

Avoidance Motivation and Bias Toward Negative Information in Individuals With and Without  
Symptoms of Depression and Anxiety

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## **Abstract**

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Research into transdiagnostic processes underlying clinical disorders has indicated the importance of avoidance motivation and mixed approach-avoidance motivation, as well as negativity bias in the development and maintenance of depression and anxiety. The primary aim of this project is to investigate the relationship between avoidance/mixed approach-avoidance motivation and negativity bias among individuals with and without symptoms of depression and anxiety. 408 participants collected via MTurk were assigned to one of three experimental conditions in which a) avoidance motivation activation b) mixed approach-avoidance motivation activation, or a control task was completed. Results indicate the trait avoidance motivation is associated with negativity bias in interpretation of ambiguous information. This relationship is moderated by symptoms of depression, so that at high levels of depression, increases in trait avoidance have their largest effect, leading to more negativity bias in interpretation. Compared to the control condition which did not undergo motivation manipulation, assignment to the avoidance motivation condition did not have a main effect leading to higher levels of negativity bias. Assignment to the avoidance motivation condition did have an interaction effect with anxiety symptoms, so that when participants were assigned to the avoidance condition (compared to the control condition), higher levels of anxiety led to greater negativity bias. When mixed approach-avoidance motivation was activated, there were no significant main effects (compared to a control condition) on negativity bias, and this relationship was not significantly moderated by levels of depression or anxiety.

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# Introduction

## Depression and Anxiety

Depression and anxiety are two of the most pervasive clinical disorders, with depression affecting more than 20% of individuals in the U.S. at some point in their lives (González et al., 2010), and an anxiety disorder affecting up to 33.7% of the population in their lifetime (Bandelow & Michaelis, 2015). Each year, 6.7% of individuals suffer from depression (NIMH, 2015) and 19.1% from an anxiety disorder (NIMH, 2021). These are two of the most costly disorders for individuals, causing impairments across a variety of domains of functioning, leading to unemployment, marital dissatisfaction, significant disability, physical health problems, and early mortality (Kroenke et al., 2007; Liu & Thompson, 2017; Trew, 2011).

The two key symptoms of depression are elevated negative affect, and diminished ability to experience positive affect (American Psychological Association [APA], 2013). Key elements of anxiety disorders include fear, or the emotional response and associated autonomic arousal for fight or flight to real or perceived imminent threat, and anxiety, or anticipation of future threat and associated vigilance, cautiousness, and muscle tension (APA, 2013). While major depression and anxiety disorders are distinct clinical conditions, they also have overlapping symptoms, and share underlying biological, cognitive, and emotional, processes (Conklin & Boettcher, 2017). Models of anxiety and depression such as the Tripartite Model (Clark & Watson, 1991) unite shared symptoms of depression and anxiety under the theme of negative affect and distress which is present in both disorders and differentiate between the more unique symptoms of depression which relate to lack of positive affect and energy, and anxiety which is uniquely associated with fear and somatic hyperarousal.

More recently, researchers have begun to focus on the underlying transdiagnostic processes that are at the root of different symptoms and diagnosable disorders. This kind of research helps us understand relationships among previously unconnected behavioral and cognitive tendencies and gives new insight into the probable etiology and maintenance of depression and anxiety. Unifying research like this has led directly to new and more targeted treatments focusing on underlying transdiagnostic processes (e.g. Mennin et al., 2018; Renna et al., 2017). This work often explores the interplay of different biological, cognitive and emotional processes in depression and anxiety, examining the ways they affect one another and the mechanisms that may be driving these relationships (Everaert et al., 2014; Gotlib & Joormann, 2010; Joormann & Gotlib, 2010; Joormann & Stanton, 2016).

Our understanding of risk factors and mechanisms that underlie depression and anxiety has greatly advanced over the last 20 years, with research indicating that deficits in cognitive control, repetitive negative thinking, and ineffective regulation of negative emotion, play a role in the formation and maintenance of depression and anxiety (Ehring, & Watkins, 2008; Goschke, 2014). Negativity bias, or cognitive bias toward negative information that can affect attention, memory, and interpretation of ambiguous stimuli, has also been linked to the formation and maintenance of depressive and anxiety disorders (Rude et al., 2002; Smith et al., 2018). Negativity bias in attention, memory, and interpretation is seen by some as a core transdiagnostic process at the root of human suffering (e.g. Garland & Howard, 2014). Another important area of research in depression and anxiety is the study of motivation and goals, which has found differences in the way individuals with anxiety or depression are motivated to set and pursue goals. Compared to those without symptoms of anxiety or depression, clinical populations are

more motivated and focused on avoiding negative outcomes (for a review, see Clark & Beck, 2010; Trew, 2011).

Few studies have examined the way in which avoidance motivation is related to negativity biases in depression and anxiety. There are, however, several lines of research across clinical, social, and cognitive psychology which, when taken together, provide preliminary support for the hypothesis that avoidance motivation may play an important causal role in the negativity biases present for anxious and depressed individuals. The outline that follows elucidates how previous research supports this hypothesis and presents a study that tests the nature of this hypothesis.

### **Negativity Bias in Depression and Anxiety**

Biases toward negative information and stimuli play a role in the formation and maintenance of depression and anxiety (Beck & Clark, 1997; Disner et al., 2011). Negativity bias among individuals with depression and anxiety has been demonstrated in various cognitive processes including attention, memory, and interpretation of ambiguous information. While some amount of bias toward negative information is adaptive and found even in healthy individuals (Rozin & Royzman, 2001), clinical samples typically have significantly more negativity bias. Specifically, studies have found that people who are depressed or anxious attend to negative stimuli or information in their environment more than their non-depressed and non-anxious counterparts in some cases (Gotlib et al., 2004; Mathews & MacLeod, 2005), interpret ambiguous information more negatively (Rude et al., 2003), and remember more negative than positive information when recalling the past under certain conditions (Herrera et al., 2017; Watkins, 2002). Detailed in the coming paragraphs is a description of the conditions under which negativity biases in each of these processes do and don't replicate among individuals with

depression and anxiety (Gotlib & Joormann, 2010; Mathews & MacLeod, 2005), as well as a brief discussion of methods used to measure negativity bias across processes. This review highlights the conditions in which negativity bias is present and consistent in both depression and anxiety, and the research that follows will use the measures that have shown the most consistent results.

### ***Attention***

Attentional bias toward negative information has been measured using a variety of stimuli, including facial expressions, emotional pictures, and emotionally relevant words. Attentional biases are often examined with tools such as the dot probe task, in which participants are tasked with rapidly and accurately indicating the location of a target stimulus (small visual probe), that appears on one side of their computer screen subsequent to the presentation of two stimuli (emotionally relevant pictures or words) on each side of their screen. The visual probe is presented randomly following either a positive, negative, or neutral stimulus, and discrimination latencies are calculated, so that attention to negative stimuli can be assessed by comparing latencies across different probe locations, with participants having shorter response latencies to visual probes presented following stimuli that already captured their attention. Other methods used to study attentional biases in depression include the use of emotional Stroop (George et al., 1997) and go/no go (Murphy et al., 1999) tasks.

In research using diverse methods, some studies have found that depressed individuals are more likely to attend to sad and threatening faces and words (e.g. Bradley et al., 1997, George et al, 1997; Gotlib et al., 2004; Joormann & Gotlib, 2007; Mathews et al., 1996; Rinck, & Becker, 2005), while others have not (Mogg et al., 1995; Mogg and Bradley, 1999). Discrepancies have mostly been attributed to the findings that, among depressed individuals,

there are more robust attention effects for emotionally relevant stimuli that are presented supraliminally rather than subliminally (Mathews & MacLeod, 2005), and that attention biases are more related to issues with disengaging from negative stimuli than attending to them in the first place (Gotlib & Joormann, 2010). Among anxious individuals, attentional bias for negative information appears robust, with effects for both supraliminally and subliminally presented stimuli, although more associated with immediately attending to negative information than remaining excessively engaged with that information (Bar-Haim et al., 2007). These findings are most consistent for negative information when it is related to threat (Bar-Haim et al., 2007). Negativity bias in attention appears to operate slightly differently in depression and anxiety, with depressed individuals having difficulty disengaging rather than initially attending to negative information, and anxious individuals displaying more negativity bias in immediately attending to stimuli. Given these differences, we'll next focus on memory and interpretation of ambiguous information, looking for measures that demonstrate similarly strong negativity bias effects in both depression and anxiety for subsequent use in this research.

### ***Memory***

Most memory effects have been demonstrated with tasks measuring recall for emotionally valenced words or faces, and recollection of personal events. There is clear evidence that depressed individuals remember more negative information than nondepressed individuals. Research points to particularly robust memory biases for depressed individuals when they are asked to deliberately recall words or events (explicit memory), whereas in cases when participants are asked to complete tasks that measure implicit memory, negativity biases are found only under limited conditions such as when the tasks involve conceptual processing (involving semantic or associative processes) and not perceptual processing alone (involving



recognition of physical features of the stimulus) (see Rinck & Becker, 2005; Watkins, 2002). Evidence for memory bias for individuals with anxiety has been inconsistent if not at times contradictory and are difficult to fully explain (Herrera et al., 2017; Mitte, 2008). Meta-analytic reviews generally indicate that there is greater likelihood of finding memory biases for anxious individuals when examining a) recall (remembering without prompting) rather than recognition (recognizing stimuli seen before when shown stimuli again) b) free (free to remember stimuli in any order) vs. serial recall (required to remember stimuli in order) c) explicit vs implicitly presented stimuli d) those with panic disorder (Clark & Beck, 2011; Coles & Heimberg, 2002; Herrera et al., 2017; Mitte, 2008). Mixed conclusions have been arrived at regarding whether shallow or deeper processing of memory stimuli result in more memory biases, and whether effects are found among those with high trait anxiety and those with generalized anxiety disorder (GAD). Like negativity bias in attention, bias in memory is also more robust among anxious individuals for threat-related information (Clark & Beck, 2011). In depression and anxiety, there are established negativity bias effects in memory in free recall tasks with explicitly presented information, and this current study will utilize this kind of task in measurement.

### ***Interpretation***

Interpretive biases were first examined in depression, using methods that relied heavily on self-report. For example, a study by Butler and Mathews (1983) presented participants with imagined scenarios such as “you wake with a start in the middle of the night, thinking you heard a noise, but all is quiet”, and asked participants to rank order three potential reasons they may have woken up, one of which was threatening. Those participants who on average ranked the threatening reason why they may have awoken higher than the other explanations, were considered to have more interpretive biases. Subsequent research began using methods less

subject to demand characteristics. For example, some studies used physiological measures of interpretive biases, presenting ambiguous auditory stimuli which could be interpreted as neutral or negative, and measuring rate of eye-blinks in response to these stimuli, with higher rates of blinking indicating the interpretation of stimuli as negative, and successfully found interpretive biases in depression (Lawson et al., 2002).

Individuals with depression as well as those with anxiety have been found to experience significant interpretive biases. Some differences between those with depression and anxiety are tied to how ambiguous information tends to be negatively interpreted. While depressed individuals tend to interpret ambiguous information as generally negative and may subsequently experience increased sadness, anxious individuals tend to interpret ambiguous information as threatening and can be subsequently more likely to worry (Hayes et al, 2010). One task frequently used in the study of interpretive biases in depression and anxiety is the Scrambled Sentences Task (SST, Wenzlaff, 1993). This task consists of a series of scrambled sentences (e.g., “happy miserable be I expect to”) which participants are instructed to form into coherent and grammatically correct sentences from the words provided. Each of the sentences can be put together to form a positive (“I expect to be happy”) or a negative (“I expect to be miserable”) sentence, with the overall number of positive vs. negative sentences used as a measure of interpretive bias. This method appears to work particularly well at capturing bias when participants are under cognitive load while filling out the SST, as this load prevents volitional efforts to suppress, modify, or edit thoughts, and allows more automatic thoughts to emerge (Beevers et al., 1999; Rude et al., 2003). While the SST was initially developed to examine interpretive biases among those with depression, similar effects have been demonstrated with individuals with anxiety. Both depressed and anxious individuals are more likely to unscramble

these ambiguous sentences in their more threatening or negative forms (for review, see Würtz et al., 2022). Because of these well-established effects, this study calls for measuring negativity bias in interpretation in both depression and anxiety via the SST.

