COGNITIVE AND AFFECTIVE FEATURES OF A PERSONALITY RISK FACTOR FOR DEPRESSION AND ALCOHOLISM

by

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Abstract

Despite the well-established relationship between depression and alcoholism, the psychological processes that link these two disorders are not well understood. The focus of the current study is on a personality construct called introversion/hopelessness (I/H), which recent research has identified as a potential motivational link between depression and alcoholism (Conrod, Pihl, Stewart, & Dongier, 2000). In this study, high introverted-hopeless (HH) and low introverted-hopeless (LH) individuals were compared on various aspects of cognitive and emotional functioning that were hypothesized to be susceptible to the effects of alcohol. Cognitive measures included the dysfunctional attitudes scale, memory bias for negative self-referent information as measured by an incidental recall task, and attentional orienting as measured by a cued reaction time task. Emotional reactivity was assessed using a procedure designed to induce transient negative and positive mood states. Cognitive reactivity to induced mood was also assessed. Results revealed that the HH group, compared to the LH group, had stronger baseline dysfunctional attitudes, a more negative self-view, and sadder affect. However, these differences were negligible when depression was covaried out. The HH group also showed preferential recall of negative self-referent information. In exploratory analyses, baseline mood and response times on the attentional orienting task were found to be highly correlated in the HH group, but not the LH group. Contrary to expectations, HH individuals were less reactive to the negative mood induction both at an affective and cognitive level. The observed pattern of findings suggests that avoidance of negatively charged emotional states and a negatively biased cognitive style that is unresponsive to changes in mood are characteristic features of introversion-hopelessness.

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Depression is considered a risk factor for alcoholism in that it predicts both future alcohol consumption as well as the subsequent development of alcohol-related problems (Hartka, Johnstone, Leino, and Motoyoshi, 1991). Furthermore, co-morbid depression worsens both the course and treatment of alcoholism (Lynskey, 1998). An estimated 20% of alcoholics continue to be depressed after a period of abstinence, suggesting that for some individuals, alcoholism is secondary to depression (Kessler et al., 1994). For this subset of individuals, depression may be involved in the initiation or maintenance alcohol problems. Despite the well-established relationship between depression and alcoholism, the psychological processes that link these two disorders are not well understood. One possibility is that depressed individuals use alcohol as a way to regulate their emotions. Cooper, Frone, Russell, and Mudar's (1995) motivational model of alcohol use predicts that negative emotions are associated with drinking for the purpose of coping, whereas positive emotions are associated with drinking for the purpose of enhancing one's emotional experience. Tests of their model on adult and adolescent samples have supported the presence of these two distinct psychological motives for alcohol consumption.

Another clue to the relationship between depression and alcoholism may be the common personality traits shared by individuals with these two disorders. Research suggests that primarily depressed alcoholics possess higher levels of trait anxiety and introversion than non-depressed or secondarily depressed alcoholics (Epstein, Ginsburg, Hesselbrock, & Schwartz, 1994; Martin & Sher, 1994). Furthermore, an inhibited style of personality (as defined by shyness, fearfulness, and a tendency to become easily upset) at an early age is predictive of depression and alcohol-related problems in adulthood (Caspi, Moffitt, Newman, & Silva, 1996).

Motivational theories of alcoholism are based on the premise that individual differences are associated with differences in susceptibility to the specific reinforcing effects of alcohol. For example, Cloninger's (1987) influential neurobiological learning model of alcoholism distinguishes between Type I and Type II alcoholics. According to his classification system, Type I alcoholics are characterized by high harm avoidance and low novelty seeking, whereas Type II alcoholics are characterized by low harm avoidance and high novelty seeking. Harm avoidance is used to describe someone who is cautious, inhibited, and pessimistic (high harm avoidance), or confident, uninhibited, and optimistic (low harm avoidance). Novelty-seeking refers to someone who is rigid, reflective and attentive to detail (low novelty seeking), or impulsive, exploratory, and distractible (high novelty seeking). Cloninger (1987) hypothesized that these two subtypes, because of their distinct personality traits, have different underlying motivations for drinking. The high harm avoidance and low novelty seeking Type I alcoholics at first inhibit their initiation and frequency of drinking, but the risk of alcoholism increases as the individual begins to experience the anxiety relieving properties of alcohol. In contrast, the low harm avoidance and high novelty seeking Type II alcoholics are motivated to drink in order to induce euphoria.

More recently, Conrod, Pihl, Stewart, and Dongier (2000) have developed a classification system for identifying substance abusers on the basis of four distinct personality-based motivational profiles: introversion-hopelessness, anxiety sensitivity, impulsivity, and sensation-seeking. Conrod et al. (2000) have suggested that the introversion-hopelessness construct may be a motivational link between depression and alcoholism. This construct consists of items that are intended to measure deficiencies in positive affect, pessimistic cognitions, and negative beliefs about one's self-worth. Thus, the measure consists of both an affective and a cognitive

dimension. According to the tripartite model of depression and anxiety (Clark & Watson, 1991), low positive affect, or anhedonia, is the key factor that discriminates depression from anxiety. In contrast, anxiety can be distinguished from depression based on symptoms of physiological arousal. Clark & Watson (1991) further postulate that the high positive correlation between these two disorders can be explained by a general distress factor called negative affectivity. Other researchers have focused on cognitive symptoms as being most valuable for distinguishing between anxiety and depression.

Individuals who score high on introversion-hopelessness show an increased risk for lifetime diagnosis of depression and have a preference for drugs with analgesic properties (opioids in particular, but also alcohol). Thus, the pain-reducing effects of alcohol may instigate consumption in this group of individuals. Supporting this view is the finding that introversion-hopelessness is associated with self-report reasons for drinking involving a desire to numb pain, reduce pessimism, and turn off negative thoughts (Blackwell, Conrod, & Hansen, 2002). Furthermore, the relationship between introversion-hopelessness and this particular subset of drinking motives was partially mediated by the frequency of negative automatic thoughts.

The objective of the present study was to more rigorously define the cognitive and affective processes that characterize these individuals in order to explicate the role that this personality profile may play in the development of problematic drinking. Because of the complexity and expenses involved in the design and delivery of alcohol administration paradigms, it was important to initially reveal the potential mechanisms through which alcohol might be reinforcing to these individuals. Once these mechanisms have been identified, an alcohol challenge study specifically targeting these cognitive and/or affective processes would be warranted. A central premise of this research is that introversion-hopelessness represents a

distinct subtype of depressogenic personality that is also susceptible to the reinforcing effects of alcohol, possibly through its pharmacological mood-enhancing properties or its effects on cognitive processes associated with depressed mood. As pointed out by Alloy & Clements (1998), many clinicians and researchers have long considered depression to be a heterogeneous disorder with non-overlapping etiologies. However, recent classifications of depressive disorders (e.g. unipolar, bipolar, endogenous) group people together based on a constellation of similar symptom patterns, which may actually reflect the end state of a common pathway for different subtypes. As mentioned earlier, the introversion-hopelessness measure has both an affective/motivational as well as a cognitive component. Due to the many competing perspectives on affective and cognitive features associated with susceptibility to depression, an important goal of this study was to evaluate introversion-hopelessness on both of these components. In the following section, a brief account is provided of major theories of depression which were influential in the development of the specific research hypotheses of this investigation. This is followed by a review of theories regarding the relationship between personality and affect susceptibility, from which other predictions for this study were derived.

Cognitive Vulnerability Theories

Two theories of cognitive vulnerability have dominated research on depression. The first of these is Beck's theory (1967; Beck, Rush, Shaw, & Emery, 1979), which postulates that depression-prone people are characterized by negative self-schema revolving around themes of failure, inadequacy, loss, and worthlessness. These maladaptive cognitive structures are represented as a set of dysfunctional attitudes which act as frameworks for evaluating personal experiences. Dysfunctional attitudes include beliefs such that one's happiness or success depends on the approval of others. Beck's view that depressive self-schema guide the

perception, interpretation, and memories of personally relevant events is consistent with current cognitive science perspectives on the operation of schema (Alloy, Abramson, Murray, Whitehouse, & Hogan, 1997). Activation of dysfunctional attitudes by life stressors leads the development of depressive symptoms through it effects on preferential processing (e.g. encoding, retrieval) of negative self-related information.

Another prominent theory of cognitive vulnerability is the hopelessness theory of depression (Abramson, Metalsky, & Alloy, 1989). According to this theory, individuals who attribute negative life events to stable and global causes, maintain that negative events will inevitably lead to negative consequences, and that negative events signify personal deficiency are more likely to develop "hopelessness depression" when confronted by stressful events. The hopelessness theory also makes specific predictions about the particular symptoms that accompany hopelessness depression. These include motivational deficit, apathy, sad affect, suicidal ideation, low energy, psychomotor retardation, and mood-exacerbated negative cognitions.

Investigators have in general used one of two methods for assessing the cognitive vulnerabilities that are central to Beck's theory and the hopelessness theory. The first method involves the use of self-report measures to assess the *content* of the self-schema or cognitive representation. Content refers to a list of general and specific terms, rules, or assumptions that individuals have constructed as a result of their personal experiences. Of these self-report measures, perhaps the most commonly employed one is the Dysfunctional Attitudes Scale (DAS; Weissmann & Beck, 1978). The second of these methods involves the use of paradigms from cognitive psychology as a means of assessing the information-processing biases which are thought to be the by-products of these cognitive styles (Alloy et al., 1997).

Depressogenic cognitive content. There is much debate in the literature regarding the stability of dysfunctional thought patterns, and their potential causal role in the development of depression. Researchers distinguish between pure trait models, pure state models, and state-trait models of cognitive vulnerability. Pure trait models predict that a predisposing variable will be highly stable and context-independent. In contrast, pure state models predict that the predisposing variable is highly unstable and state-dependent, in essence rejecting the idea of a stable cognitive structure. Finally, state-trait models propose that vulnerabilities have a stable trait-like component, but may not be detectable until activated by internal or external factors. Although some have interpreted Beck's theory as a trait model, other researchers have maintained that it is more consistent with a state-trait vulnerability model. In defense of this latter view, Zuroff and his colleagues (Zuroff, Blatt, Sanislow, Bondi, & Pilkonis, 1999) draw attention to Beck's original statement that dysfunctional attitudes and negative self-schema are latent until activated through a negative life event that impinges on the content of the attitude or self-schema. Although the hopelessness theory of depression (Abramson et al., 1989) does not explicitly propose depressogenic inferential styles to be latent structures, it does define these inferential styles as tendencies to make specific attributions about the self, the world, and the future in the presence of a negative life event. As such, the context of a negative life event is also necessary to measure these inferential styles (Just et al., 2000).

Due to conflicting findings in the research literature as to whether cognitive patterns are antecedents, concomitants, or consequences of depressive state, some researchers in the past have favored the *remitted* depression paradigm in order to evaluate the potential causal role of cognitive vulnerability factors in the development of depression. This method was largely based on the idea that if negative cognitive patterns are vulnerability factors for depression, then they

should persist long after a depressive episode has remitted. If, on the other hand, these cognitive patterns are merely symptoms of depression, then they should vanish with remission. More recently, the adequacy of the remitted depression design has been questioned by a number of prominent researchers (e.g. Just, Abramson, & Alloy, 2001; Segal & Ingram, 1994). In their recent critique of this literature, Just et al. (2001) have listed a number of methodological problems associated with the use of the remitted depression design. Specifically, these researchers have identified four major shortcomings of this paradigm. The first point made by Just et al. (2001) is that remitted depression studies are based on the faulty assumption that a variable must possess trait-like stability in order to qualify as a vulnerability factor. A second problem is that remitted depression studies have used a backward selection strategy in which participants are selected on the basis of a "dependent" variable (i.e. presence or absence of past depression) and compared on the "independent" variable (i.e. cognitive vulnerability). According to Just et al. (2001), this method fails to consider the possible heterogeneity of cognitive vulnerability among both the previously depressed and never-depressed individuals. Third, these studies have overlooked the role of stress as an activating feature. Finally, as these reviewers have argued, the finding of negative cognitive styles in remitted depression studies cannot definitively conclude that these styles were present before the depressive episode or developed as a result of it.

In light of these difficulties, researchers such as Just et al. (2001) and Segal & Ingram (1994) have recognized the value of utilizing procedures designed to "prime" or activate cognitive styles, which in the absence of adversity, have remained in a frozen or locked state. Perhaps the most common of these methods is mood activation. This technique is based on the "mood-state hypothesis" (Persons & Miranda, 1992), which proposes that negative cognitions

are accessible only during negative mood states. Mood priming procedures using remitted depressed patients have in general supported the presence of latent dysfunctional thoughts (e.g. Segal, Gemar, & Williams, 1999; Gemar, Segal, Sagrati, & Kennedy, 2001). Such studies suggest that at least some aspects of depressive self-representation may transpire if properly primed. Another method that has been proposed by Just et al. (2001) as an alternative to the remitted depression design and that has been utilized in a number of prominent studies (Alloy, Abramson, Whitehouse, & Hogan, 1997; Abramson, Alloy, Hogan, et al, 1998; Alloy, Abramson, Tashman, et al., 2001) is the behavioral high-risk paradigm. This method involves selecting never-depressed participants and categorizing them as being at low or high risk for depression based on the presence or absence of hypothesized psychological vulnerability factors. The two groups would then be compared on their likelihood of developing a future depressive episode.

