really feel close to.
25. I wish I were somebody else.
26. I'm annoyed at myself for being so bad at making decisions.
27. I don't make a good impression on other people.
28. The future looks hopeless.
29. I don't get the same satisfaction out of things these days.
30. I wish something would happen to make me feel better.