***Mechanisms: Why do biases toward negative information arise?***

Many theories focus on cognitive mechanisms that explain why biases toward negative information arise, including explanations based in mood-congruency and schema theory (Disner et al., 2011; Dozois & Beck, 2008). Mood-congruency approaches emphasize how cognitions are naturally biased toward information that is in line with current mood, while schema theories explain how internal schemas or representations of stimuli and experiences guide cognitive processing of new information toward those schemas. Other more recent theories have highlighted the role that affect plays in causing negativity biases, with affective sources preceding and driving cognitive biases (e.g. Joormann, 2010). This research aims to test the theory that general avoidance motivation, or a general desire to avoid negative outcomes, makes goal relevant content more salient, thereby biasing information processing toward the kind of negative information that appears most important based on these avoidance motivations. This is a theory that has been described (Derryberry & Reed, 1997; Roskes et al., 2014), but rarely experimentally tested. The next section highlights supporting research, beginning with a review of the relationship between motivation and information processing. Next, this review details research on approach and avoidance goals in depression and anxiety and proposes hypotheses and a study to test them.

**Motivation, Goal Pursuit, and Information Processes**

Scholars have grappled for centuries with the question of how goals, motivation, and other kinds of cognition are related (Lazarus, 1991). Psychological research into goals and

motivations have helped refine the definitions of these concepts, as well as their relationship to information processes. Goals have been defined in a variety of ways, but most recent definitions include three core elements: 1) they are internal representations with both cognitive and motivational elements; 2) they include a desire or motivation for a specific end-state; 3) they guide human behavior (e.g., see Dickson, Johnson, Huntley, Peckham, & Taylor, 2017, p. 6; Elliot, 2006, p. 113; Fishbach and Ferguson, 2007, p. 491). The definition of motivation is quite complicated, and many researchers have lamented the lack of a unified definition with widespread agreement (Kanfer, 1990; Kleinginna & Kleinginna, 1981). According to most accepted theories, motivation refers to an internal drive or desire to move in a particular direction (Kleinginna & Kleinginna, 1981). Goals and motivations are inherently connected, unified by their purposive explanation of behavior, with goal setting and pursuit being driven by and directing motivation (Elliot, 2006). Although some argue that goals and motivations are not conceptually the same and can, in some cases, not be perfectly aligned (e.g., Förster et al., 1998), they remain fundamentally intertwined (Elliot & Thrash, 2001). Because of the relationship between goals and motives, and the fundamental role that motivation plays in goal setting and pursuit, subsequent parts of this review that use the term “goal” should also be understood to be referring to the motivation that underlies the goal, or the desire to move toward an end state.

The interdependence of motivation and cognition has been demonstrated (see Locke, 2000), with motivations and goals having the capacity to affect a host of cognitive processes (Ferguson et al., 2008; Katz-Navon et al., 2016). Research by Ziva Kunda (Kunda, 1990) and E. Tory Higgins (Sorrentino, & Higgins, 1986) has clarified that cognitive processing does not operate in a motivational vacuum. Instead, cognitions are often driven by goals and motives, even when these are not conscious (Kruglanski et al., 2002). More specifically, research has

shown that goal activation leads to selective attention toward goal-relevant stimuli, even preconsciously (Bargh et al., 2001; Moskowitz, 2002). Goal pursuit can also lead to memory biases toward goal related information (Knight et. Al, 2007), and cause participants to interpret ambiguous stimuli in ways that are consistent with their goals and motivations (Balcetis & Dunning, 2006).

It's clear that goals and their underlying motives affect information processing, causing people to process goal-relevant information more thoroughly (Baumeister et al., 2001; Fiske & Taylor, 1991). It is important to note that goals have both cognitive and motivational components, according to most theorists. Some propose that goals exist as cognitive structures in memory which also have important connections to motivational systems (Shah, & Gardner, 2007). Based on this theory, goal activation has effects on attention memory and interpretation of information, as goals are memory based. When memories surrounding a goal become more active, subsequent cognitions (and behaviors) are biased in the direction of information relevant to a goal (Ferguson et al., 2008; Vogt et al., 2011). This process occurs when a goal is activated, but not when there is merely semantic activation alone (Förster et al., 1998), as goals are also inherently motivational and by definition include activity within structures related to motivation in the brain. Differences between goal activation and semantic activations include: a) goal activation effects involve decreases in motivation once a goal is attained; b) goal activation effects involve gradients as a function of distance to the goal; c) goal activation effects involve inhibition of conflicting goals; d) goal activation effects persist over time whereas semantic activation decays (Becker et al., 1997; Förster et al., 2007). To provide evidence of goal-based accounts of any activation, one may differentiate this from semantic activation alone by showing that an activation had any of these four properties.

## Approach and Avoidance Motivation

Several lines of research into individual differences in the way people set goals have highlighted the importance of distinguishing between motivation to achieve positive end-states (approach motivation) and to avoid negative end-states (avoidance motivation) (Spielberg et al., 2011). Different areas of research have been established which are based on principles centered around approach-avoidance typologies. Each of these slightly different conceptualizations have been shown to have important explanatory power in accurately predicting a range of human behaviors. Some are listed below, and described in the paragraphs following:

**Table 1**  
*Constructs Related to Approach and Avoidance Motivation*

Author	Approach	Avoidance
Gray (1990)	Behavioral Activation System	Behavioral Inhibition System
Higgins (1987, 1997)	Promotion Focus	Prevention Focus
Elliot and Thrash (2002)	Extraversion	Neuroticism
Westaby (2005)	Reasoning for	Reasoning Against

The Behavioral Activation and Inhibition systems (BAS/BIS) are proposed by Grey (1981, 1990) to underlie learning and affect. The Behavioral Activation System is focused and responds to rewards (appetitive behavior), while the inhibition system is focused on avoiding threat and punishment (aversive behavior). Both systems are associated with specific brain structures, and there is evidence of individual differences in baseline activity and responsivity levels of each system (Sutton & Davidson, 1997). Individual differences in activity of each system has been connected to many personality and clinical characteristics. Although levels of BAS and BIS activity are often negatively correlated, the systems, and scales measuring them, should be conceptualized as distinct unidimensional systems (Maack & Ebesutani, 2018).

Research by Higgins and colleagues (Higgins et al., 1994; Higgins, 1998) outlines two regulatory systems, one which is dedicated to approaching desired end-states, and the other dedicated to avoiding other undesired end-states. These regulatory systems are the core of Higgins Regulatory focus theory, which distinguishes between a “promotion focus on hopes and accomplishments (gains)” (approach), and “a prevention focus on safety and responsibilities (non-losses)” (avoidance) (Higgins, et al., 2001, pg. 3). Higgins’ research centralizes these systems at the root of all goal-directed behavior (Higgins et al, 2001).

Other researchers building on the work by Gray (1990) have also made the case that approach and avoidance motivation is at the core of human behavior (Elliot & Covington, 2001; Elliot & Thrash, 2002). Direct relationships between approach and avoidance goals and other constructs, have led researchers to unite previously disparate theoretical constructs under the umbrella of approach-avoidance theory. Elliot and Thrash (2002), consider approach motivation conceptually synonymous with the Behavioral Activation System (BAS) sensitivity as well as the personality factor of extraversion, and avoidance motivation synonymous with Behavioral Inhibition Systems (BIS) sensitivity and neuroticism. Avoidance goals and motivations have also been linked to negative affect, as has the BIS system generally (Elliot & Thrash, 2002).

Another theory that explains human behavior linked to approach avoidance is Behavioral Reasoning Theory (Westaby, 2005). This theory highlights how “reasons for” (connected to approach motivation) and “reasons against” (linked to avoidance motivation), play a critical role in how we make decisions, as when individuals make choices, they “search for behavioral options in memory that have the most justifiable and defensible set of reasons” (Westaby, 2005, pg. 101). Other fundamental research explaining behavior that relate to approach and avoidance include the study of differences between gain and loss in economics (Kahneman & Tversky,

1979). Several theorists have put forth different models for how gain and loss relate to approach and avoidance motivation to come together to influence human behavior (for different theories, see Corr & McNaughton, 2012 & Wright et al., 2013).

### **Approach and Avoidance Motivation in Depression and Anxiety**

Individuals who are particularly high or low on BIS or BAS activity are considered at higher risk of developing psychopathology or problems with adjustment (Bijttebier et al., 2009). Indeed, individual differences in approach and avoidance motivation have been implicated in a host of clinical disorders, including addiction, eating disorders, schizophrenia, psychopathy, personality disorders, anxiety, and depression (Trew, 2011). Addiction has been characterized as a disorder of high levels of approach sensitivity and approach motivation (Spruyt, et al., 2013), and schizoid personality features have been linked to avoidance motivations. Anxiety, depression, anorexia, and schizophrenia have been linked to high levels of BIS sensitivity (Trew, 2011). Approach and avoidance motivation has been shown to be particularly important in depression and anxiety. In fact, some recent treatments focusing on transdiagnostic processes in depression and anxiety have made approach-avoidance motivation and regulating these motivations particularly under approach-avoidance conflict an important element of treatment (Quintero et al., 2021).

### ***Motivation and Depression***

Depressed individuals are more likely to set and continue to pursue unrealistically lofty goals, set goals inflexibly, and react impulsively and with greater urgency to motivations that are not fulfilled than nondepressed individuals (Dickson et al., 2017; Street, 2002). Depression is also frequently characterized by a lack of approach behaviors and high levels of avoidance behaviors and motives. These approach and avoidance tendencies serve both as individual



difference variables that make one more disposed to becoming depressed, and as mechanisms that maintain depression through negative reinforcement (Manos et al., 2010; Martell et al., 2001). Indeed, depressed individuals higher levels of avoidance behaviors and lack of approach motivation are connected to many of the central symptoms of depression, including anhedonia, lack of energy, and social withdrawal (Aldao et al., 2010; Struijs et al., 2017). Research based on self-report and more direct measures of approach and avoidance goals, have supported the conclusion that depressed and dysthymic individuals have higher BIS sensitivity, and lower BAS sensitivity, and set fewer approach goals and more avoidance goals (Dickson and MacLeod, 2006; Trew, 2011), although there is some conflicting evidence on whether depressed individuals set more avoidance goals (Dickson et al., 2016).

### ***Motivation and Anxiety***

Like depression, anxiety is associated with deficits in flexibly setting goals, and preoccupation with negative content. Large bodies of evidence indicate that anxious individuals have high levels of BIS activation which guides sensitivity to threat and keep these individuals in a higher state of vigilance and more prone to worry, rumination, and fear. No reliable relationships with the BAS system have been reported for anxiety (Bijttebier et al., 2009; Dickson et al., 2017). Some have updated earlier models of Gray's BAS/BIS systems to break out a 3<sup>rd</sup> motivational system called the Fight-Flight-Freeze System (FFFS), which is activated by "conditioned and unconditioned aversive stimuli and initiates escape behavior", and is more associated with fear and panic than the anxiety associated with the BIS system (see Vervoort et al., 2010, p. 282). Yet others updated Gray's BAS/BIS model in the form of Reinforcement Sensitivity Theory (Corr & McNaughton, 2008). This theory redefines the BIS and FFFS systems, and postulates that it is the FFFS system that primarily responds to threats, and the

central role of the BIS system is to resolve conflicts that arise in situations that have elements of both reward and threat, modulating the FFFS and BAS systems in conflict up or down depending on the size of the perceived threat and reward (Bijttebier et al., 2009). Even among newer models, high levels of avoidance motivation remain a fundamental component of anxiety disorders, and one important underlying source of symptoms of anxiety. There has been some mixed evidence on whether comorbid anxiety actually may account for the relationship found between avoidance motivation and depression (see Spielberg et al., 2011), and so in this study we will look at groups of individuals with depression with and without anxiety to examine how avoidance motivation relates to symptomatology.

### ***Mixed Approach-Avoidance Motivation***

While early research focused on approach and avoidance motivations separately, “in daily life, decisions are made in conflicting situations by balancing rewarding and aversive outcomes” (Ironside et al., 2020, p. 399). Therefore, recent research has started to examine situations in which mixed motivations arise, wherein an individual has active approach and avoidance motivations. How individuals respond in these states of motivational conflict have been implicated in anxiety and depressive disorders. For example, according to the Emotion Regulation Therapy model, motivational paralysis in individuals with distress disorders such as GAD are thought to sometimes be caused by the simultaneous pulls toward high threat and high reward, rendering the individual “nearly incapable of taking behavioral action” (Fresco et al., 2013, p. 286). Similarly other recent studies have found that when such conflicts arise, individuals are more likely to experience sympathetic system arousal, feel more anxiety, and be less capable of following through on goal relevant behavior, instead staying in a stage of “environmental scanning and risk-assessment behaviors” (see Barker et al, 2019, p. 2; Gray &

McNaughton, 2003). These views of approach-avoidance motivation also provide a rationale for why individuals with depressive or anxiety symptoms may react to approach-avoidance situations differently than their asymptomatic counterparts. It may be that healthy individuals who are in motivational conflict do not pay more attention to negative information in their environment, while those who are depressed or anxious may exhibit more negativity bias in this conflicted motivational state as they are less capable of flexibly balancing between reward and threat.