Information-processing biases of depressogenic cognitive content. In part due to the ambiguity involved in trying to assess depressogenic cognition through self-report measures such as the DAS, some researchers have turned to paradigms that evaluate on-line processing of information in relation to the self-schema. Segal's priming paradigm (Segal et al., 1995) is based on the hypothesis that negative self-schema are more elaborate and tightly organized than positive self-schema in depressed people. According to this hypothesis, activating one element of the negative self-schema should facilitate activation of the entire structure. The procedure employed by Segal was a modified version of the Stroop task, where the Stroop words were preceded by words or phrases that either matched or mismatched them with respect to self-descriptiveness. Using this methodology, Segal et al. (1995) demonstrated that depressed people, compared to non-depressed people, take longer to name the colors of the Stroop words when the

prime and target pairs are both negative self-descriptive words. This presumably occurs because the priming procedure causes widespread activation of the interconnected elements of the negative self-schema, which in turn decreases available attentional resources for the color-naming task.

Derry & Kuiper (1981) investigated differences in self-schema among clinical depressives, nondepressed psychiatric control patients, and normal nondepressives by asking them to make structural, semantic, and self-referent ratings on depressed- and nondepressed-content personally descriptive adjectives. Immediately afterwards, participants were asked to recall as many of the adjectives as possible. The two nondepressed groups displayed superior recall of self-relevant, nondepressed-content words, whereas the clinical depressives displayed superior recall of self-relevant, depressed-content words. Similar findings have been reported in other studies using this paradigm or variations of it (e.g. Murray, Whitehouse, & Alloy, 1999; Dozois & Dobson, 2001).

Alloy and her colleagues (1997) compared non-depressed individuals hypothesized to be at high or low cognitive risk for depression (determined by the presence or absence of dysfunctional attitudes and negative inferential style) on five different information-processing measures. In this study, researchers used positive and negative words that were either depression-relevant or depression-irrelevant: (1) judgments of self-descriptiveness for these words; (2) response times for these judgments; (3) past behavioral examples for self-descriptive words; (4) future behavioral predictions; and (5) correct recall of the words. Differences between the low and high-risk groups were present on all measures, and these differences were more pronounced for the depression-relevant content than for the depression-irrelevant content. The results indicate that depression-prone individuals show preferential endorsement, processing

and retrieval of negative self-relevant material compared to non-depression-prone individuals at both the automatic (unconscious) and voluntary (conscious) levels of processing.

The Role of Rumination and Distraction

Rumination can prolong or exacerbate symptoms in depressed people, whereas distraction can shorten or decrease depressed mood (Noelen-Hoeksema & Morrow, 1993). Rumination has also been shown to predict future depressive disorders, including new onsets of depressive episodes (Nolen-Hoeksema, 2000). In dysphoric individuals, self-focused rumination may also lead to negatively biased interpretations of events and less effective solutions to interpersonal problems, whereas distraction may help them to be more optimistic and effective in solving problems (Lyubomirsky & Nolen-Hoeksema, 1995). A different study using a sample of depressed outpatients found that distraction, but not rumination, predicted change in depression severity over the course of treatment (Bagby, Rector, Segal, Joffe, Levitt, Kennedy, & Levitan, 1999). Thus, rumination seems to be linked to prolongation of depressed mood, whereas distraction may be the critical element in recovering from depressed mood. Furthermore, rumination is associated with a greater tendency to use alcohol or other drugs as a means of coping (Nolen-Hoeksema & Harrell, 2003).

A recent study by Compton (2000) suggests that rumination might be associated with even more fundamental difficulties in the ability to orient attention. In this investigation, participants who had trouble disengaging attention in a cued target detection task experienced greater negative mood in response to watching a distressing movie. Specifically, when the target was preceded by an invalid peripheral cue, participants with greater response time costs reported more distress on a composite measure of negative affect. The author suggests that individual differences in emotion are associated with the ability to shift attention away to a new focus, and

that this may be a basic underlying mechanism of rumination. Thus, basic deficits in attentional regulation may be a marker for susceptibility to negative mood and depression. Some cognitive neuroscientists have also speculated on the relation between attentional orienting and disordered mood (e.g. Rothbart, Posner, & Rosicky, 1994). Posner & Rothbart (2000) have also discussed the link between temperamental differences in emotional regulation and attentional control.

Individual Differences in Emotional Reactivity

Personality theories also offer predictions with regards to specific traits or motivational systems that may be involved in sensitivity to different emotional states. Zelenski and Larsen (1999) point out that most classification theories of personality include two dimensions that are similar to extraversion and neuroticism. The general consensus has been that the former is associated with positive affect whereas the latter is associated with negative affect. Moreover, mood induction studies (e.g. Larsen & Ketelaar, 1989; Gomez, Cooper, & Gomez, 1999) suggest that extraversion and neuroticism reflect dispositional susceptibilities to different affective states. Gray (1981) posited that two independent brain systems are involved in approach and active avoidance behaviors. According to Gray, these two motivational systems, which he called the *Behavioral Activation System* (BAS) and the *Behavioral Inhibition System* (BIS) are at a 45° angle to Eysenck's (1967) dimensions of extraversion and neuroticism. Cloninger's (1986) novelty seeking and harm avoidance subtypes are also similar to Gray's BAS and BIS. Recently, Zelenski and Larsen (1999) performed a factor analysis of traits from these three personality classifications, which yielded three factors named reward sensitivity, punishment sensitivity, and impulsivity-thrill seeking. Using both a laboratory mood induction and self-report measures of daily affect, they found that reward sensitivity predicted increased pleasant affect and increased

arousal, whereas punishment sensitivity predicted increased unpleasant affect and decreased arousal.

There is also limited evidence to suggest that individuals at a heightened risk for alcoholism show specific patterns of emotional reactivity to experimental mood inductions. For example, Randall and Cox (2001) found that high-risk participants (defined as having a family history of alcoholism), compared to low-risk participants (defined as having no family history of alcoholism), experienced greater negative affect and also consumed greater quantities of nonalcoholic beer in a taste test following the negative mood induction.

The Effects of Alcohol on Mood and Cognition

Alcohol is known to have widespread influences on brain structures that control a variety of cognitive processes, and to have different short and long-term effects on mood. Low doses of alcohol have been shown to improve performance on a rapid information processing vigilance task, and to improve mood (Lloyd & Rogers, 1997). In another study, alcohol consumption decreased the negative impact of an emotional film on mood (Van Tilburg & Vingerhoets, 2002). There also appear to be individual differences in the relationship between alcohol and positive mood, with this relationship being substantially weaker in those who report drinking alcohol to cope (Steptoe & Wardle, 1999). Selective attention and reflexive attention to exogenous cues also appear to be susceptible to alcohol effects (Schulte, Muller-Oehring, Strasburger, Warzel, & Sabel, 2001; Post, Chaderjian, & Maddock, 2000). Even more interesting is a study by Stephens and Curtin (1995), which demonstrated the capacity for alcohol to affect the negative self-referent bias that is considered a hallmark of depression or depression-proneness. In this study, depressed and nondepressed participants were randomly assigned to receive either alcohol or a placebo. After beverage consumption, participants processed personally descriptive adjectives

under self-relevant or semantic processing instructions according to Derry and Kuiper's (1981) previously described paradigm. Compared to nondepressives in the placebo condition, depressives in the placebo condition recalled significantly more depressed-content words. A more interesting finding was that depressed participants who consumed alcohol recalled significantly fewer self-relevant, depressed-content words relative to depressed participants who consumed a placebo. There were no differences in recall between these two groups for self-relevantly encoded non-depressed-content words, or words that were processed under the semantic encoding instructions regardless of their emotional valence. Non-depressed participants, on the other hand, did not show this differential effect of alcohol on word recall. There was also a significant correlation between reduced recall of depressed-content self-relevant words and mood enhancement following alcohol consumption in depressed participants, but not in non-depressed participants. The findings suggest a possible link between alcohol consumption and mood enhancement through the effects of this substance on abnormal cognitive processes.

Research Hypotheses

An important goal of the current study was to facilitate the development of a comprehensive account of introversion-hopelessness, and gain insight into its potential involvement in drinking behavior. Accordingly, the specific predictions of this research were derived from a variety of cognitive, affective, and motivational theories of depression and depression-proneness. Based on cognitive vulnerability theories of depression, it was expected that individuals with high introversion-hopelessness (HH), compared to individuals with low introversion-hopelessness (LH), would reveal lower baseline levels of affect, as well as greater dysfunctional attitudes. Affect is often conceptualized as an experience that involves two

independent dimensions, pleasure and arousal. The pleasure dimension represents emotions that can range from unpleasant feelings (e.g. unhappy, miserable, gloomy, blue) to pleasant feelings (e.g. happy, elated, cheerful, delighted). In the arousal dimension, emotions can range from low activation (e.g. quiet, tranquil, still, passive) to high activation (e.g. surprised, stimulated, active, aroused). With respect to these two dimensions of affect, HH individuals were expected to score lower than LH individuals on the pleasure dimension, but no predictions were made with respect to how the two groups would compare on the arousal dimension. Besides these two dimensions, HH participants were also expected to report lower mood on a more global measure of affect ranging from sad to happy mood. Another expected outcome was that HH individuals would show preferential endorsement and recall of negative self-referent information compared to LH individuals. However, no predictions were made as to how LH and HH individuals would compare on endorsement and recall of positive self-referent words, as findings in the literature have not always supported the existence of a more positive self-view in non-depressives. Since the state-trait model of cognitive vulnerability also predicts that negative emotional priming will facilitate access to dysfunctional attitudes, another conjecture was that a negative mood induction would increase dysfunctional attitudes in HH, but not LH, individuals.

According to personality theories, traits such as introversion, harm avoidance, and punishment sensitivity predict differential sensitivities to emotional states. As such, HH individuals were expected to react to a negative mood induction with greater negative affect and to a positive mood induction with lower positive affect than LH individuals. Once again, these differences were anticipated to emerge on the happiness and pleasure dimensions of affect, but not necessarily on the arousal dimension.

Recently, there has also been an interest in understanding how temperament and emotional regulation are associated with attentional processes. However, very few studies have explored these basic, more automatic mechanisms in connection with mood. Prompted by Compton's (2000) findings relating attentional orienting to negative affect, a modified version of the cued reaction time task was included in the current study in order to determine if HH and LH people would demonstrate any differences in attentional processes. As will be explained below, various problematic aspects of Compton's (2000) paradigm were identified and corrected, precluding a full replication of her results. In part due to this issue, and in part due to the lack of well-developed theories to help formulate hypotheses, no specific predictions were made regarding the conditions under which HH and LH might show differences in their ability to shift attention towards or away from target stimuli.

Method

Participants

Participants were selected through a two-stage process. In the screening phase, undergraduate students were recruited through the UBC Psychology Department subject pool. Interested students were offered course credit for completing a survey titled "Personality and Drug Use Inventory", which included the Substance Use Risk Profile Scale (SURPS; Woicik, Conrod, Stewart, Pihl, & Dongier, 2002) defined in the subsequent section along with other self-report measures designed to assess their drinking and drug use patterns and motives, coping styles, automatic thoughts, and dysfunctional attitudes. On the cover sheet of the survey, participants were asked to provide their name and contact information if they were interested in participating in future studies, and were informed that they would be offered $5 per hour for volunteering their time. From the sample of students who expressed an interest in being

contacted, those scoring one standard deviation above and below the mean of the SURPS introversion-hopelessness subscale were contacted by phone by a research assistant and invited to the laboratory to participate in the experimental phase of the study. A total of 24 LH and 18 HH individuals constituted the final sample size. As a consequence of missing data, analyses involving mood ratings and dysfunctional attitudes were limited to a subsample of 22 LH and 14 HH participants. As for the Posner task, response time data were available from 21 LH and 17 HH individuals. The mean age was 19.82 for the first subsample, and 19.69 for the latter subsample. Both groups consisted almost exclusively women, with only 3 males in either subsample.

Methods

Measures

Introversion-Hopelessness. The introversion-hopelessness subscale is one of four subscales of the SURPS (see Appendix A), a 28-item brief measure intended to measure personality risk for substance abuse according to Conrod et al.'s (2000) classification system. The psychometric properties of the SURPS have been evaluated on 4 undergraduate samples (Woicik, Conrod, Stewart, Pihl, & Dongier, 2002). In these samples, internal reliabilities of the subscales ranged from .64 to .89, with the highest alpha coefficient being associated with the introversion-hopelessness subscale. Test-retest reliabilities, assessed over a 55 day interval, were .53 for anxiety-sensitivity, .74 for introversion-hopelessness, .76 for impulsivity, and .86 for sensation seeking. The validity of the SURPS has been supported through demonstration of convergent and discriminant relationships of the subscales with preference for specific classes of drugs, as well as other personality and symptom measures relevant to substance abuse. The

introversion-hopelessness subscale consists of 8 items that are rated on a 4-point scale ranging from (1) strongly disagree to (4) strongly agree.

Depression. Severity of depressive symptoms were assessed using the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). The BDI is a widely used 21-item self-report scale with high internal consistency, test-retest reliability, and convergent validity.