### ***Measurement and Manipulation***

Approach and avoidance goals have been measured using several different tools. One popular measure of approach and avoidance goals is the BAS/BIS scales (Carver & White, 1994). These ask participants to report the degree to which a series of sentences phrased in terms of either approach (e.g. “If I see a chance to get something I want I move on it right away”) or avoidance (e.g. “I worry about making mistakes”) tendencies are important to them. The Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ, Torrubia et al., 2001), is another way of measuring BAS/BIS tendencies. The SPSRQ, which has shown strong validity and reliability, is a 48 item self-report scale that the author’s developed to fully encompass the reactivity and responsiveness of the approach and avoidance systems first described by Gray in 1981. The Sensitivity to Reward subscale is a measurement of approach motivation, and the Sensitivity to Punishment scale is a measure of the BIS system that is at the heart of avoidance motivation, and incorporates questions that tap into behavioral inhibition (passive avoidance, as well as measuring mental processing resulting from the threat of punishment or failure (Torrubia et al., 2002). Another measurement tool gives participants two separate periods of time (usually around 75 seconds each) within which they are asked to record

either as many approach or avoidance goals as they can. The order of the presentation of approach or avoidance goal prompts are counterbalanced, but taken by all participants. Participants are asked to provide goals that come to mind to complete sentences that begin with “It is important for me to...” (approach prompt) or “It is important for me to avoid...” (avoidance prompt), and are given an example of each kind of goal. The degree to which approach or avoidance goals are active is based on the proportion of total goals listed that are approach or avoidance based. Other measures of avoidance goals are prompts that ask for individuals to generate a few goals without a time constraint (usually 6 or 8), and then code each goal for approach or avoidance orientation (Elliot & Thrash, 2002; Elliot et al., 2009; Gable, 2006), measuring the overall number of avoidance goals generated of all goals reported.

It is important to distinguish between measuring the tendency to set and pursue avoidance goals, and methods that aim to activate or manipulate avoidance motivation. Developed methods, and indeed much of the research into avoidance motivation in depression and anxiety, traditionally focus more on measuring approach and avoidance, but not on directly examining the effects of activating avoidance motivation via manipulation on subsequent information processing or behavior. Methods of activating approach or avoidance motivation come in multiple forms, but mostly as manipulations that ask participants to physically move their arms and hands (e.g. Gawronski et al., 2005) or face (Kelley et al., 2017) in ways consistent with approach or avoidance (for review of effects, see Elkjær et al., 2020). Much fewer research has examined psychologically manipulated approach-avoidance activation. The studies that have, mostly do so in specific approach avoidance areas such as sexual (Muisse et al., 2017), academic (Schödl et al., 2018), or social approach avoidance (Strachman & Gable, 2006). These studies typically do so either through explicit instruction of participants to approach or avoid in an

upcoming expected interaction (Strachman & Gable, 2006), and in some cases ask participants to generate or recall past approach-avoidance goals or situations in a particular domain (Muis et al., 2017).

### **Avoidance Motivation and Negativity Bias in Depression and Anxiety: Summary**

Literature on the importance of motivation in general provides good evidence that motivation and goals can have significant, and sometimes automatic effects, on the way we perceive and think about the world around us. Effects of goal activation appear to be distinct from those of semantic activation and the effects of goal activation in particular persist after a delay (Bargh et al., 2001; Sela & Shiv, 2009). When a motivation is active, cognitions are biased in the direction of information relevant to that motivation. In the context of avoidance motivation and depression and anxiety, this could mean that when an individual has higher levels of avoidance motivation, negative stimuli become particularly relevant, leading to negativity bias in attention, memory, and interpretation. If this is the case, the question follows whether when avoidance or mixed approach-avoidance motivations are activated, they cause increased negativity bias. Questions also follow as to whether there may be differences in how such a manipulation leads to negativity bias differently among individuals with depression and anxiety: might anxiety and depression interact with activation of avoidance motivation so that stronger relationships between avoidance motivation and negativity bias will be seen in these samples than in those without any symptoms of depression and anxiety? These questions are at the core of this research.

There are a few studies that have asked closely related questions and show evidence that in some cases avoidance motivation activation can lead to greater negativity bias. Strachman and Gable (2006) found that in a lab-created social situation, individuals with high motivation to

avoid negative social outcomes pay more attention to related negative social information. In a second study, Strachman and Gable then activated motivation for social-avoidance in the lab via manipulation and found that individuals high in trait-avoidance motivation in this avoidance condition (compared to those in an approach condition) paid more attention to negative information provided about a potential other they expected to interact with, and then evaluated this other more negatively. This effect did not replicate among individuals low in trait anxiety, and the authors hypothesize that this is due to an interaction effect between trait avoidance and negativity bias resulting from avoidance motivation. However, it is equally possible that the avoidance manipulation may not have worked for those with low trait avoidance who perhaps were not as focused on avoidance motivations despite the manipulation, and in reality, inducing avoidance motivation can lead to less negativity bias both among those with high and low trait anxiety. This remains a plausible hypothesis as there was no manipulation check in this study to ensure that avoidance goals were activated for all participants. This study also manipulated and measured avoidance and negativity bias in a very closely connected lab-induced social situation. It remains unclear if a more general activation of avoidance motivations, perhaps via having participants describe general avoidance goals that are important to them, may have downstream effects on processing even in unrelated memory and interpretation tasks. This general activation of avoidance is more similar to daily life in which individuals may have any number of their own avoidance motivations which may be somewhat active and may encounter information that is not clearly and directly related to a specific avoidance motivation. In such a circumstance, might avoidance motivation still lead to negativity bias both among those with high and low levels of depression and anxiety? Lastly, Strachman & Gable also did not create a mixed approach-

avoidance condition, which may have unique effects on negativity bias as described earlier in this introduction, and which deserves its own exploration.

A study by Ackerman, 2009, showed that when individuals' goals of self-preservation (avoiding harm) is activated, they are more likely to remember out-group members, who may be more threatening (Ackerman, 2009). This is good evidence that goal pursuit automatically leads to increased processing of goal-relevant stimuli even when goals are self-preservation or avoidance based, and not reward focused. Similarly, it's likely that when avoidance goals are activated, more processing is dedicated toward stimuli relevant to those goals, leading to more biases toward negative stimuli.

Given the documented presence and importance of both negativity bias and avoidance goals in depression and anxiety, it seems important to clarify the nature of this relationship, examining whether those with higher levels of avoidance motivation and approach-avoidance conflict also experience more negativity bias, and whether avoidance motivations have a causal role in heightening negativity bias among those suffering from depression and anxiety. This research will likely have important clinical implications for treating negativity bias, and for focusing treatments on disrupting patterns of avoidance goal setting. Past methods which have attempted to directly re-train negativity bias in depression have not been very successful (Cristea et al., 2015; Mogoșe et al., 2014), and recognizing avoidance motivation as a mechanism that drives negativity bias may impress upon clinical researchers that negativity bias can be mitigated through treatments that focus in part on minimizing avoidance motivation such as ERT (Quintero et al., 2021). This research aims to provide further evidence that avoidance motivation is an important transdiagnostic process which when treated can not only improve clinical outcomes

directly from motivational shifts, but also indirectly improve outcomes via modulation of negativity bias.

### **Study Aims and Hypotheses**

The overall aim of the research is to better understand the relationship between avoidance goals and negativity bias among individuals with and without symptoms of depression and anxiety. In the following study, I will examine the following specific aims and hypotheses.

#### ***Aim 1***

To clarify whether there is a relationship between trait avoidance motivation and negativity bias among individuals with and without symptoms of depression or anxiety.

**Hypothesis 1a.** There will be a positive correlation between high levels of trait avoidance motivation and negativity bias in memory and interpretation, so that the more that people have trait avoidance motivations, the higher the levels of negativity biases will be on measures of bias in memory toward negatively valenced words, and the interpretation of ambiguous information.

**Hypothesis 1b.** The relationship between avoidance motivation and negativity bias will be moderated by symptoms of depression and/or anxiety so that trait avoidance motivation is more highly associated with negativity bias as levels of depression and anxiety symptomatology increase.

#### ***Aim 2***

To clarify whether when avoidance motivations or approach-avoidance motivations are activated, higher levels of negativity bias are exhibited by individuals with and without symptoms of depression or anxiety. To clarify whether this relationship is due to activation of avoidance motivation, and not mere semantic activation of avoidance systems, as evidenced by



the presence of negativity bias among those who have active avoidance motivation even after delay.

**Hypothesis 2a.** There will be a positive causal relationship in which activation via manipulation of avoidance motivation, will cause higher levels of negativity bias in memory and interpretation, compared to a control condition in which no motivations are activated via manipulation (even after delay, as goal activation, unlike semantic activation, persists even after delay).

**Hypothesis 2b.** This causal relationship between avoidance motivation activation and negativity bias will be exhibited both for individuals with higher or lower levels of depression and anxiety. However, the size of the relationship is moderated by level of depression and anxiety symptomatology, whereby individuals with more symptoms of depression and anxiety will have higher levels of negativity bias after avoidance manipulation than those with less depression and anxiety.

**Hypothesis 2c.** There will be no significant main effect of activation via manipulation of mixed approach-avoidance motivation on negativity bias, and compared to a control condition in which no motivations are activated via manipulation, negativity bias will not be significantly higher when mixed approach-avoidance is manipulated.

**Hypothesis 2d.** Among participants experiencing higher levels of depression and/or anxiety, activation of mixed approach-avoidance motivation will cause higher levels of negativity bias in memory and interpretation, compared to a control condition in which no motivation is activated via manipulation (even after delay, as goal activation, unlike semantic activation, persists even after delay). However, among participants with lower levels of

depression and anxiety, mixed approach-avoidance motivation condition will not cause significantly more negativity bias than the control condition.

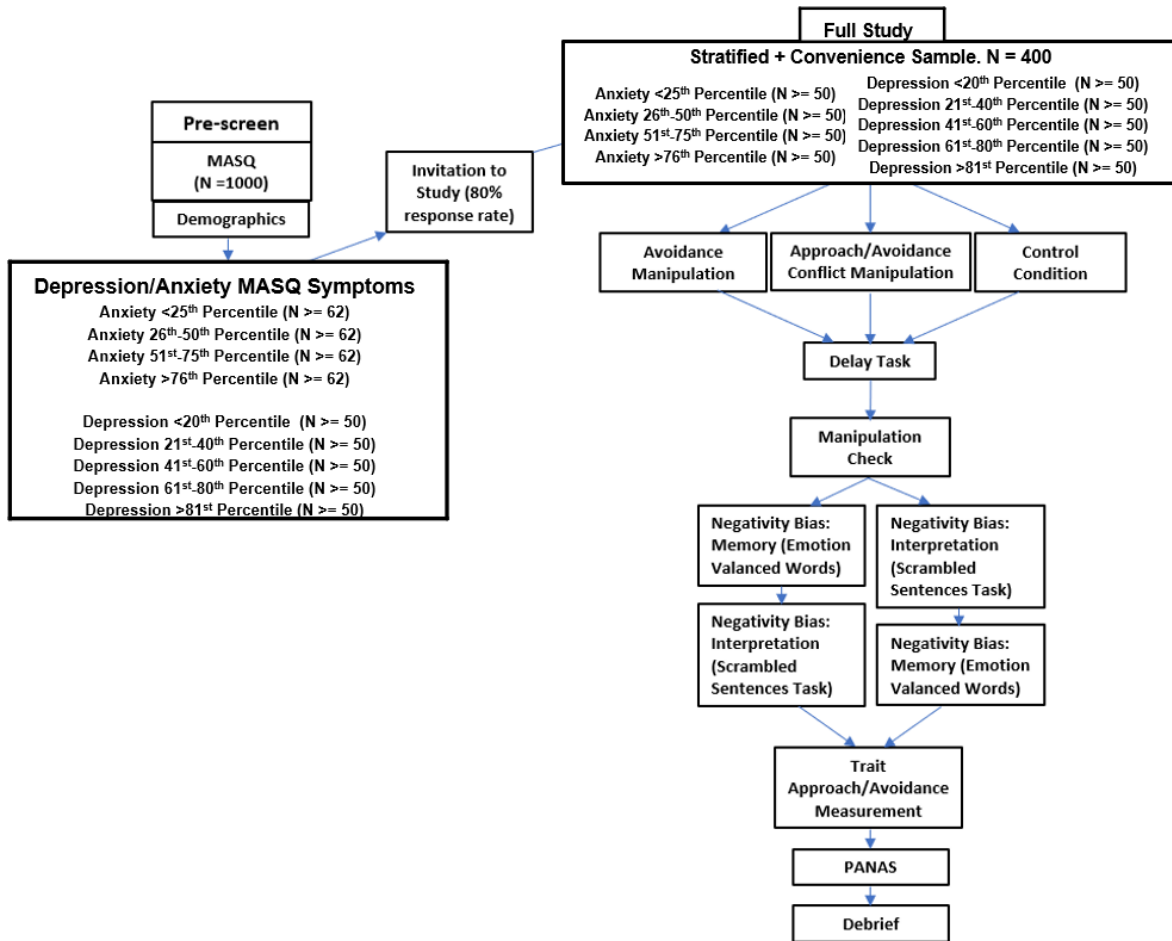
## **Methods**

### **Design**

Participants were recruited from Amazon Mechanical Turk as described in the Participants section that follows, starting with a pre-screen that identified individuals with a wide range of symptoms of depression and anxiety and inviting them into a full study. Participants entered a study hosted on Qualtrics, and were randomly assigned to one of three motivation manipulation conditions, including an avoidance activation, mixed approach-avoidance activation, and control condition. After this manipulation, participants went through a delay task (to differentiate between semantic and goal activation) and then a manipulation check (to ensure that the manipulation is working correctly). Negativity bias in memory (Chepenik et al., 2007) and interpretation of ambiguous information (Scrambled Sentences Task, Wenzlaff & Bates, 1998) was then measured in randomized order. Due to an error in programming the Qualtrics study, memory bias items were not randomized, calling into questions these results. Next, trait avoidance and approach motivation were measured (SPSRQ, Torrubia et al., 2001). This was followed by a measure of current mood (PANAS), and a study debrief. This flow is presented in Figure 1 below. In each of the studies participants were compensated for their time at a rate of approximately \$8-\$10 per hour, a rate which is more than average on MTurk, and more than enough to obtain high quality data (Litman et al., 2015). Data was examined to ascertain a) the relationship between trait avoidance and negativity bias among those with high and low levels of symptoms of depression and anxiety b) if the manipulations activating avoidance and mixed

approach avoidance motivation lead to higher levels of negativity bias than within the control condition, and if these effects are moderated by levels of symptoms of depression and anxiety.