Mood. Three visual-analogue scales (VAS) were used to obtain mood ratings along the dimensions of sad/happy, unpleasant/pleasant, and low arousal/high arousal. The latter two represent the two dimensions of affect that have been strongly related to personality dimensions in past research. The more global sad/happy measure was included since the concept of sadness is frequently associated with the depressive experience. Each VAS consisted of a single 152 mm. (6-inch) line anchored by two descriptors at the 0- and 152-mm. endpoints. The anchor points were *sad* and *happy* for the first scale, *extremely unpleasant feelings* and *extremely pleasant feelings* for the second scale, and *extremely low arousal* and *extremely high arousal* for the third scale. The scales were placed on the same 8.5 x 11-inch sheet of paper with the happiness scale at the top, followed by the pleasure and arousal scales. Participants were instructed to rate their mood along all three dimensions by placing a dissecting mark on the line position that best corresponded to their current mood. Visual-analogue scales are simple, efficient instruments for measuring feeling states in a quick, reliable, and sensitive manner. They have been shown to correlate well with standardized measures of mood, anxiety and depression (Cella & Perry, 1986), and to discriminate between dysphoric and nondysphoric college students (Killgore, 1999). They have also been shown to possess adequate test-retest reliability over short time intervals (Cella & Perry, 1986).

Dysfunctional Attitudes. Depressogenic attitudes and beliefs were assessed 4 times throughout the experiment using 12-item brief versions of the Dysfunctional Attitudes Scale (DAS; Weissmann & Beck, 1978). The DAS is intended to measure cognitive vulnerability to depression. It is often described as a state-dependent measure because it fluctuates with clinical state and is sensitive to mood manipulations. The scale consists of 40 items that are rated on a 7-point scale ranging from "totally agree" to "totally disagree". A subset of items load highly on a Need for Approval factor, and another subset load highly on a Perfectionism factor. For practical reasons involving time constraints and the need to administer the measure repetitively, four 12-item short versions of the DAS were constructed by randomly selecting items from the original scale. Item selection was subject to the constraint that each brief version contain the same number of items from the Perfectionism dimension and the Need for Approval dimension, as well as from the remaining item set that do not belong to these dimensions.

Attentional orienting and self-referent information processing. Measures of attentional orienting and self-referent information processing are described in the context of their respective experimental procedures.

Procedure

Each participant was tested individually by an experimenter who was blind to their personality subtype. Upon arrival at the laboratory, participants were asked to read and sign an informed consent form describing the general purpose of the study, the tasks they would be asked to perform, information on confidentiality, and potential risks and benefits associated with participating in the study. Following the informed consent process, they were taken to the experimental room.

The sequence of the experimental procedure is depicted in Figure 1. Participants first completed the BDI, and baseline measures of their mood and dysfunctional attitudes were obtained. This was followed by the Posner task, the word task, and the two mood induction procedures. Details of these procedures are provided in the sections to follow. Mood and dsyfunctional attitudes were re-assessed after the word task and following each mood induction.

Posner Attentional Orienting Task. Compton's (2000) study revealed an interesting relationship between ability to disengage attention and susceptibility to negative affect. However, closer examination of Compton's paradigm revealed some problems with the target-cue paradigm. Specifically, the relative percentages of valid cues, invalid cues, and uncued trials made it ambiguous whether the cue was predictive or non-predictive. On predictive trials, the target appears on the same side as the cue on a greater percentage of trials, whereas on non-predictive trials, the target has an equal likelihood of appearing on either the same side or the opposite side as the cue. This distinction is important because different attentional processes are involved in the detection of a target when it is preceded by one type of cue versus the other. When the cue is non-predictive, attentional orienting is purely reflexive. On the other hand, target detection in the case of a predictive cue involves attentional orienting that is largely volitional, or effortful. Participants expect the target to come up on the same side as the cue more often than not, and this knowledge guides their attention. In addition, non-predictive cues have a biphasic effect on response times. That is, targets preceded by a valid cue are detected more quickly than targets preceded by an invalid cue when the cue target delay (stimulus onset asynchrony, or SOA) is short. At longer SOAs, the reverse effect is observed such that targets preceded by a valid cue are detected more slowly than targets preceded by an invalid cue, a

phenomenon that is referred to as *inhibition of return* (IOR; Posner, Rafal, Choate, & Vaughan, 1985).

In the present study, non-predictive and predictive versions of the cue-target paradigm were used to disentangle the effects of volitional and reflexive orienting. In the non-predictive version, valid and invalid cues occurred with equal likelihood. In the predictive version, the target was preceded by a valid cue on approximately 80% of trials and by an invalid cue on less than 20% of trials. Both versions also included a small number of catch trials, in which a cue was presented, but a target did not appear. These catch trials ensure that participants are paying attention to the task, and not engaging in random key presses. The following details pertain to both the non-predictive and the predictive versions.

Displayed on the screen is a central fixation point in the shape of a small cross, with two 1 X 1 inch boxes appearing approximately 2 inches to its left and right. In the valid cue condition, one of the boxes turns bold for 90 ms, followed by a small bolded square (the target) appearing in the center of the *same* box. In the invalid cue condition, one of the boxes goes bold for 90 ms, followed by a target square appearing in the center of the *opposite* box (see Appendix A for a pictorial representation of the valid and invalid trials). Figure 2 illustrates invalidly and validly cued trial types. Because the time delay between cue and target onset has different effects on reflexive and volitional orienting, SOA was also varied such that half of the trials in either condition had SOAs of 100 ms. and the other half had SOAs of 700 ms. The target remains on the screen until the participant presses the key, or for a maximum of 1000 ms. The non-predictive and predictive versions each consisted of 2 blocks of 65 trials.

Prior to starting the task, participants were given verbal instructions on the procedure and a short practice trial. They were instructed to maintain their gaze on the fixation point and press

the space bar as soon as they detected the target. All participants completed the non-predictive version first, then the predictive version. The reason for maintaining this fixed order of cue type is that once volitional attention has been instigated by the expectation of a predictive cue, it is difficult to inhibit even when the situation no longer calls for the observer to strategically shift attention to a particular location.

Word Task. This procedure is based on Derry and Kuiper's (1981) paradigm. A total of 60 personal adjectives (30 depressed content and 30 nondepressed content) formed the stimuli for this task (see Appendix B). Half of the depressed-content words and half of the nondepressed content words were randomly chosen to be processed under self-relevant encoding instructions, and the remainder to be processed under semantic encoding instructions. Participants were presented with a sheet of paper with 60 questions printed on the left side, and two columns labeled *Yes* and *No* on the right side. The self-relevant processing question read "Does this word describe you?" The semantic processing question read "Does this word mean the same as _____ ?", with a synonym of the adjective being judged on one half of the questions, and an antonym on the other half (see Appendix B). The questions were distributed randomly throughout the list with the restriction that no type of question appear more than twice in any five successive questions. The experimenter introduced the task using the following instructions:

"In this part of the experiment you will be asked to evaluate a series of 60 words which will be presented one at a time. Each word is to be evaluated on one specific dimension. These dimensions are listed in order on the rating sheets you have been provided. I will call out a number and you are then to read the statement associated with that number. I will then call out a single word. You are then to circle the appropriate letter to indicate whether or not the statement is applicable to that word. Circle Y if your answer is Yes, and N if your answer is No. Each

word is to be evaluated only with respect to the single statement associated with the word called out. Are there any questions?"

After answering any questions, the experimenter proceeded to call out the 60 words. In each instance, the experimenter first called out the question number associated with the word, waited for the participant to read the question, then read aloud the word itself. The experimenter waited approximately 10 seconds for the participant to circle his or her choice, then called out the next number, and so on until all 60 words were processed. Upon completion of the task, the participant was asked to turn over the rating sheet and told that they had 3 minutes to write down as many of the words that he or she could remember. Participants were not be informed ahead of time about the incidental recall portion of the task in order to prevent them from actively trying to memorize the word stimuli.

Negative Mood Induction. The negative mood induction procedure is based on the continuous music technique (Eich and Metcalfe, 1989). The technique requires participants to think as intensely as possible about an unpleasant event from their past, or imagine something that will make them get into an unpleasant mood, while listening to various selections of melancholic music. Details of the instructions given to participants are outlined elsewhere (Eich & Metcalfe, 1989; Eich, Macaulay, & Ryan, 1994). After listening to the instructions, the participant was informed that the experimenter would return from time to time to obtain ratings of their mood. Next, the "sad" music was turned on to a comfortable listening volume, and the experimenter left the room. Five minutes after music onset, and every 5 minutes thereafter, the experimenter entered the room with a clean copy of the VAS on which participants marked their current mood on the three dimensions. The mood induction was terminated after 20 minutes.

Positive Mood Induction. The procedure for the positive mood induction was similar to the procedure for the negative mood induction. Participants were asked to think as intensely as possible about a pleasant memory from their past, or to imagine something that will make them get into a pleasant mood, while listening to various selections of lively music. Details of these instructions are also found in the studies cited above (Eich et al., 1989; Eich et al., 1994). Participants were once again advised that the experimenter would be returning from time to time to obtain ratings of their mood. After receiving these instructions, the "happy" music was turned on to a comfortable listening volume, and the experimenter left the room. Five minutes after music onset, and every 5 minutes thereafter, the experimenter entered the room with a clean copy of the VAS on which participants marked their current mood state. The mood induction was terminated after 20 minutes.

The negative and positive mood inductions were counterbalanced such that 11 LH and 11 HH participants received the negative mood induction first, and 13 LH and 7 HH individuals received the positive mood induction first.

At the end of the session, participants were debriefed on the rationale and hypotheses of the study, explained why they were not told about the incidental recall portion of the self-referent word task, and given an opportunity to ask questions. They were also provided with a written debriefing script, and paid $15 for their participation.

Results

Current Depression Status

The mean BDI scores for the LH and HH groups were 7.1 and 16.9, respectively. Not unexpectedly, this difference was highly significant [t (36) = 3.98, $p < .001$]. One of the criticisms that have been raised with respect to assessing cognitive vulnerability in depression is

that any observed group differences may be due to mood congruency effects rather than the presence of an underlying cognitive structure (Segal & Blatt, 1993). In order to ensure that any observed effects of group status were not simply due to differences in current levels of depression or dysphoric mood, all analyses were conducted both with and without BDI as a covariate. In this way, it was possible to speculate whether the effects were unique to introversion/hopelessness, or confounded with the effects of depression. In cases where covarying out BDI led to a different outcome, both sets of results are presented.

Baseline Measures

A Hotelling's T^2 was used to compare the LH and HH groups on baseline measures of mood and dysfunctional attitudes. Results of this analysis demonstrated an overall difference in the four baseline measures [$F(4,31) = 3.06$, $p = .031$]. Bonferroni-adjusted univariate ANOVAs using an alpha of .0125 (.05/4) failed to ascertain the source of this difference, although baseline sad/happy ratings and baseline DAS ratings came close to being significant. The HH group, compared to the LH group, rated their baseline mood along the sad/happy dimension to be lower [$F(1,34) = 6.25$, $p < .02$]. The HH group also had lower baseline DAS ratings compared to the HH group [$F(1,34) = 6.33$, $p < .02$], indicating more baseline dysfunctional attitudes. Adjusted scores on all four baseline measures are displayed in Figure 3.

A potential problem with these results pertains to the heterogeneity of covariance matrices, which was determined by means of the Bartlett-Box test ($F= 3.95$, $p < .001$). Some authors (e.g. Tabachnik & Fidell, 2000; Harris, 1985) caution against routine use of this test as a precondition for performing the T^2 test for two reasons. First of all, the Bartlett-Box test is overly powerful and likely to yield significant results in cases in which violation of the HOCV assumption has only minor effects on critical T^2 values. In addition, it is overly sensitive to

violations of the normality assumption whereas the T^2 test is robust against departures from multivariate normality. Nevertheless, given the unequal sample sizes in the data set, the potential impact of this violation should not be ignored. An inspection of the HOCV matrices for each group indicated that heterogeneity of the covariance matrices was mainly due to greater dispersion within the HH group, which would imply a liberal bias in our test since this is the group with the smaller sample size. As such, the results need to be interpreted with caution.

The Hotelling's T^2 analysis was also repeated with total BDI scores covaried out in order to control for current level of depressive symptoms. Once the effects of depressive symptoms were removed, differences between the groups on baseline measures was no longer significant [$F(4,30) = 1.91$, $p > .10$].

Effects of mood induction on dysfunctional attitudes

A two-way between-within analysis of covariance (ANCOVA) was conducted in order to compare the effects of the mood manipulations on the dysfunctional attitudes of the LH and HH groups, while controlling for depressive symptoms and baseline dysfunctional attitudes. DAS ratings obtained after the word recall task were used as the baseline measure of dysfunctional attitudes instead of initial DAS ratings in view of the possibility that ratings may have been influenced by the word task. Group status (LH vs. HH) served as the between-subjects factor and mood manipulation (negative vs. positive) served as the within-subjects factor. Results of this analysis revealed a significant main effect of mood state [$F(1, 32) = 12.18$, $p=.001$), which was qualified by a significant group x mood state interaction [$F(1, 32) = 5.83$, $p = .022$]. The interaction effect is displayed in Figure 4. Follow-up analyses of simple main effects revealed the source of this interaction. Specifically, mean DAS scores in the LH group were significantly lower at the end of the negative mood induction relative to DAS scores at the end of the positive

mood induction [$F(1,32) = 24.18$, $p < .0001$), whereas no significant change in DAS scores across the two mood conditions was observed in the HH group. Interestingly, the LH group had greater dysfunctional attitudes than the HH group in the negative mood state, but lower dysfunctional attitudes in the positive mood state. However, these group differences were not found to be significant.

The same analysis was repeated without covarying out depressive symptoms. Similar results were obtained, with a slightly less pronounced group x mood state interaction [$F(1, 33) = 4.33$, $p = .045$].

Affect Susceptibility

Ratings on Happiness Dimension. Mean ratings on this dimension were assessed using a three-way group (LH vs. HH) x mood state (negative vs. positive) x time (5 ratings) between-within ANCOVA design, with depressive symptoms and baseline sad/happy ratings as the covariates. One sad/happy rating immediately prior to the mood induction and 4 sad/happy ratings obtained at 5-minute intervals during the mood induction procedure formed the 5 levels of the time factor. Since the mood induction was counterbalanced, the pre-induction mood rating was different depending on which order the participant received. For participants who received the negative mood induction first, the initial rating would be that obtained immediately following the word recall, whereas for participants who received the positive mood induction first, the initial mood rating would be that obtained following the negative mood induction.

The results of the ANCOVA, which are presented in Table 1, revealed a significant three-way (group x mood state x time) interaction. This interaction effect is graphically depicted in Figure 5. Degrees of freedom were adjusted for lack of sphericity using the Huynh-Feldt correction. Since homogeneity of between-group covariance matrices is a pre-condition for

testing the sphericity assumption, this requirement was assessed using the Bartlett-Box test. The test indicated that the covariance matrices were indeed homogeneous. As such, the degrees of freedom adjustment for lack of sphericity was justified.

In order to reveal the source of the three-way interaction, an analysis of simple interactions was conducted separately for each mood state. For the negative mood state, there was a significant group x time interaction [$F(2.71, 158.5) = 6.65$, $p = .0017$], whereby the mood ratings for the LH group showed a greater decrease over time compared to the HH group. Simple simple effects analyses for the first and last sad/happy ratings demonstrated that the two groups did not differ with respect to their mood just before the negative mood induction [$F(1,222.5) = 0.30$, n.s.]. However, the LH group reported significantly lower mood at the end of the procedure [$F(1, 222.5) = 4.87$, $p < .03$]. For the positive mood state, although the LH group showed a greater increase in mood over time compared to the HH group, the group x time interaction was not significant.

Ratings on Pleasure Dimension. Analyses were conducted following the same procedures that were used for the Sad/Happy dimension, including the degrees of freedom adjustments due to failure to meet the sphericity assumption. As before, the ANCOVA yielded a significant three-way (group x mood state x time) interaction. Results of this test are displayed in Table 2, and the interaction effect is depicted in Figure 6. In simple interactions analyses, a significant group x time interaction [$F(2.85, 178.6) = 5.80$, $p = .0037$] was revealed for the negative mood state, such that the LH group showed a greater decrease in mood over time compared to the HH group. Simple simple effects analyses for the first and last pleasure ratings demonstrated that the two groups reported similar levels of mood just before the negative mood induction [$F(1,242.6) = 1.29$, n.s.]. However, the LH group reported significantly lower mood at the end of the

procedure [$F(1, 242.6) = 5.2$, $p < .025$]. The LH group also showed a greater increase in mood over time compared to the HH group; however the group x time interaction was not significant. Thus, the results of this analysis were similar to the results obtained for the Sad/Happy ratings.

Ratings on Arousal Dimension. The arousal ratings could not be analyzed using the three-way between-within ANCOVA procedure that was utilized for the happiness and pleasure ratings, because the Bartlett-Box test revealed that the dispersion matrices for the LH and HH groups were not homogeneous [$F(55, 2499) = 1.56$, $p=.005$]. Since violation of this assumption precludes the testing of the sphericity assumption, the data could not be analyzed in this manner. As a solution to this problem, two changes scores were computed for each mood state representing the difference between the last and first arousal ratings. The change scores were analyzed using a two-way between-within ANCOVA, with group status (LH vs. HH) as the between-subjects factor and mood state (negative vs. positive) as the within-subjects factor. Depressive symptoms and baseline arousal ratings were entered as covariates. Although it was not possible to analyze change in arousal over time with this simplified data set, heterogeneity of covariance was no longer an issue. Results of the analysis are presented in Table 3. There was a significant group X mood state interaction, which is displayed in Figure 7. Simple effects analyses conducted separately for each mood state revealed that the two groups differed significantly with respect to change in physiological self-report arousal. The LH group reported a decrease in arousal during the negative mood induction, whereas the HH group reported very little, if any, change. The difference between the two groups was statistically significant [$F(1,64) = 5.69$, $p < .025$]. A different pattern was observed for the positive mood induction. Whereas the LH group experienced an increase in arousal from start to end, the HH group experienced a decrease in arousal. This group difference was also significant [$F(1,64) = 5.18$, $p < .03$]. All

analyses for mood ratings were also conducted without covarying out depressive symptoms, yielding largely similar results.

Self-referent Encoding Task

Self-descriptiveness ratings. Due to violation of the HOCV assumption as assessed by the Bartlett-Box test [$F(10,6315) = 2.14$, $p < .02$], repeated-measures analysis of this data was not viable. In order to circumvent this problem, the method of profile analysis was adopted. Profile analysis is the multivariate approach to repeated measures when the dependent variables are all measured on the same scale. Although it is less powerful than repeated-measures analysis, it avoids the sphericity assumption and is robust to violation of the HOCV assumption. Profile analysis involves three tests of significance. The parallelism test is the primary question addressed by profile analysis, and is analogous to the test of interaction in univariate repeated-measures ANOVA. The levels test answers whether the groups score differently on the collected set of measures. It addresses the same question as the between-subjects main effect in univariate repeated-measures design. Finally, the flatness test investigates whether average scores on the dependent measures are similar. This is analogous to the within-subjects main effect in univariate repeated-measures.

Word category was specified as a within-subjects factor with 4 levels, and total number of yes-rated words in each category (positive self-referent, positive semantic, negative self-referent, negative semantic) comprised the dependent measures. Group status (LH vs. HH) was specified as a between-subjects factor. Results of the profile analysis with depressive symptoms covaried out revealed a main effect of word category, thus the flatness test was rejected [$F(3,37) = 47.89$, $p < .001$]. However, there was no main effect of group status (levels test not significant) or any group status x word category interaction (parallelism test not significant).

Taken together, these findings indicate that the two groups, on average, endorsed different numbers of words in each category, but there were no group differences in the pattern of responses to the word categories. A graphical representation of the group profiles is provided in Figure 8.

Interestingly, when the profile analysis was conducted without covarying out the BDI scores, a different pattern of results emerged. Again, there was a main effect of word category [$F(3,37) = 55.92$, $p < .001$], but this was qualified by a significant group status x word category interaction [$F(3,37) = 8.79$, $p < .001$]. The group profiles based on this analysis are displayed in Figure 9. When parallelism and flatness are both significant, the recommended follow-up procedure is to test differences among group means at each level of the repeated measure. A Bonferroni-adjusted alpha of .0125 (.05/4) was used in order to control for family-wise Type I error. According to the results of the follow-up tests, the HH group endorsed significantly fewer positive self-referent words [$F(1,40) = 16.19$, $p < .001$] and significantly more negative self-referent words [$F(1,40) = 17.73$, $p < .001$] than the LH group. These findings should be interpreted with caution, however, since homogeneity of variance was violated for both of these measures. To be precise, the variance of these measures was larger in the HH group, which is also the smaller of the two groups. This situation entails a liberal bias in the tests of significance. Nevertheless, it is unlikely that correction of this bias would alter the findings, as the F-values were highly significant in both cases.

Incidental Word Recall. Word recall was analyzed using three-way between-within ANCOVA. As in previous analyses, group status (LH vs. HH) served as the between-subjects factor. The two within-subjects factors were encoding instructions (self-referent vs. semantic) and valence (positive vs. negative). Derry and Kuiper (1981) recommend using a proportion-

correct recall score to ensure that differences in recall are not influenced by differential numbers of yes and no ratings. According to this protocol, each individual's recall of words in a given category is divided by the total number of words that were endorsed in that category. However, this adjustment was not feasible in the current analysis, as a large number of participants in the LH group did not endorse any negative self-referent words, resulting in mathematically undefined ratios (i.e. scores of 0/0). Although Derry and Kuiper (1981) acknowledge this as a problem, they were able to remove such scores because they constituted a very small percentage of data points in their sample. As an alternate means of adjusting for differences in endorsement, the total number of yes-rated words in each of the four word categories (positive self-referent, negative self-referent, positive semantic, and negative semantic) were treated as covariates. Depressive symptoms also entered the analysis as a covariate.

Results of this analysis are presented in Table 4. A significant group status x encoding instructions x valence interaction was observed, which was followed up by analyses of group status x valence simple interactions for each type of encoding instruction. In the case of semantic words, this interaction was not significant, indicating that the LH and HH groups did not differ with respect to the number of positive and negative semantic words that they recalled. For self-referent words, there was a significant group status x valence simple interaction [$F(1,70) = 4.91$, $p < .03$], whereby the HH group recalled significantly more negative self-referent words than the LH group [$F(1,140) = 5.73$, $p < .02$]. The two groups did not differ, however, with respect to the number of positive self-referent words that they recalled [$F(1,140) = 1.32$, $p > .25$]. A graphical representation of the word recall data is provided in Figure 10. Results did not differ when BDI scores were not treated as a covariate.

Analysis of Response times for the Posner Task

To determine whether the manipulations of the attentional orienting paradigm (cue type, validity, and SOA) were successful, the data were initially evaluated without covarying out BDI scores. A four-way between-within ANOVA was conducted, with group status (LH vs. HH) serving as the between-subjects factor, and cue type (non-predictive vs. predictive), SOA (100 ms. vs. 700 ms.), and cue validity (valid vs. invalid) serving as the within-subjects factors. Results of this analysis are presented in Table 5, and mean response times based on cue type, SOA, and validity, are displayed in Figure 11. There was a main effect of SOA, with target detection slower at the short SOA compared to the long SOA. Significant two-way interactions included SOA x validity as well as and cue type x validity. Of particular interest is the three-way interaction of SOA x cue type x validity, which indicate that the manipulations were effective. In the case of the non-predictive cue, the IOR phenomenon was evident in that target detection was faster for valid cues at the shorter SOA but faster for invalid cues at the longer SOA. In the case of predictive cues, valid cues facilitated target detection at either SOA. None of the effects involving group status were significant, which indicated that the two groups did not differ with respect to their reaction times to target detection on any of the eight possible cue type, SOA, and validity combinations.

Repeating this analysis with BDI as a covariate yielded different results (see Table 6). Specifically, two interactions were affected. The SOA x cue type x validity interaction was no longer significant. As well, there was a significant group status x validity interaction, with the HH group showing a slower response time to invalid cues compared to the LH group. However, this interaction was essentially uninterpretable outside the context of cue type, SOA, and validity. In order to identify the source of this difference, it was necessary to compare the two groups with respect to response times under each combination of cue type, SOA, and validity.

Figure 12 displays the mean adjusted response times for each group separately. In the non-predictive cue condition, the IOR effect was less pronounced for the HH group. When the cue was predictive, this group also showed the expected facilitation effect at the longer SOA, whereas the LH group did not show this effect. This is not an uncommon occurrence in the case of peripheral (as opposed to central) cues. An explanation offered by Danziger and Kingstone (1999) is that volitional orienting to an informative peripheral cue also requires a suppression of involuntary orienting to the cued location. In essence, attentional orienting and IOR can occur in parallel and the former can "mask" the presence of the latter. Failure to observe this masking effect in the LH group appears to be due to the larger IOR effect.

Finally, exploratory correlational analysis was also conducted to determine if any relationship existed between mood and response times as was the case in Compton's (2000) study. Correlations between baseline ratings of mood on the pleasure dimension and response times to each SOA/cue type/validity combination were computed separately for each group. As seen in Table 7, baseline mood on the pleasure dimension was highly correlated with 6 of the 8 mean response time measures for the HH group. By contrast, none of these correlations were significant in the LH group. The results were not altered when the effects of BDI were partialed out.

Discussion

In this study, a distinct personality profile which is thought to contribute to the development of depression and problematic drinking was the subject of analysis. The findings of this study shed light on a number of cognitive and emotional characteristics that differentiate individuals who score high and low on introversion-hopelessness.

Let us first consider how these individuals compared in the emotional realm. With respect to baseline, or resting state mood, the two groups differed significantly on subjective degree of happiness, with those in the HH group reporting lower affect on the sad/happy dimension than those in the LH group. However, this difference was not significant when the effects of current depression were removed. In other words, being low or high in introversion-hopelessness does not appear to contribute to differences in sad/happy mood over and above what can be predicted by depressive symptoms. It is not clear why the two groups did not show this pattern on the pleasure dimension. One possibility is that sadness is a more global concept that more accurately describes a depressed mood state, whereas the concept of unpleasant mood likely has different connotations for different people. Another possibility is that the sad/happy measure was more familiar to participants, and they were able to rate their mood more readily on this measure compared to the less intuitive unpleasant/pleasant measure. Presenting both measures together may have also contributed to this uncertainty. As such, participants' preliminary ratings on the pleasure dimension may have been somewhat arbitrary. It is interesting that the two groups did not differ with respect to reported physiological arousal, irrespective of current depressive state.

Another question of interest was how LH and HH individuals would compare in terms of their sensitivity to experimental mood manipulations. Group responses to the negative mood induction will be considered first. Contrary to expectations, the HH group responded to the negative mood induction procedure with less negative affect than the LH group. This was true for both the happiness and pleasure dimensions. Participants in the HH group also reported very little change in arousal during the negative mood induction compared to participants in the LH group, who reported a lowering of arousal. When the pleasure and arousal dimensions are

considered together, the quality of the emotional experience would appear to be quite different for each group. For the LH group, a substantial shift from pleasant to unpleasant emotions was coupled with a lowering of physiological activation. This suggests a resigned or tranquil quality to their experience of sad or unpleasant mood. As for the HH group, the move from pleasant to unpleasant emotions was less pronounced, suggesting vague feelings of sadness that were not accompanied by changes in physiological sensations.