**Figure 1**  
*Sampling and Study Design*



## Participants & Procedure

Participants were recruited from Amazon’s Mechanical Turk (MTurk) via CloudResearch (Litman et al., 2017). MTurk was originally created as a microtasking platform, where participants can complete small tasks for payment. During the last 10 years, thousands of peer reviewed studies have used MTurk participants for their samples (Litman & Robinson, 2020). In the past years, data quality on MTurk has deteriorated (Litman et al, 2020). The platform has

been examined by researchers, who have concluded that when appropriate sampling techniques are used, MTurk participants can still be a source of high quality data, and clinical populations can be recruited and studied effectively (Chandler et al., 2020; Shapiro et al., 2013). This study used CloudResearch's Approved Participants Group, a group of participants who have been shown to provide high quality data, and who are demographically similar to the larger MTurk population (Hauser et al., 2023; Rivera et al., 2022).

Data were collected via a two-step recruitment process to ensure that participants in the full study would have a wide range of symptoms of depression and anxiety. Working backwards, the goal was to recruit N=400 participants to a full study, meeting a quota of at least N =50 within each quartile of depression and within each quartile of anxiety. 400 participants in the full study was the goal, so that there would be enough participants within each manipulation condition (>120) so that I have sufficient power to examine individuals across levels of symptoms of depression or anxiety within each condition (30 per quartile). 30 individuals per cell leads to about 80% power for a normal effect size, which is the minimum recommended (VanVoorhis & Morgan, 2007). To get at least N=50 within each quartile to enter the full study, I estimated that I must have at least N=62 per quartile in the pre-screen. This was assuming a >80% retention rate; a rate that is indicated by the literature, especially when the second wave happens in close temporal proximity to, and pays more than, the first wave (Hall et al., 2020).

To this end, a pre-screen was administered to participants in the U.S. on MTurk, which used the MASQ-D30 (Wardenaar et al., 2010) to determine levels of symptoms of depression and anxiety. Estimates for quartiles were based on Schulte-van Maaren et al. (2012), who identified scores of 14, 17, and 22 as the 25<sup>th</sup>, 50<sup>th</sup> and 75<sup>th</sup> quartile scores for depression (Anhedonic Depression subscale), and 10, 11, and 13, as quartile scores for anxiety (Anxious

Arousal subscale) in a representative sample of the Dutch population. The study plan was to gather approximately 1,000 participants in the pre-screen and examine if at that point there were enough participants within each quartile to invite at least 62 from each quartile to the full study. These participants, alongside additional pre-screen entrants who provided high quality, would then be invited to the Full Study, until a sample of 400 was reached in the full study.

## Measures & Manipulations

Table 2 below summarizes the measures used across the pre-screen and full study and the associated constructs they correspond to. The subsequent sections below describe the measures in more detail. These are also made available in full in Appendix A.

**Table 2**  
*Summary of Measures and Associated Constructs*

<b>Measure Names</b>	<b>Construct Measured</b>
MASQ-D30 (Wardenaar et al, 2010)	
Anhedonic Depression	Depression specific symptomatology
Anxious Arousal	Anxiety specific symptomatology
Depicted Action Tendencies Instrument (DAT, OToole & Mikkelsen, 2021)	Avoidance and approach motivation levels (manipulation check)
Scrambled Sentences Task (SST, Wenzlaff & Bates, 1998)	Negativity bias in interpretation
Memory Bias (adapted from Chepenik et al., 2007)	Negativity Bias in recall
Sensitivity to Punishment & Reward Questionnaire (SPSRQ, Torrubia et al., 2001)	
Sensitivity to Punishment (SP)	Avoidance Motivation
Positive and Negative Affect Scale (PANAS, Watson et al., 1988)	Current affect, positive and negative

### ***Depression and Anxiety (Pre-Screen)***

The MASQ-D30 (Wardenaar et al, 2010) was used to create the quartiles of depression and anxiety symptoms for recruitment to the full study, and was also used as a measure of symptoms in analyses. The MASQ-D30, is a 30 item measure of symptoms related to anxiety and depression. Participants were asked how much they had “felt or experienced” the “feelings, sensations, problems, and experiences” listed below. Prompts include items such as “Felt worthless”, “Had pain in my chest” and “Felt really good about myself”. Responses were coded on a 5-point Likert scale ranging from “1...Not at all” to “5...Extremely”. The full wording of this scale and all measures can be found in Appendix A. The MASQ-D30 consists of 3 subscales that measure General Distress (present in both depression and anxiety), Anhedonic Depression (elevated in depression) and Anxious Arousal (elevated in anxiety). Subscale scores are calculated as the sum of the relevant items, ranging from 10 to 50, with higher scores indicating more severe psychopathology. Scores on the negative affect subscale were not considered for inclusion criteria in deciding which quartile range of depression/anxiety a participant falls into. Internal consistencies for the subscales reportedly range from 0.85 to 0.92 (Lin et al., 2014). No specific clinical cut-offs have been reported, but studies have found mean scores within clinical populations of those diagnosed with a mood disorder to be 41.2 on the Anhedonic Depression subscale, and mean scores of those diagnosed with any anxiety disorder of 20.9 on the Anxious Arousal subscale (Lin et al., 2014). Construct and convergent validity of the MASQ-D30 has been well established within several international samples (see Lin et al., 2014).

### ***Demographics (Pre-Screen)***

Participants were asked basic demographic questions assessing, gender, race, age, income, and education levels, to have a basic understanding of the sample representativeness,

and to be able to control for demographic differences if they appeared important in exploratory analyses.

### ***Manipulation of Avoidance and Approach-Avoidance Motivation***

Combining methods used by McLaughlin et al. (2007) and Gable (2006), participants were exposed to 1 of 3 conditions: 1) Avoidance motivation manipulation, 2) Mixed approach-avoidance manipulation and 3) Control condition. In the avoidance and mixed approach-avoidance manipulation conditions, participants saw a short definition of avoidance (or approach-avoidance) motivations and goals and were then asked to “think of four important avoidance (or mixed approach-avoidance) goals relating to any aspect of your life.” Participants were asked to think deeply about each goal and list details, feelings, and anticipated situations surrounding each goal. In the control condition, participants were instructed to “In as much detail as possible, first describe the room/location that you are currently located in in the box below”, and then were asked to describe another room they were in that day (Muisse et al, 2017).

### ***Negativity Bias in Interpretation***

Based on the methods of Rude, Wenzlaff, and Whitney (2002), I used the Scrambled Sentences Task (SST, Wenzlaff & Bates, 1998) to measure participants’ tendency to interpret ambiguous information in positive or negative ways. Participants were presented with a list of scrambled sentences (e.g., “winner born I am loser a”) and instructed to write a number above five of the six words of each scrambled sentence to produce a grammatically correct sentence. This results in either a positive (“I am a born winner”) or negative (“I am a born loser”) sentence. Participants were presented with two blocks of 20 sentences and given 2.5 minutes to complete as many of the sentences within each block as possible during this period. 20 of the 40 total sentences presenting were not positive or negative, and served as filler items without emotional

valence. A “negativity” score for each block was produced by calculating the ratio of negative sentences over total (positive and negative) sentences completed (of 20 possible). In keeping with the methods of Wenzlaff (1993), a cognitive load procedure was used during the administration. Participants were given a six-digit number to remember while they were completing one block within the task (Rude, 2002). An extensive review of the validity of the SST was recently conducted, with the authors concluding that “the SST appears to be a valid instrument for assessing IBs [interpretation biases]”, and that the measure showed strong convergent validity and mixed results in terms of divergent validity (Würtz et al., 2022, pg. 13).

### ***Negativity Bias in Recall***

Based on the methods of Chepenik, Cornew, & Farah (2007), participants were presented with three sets of 16 words, half of which had negative emotional valence and half of which were neutral. Those with negative valence were further split between depression related words and threat related words. Each word in each 16 word set was presented individually for 2 seconds in the center of the screen. After each set, participants were asked to freely recall as many of the 16 words as possible. At the end of the 3rd round of recall testing, participants were then presented with all the previous 48 words mixed in with 48 new unseen words and were asked whether each word was or wasn’t presented previously and their levels of certainty about their judgment. Recall and recognition were both measured based on total percentage correctly identified, but hypotheses focused on recall as previous research indicated negativity bias more in recall than recognition for anxious individuals. An error in Qualtrics randomization occurred, whereby neutral, depression-related, and threat-related words did not randomize within each 16 word set. Across the three 16 words presentation sets, all participants first saw 8 neutral words, then 4 depression-related words, followed by 4 anxiety-related words.



### ***Delay Task***

Adapted from Huh, Vosgerau, & Morewedge (2016), participants were asked to list as many words as they could that have the letter “e” in the middle of the word, during a 2.5 minute period. This delay task was included in order to cause semantic activation to fade, but motivational activation to remain or even grow during this delay (Sela & Shiv, 2009).

### ***Manipulation Checks***

The Depicted Action Tendencies Instrument (DAT) has a series of images that convey particular approach/avoidance motivations in the presence of threat or reward (OToole & Mikkelsen, 2021). 4 images were included and presented to participants in this study that were likely to reflect how participants felt if manipulations activated expected motivations. The 4 images included two to measure the desire to avoid threat (AvT1 & AvT2), and two images to measure the desire to approach reward (ApR1 & ApR2). See Appendix A for the images. Instructions to participants read “To what degree does this image feel like it describes the way you are feeling in this moment” on a Likert scale from “1...Not at all how I feel in this moment” to “5...Exactly how I feel in this moment”. If the manipulations work, individuals in the avoidance and approach-avoidance motivation conditions will rate avoidance images as more similar to how they feel. They also may rate approach images as less similar to how they feel, compared to ratings of participants in the control condition.

### ***Trait Avoidance Motivation***

Torrubia et al.’s (2001) SPSRQ scale was used to identify the degree to which individuals had high or low levels of trait avoidance. This scale includes 48 yes/no questions such as “Are you often afraid of new or unexpected situations?” and “Would you like to be a socially powerful person?”. The subscale of Sensitivity to Punishment (SP) most closely captures trait avoidance

motivation and has an internal consistency of .82 (Torrubia et al., 2001). The SP subscale has shown strong discriminant and convergent validity, and correlates with the BIS and neuroticism and negatively correlates with traditional measures of sensation seeking and extraversion (Cooper & Gomez, 2008; Torrubia et al., 2001). Examples of questions within this subscale includes items such as “Generally, do you pay more attention to threats than to pleasant events?” and “Are you easily discouraged in difficult situations?”. Questions are available in Appendix A.

### ***Current Affect***

The Positive and Negative Affect Scale (PANAS; Watson et al., 1988) was used to assess current affect. It consists of 20 emotionally laden adjectives that are either positive (e.g., inspired, proud) or negative (e.g. afraid, hostile) and instructs participants to rate how each of the adjectives corresponds to how they are feeling “right now” on a 5 point Likert scale, where “1...Not at all” and “5...Extremely”.