With regards to emotional reactivity to the positive mood induction, both groups reported similar amounts of change on the happiness and pleasure dimensions. Although the LH group reported more positive affect throughout the positive mood induction, this difference did not reach statistical significance. However, significant group differences emerged on the arousal dimension in response to the induced positive mood. The LH group reported an increase in physiological activation, which denotes a rise in feelings such as excitement, liveliness, or elation. In contrast, the HH group reported a decrease in physiological activation, which implies that their experience of positive mood may have had a more subdued quality.

Overall, it appears that the HH group experienced a more restricted range of emotions. Their lack of reactivity to the negative mood induction is especially curious, and inconsistent with predictions based on personality and motivational theories. The finding suggests that proneness to negative mood is not a central feature of introversion-hopelessness. This finding appears not support the idea that introversion-hopelessness is characterized by punishment sensitivity. However, it might be that HH individuals found the negative mood induction intimidating, and attempted to cope with the threat of escalating negative affect by holding themselves together, possibly through cognitive control or avoidance. Instead of dispelling the idea of punishment sensitivity, this perspective suggests that this sensitivity may have acted as a

disincentive, deterring the introverted-hopeless participant from fully engaging in the negative mood induction. Although the obtained results are ambiguous with respect to their support of personality theories of affect susceptibility, they are consistent with Clark & Watson's (1991) tripartite model. As mentioned earlier, this model postulates that low positive affect, rather than high negative affect, is a key component of the depressive experience. Interestingly, the lack of physiological arousal in the HH group is also consistent with the tripartite model in terms of distinguishing symptoms of depression from those of anxiety.

The outcomes of this investigation also yielded valuable information on the cognitive features that distinguish high and low introverted-hopeless individuals. One of the observed findings was that HH participants reported greater baseline dysfunctional attitudes compared to the LH group. Yet this difference, like the difference in baseline mood, was negligible once the effects of depression were removed. It thus appears that although HH individuals possess a more negative set of assumptions and beliefs than LH individuals, this difference is due to higher levels of depression in the former group.

Despite the wide-spread use of the DAS for appraising depressogenic schemas, one cannot deduce that the self-worth contingencies measured by this scale are explicitly tied to a self construct (Segal & Blatt, 1993). A more direct evaluation of the content and organization of self-schema was made possible with the employment of Derry & Kuiper's (1981) self-referent encoding task. Interestingly, this paradigm yielded comparable findings to the DAS with respect to cognitive content. Those in the HH group endorsed significantly more negative as well as significantly fewer positive self-referent adjectives compared to the LH group. It should be noted that HH individuals still endorsed more positive than negative adjectives (roughly 60% of personal adjectives chosen by these individuals were positive). Nevertheless, this positive bias

was considerably greater in the LH group, for which roughly 90% of personal adjectives chosen were positive. On the whole, negative self-views appear to be more characteristic of the HH group, whereas positive self-views appear to be more characteristic of the LH group. However, these differences in self-image were not apparent in the absence of differences in depressive symptoms. What can be deduced from these findings is that the content of cognitive structure as measured by dysfunctional attitudes and self-representation is either state-dependent, fluctuating with severity of depression, or is only detectable in the presence of an activating trigger. By capitalizing on the mood induction procedure, the current study tested whether dysfunctional attitudes would be differentially activated in LH and HH individuals. Results did not support the prediction that HH individuals would be more cognitively reactive to the negative mood induction compared to LH individuals. On the contrary, it was the LH group that evidenced greater shifts in dysfunctional attitudes in response to both mood inductions. In relation to the HH group, this group had higher dysfunctional attitudes following the negative mood induction, but lower dysfunctional attitudes following the positive mood induction. Viewed from a slightly different perspective, the dysfunctional attitudes of the LH group increased after the negative mood induction, but returned to initial levels after the positive mood induction. In contrast, the dysfunctional attitudes of the HH group remained unaltered by either type of mood induction.

Several explanations for these unexpected findings will be considered and discussed. First of all, ceiling and floor effects can be ruled out since the analysis treated baseline DAS scores as a covariate instead of defining change from baseline in terms of difference scores. Also, despite the fact that the HH group had higher dysfunctional attitudes at baseline, their average scores were around the midpoint of the DAS scale, and thus they had room to move in either direction. If anything, ceiling effects would be more likely to appear in the LH group, as

their scores were closer to the high end of the scale (note that higher scores on the DAS indicate lower dysfunctional attitudes).

More plausible explanations for the observed differences in cognitive reactivity can be derived by revisiting their patterns of emotional reactivity to the mood inductions. Considering that the HH group responded to the negative mood induction with less affective reactivity, it may be argued that they did not reach a low enough mood to activate dysfunctional patterns of cognitive processing. However, there are three reasons for dispelling this argument. First of all, the mood manipulation was effective for both groups, in that both groups showed a significant change in mood from pre- to post-mood induction. Second, this argument would suggest a threshold activation process whereby cognitive processing gets "switched on" only when a certain level of mood is reached, rather than a continuous activation process that involves a graded response to changes in mood. Third, although a threshold activation process may explain their lack of cognitive reactivity to the negative mood induction, it does not explain their lack of reactivity to the positive mood induction. The HH group failed to show any shift in dysfunctional attitudes despite achieving a level of positive affect that was comparable, albeit somewhat lower, than the LH group. As such, the failure of this group to show a cognitive shift in response to the positive mood prime demands an alternative explanation. It may be that the effect of positive mood priming on dysfunctional attitudes is to facilitate return to baseline levels when they have been previously activated by a negative mood prime.

A more likely explanation for the observed effects is that HH participants engaged in cognitive avoidance or detachment during both mood induction procedures. Perhaps these individuals found the cognitive aspect of the mood induction (i.e. thinking of personal memories) aversive, or were unmotivated to turn their attention inwards for fear of conjuring up unwelcome

self-related thoughts, and chose instead to remove themselves cognitively while still engaging in the mood alteration process through other means (e.g. focusing on the music or a non-threatening mental image).

A somewhat different perspective that is also consistent with the obtained results is that HH individuals have excessive cognitive rigidity. Implicit in the definition of dysfunctional attitudes is the notion that these attitudes are excessively rigid, absolute rules for interpreting the meaning of personally meaningful incidents. It may be that the beliefs and assumptions of introverted-hopeless persons are so absolute that they are unyielding to any rise or fall in mood. The notion of cognitive rigidity is more commonly encountered in the literature on suicide rather than depression per se. According to Baumeister (1990), one of the steps in the causal process leading to suicide is "cognitive deconstruction", which helps to prevent meaningful self-awareness and emotion. Features of cognitive deconstruction include passivity, lack of emotional range, feelings of constriction, and cognitive rigidity, i.e. inflexible or one-sided thinking with no room for compromise. Interestingly, in the current sample, approximately one-third (32%) of HH individuals reported having passive suicidal thoughts on item 9 of the BDI, compared to none of the individuals in the LH group. Although passive suicidal thoughts are a common symptom of depression, and are by no means an indication that the individual will act on these thoughts, the discrepancy is noteworthy nevertheless. Future research could explore the pervasiveness and strength of suicidal tendencies among HH individuals using more comprehensive assessment tools.

A recently emerging concept in the depression literature that overlaps with the idea of cognitive rigidity is *automaticity,* or predictive certainty. The work of Andersen and her colleagues (Andersen & Lyon, 1987; Andersen , 1990; Andersen , Spielman, & Bargh, 1992) has

been especially influential in this regard. These researchers contend that depressed individuals not only have pessimistic expectations about the future, but they also possess considerably greater certainty about their predictions compared to non-depressed individuals. According to Andersen and her colleagues, the notion of predictive certainty is implicit in the concept of hopelessness, as perceiving a future negative event to be inevitable would be equivalent to giving up all hope. In a series of studies, they have found strong support for this proposition. In one of these studies (Andersen, Spielman, & Bargh, 1992), individuals with varying degrees of depression were presented with a series of positive and negative events at a computer terminal, and asked to predict whether these events were likely to happen to them in the future by pressing yes or no on the keyboard. Severely depressed individuals, compared to mildly or moderately depressed individuals, not only made more negative predictions, but also made these judgments more quickly. In addition, when the task was repeated under an attentional load condition, depressives did not show an increase in response latencies for either negative or positive events, whereas the other two groups did. Although not directly comparable to the current study, this body of research provides some support for the speculation that introverted-hopeless individuals may possess a similar pattern of all or none thinking which encompasses more global thinking patterns rather than being restricted to future events.

Asking participants to report what they were thinking during the mood induction might have been helpful in interpreting the obtained results. Yet another solution would be to utilize mood induction techniques over which the participant has little intentional control. Alternatively, cognitive shift could be assessed using experimental paradigms that emphasize more automatic or uncontrolled processes in order to bypass possible response strategies or biases that are associated with self-report measures such as the DAS.

An equally interesting and unexpected finding was that LH individuals showed an increase as well as a decrease in dysfunctional attitudes in response to bidirectional shifts in mood. This observation introduces the prospect that cognitive flexibility may be an emotionally healthy way of responding to positive as well as negative events or triggers that challenge one's characteristic self-view and attributional style.

Results from the incidental recall portion of the self-referent encoding task are considered next. Differences in adjective endorsement patterns have already been discussed as signifying differences in self-schema content. As Derry & Kuiper (1981) point out, the mere act of making self-descriptiveness ratings alone is not enough to enhance recall. Once the incoming data have been interpreted and deemed compatible with one's self-view, their retention depends on the strength of memory traces that are formed. Superior recall for negative information would indicate a processing bias that is characterized by a tendency to minimize positive appraisals and/or maximize negative appraisals. Thus the self-schema must also be organized for efficient processing of one type of information. The tendency for HH individuals to recall more negative self-descriptive adjectives compared to LH individuals even after controlling for current depression suggests that a negatively biased self-schema organization may be a unique feature of introversion-hopelessness. Participants in the HH group recalled, on average, one more negative self-referent word than the LH group. This is actually a sizeable difference considering that the mean number of negative self-referent words recalled in each group was less than three. Moreover, this difference was despite the fact that HH individuals endorsed significantly more negative self-referent words, as the analysis controlled for group differences in the number of words that were judged as self-descriptive in each category. Thus, the observed difference cannot be explained by an encoding bias resulting from the tendency of the HH group to

selectively attend to negative self-descriptive words. This reasoning is supported by the fact that the HH group did not differ from the LH group with respect to how many positive self-referent words they recalled even though they rated fewer of these words to be self-descriptive.

The negative recall bias displayed by HH individuals suggests a processing advantage for new information that is compatible with negative features of the existing self-schema. With time, the processing bias may eventually strengthen negative constructs by increasing the likelihood that negative information will be more easily accepted whereas positive or disconfirming new information will be more easily rejected. Furthermore, this efficiency of processing appears to be independent of depressive state. Unless the content of the self-schema itself were negatively biased, one would not expect a recall bias to ensue. However, it seems that this content is only salient or accessible in HH persons in the presence of co-existing depression.

With respect to the Posner task, the findings provide weak evidence for differences in attentional mechanisms between LH and HH individuals. Although the two-way interaction indicated that HH participants were slower to respond to invalid cues in general, the significance of this finding is doubtful due to the different attentional mechanisms that operate depending on SOA and cue type. Although the HH group showed more facilitation at the cued location for predictive cues and less IOR at the cued location for non-predictive cues, these observations are purely speculative. A more intriguing discovery was that baseline mood and response times were significantly negatively correlated in the HH group, whereas no such associations were apparent in the LH group. The fact that correlations with baseline mood were not restricted to a particular cue type/SOA/validity combination would seem to rule out the possibility that mood is associated with any specific attentional bias or deficit. Rather, mood appears to be related to generally slower response times. Why such a link between mood and response time would exist

in one group but not the other is not evident. An important point to keep in mind is that these correlations are based on small sample sizes and are therefore prone to fluctuation. The findings are nevertheless interesting and are reported for the purpose of stimulating ideas for future inquiries in this emerging domain of research.

The findings of this study offer some interesting hypotheses with respect to the mechanism of reinforcement underlying the coexistence of mood and alcohol problems in introverted-hopeless individuals. Alcohol may improve depressed mood through its pharmacological effects. Since HH individuals appear to have more depressive symptoms and sadder affect, they may benefit from the short-term mood improving properties of alcohol. A more intriguing possibility is that alcohol influences cognitive processes associated with self-evaluation or self-awareness, possibly by decreasing attention to or interfering with depth of processing of negative self-relevant information. Limited support for this conjecture comes from Stephens and Curtin's (1995) study. The possibility that HH individuals may have purposefully engaged in cognitive avoidance during the negative mood induction was mentioned earlier. By naturally reducing self-focused attention, perhaps alcohol mimics this effect without any active effort on the part of the individual. As a result of this decreased self-focus, HH individuals may also become more receptive to experiencing negative emotions. Conversely, alcohol may not decrease self-focus, but numb the pain associated with the experience or make the process of self-evaluation less threatening. If cognitive rigidity is a factor in the observed findings, alcohol may allow for more flexible, open thinking.

In view of the generally unexpected findings of this investigation, the ideas that have been proposed in this discussion are necessarily speculative and are meant to offer new hypotheses to be pursued in future studies. In addition, since the sample consisted mostly of

females, the results cannot be generalized to male populations or non-college populations. It should also be kept in mind that the participants were relatively well-functioning young adults from a university population. Although depressive symptoms were present in both groups, there is a good chance that most of these students have not experienced their first bout of clinical depression. Thus, it is possible that the processes that were observed in these participants, specifically those in the HH group, reflect coping strategies that have not been fully challenged by experiences that exceeded their ability to cope. Another limitation of this study is the relatively small sample size with unequal numbers in each group. Heterogeneous data dispersion, coupled with disparate sample sizes, may have led to biases in the statistical tests in spite of the care taken to evaluate and correct for these biases when possible. Nevertheless, the results that were obtained in this study are an important step towards developing a comprehensive understanding of introversion-hopelessness, and provide some interesting avenues for further research into the possible reinforcing effects of alcohol for individuals with this personality profile.

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Table 1

Repeated measures ANCOVA for sad/happy ratings

Source	*df*	*Mean Square*	*F*	*p*
Between subjects				
Group status (G)	1	3265.60	1.41	.244
Subjects within-group error	32	2318.14		
Within subjects				
Mood state (M)	1	11423.09	12.08	.001
M X G	1	5392.66	5.70	.023
M X subjects within-group error	32	945.72		
Time (T)	2.72	349.09	2.57	.065
T X G	2.72	893.93	1.46	.233
T X subjects within-group error	86.9	136.03		
M X T	2.24	2637.68	6.59	.002
M X T X G	2.24	2360.55	5.90	.003
M X T X subjects within-group error	71.6	400.22		

Note. Effects involving the covariate term (BDI and baseline happiness ratings) are not displayed for simplicity of presentation.

Table 2

Repeated measures ANCOVA for pleasant/unpleasant mood ratings

Source	*df*	*Mean Square*	*F*	*p*
Between subjects				
Group status (G)	1	286.90	.13	.72
Subjects within-group error	32	2255.26		
Within subjects				
Mood state (M)	1	12316.00	14.75	.001
M X G	1	6385.14	7.65	.009
M X subjects within-group error	32	835.19		
Time (T)	3.25	452.03	2.87	.036
T X G	3.25	637.72	4.05	.008
T X subjects within-group error	104	157.47		
M X T	2.33	3752.31	7.77	.000
M X T X G	2.33	1831.66	3.79	.021
M X T X subjects within-group error	74.6	482.82		

Note. Effects involving the covariate term (BDI and baseline pleasure ratings) are not displayed for simplicity of presentation.

Table 3

Repeated measures ANCOVA for change in arousal

Source	*df*	*Mean Square*	*F*	*p*
Between subjects				
Group status (G)	1	.046	.00	.994
Subjects within-group error	32	849.36		
Within subjects				
Mood state (M)	1	6535.58	2.93	.097
M X G	1	10195.58	4.57	.040
M X subjects within-group error	32	2233.62		

Note. Effects involving the covariate terms (BDI and baseline arousal ratings) are not displayed for simplicity of presentation.

Table 4

Repeated measures ANCOVA for word recall

Source	*df*	*Mean Square*	*F*	*p*
Between subjects				
Group status (G)	1	2.25	.72	.403
Subjects within-group error	35	109.57		
Within subjects				
Valence (V)	1	.41	.20	.657
V X G	1	3.17	1.55	.221
V X subjects within-group error	35	2.04		
Encoding instructions (E)	1	1.23	.67	.418
E X G	1	.04	.02	.882
E X subjects within-group error	35	1.83		
V X E	1	.04	.05	.824
V X E X G	1	3.73	4.87	.034
V X E X subjects within-group error	35	.77		

Note. Effects involving the covariate terms (BDI score and number of yes-rated words in each word category) are not displayed for simplicity of presentation.

Table 5

Repeated measures ANOVA for Posner task response times

Source	*df*	*Mean Square*	*F*	*p*
Between subjects				
Group status (G)	1	1599.50	.09	.766
Subjects within-group error	38	17777.95		
Within subjects				
Cuetype (C)	1	12394.56	2.89	.098
C X G	1	1310.31	.31	.584
C X subjects within-group error	38	4296.08		
SOA	1	63786.05	52.54	.000
SOA X G	1	1178.39	.97	.331
SOA X subjects within-group error	38	1214.09		
Validity (V)	1	18.08	.02	.887
V X G	1	2552.57	2.90	.097
V X subjects within-group error	38	879.21		
C X SOA	1	2124.07	3.51	.069
C X SOA X G	1	551.29	.91	.346
C X SOA X subjects				

within-group error	38	605.70		
C X V	1	8011.13	14.39	.001
C X V X G	1	4.12	.01	.932
C X V X subjects				
within-group error	38	556.19		
SOA X V	1	21003.45	63.01	.000
SOA X V X G	1	54.19	.16	.689
SOA X V X subjects				
within-group error	38	333.33		
C X SOA X V	1	6311.95	10.58	.002
C X SOA X V X G	1	822.88	1.38	.248
C X SOA X V X subjects				
within-group error	38	596.82		

Table 6

Repeated measures ANCOVA for Posner task response times controlling for BDI scores

Source	*df*	*Mean Square*	*F*	*p*
Between subjects				
Group status (G)	1	2061.04	.11	.739
Subjects within-group error	37	18245.38		
Within subjects				
Cuetype (C)	1	11212.16	2.59	.116
C X G	1	4.38	.00	.975
C X subjects within-group error	37	4327.35		
SOA	1	22172.93	17.94	.000
SOA X G	1	282.93	.23	.635
SOA X subjects within-group error	37	1236.02		
Validity (V)	1	2302.86	2.79	.103
V X G	1	5194.24	6.30	.017
V X subjects within-group error	37	825.18		
C X SOA	1	2408.45	4 .02	.052
C X SOA X G	1	6.90	.01	.915
C X SOA X subjects				

within-group error	37	598.81		
C X V	1	2265.19	3.96	.054
C X V X G	1	5.12	.01	.925
C X V X subjects				
within-group error	37	571.82		
SOA X V	1	8462.23	25.46	.000
SOA X V X G	1	23.60	.07	.791
SOA X V X subjects				
within-group error	37	332.39		
C X SOA X V	1	899.53	1.48	.232
C X SOA X V X G	1	254.42	.42	.522
C X SOA X V X subjects				
within-group error	37	608.07		

Note. Effects involving the covariate term (BDI score) are not displayed for simplicity of presentation.

Table 7

Correlations between baseline mood and response times on Posner task

	Baseline mood (Unpleasant/Pleasant)	
Cuetype, SOA, validity combination	LH group	HH group
1. Predictive, 100 SOA, valid	-.066	-.782**
2. Predictive, 100 SOA, invalid	-.024	-.741**
3. Predictive, 700 SOA, valid	-.020	-.675**
4. Predictive, 700 SOA, invalid	-.053	-.688**
5. Non-predictive, 100 SOA, valid	.054	-.605**
6. Non-predictive, 100 SOA, invalid	-.025	-.396
7. Non-predictive, 700 SOA, valid	-.331	-.625*
8. Non-predictive, 700 SOA, invalid	.030	-.512

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

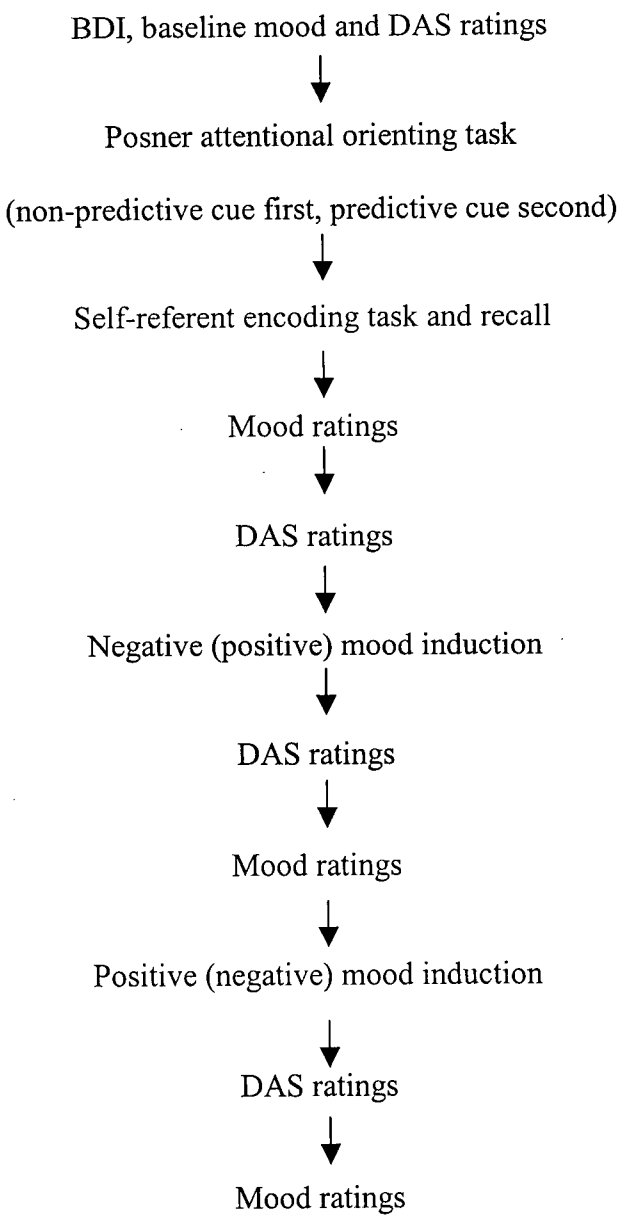


Figure 1. *Procedural sequence of experimental tasks*

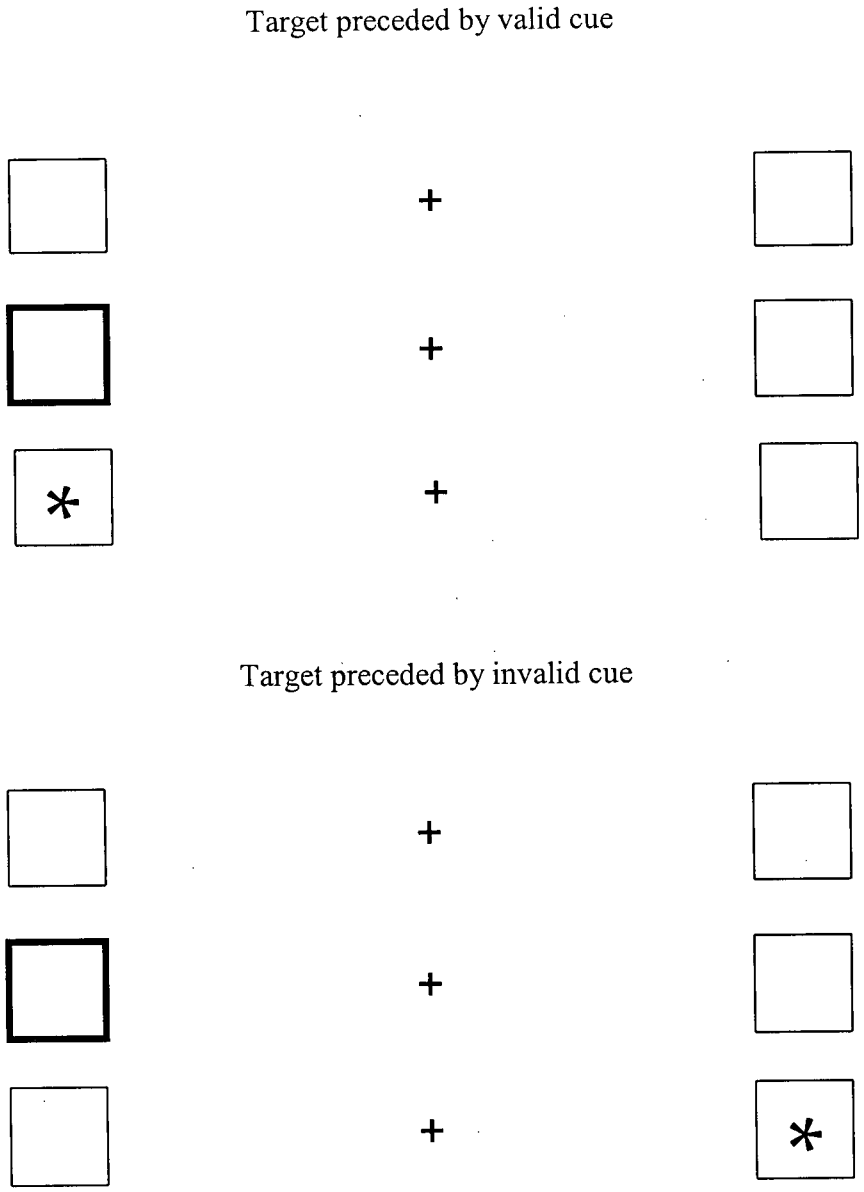
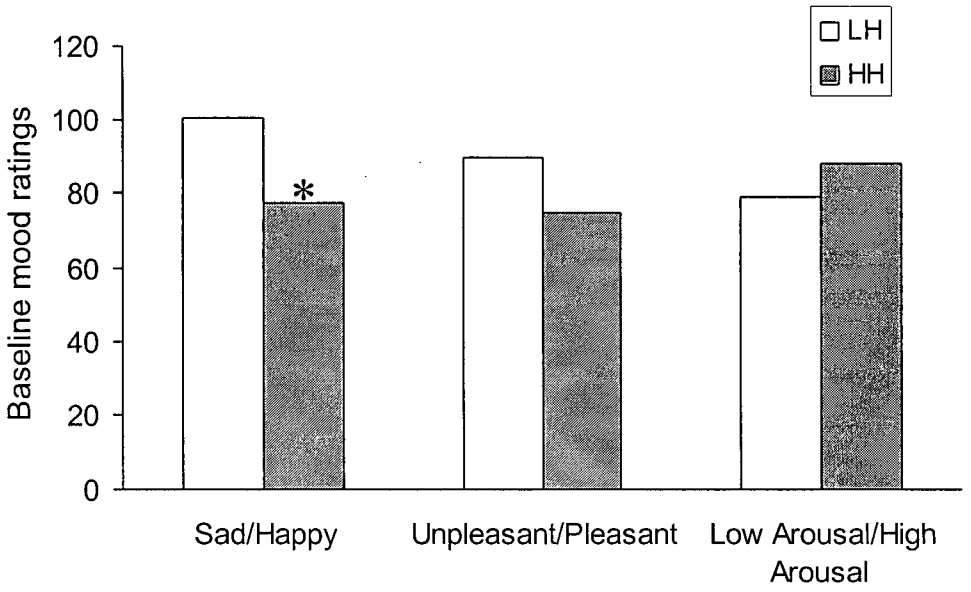