### ***Data Quality Checks***

Four different data quality checks were included: two check questions were added to the pre-screener, and there were two checks in the full survey. One check question was included as part of the MASQ-D30 and read “Select “not at all” for this item”. The second was included in the demographics in the pre-screener, and read “I work fourteen months in a year” (Huang et al., 2015), with those indicating that this is “somewhat true” or “very true”, marked as incorrect. Only those who passed both these items in the pre-screener were invited to the survey. Full survey data quality checks included a review of open ended-responses to the motivation activation conditions. Two coders reviewed open ends from the 3 conditions (avoidance, approach-avoidance conflict, control) and made sure answers were coherent, prompt-responsive, and not nonsensical. Respondents who do not provide at least 2 such sentences were excluded

from further analyses. A second in-survey check was placed within the SPSRQ, and read “Have you ever used a computer?” (Huang et al., 2015). All respondents who said “No” were considered inattentive and excluded from analyses.

### **Data Analysis: Plan**

I began by examining only data from the control condition in which negativity bias was not impacted by any motivational manipulation, as this is the relevant data which can be used to test Hypotheses 1a and 1b. To examine results of Hypothesis 1a, I calculated the correlations between trait avoidance motivation as measured by the SP scale in the SPSRQ, and negativity bias as measured by both the percentage of correctly recalled negatively (to neutrally) valenced words in the memory bias task, and the proportion of negatively to positively disambiguated scrambled sentences in the interpretation bias task. I then included depression and anxiety symptoms based on the MASQ-D30 as moderator variables into a regression model and examined if the interaction terms of depression symptoms x trait avoidance or anxiety symptoms x trait avoidance terms were significant (Hypothesis 1b). I then included PANAS scores in the model in an additional step to examine if main effects and interactions were still predictive of negativity bias when current affect was statistically controlled for.

To examine Aim 2 and associated hypotheses, I began by dummy coding motivation activation condition (control =0, avoidance=1, approach-avoidance conflict =2). I then ran an ANOVA to examine if there were overall differences in negativity bias scores in memory or interpretation based on assignment to motivation activation condition (Hypothesis 2a, 2c). Next, I ran moderated linear regression analyses with memory and interpretive biases as outcome variables. I ran separate models for avoidance and approach-avoidance conditions, and in each one I examined whether there were interactions between depression and anxiety symptoms and

motivation activation condition (Hypothesis 2b, 2d). I then additionally explored whether including trait avoidance motivation in this model predicts negativity bias above and beyond motivation condition, and if effects remained significant even when statistically controlling for current mood.

## Results

### Pre-Screening

After collecting N=1,165 and removing participants who failed 2 embedded attention checks (N = 30), there were >62 participants within each quartile of anxiety (Table 3). However, there were significantly fewer participants within the two bottom quartiles of depression (Table 4). In order to invite participants with the widest range of depression symptoms from the current sample, depression quintiles were recalculated for the MTurk pre-screen sample, yielding depression scores of 26, 31, 37, and 43 as quintiles of depression. The first 50 high quality participants who entered the pre-screen within each depression quintile were invited to the full study (total of 250\*expected retention of 80% = 200), alongside the first 62 participants within each anxiety quartile (total of 248). Due to naturally occurring overlap within anxiety and depression quartiles, this was a total of 301 participants. In order to reach the N=400, an additional 199 participants were invited based on time of entry into the pre-screen, until 500 participants were included in the first round of invited to the full study. Pre-screening data were collected between Nov 3<sup>rd</sup>- Nov 10<sup>th</sup>, 2023.

**Table 3**

*Pre-screen Reported Anxiety symptoms on MASQ-D30 across Schulte-van Maaren et al (2012) Quartiles*

Anxiety Percentiles	<i>n</i>	%
<25 <sup>th</sup> Percentile	270	24.3
26 <sup>th</sup> -50 <sup>th</sup> Percentile	156	14.0

51 <sup>st</sup> -75 <sup>th</sup> Percentile	189	16.7
>76 <sup>th</sup> Percentile	498	44.7

**Table 4**

*Pre-Screen Reported Depressive symptoms on MASD-D30 across Schulte-van Maaren et al (2012) Quartiles*

Depression Percentiles	<i>n</i>	%
<25 <sup>th</sup> Percentile	20	1.8
26 <sup>th</sup> -50 <sup>th</sup> Percentile	17	1.5
51 <sup>st</sup> -75 <sup>th</sup> Percentile	92	8.3
>76 <sup>th</sup> Percentile	985	88.4

### Full Study

Full Study data were collected between Nov. 13<sup>th</sup> and Dec. 22<sup>nd</sup>. Approximately every 10 days that the full study was live, an additional 100 participants were invited based on time entered into the Pre-Screen, until at least 400 participants entered the full study. After removing participants who failed an attention check question in the full survey or who didn't provide acceptable open ends (N = 43), the full study had N = 408 participants, with >N=50 within each quartile of anxiety and quintile of depression (Table 5). Table 5 shows basic demographic information about high quality participants who completed the full study. 48.5% of the sample identified as women, and the mean age was 41.3 (*SD* = 11.4), with mean depression scores of 33.75 (*SD*=9.47), and mean anxiety scores of 14.81 (*SD* = 5.90). The mean time between data collection of the MASQ-D30 and entry into the full study was 25.3 days (*SD* = 5.8). Participants were randomized into 3 motivation conditions: avoidance motivation (N=125), approach-avoidance motivation (N=123) and control (N = 154).

**Table 5**  
*Full Study Participant Demographics*

Baseline characteristics	<i>n</i>	%	<i>Mean</i>	<i>SD</i>
<b>Anhedonic Depression, MASQ-D30</b>				
<20 <sup>th</sup> Percentile	104	25.5		
21 <sup>st</sup> -40 <sup>th</sup> Percentile	66	16.4		
41 <sup>st</sup> -60 <sup>th</sup> Percentile	69	17.1		
61 <sup>st</sup> -80 <sup>th</sup> Percentile	88	21.8		
>81 <sup>st</sup> Percentile	76	18.9		
Average Depression Score	403	-	33.75	9.47
<b>Anxious Avoidance, MASQ-D30</b>				
<25 <sup>th</sup> Percentile	84	20.6		
26 <sup>th</sup> -50 <sup>th</sup> Percentile	57	14.0		
51 <sup>st</sup> -75 <sup>th</sup> Percentile	85	20.8		
>76 <sup>th</sup> Percentile	171	41.9		
Average Anxiety Score	397	-	14.81	5.90
<b>Gender</b>				
Man	205	50.4		
Woman	198	48.6		
Other	4	1.0		
Age	397	-	41.34	11.57
Average Time, Pre-Screen to Full Study	408	-	25.33	5.75

**Trait Avoidance and Negativity Bias (Aim 1)**

Are trait avoidance and negativity bias correlated? Data from participants who did not receive any avoidance or approach-avoidance manipulation revealed a positive correlation between trait avoidance motivation, as measured by the sensitivity to punishment subscale (SP) of the SPSRQ, and negativity bias in interpreting ambiguous information as measured by the

Scrambled Sentences Task (SST),  $r(147) = .232, p = .005$  (Table 6). There was an error in the administration of recall bias measurement which hindered accurate interpretation. No significant correlation was found between SP scores and negativity bias in recall for negative words,  $r(151) = .011, p = .895$ .

**Table 6**

*Descriptive Statistics and Correlations for Study Variables for Hypothesis 1a*

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3
1. Negativity Bias, SST	148	30.23	27.68	—		
2. Negativity Bias, Recall	153	46.71	15.10	.066	—	
3. Punishment/Trait Avoidance, SP	151	36.35	6.64	.232**	.011	—

\*\*  $p < .01$

***Trait Avoidance and Negativity Bias in Interpretation (Aim 1)***

Using the SPSS PROCESS Model 2 (v4.2; Hayes, 2022), I examined the results of a linear regression predicting SST scores based on SP with depression and anxiety symptoms as moderators (Table 7). This analysis showed that the relationship between trait avoidance motivation and negativity bias was moderated by depression, with a significant interaction term,  $\beta = .078, p = .035$ . This indicates that when participants had higher levels of depression, trait avoidance motivation (SP) was associated with higher levels of negativity bias in interpretation of ambiguous information (SST scores). In this model, the interaction term for anxiety and SP scores was not significant. The overall model predicted 19.1% of the variance in SST scores.

**Table 7**

*Negativity Bias in Interpretation (SST) Predicted from Trait Avoidance (SP), with Depression and Anxiety Symptoms as Moderators*

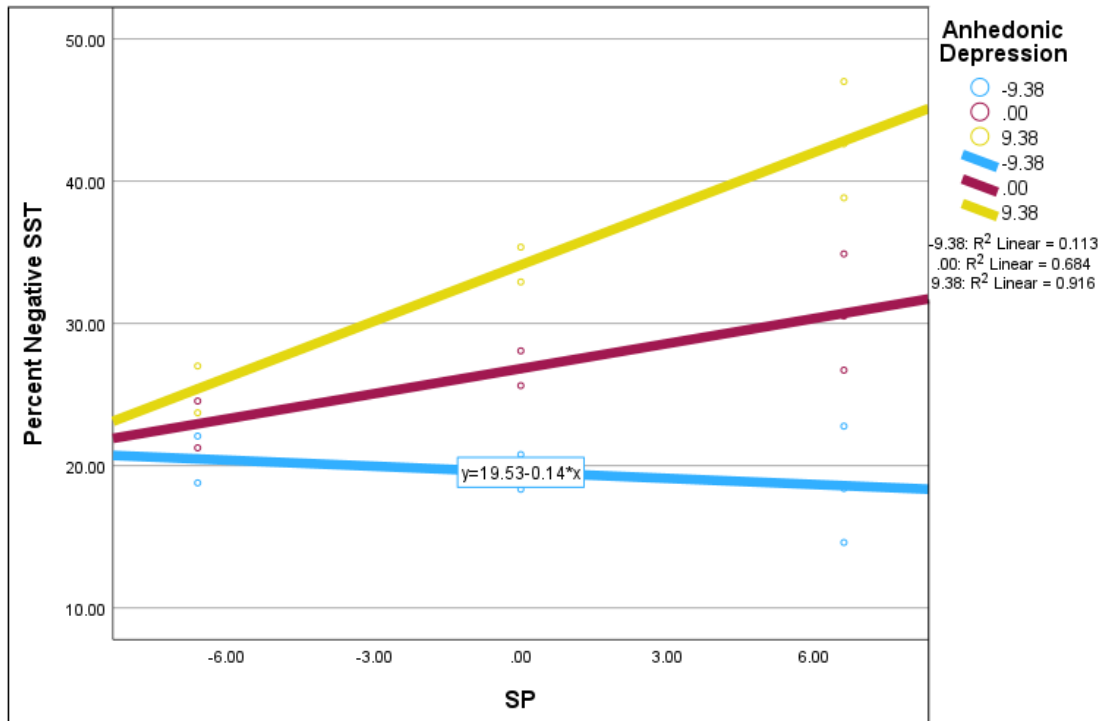
Predictor	$\beta$	<i>p</i>	<i>SE</i>	95% CI	
				LL	UL
Trait Avoidance, SP	.568	.140	.383	-.189,	1.33
Anhedonic Depression	.777**	.003	.255	.273,	1.28
Anhedonic Depression x SP	.078*	.035	.037	-.006,	-.150
Anxious Arousal	.236	.602	.451	-.657	1.13
Anxious Arousal x SP	.084	.204	.066	-.046	.2137

*CI* = confidence interval; *LL* = lower limit; *UL* = upper limit.

Probing the significant interaction, the Johnson-Neyman technique revealed that the interaction was significant when depression was 1 *SD* above the mean. Visualizing the interaction term revealed that at high levels of depression, increases in trait avoidance had their largest effect, and were associated with more negativity bias in interpretation of ambiguous information (Figure 2). This effect was somewhat smaller at mean depression levels, and reversed at low levels of depression, where trait avoidance had a negative slope, associated with lower levels of negativity bias.

**Figure 2**

*Visualization of the Depression by Trait Avoidance Interaction in predicting SST scores*



I ran an additional regression model using PROCESS (in line with planned data analyses), adding in current affect which was measured at the end of the survey (PANAS), to see if the Depression x SP interaction held even when current affect was controlled for. Significance of the interaction term dipped below significance,  $\beta = .067$ ,  $p = .056$  (Table 8). This model explained 22.9% of the variance in SST scores.