Figure 2. *Trial types for Posner attentional orienting task*



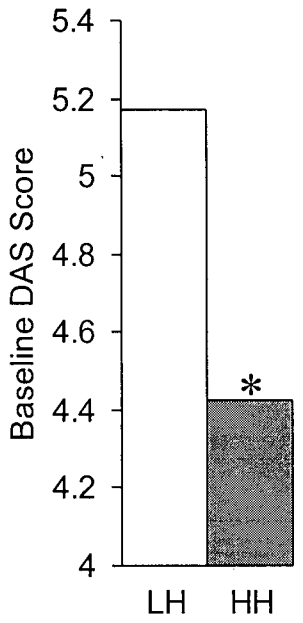


Figure 3. *Mean baseline ratings of mood and dysfunctional attitudes*

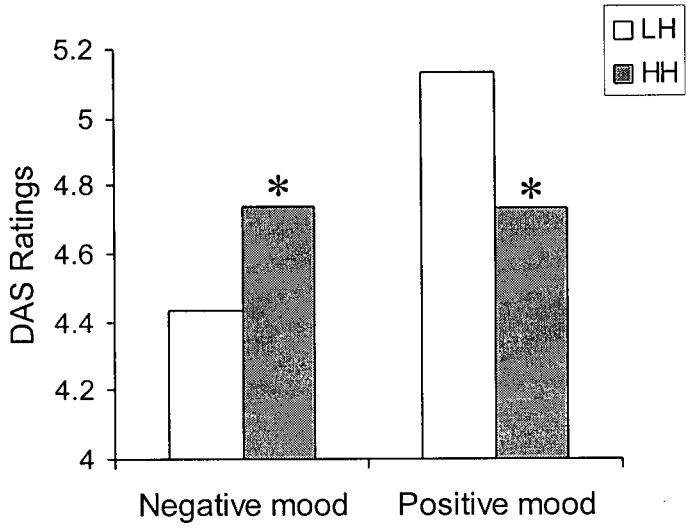


Figure 4. *Adjusted means for dysfunctional attitude scores following negative and positive mood induction, controlling for baseline dysfunctional attitudes and depressive symptoms*

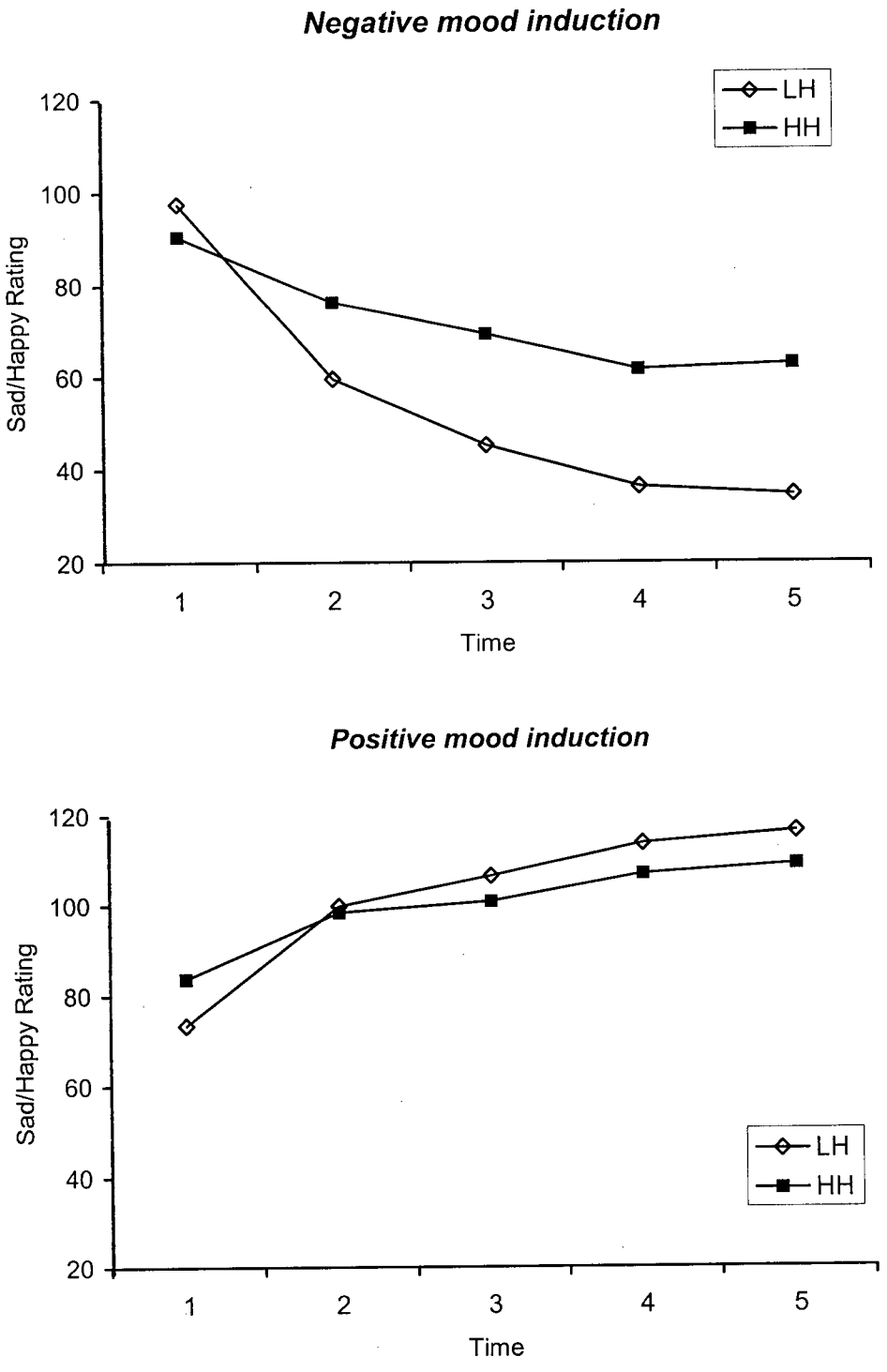


Figure 5. *Adjusted means for happiness ratings during negative and positive mood inductions, controlling for baseline happiness ratings and depressive symptoms*

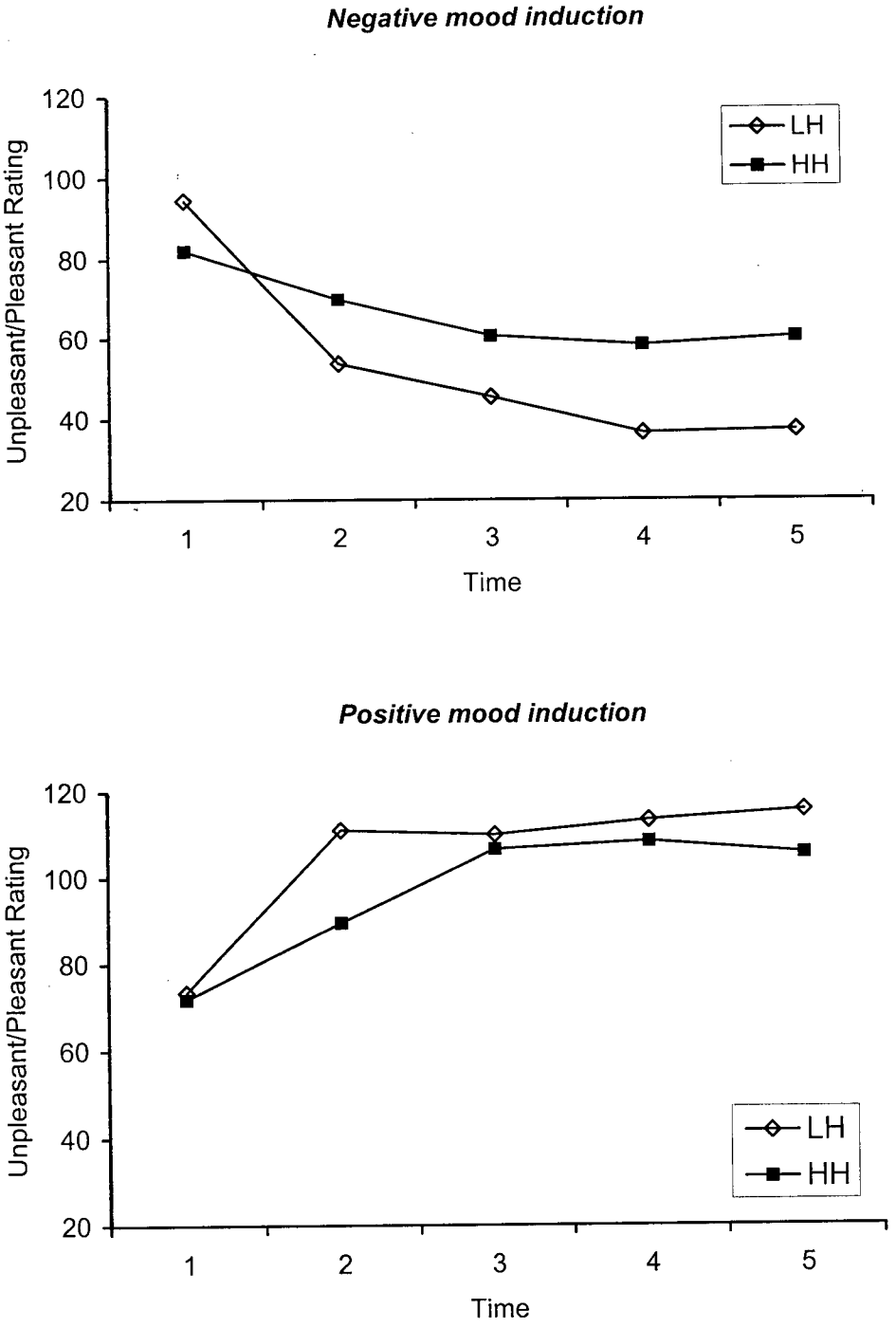


Figure 6. *Adjusted means for pleasure ratings during negative and positive mood inductions, controlling for baseline pleasure ratings and depressive symptoms*

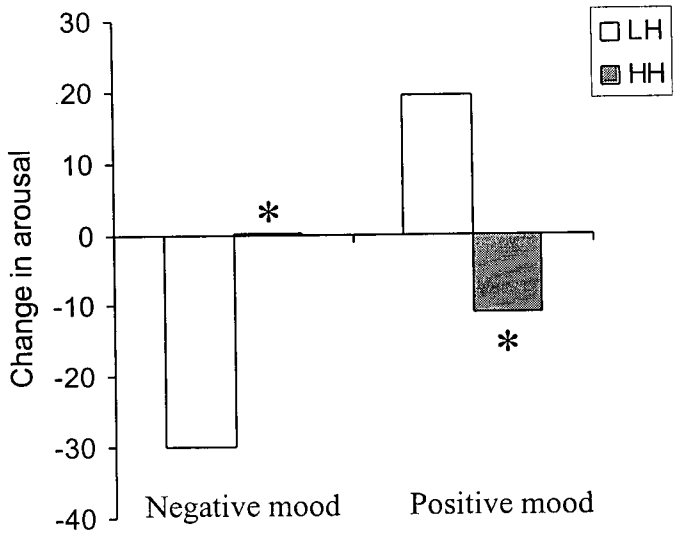


Figure 7. *Adjusted means for change in arousal during negative and positive mood inductions, controlling for baseline arousal ratings and depressive symptoms*