**Table 8**

*Negativity Bias in Interpretation (SST) Predicted from Trait Avoidance (SP), with Depression and Anxiety Symptoms as Moderators, with PANAS as an added covariate*

Predictor	$\beta$	$p$	$SE$	95% CI	
				LL	UL
Trait Avoidance, SP	.251	.658	.381	-.503	1.00
Anhedonic Depression	.626*	.035	.293	.046	1.21
Anhedonic Depression x SP	.067	.056	.035	-.002	.135
Anxious Arousal	-.366	.483	.521	-1.395	.664
Anxious Arousal x SP	.096	.140	.065	-.032	.225
Positive Affect (PAS)	-.431	.154	.301	-1.026	.163
Negative Affect (NAS)	.877*	.029	.398	.090	1.67

*CI* = confidence interval; *LL* = lower limit; *UL* = upper limit.

### ***Trait Avoidance and Negativity Bias in Recall (Aim 1)***

As noted in the Methods section, an error in the measurement of bias in recall affects the ability to make accurate inferences from these results. Nevertheless, using the PROCESS Model 2 (Hayes, 2022), I examined the results of a linear regression predicting negativity bias in memory recall based on SP with depression and anxiety symptoms as moderators (Table 9). This analysis revealed that the relationship between trait avoidance motivation and negativity bias in recall was moderated by anxiety, with a significant interaction term,  $\beta = -.093$ ,  $p = .013$ . This indicates that when participants have higher levels of anxiety, trait avoidance leads to lower memory recall negativity scores. In this model, the interaction term for depression and SP scores was not significant. The overall model predicted 7.4% of the variance in SST scores.

**Table 9**

*Negativity Bias in Recall Predicted from Trait Avoidance (SP), with Depression and Anxiety Symptoms as Moderators*

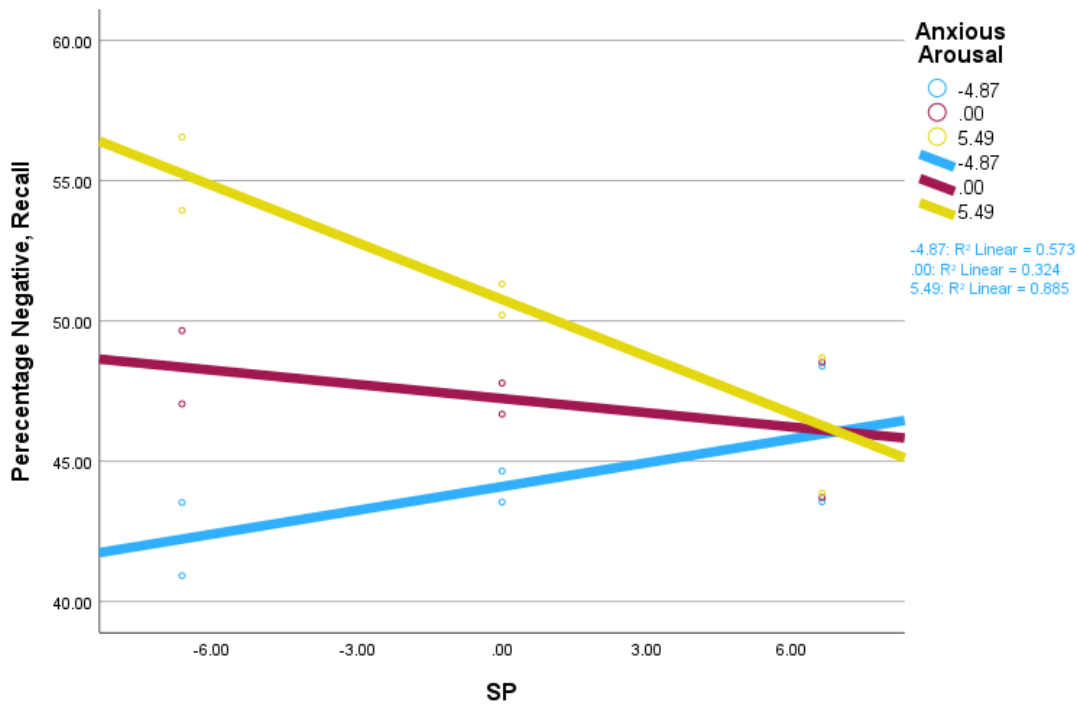
Predictor	$\beta$	$p$	$SE$	95% CI	
				LL	UL
Trait Avoidance, SP	-.169	.441	.219	-.601	.263
Anhedonic Depression	.059	.687	.146	-.230	.347
Anhedonic Depression x SP	.030	.148	.021	-.0107	.070
Anxious Arousal	.644*	.014	.258	.133	1.15
Anxious Arousal x SP	-.093*	.013	.037	-.166	-.0199

*CI* = confidence interval; *LL* = lower limit; *UL* = upper limit.

Visualizing the interaction term revealed that at high levels of anxiety, trait avoidance was associated with less negativity bias in recall (Figure 3). This effect was somewhat smaller at mean anxiety levels, and reversed at low levels of anxiety, where trait avoidance was associated with higher levels of negativity bias. The nature of the programming error of this task, in which the first 8 words presented in each 16 word set were neutral, may explain this interaction, whereby among those with highest levels of anxiety, those with higher trait avoidance focused more on the words presented earlier, and more easily avoided negative words grouped together at the end of the memory blocks, thereby recalling less of the later-presented negative words.

**Figure 3**

*Visualization of the Anxiety by Trait Avoidance Interaction in predicting Memory Recall Bias scores*



**Manipulation Checks for Motivation Activation Conditions**

Before examining hypotheses related to Aim 2 of this paper which focus on whether or not when avoidance motivation is activated it leads to negativity bias, it first needs to be determined if assignment to experimental conditions, which aimed to activate avoidance motivation, were successful. This was measured via an Independent Samples t-test comparing

scores on the DAT (manipulation check) between the control and avoidance motivation condition. Results revealed that participants who were assigned to the avoidance motivation condition reported higher levels of avoidance motivation on the DAT ( $M = 4.46, SD = 2.44$ ) than those in the control condition ( $M = 3.73, SD = 2.08$ ) (see Table 10),  $t(279) = 2.70, p = .007$ ; Cohen's  $d = .32$ . Assignment to the avoidance motivation condition also led to lower levels of approach motivation ( $M = 4.71, SD = 2.44$ ) than the control condition ( $M = 5.24, SD = 1.88$ ),  $t(279) = -2.06, p = .040$ ; Cohen's  $d = .24$ .

And Independent Samples t-test comparing DAT scores between the control and approach-avoidance motivation condition revealed that participants who were assigned to the approach-avoidance motivation condition reported higher levels of avoidance motivation ( $M = 4.61, SD = 2.32$ ) than those in the control condition ( $M = 3.73, SD = 2.08$ ),  $t(276) = 3.32, p = .001$ ; Cohen's  $d = .40$ . Results were not significant, but trending towards lower levels of approach motivation in the approach-avoidance motivation condition ( $M = 4.91, SD = 2.17$ ) than the control condition ( $M = 5.24, SD = 1.88$ ),  $t(279) = -1.36, p = .175$ .

Although participants assigned to the approach-avoidance condition had mean scores on the DAT measures for approach and for avoidance that were higher than they were for participants in the avoidance condition, an Independent Samples t-test comparing DAT scores between these conditions revealed that these differences were not statistically significant (DAT approach scores,  $t(251) = -.693, p = .489$ ; DAT avoidance scores  $t(251) = -.492, p = .623$ ).

**Table 10**  
*Means of Manipulation Check scores by Condition*

Manipulation Check by Motivation Condition	Avoidance		Approach-avoidance		Control Condition	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Avoidance Manipulation Check	4.46	2.44	4.61	2.32	3.73	2.08
Approach Manipulation Check	4.71	2.44	4.91	2.17	5.24	1.88

## **Examining whether there are Differences between Motivation Condition on Symptoms of Anxiety, Depression, and Trait Avoidance**

Participants were randomized to the three motivation conditions and therefore there were no expected differences between participants assigned to the three motivation conditions on measures symptoms of depression and anxiety on the MASQ-D30, or on trait avoidance as measured by the SP subscale of the SPSRQ. In order to confirm that there were no differences between motivation conditions on these variables, nine Independent Samples t-tests were calculated, comparing the mean scores of these three variables across the three conditions. Results are presented in Table 11.

Examining results from three Independent Samples t-tests I examined whether there was a relationship between depression symptoms and assignment to the avoidance condition compared to the control condition, or assignment to the approach-avoidance condition compared to the control condition, or assignment to the avoidance condition compared to the approach-avoidance condition. Results revealed no significant relationships differences in depression scores based on assignment to avoidance condition ( $M = 33.01$ ,  $SD = 9.60$ ) compared to the control condition ( $M = 34.69$ ,  $SD = 9.59$ ),  $t(278) = -1.458$ ,  $p = .146$ , or assignment to approach-avoidance condition ( $M = 33.42$ ,  $SD = 9.17$ ) compared to control condition,  $t(273) = -1.111$ ,  $p = .265$ , or assignment to avoidance condition compared to approach-avoidance condition,  $t(247) = -.344$ ,  $p = .731$ .

Examining results from three Independent Samples t-tests I examined whether there was a relationship between anxiety symptoms and assignment to the avoidance condition compared to the control condition, or assignment to the approach-avoidance condition compared to the control condition, or assignment to the avoidance condition compared to the approach-avoidance condition. Results revealed no significant relationships differences in anxiety scores based on

assignment to avoidance condition ( $M = 14.65, SD = 6.53$ ) compared to the control condition ( $M = 14.81, SD = 5.44$ ),  $t(274) = -.228, p = .823$ , or assignment to approach-avoidance condition ( $M = 14.97, SD = 5.85$ ) compared to control condition,  $t(271) = .230, p = .820$ , or assignment to avoidance condition compared to approach-avoidance condition,  $t(243) = -.406, p = .685$ .

Using three Independent Samples t-tests I examined whether there was a relationship between trait avoidance and assignment to the avoidance condition compared to the control condition, or assignment to the approach-avoidance condition compared to the control condition, or assignment to the avoidance condition compared to the approach-avoidance condition. Results revealed no significant relationships differences in trait avoidance scores based on assignment to avoidance condition ( $M = 35.78, SD = 6.20$ ) compared to the control condition ( $M = 36.35, SD = 6.64$ ),  $t(276) = -.733, p = .461$ , or assignment to approach-avoidance condition ( $M = 35.80, SD = 6.40$ ) compared to control condition,  $t(274) = -.021, p = .485$ , or assignment to avoidance condition compared to approach-avoidance condition  $t(250) = -.023, p = .982$ . This indicates that reporting of trait avoidance may have been stable and not affected by assignment to condition.

**Table 11**  
*Means of Depression and Anxiety Symptom scores (MASQ-D30) and Trait Avoidance (SP) scores by Condition*

Measured Variable by Motivation Condition	Avoidance Condition		Approach-avoidance		Control Condition	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Anhedonic Depression	33.01	9.60	33.42	9.17	34.69	9.59
Anxious Arousal	14.65	6.53	14.97	5.85	14.81	5.44
Trait Avoidance, SP	35.78	6.20	35.80	6.40	36.35	6.64

**Assignment to Motivation Condition and Negativity Bias in Interpretation and Recall (Aim 2)**  
***Main Effects***

Did assignment to an experimental condition lead to greater negativity bias levels? A one-way ANOVA revealed no significant differences between any of the conditions in SST scores (negativity bias in interpretation),  $F(2,394) = .103, p = .902$ , indicating no support for hypothesis 2a, and in line with hypothesis 2c. A one-way ANOVA likewise revealed no significant differences between condition on recall bias scores,  $F(2,402) = .920, p = .400$ . Means and standard deviations of SST and recall bias scores by condition are reported in Table 12.

**Table 12**  
*Means of Negativity Bias scores by Condition*

Manipulation Check by Motivation Condition	Avoidance Condition		Approach-avoidance Condition		Control Condition	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Negativity Bias, Interpretation (SST)	31.38	30.47	29.74	30.60	30.23	27.68
Negativity Bias, Recall	48.98	14.82	48.39	13.71	46.71	15.10

***Interaction Effects: Avoidance Condition, Moderation of Depression and Anxiety, and Negativity Bias in Interpretation***

There was no main effect for condition on negativity bias. In order to examine if there were higher order effects based on condition and the interaction terms of depression and anxiety, condition was Dummy coded, with the control group as the reference category. Using the PROCESS model for SPSS (Hayes, 2019), a linear regression was calculated predicting SST scores from avoidance condition, with depression and anxiety symptoms as moderators. Results are presented in Table 13. There was a significant interaction between avoidance condition and anxiety symptoms,  $\beta = 1.117, p = .022$ . This indicates that assignment to the avoidance condition, instead of the control condition, led to higher SST scores among participants experiencing more anxiety symptoms. Visualizing the effect, for individuals with higher baseline levels of anxiety, assignment to the avoidance condition led to more negativity bias in interpretation, while for individual with lower levels of anxiety, assignment to the avoidance

condition led to a smaller rise in negativity bias in interpretation (Figure 4). The Johnson-Neyman technique revealed the interaction effect was significant when anxiety was 1 *SD* above the mean. I ran an additional model to explore whether there were any significant three way interactions, but none were significant, and these were therefore not included in subsequent analyses.

**Table 13**

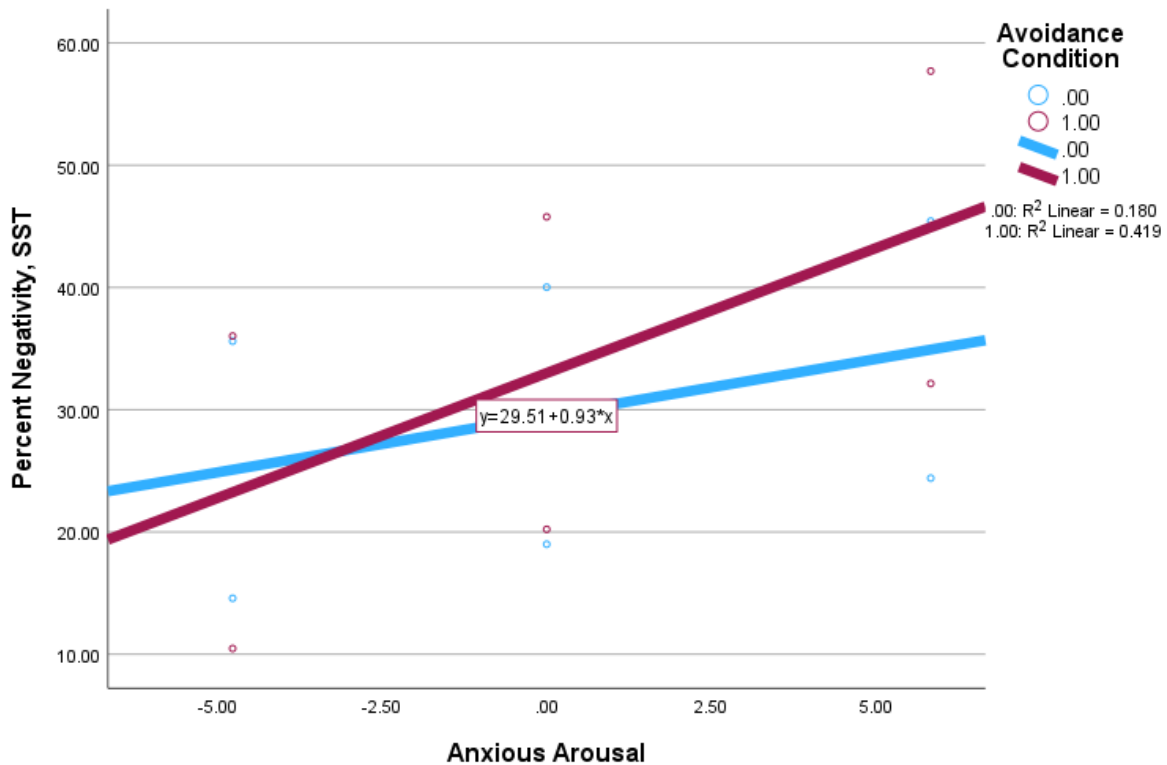
*Negativity Bias in Interpretation (SST) Predicted from Avoidance Condition, with Depression and Anxiety Symptoms as Moderators*

Predictor	$\beta$	<i>p</i>	<i>SE</i>	95% CI	
				LL	UL
Avoidance Condition	3.489	.225	2.873	-2.161	9.140
Anhedonic Depression	1.121**	<.001	.175	.776	1.466
Anhedonic Depression x Avoidance Condition	.242	.432	.307	-.362	.845
Anxious Arousal	.926**	<.001	.286	.364	1.489
Anxious Arousal x Avoidance Condition	1.117*	.022	.484	.166	2.069

*CI* = confidence interval; *LL* = lower limit; *UL* = upper limit.

**Figure 4**

*Visualization of the Avoidance Condition by Anxiety Interaction in predicting SST scores*



I next examined if adding trait avoidance to the model led to explaining a larger amount of the variance in SST scores. A linear regression was calculated predicting SST scores from avoidance condition, with depression symptoms and anxiety symptoms, as well as trait avoidance, as moderators. Results revealed that this marginally increased the explanatory power of the model from  $R^2 = 22.6\%$  to  $R^2 = 24.2\%$  with trait avoidance (SP) included. In this model, trait avoidance was significantly predictive of SST scores,  $\beta = .779$ ,  $p < .001$ . The interaction between anxiety and assignment to avoidance condition dropped below significance  $\beta = .926$ ,  $p = .074$ . Results are presented in Table 14.

**Table 14**

*Negativity Bias in Interpretation (SST) Predicted from Avoidance Condition, with Depression and Anxiety Symptoms as Moderators, Trait Avoidance as Covariate*

Predictor	$\beta$	$p$	$SE$	95% CI	
				LL	UL
Avoidance Condition	3.122	.273	2.842	-2.466	8.710
Anhedonic Depression	.918**	.000	.182	.560	1.276
Anhedonic Depression x Avoidance Condition	.293	.337	.304	-.306	.891
Anxious Arousal	.689*	.019	.292	.115	1.264
Anxious Arousal x Avoidance Condition	.926	.074	.518	-.092	1.944
Trait Avoidance, SP	.779**	.001	.233	.320	1.237

*CI* = confidence interval; *LL* = lower limit; *UL* = upper limit.

Based on the proposed data analysis plan, I ran one additional model using PROCESS, that also included current affect (PANAS) as a covariate. In this model, the interaction between avoidance condition and anxiety symptoms was on the cusp of significance ( $\beta = 1.006$ ,  $p = .051$ ), and trait avoidance was a significant ( $\beta = .558$ ,  $p = .020$ ) predictor of negativity bias in interpretation. Results are presented in Table 15. This model explained 27.1% of the variance in SST scores.



**Table 15**

*Negativity Bias in Interpretation (SST) Predicted from Avoidance Condition, with Depression and Anxiety Symptoms as Moderators, Trait Avoidance and PANAS as Covariates*

Predictor	$\beta$	$p$	$SE$	95% CI	
				LL	UL
Avoidance Condition	2.943	.294	2.800	-2.561	8.447
Anhedonic Depression	.654**	.002	.205	.251	1.058
Anhedonic Depression x Avoidance Condition	.145	.633	.303	-.450	.740
Anxious Arousal	.272	.831	.328	-.372	.917
Anxious Arousal x Avoidance Condition	1.006	.051	.513	-.0025	2.0134
Trait Avoidance, SP	.558*	.020	.238	.090	1.026
Positive Affect (PAS)	-.457**	.010	.176	-.803	-.112
Negative Affect (NAS)	.742**	.003	.255	.241	1.244

*CI* = confidence interval; *LL* = lower limit; *UL* = upper limit.

***Interaction Effects: Avoidance Condition, Moderation of Depression and Anxiety, and Negativity Bias in Recall***

A similar PROCESS model was then computed with Recall Bias as an outcome variable, and avoidance condition as a predictor with depression and anxiety included as moderators. Results are presented in Table 16. There was a significant interaction between avoidance condition and depression symptoms,  $\beta = .335$ ,  $p = .038$ . Examining the visualization of this interaction (Figure 5), results indicate that only when participants were assigned to the avoidance condition instead of the control condition, did increases in depression symptoms predict higher levels of negativity bias in recall (see Figure 5). These results must be considered within the context of the error in the presentation of the memory recall task.

**Table 16**

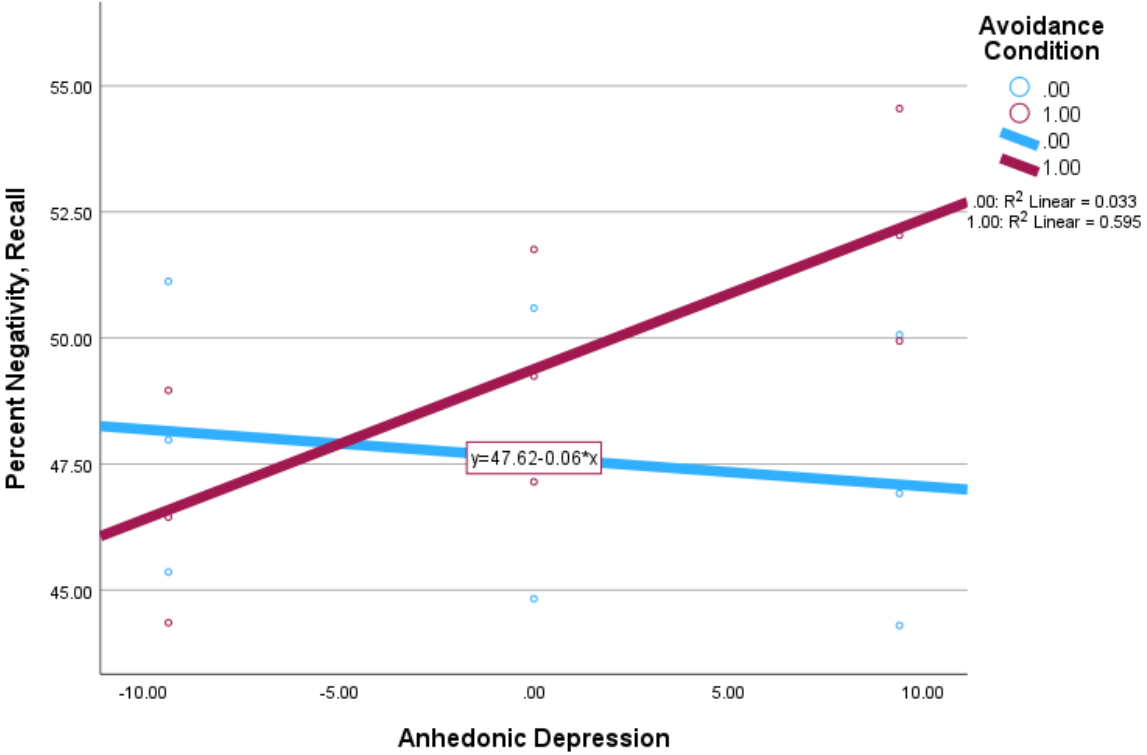
*Negativity Bias in Recall Predicted from Avoidance Condition, with Depression and Anxiety Symptoms as Moderators*

Predictor	$\beta$	$p$	$SE$	95% CI	
				LL	UL
Avoidance Condition	1.794	.258	1.583	-1.318	4.918
Anhedonic Depression	-.057	.553	.095	-.244	.131
Anhedonic Depression x Avoidance Condition	.355*	.038	.170	.0203	.689

Avoidance Condition					
Anxious Arousal	.549**	<.001	.158	.238	.860
Anxious Arousal x Avoidance Condition	-.110	.687	.273	-.646	.426

CI = confidence interval; LL = lower limit; UL = upper limit.

**Figure 5**  
*Visualization of the Avoidance Condition by Depression interaction in predicting Negativity Bias in Recall Scores*



***Interaction Effects: Approach-Avoidance Condition, Moderation of Depression and Anxiety, and Negativity Bias in Interpretation and Recall***

Hayes’ (2022) PROCESS Model 2, was used to examine if SST scores can be predicted based on assignment to the approach-avoidance condition when depression and anxiety are included as moderators. Results revealed no significant interactions between being assigned to the approach-avoidance condition and depression ( $\beta = .429, p <=.174$ ) or anxiety ( $\beta = -.011, p <=.983$ ) on SST scores (Table 17). Another linear regression using the PROCESS Model 2 (Hayes, 2022), was computed to examine if negativity bias

in recall can be predicted based on assignment to the approach-avoidance condition when depression and anxiety are included as moderators. This model also showed no significant interaction effects (Table 18), but this finding is limited due to the error in administration of the memory recall task.

**Table 17**

*Negativity Bias in Interpretation (SST Predicted from Approach-avoidance Condition, with Depression and Anxiety Symptoms as Moderators)*

Predictor	$\beta$	<i>p</i>	<i>SE</i>	95% CI	
				LL	UL
Approach-avoidance Condition	-.118	.968	2.911	-5.841	5.605
Anhedonic Depression	1.015**	<.001	.170	.681	1.350
Anhedonic Depression x Approach-avoidance Condition	.429	.174	.315	-.1898	1.047
Anxious Arousal	1.295**	<.001	.278	.749	1.842
Anxious Arousal x Approach-avoidance Condition	-.011	.983	.496	-.986	.964

*CI* = confidence interval; *LL* = lower limit; *UL* = upper limit.