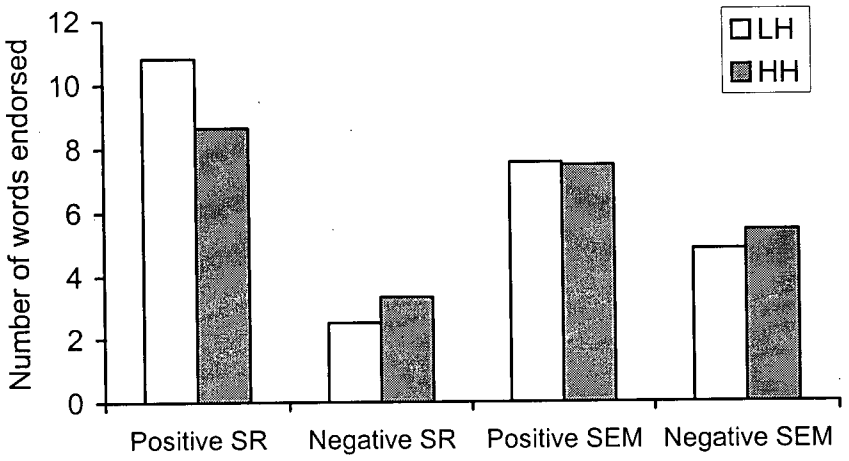


Figure 8. *Adjusted means for number of words endorsed in each category, controlling for depressive symptoms*

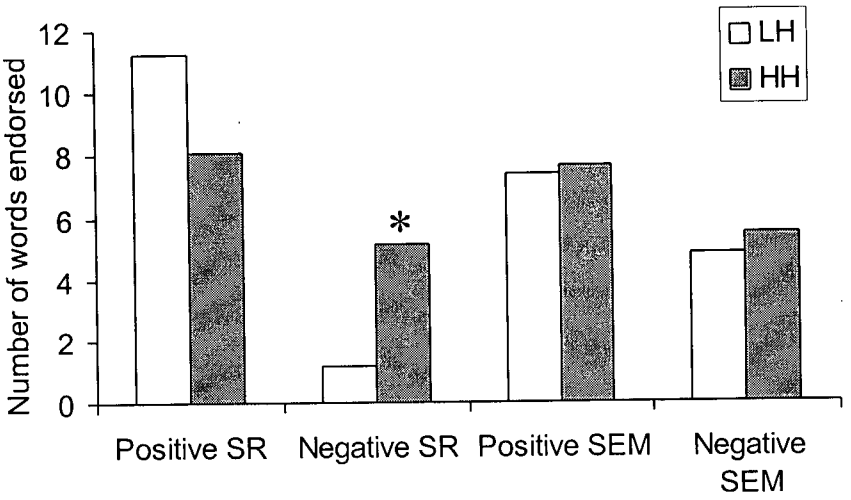


Figure 9. *Adjusted means for number of words endorsed in each category, without controlling for differences in depressive symptoms*

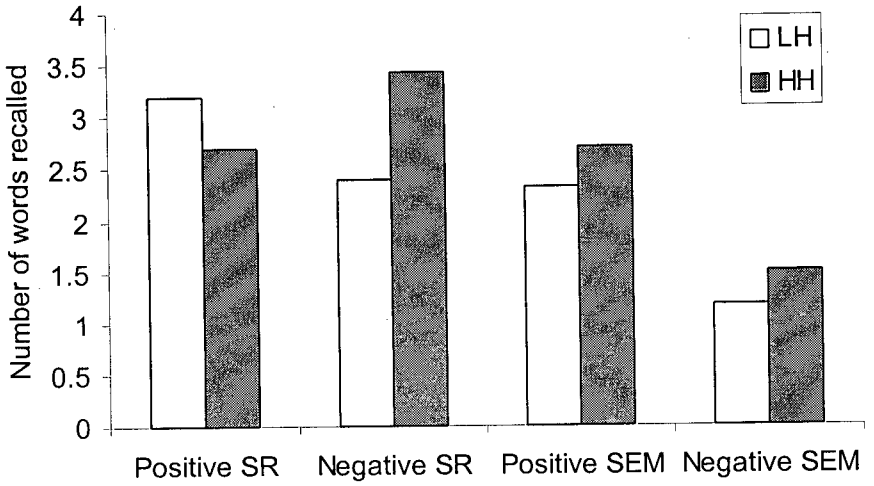


Figure 10. *Adjusted means for number of words recalled in each category, controlling for number of words endorsed but not controlling for depressive symptoms*

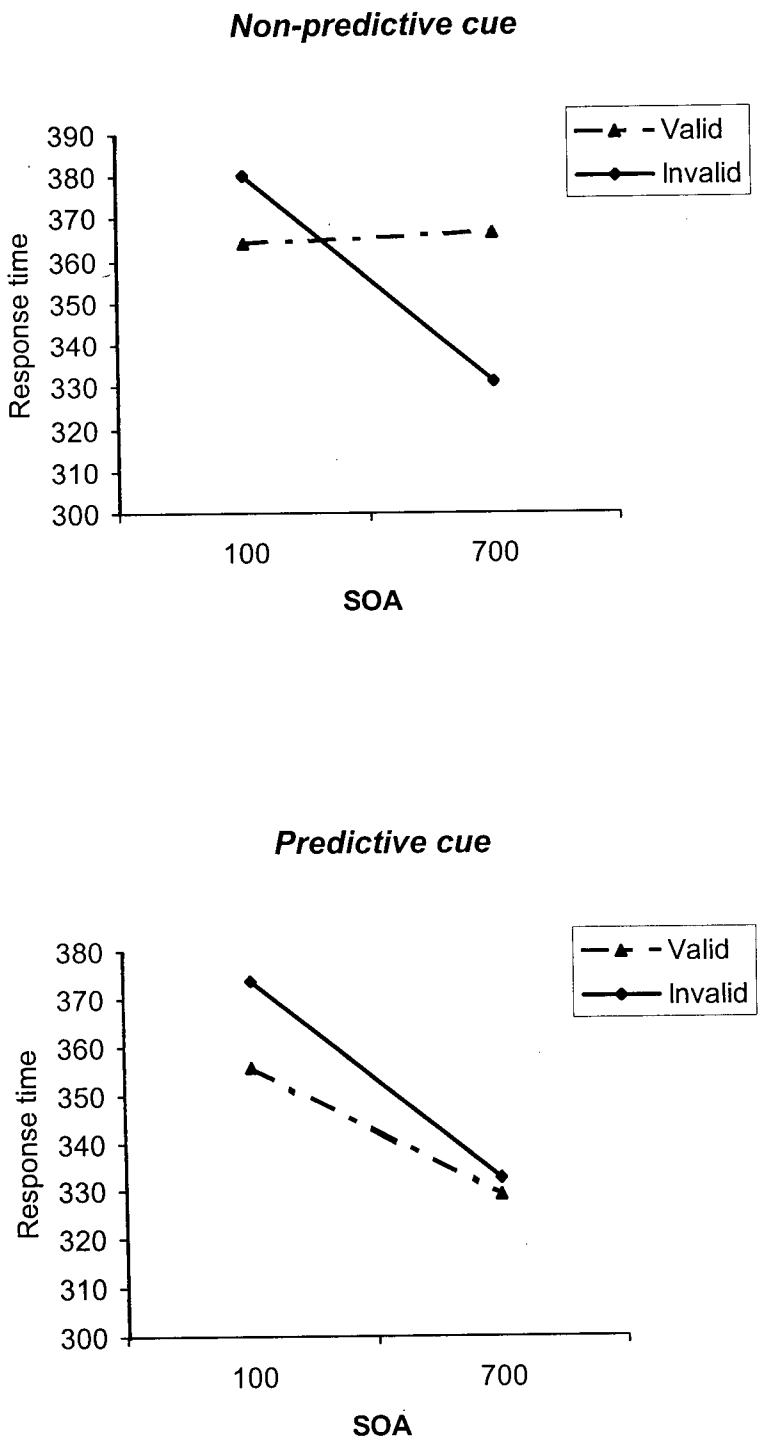


Figure 11. *Mean response times on Posner attentional orienting task*

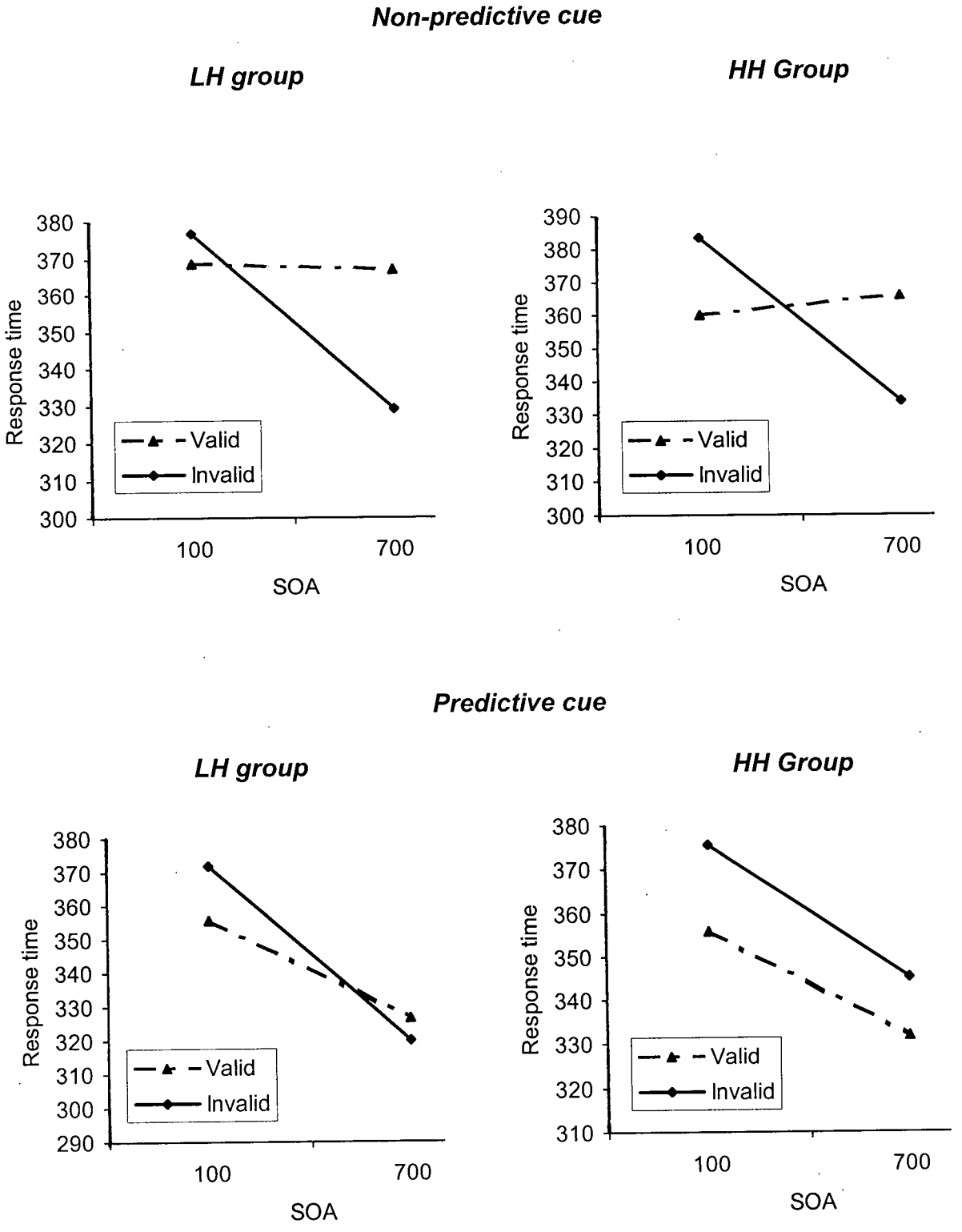


Figure 12. *Adjusted mean response times on Posner attentional orienting task, controlling for depressive symptoms*

Appendix A

Substance Use Risk Profile Scale (SURPS)

Please indicate the extent to which you agree with each of the following statement by circling the number that best corresponds with the following scale.

1 = Strongly disagree 2 = Disagree 3 = Agree 4 = Strongly agree

1. I am content.	1 2 3 4
2. In stressful situations, I often fear that no one will reach me in time.	1 2 3 4
3. I often don't think things through before I speak.	1 2 3 4
4. I would like to skydive.	1 2 3 4
5. I am happy.	1 2 3 4
6. I get frightened and feel that I am losing my mind when I cannot concentrate on the things that I need to do.	1 2 3 4
7. I often involve myself in situations that I later regret.	1 2 3 4
8. I enjoy new and exciting experiences even if they are unconventional.	1 2 3 4
9. I have faith that my future holds great promise.	1 2 3 4
10. It's frightening to feel dizzy or faint.	1 2 3 4
11. The most interesting and exciting things are usually illegal or immoral.	1 2 3 4
12. I like doing things that frighten me a little.	1 2 3 4
13. Sometimes I think I am no good at all.	1 2 3 4

14. It frightens me when I feel my heart beat change. 1 2 3 4

15. I usually act without stopping to think. 1 2 3 4

16. I would like to learn how to drive a motorcycle. 1 2 3 4

17. I feel proud of my accomplishments. 1 2 3 4

18. I get scared when I'm too nervous. 1 2 3 4

19. Generally, I am an impulsive person. 1 2 3 4

20. I am interested in experience for its own sake, even if it is illegal. 1 2 3 4

21. I feel that I'm a failure. 1 2 3 4

22. I get scared when I experience unusual body sensations. 1 2 3 4

23. I'm stubborn and strong-minded and act upon my thoughts despite others' opinions. 1 2 3 4

24. I would enjoy hiking long distances in wild and uninhabited territory. 1 2 3 4

25. I feel pleasant. 1 2 3 4

26. It scares me when I'm unable to focus on a task. 1 2 3 4

27. I feel I have to be manipulative to get what I want. 1 2 3 4

28. I am very enthusiastic about my future. 1 2 3 4