**Table 18**

*Negativity Bias in Recall Predicted from Approach-avoidance Condition, with Depression and Anxiety Symptoms as Moderators*

Predictor	$\beta$	<i>p</i>	<i>SE</i>	95% CI	
				LL	UL
Approach-avoidance Condition	.303	.850	1.598	-2.838	3.444
Anhedonic Depression	.120	.232	.094	-.072	.296
Anhedonic Depression x Approach-avoidance Condition	-.192	.268	.173	-.532	.148
Anxious Arousal	.388*	.0132	.156	.082	.695
Anxious Arousal x Approach-avoidance Condition	.256	.353	.276	-.286	.798

*CI* = confidence interval; *LL* = lower limit; *UL* = upper limit.

## Discussion

### Summary

This study first examined the relationship between avoidance motivation and negativity bias in interpretation and recall in a sample of participants with a wide range of symptoms of

depression and anxiety. Trait avoidance motivation was found to be associated with negativity bias in interpretation of ambiguous information. An error in the administration of the measure which aimed to detect levels of negativity bias in recall prevents meaningful interpretation of the results of the avoidance-recall bias relationship. The relationship between trait avoidance and negativity bias in interpretation was moderated by symptoms of depression, so that at high levels of depression, increases in trait avoidance had their largest effect, leading to more negativity bias in interpretation of ambiguous information.

Beyond correlational findings, this study also sought to establish whether general avoidance motivation could be manipulated experimentally, and if, after activated, avoidance motivation led to greater levels of negativity bias. Combining previous research that demonstrated methods to activate avoidance motivation within specific contexts (e.g. social avoidance motivation by Gable, 2006) with methods used to induce participant reflection and elaborate on thoughts and associated feelings (McLaughlin et al., 2007), a new experimental paradigm was used to successfully induce increases in avoidance motivation within experimental conditions of avoidance and approach-avoidance conflict. Assignment to the avoidance motivation condition did not show the hypothesized main effect, as it did not lead to higher levels of negativity bias in interpretation, compared to the control condition. However, assignment to the avoidance motivation condition did have an interaction effect with anxiety symptoms, so that when participants were assigned to the avoidance condition (compared to the control condition), higher levels of anxiety led to greater negativity bias. Assignment to the mixed approach-avoidance motivation condition, did not have any significant main effects (compared to a control condition) on negativity bias, and this relationship was not significantly moderated by levels of depression or anxiety.

## **Differences between Correlational & Experimental Findings, and between Symptoms of Depression and Anxiety**

Why was there a significant relationship found between trait avoidance motivation and negativity bias in the correlational portion of this research, but no experimental main effects of assignment to conditions which increased avoidance motivation on negativity bias? The introduction to this study made the case that for all individuals, when avoidance motivation is active, stimuli that are negative in nature are motivation-related content are, and because cognitions are biased towards information relevant to motivations, individuals would be more biased toward negative content when avoidance motivation has been activated. Why was this main effect not found in the experimental portion of this research? Of course, one explanation is that the hypothesis was incorrect, and avoidance motivation does not lead to negativity bias. It is alternatively possible that the hypothesis is correct in essence, however, when healthy individuals with minimal symptoms of anxiety and depression are assigned to experimental motivation conditions, they listed goals that were already resolved or were not as emotionally evocative. This in turn might lead to a lack of a main effect of assignment to condition on negativity bias. Future analyses may more fully examine the content of the goals and motivations generated within avoidance and approach-avoidance mixed manipulation conditions to determine if such differences were found between those with high and those with low levels of symptoms of anxiety and depression. A future paradigm may compensate for this issue by asking individuals to list goals and motivations about things they are currently struggling with as opposed to the manipulation used in this study which invited individuals to consider writing about goals that “might be about something that might happen, or things that have happened or are currently happening”. Within the current research, additional exploration could be done by coding themes, and determining whether the goals listed were or were not already resolved.

Another important question that should be further explored is why symptoms of *depression* were found to be a significant moderator of trait avoidance motivation on negativity bias in interpretation, and symptoms of *anxiety* were a significant moderator of the effect of assignment to the avoidance motivation condition on negativity bias? That is to say, within the correlational context, depression, but not anxiety moderated the avoidance motivation-negativity bias relationship, and within the experimental context, anxiety, but not depression, moderated the avoidance motivation-negativity bias relationship.

There are many possibilities as to why this was found in this study. One explanation is that anxiety only appeared to moderate the avoidance motivation negativity bias relationship, but in reality there is a third extraneous variable that controls both. Alternatively, hypotheses may be correct, but among participants with high levels of depression, which was the group which demonstrated the significant moderation effect in the correlational context, assignment to the avoidance motivation condition did not have a significant effect on negativity bias because the levels of avoidance motivation were already significantly high, even within the control condition. There may be a level of avoidance motivation that serves as a ceiling, upon which greater levels of avoidance motivation do not lead to any additional negativity bias. The group which showed the strongest moderating effect between trait avoidance and negativity bias were those individuals who reported symptoms of depression  $>1$  SD above the mean, and this group did indeed have much higher levels of mean avoidance motivation scores on the DAT avoidance manipulation check than individuals who were  $<1$  SD above the mean, both within the avoidance motivation condition (mean summed DAT scores  $> 1$ SD depression = 5.35, mean DAT scores  $<1$ SD = 4.29), and in the control condition (mean DAT scores  $> 1$ SD depression = 4.30, mean DAT scores  $<1$ SD = 3.56).

An alternative explanation is that negativity bias in interpretation is a less mutable cognitive process for individuals with depression symptoms than those with anxiety symptoms. Indeed, recent meta-analyses examining the effects of cognitive bias retraining in depression and anxiety, found more evidence of changes in negativity bias among individuals with anxiety than those with depression (Fodor et al., 2020). If this is the case, among individuals with higher levels of depression, assignment to the avoidance motivation condition may not have led to more negativity bias because negativity bias is a less mutable feature of depression than it is of anxiety, and changes in avoidance motivation may not lead to changes in negativity bias as easily for those with depression as it may for those with anxiety.

Why did we not see a moderation effect for anxiety in the trait avoidance and negativity bias relationship, while anxiety was a moderator in the experimental portion of the study? One explanation is that anxiety does moderate the relationship between avoidance motivation and negativity bias in interpretation, but the Sensitivity to Punishment subscale of the SPSRQ was not sensitive enough to capture some elements of avoidance motivation that may be most susceptible to the moderating effects of anxiety. Recent research has highlighted that a) some of the questions in the version of the SPSRQ used in this study (Torrubia et al., 2001) have some questions that were translated too literally from the original in Catalan, and therefore lost some of their effectiveness, and b) that the yes/no method of responding to each question can obscure some important individual differences that can be better captured with 5 point Likert response options (Conner et al., 2018). For example, the first question in the Sensitivity to Punishment subscale asks, “Do you often refrain from doing something because you are afraid of it being illegal?”, with Yes/No as response options. This question may not quite capture the full range of avoidance motivation and related behavior as even individuals with low avoidance motivation

may still say “Yes” to this question. Future studies may use newer SPSRQ scales or other measures of avoidance motivation. Future studies may also use newer versions of the SST, as some have been created which have stimuli more closely related to anxiety such as panic and worry (Zahler et al., 2020; Krahe et al., 2022). While the standard SST task has been shown to be unscrambled as more negative for individuals with both depression and anxiety, the content of the sentences themselves tend to have more depression related topics than anxiety related ones (See Appendix A for full list), and it’s possible that stronger moderation effects for anxiety will be found when these versions of the SST are used.

These preceding explanations explain how hypotheses may still be found to be true, and lack of effects in the correlational study may have been due to measures used. However, an alternative explanation for the discrepancy between finding no moderating effect for anxiety in the correlational study, but finding it in the experimental portion, is that in truth anxiety is not a moderator of the relationship between avoidance motivation and negativity bias. Why then, did we find that anxiety did show a moderation effect on the relationship between assignment to avoidance condition on negativity bias? It’s possible to alternatively hypothesize that this finding in the experimental condition was due to the fact that participants with high levels of anxiety generated avoidance goals that made them experience more symptoms of anxiety, and this heightened anxiety led to negativity bias. Such explanations could be experimentally accounted for by measuring anxiety levels after assignment to condition, to examine if the avoidance motivation prompt led to higher symptoms of anxiety.

### **Clinical Applications**

Virtually all traditional treatment models consider cognitions, emotions, and behaviors as important aspects of a patient’s experience. Models differ in the emphasis they place on each of



these components of human experience, and the degree to which they believe which of these concepts mechanistically underly clinical symptomatology and are the correct targets for change. This study, drawing from the transdiagnostic research which highlight how dysfunction in underlying mechanisms can lead to clinical symptoms in a range of different disorders, sought to find additional evidence for how some mechanisms that are already known to be of clinical importance, relate to one another. On the whole, results of this study are aligned with theories of treatment that focus on the importance of approach-avoidance motivational systems that underlie disorders, and the fact that changes within these motivational systems can have direct downstream effects on cognitive biases.

There are a number of treatment models that place a strong emphasis on working with patients to change their motivational systems in order to have a larger effect on behaviors and cognitions. Emotion Regulation Therapy places motivations as a central target of treatment (ERT, Mennin & Fresco, 2014), and elements of this treatment focus on helping patients become more aware of their approach and avoidance motivations and how they are interlaced with emotions and behaviors. ERT teaches patients to be “counteractive” in their response to strong emotions and motivational pulls, by focusing thoughts and feelings toward opposing motivations (Renna et al., 2017). For example, a patient who is stuck in an avoidance and security seeking state and not pursuing an important goal that has elements of both approach and avoidance, might be encouraged to activate their approach motivational systems. Results of this study align with the ideas of this treatment approach and suggest that improvements within these motivational systems may also lead to reductions in cognitive biases.

It is also interesting to consider how these results align with Foa’s Emotional Processing Theory (EPT, Foa & Kozak 1986). A basic tenant of EPT is that “emotions such as fear are

represented in memory as a cognitive structure that includes information about the fear stimuli, the fear responses, and the meaning of the stimuli and responses.” (Foa & McLean, 2016, pg. 3). Within this context, heightened avoidance motivational systems may lead to more frequent activation of these cognitive fear structures. If avoidance motivation on the whole is lessened, it may lead to less activation of fear related cognitions and responses. According to this theory though, cognitive biases likely would be activated if associated fear structures are activated, meaning that avoidance motivation likely does not have a direct effect on negativity bias according to Foa’s theories. Instead, the EPT approach focuses on how one can change the cognitive structures themselves to reduce pathological fear. This process is summarized by Foa who writes that interventions “achieve their effects through emotional processing, the process by which corrective, realistic information is incorporated into the fear structure and modifies the pathological elements in the structure” (Foa & McLean, 2016, pg. 3).

### **Limitations & Future Directions**

While this study revealed important relationships between avoidance motivation and negativity bias, there are a number of areas which require more study to gain more insight into these relationships. First, although the study set out to measure negativity bias within both interpretation of ambiguous information and in recall, due to an error in randomization, recall bias results could not be meaningfully interpreted. Future studies may look more specifically at results of similar avoidance activation on negativity bias in both recall and attention which are key sources of negativity bias that drive downstream symptoms of depression and anxiety.

When designing this study, the plan was to gather the data about depression and anxiety symptoms in the pre-screen and administer the full study within the same 10-day time frame. However, participants within the first batch recruited on MTurk to the full study took

substantially longer to complete the full study than piloting previously indicated. This led to a pause in collection during which approval for a modification to the IRB was requested, in order to pay more and increase the length of time the study was advertised for. This resulted in a larger than planned time gap between measuring depression & anxiety symptoms and the full study (mean of 25.3 days). The MASQ-D30 was not readministered within the full study, so it is possible that participant symptomatology changed between the time this data was collected and when trait avoidance motivation and negativity bias was measured, and avoidance motivation was manipulated. This may have obscured or weakened potential moderation effects of depression and/or anxiety.

The placement of some measures within the full study also represents a potential limitation to this research. Trait avoidance was measured (via the SP subscale in the SPSRQ) after participants had already been assigned to various experimental conditions, so it is possible that the assignment to a condition led to differences in reported trait avoidance. While this is not a limitation of the examination of results of Aim 1, which was explored only within the control condition which did not experience any avoidance manipulation, this may have led to participants within the experimental conditions reporting higher levels of trait avoidance motivation. As reported within the results section, a t-test revealed no significant differences in trait avoidance scores based on assignment condition, which assuages this limitation to a degree.

While assignment to the avoidance motivation condition was associated with higher levels of negativity bias among more anxious participants, it is not clear whether a) assignment to a condition in which avoidance motivation is reduced might lead to less negativity bias or if b) assignment to an approach motivation condition which aims to activate approach leads to less negativity bias. It is likely harder to experimentally induce a reduction in avoidance motivation

than it is to cause it to increase, in part because merely activating approach motivation may not necessarily lead to lower avoidance motivation as these constructs are largely conceptualized as orthogonal. If avoidance motivation can be experimentally down-activated in a similar experimental paradigm, it may indeed lead to lower levels of negativity bias. Were this to be found, it would have additional clinical implications for the treatment of depression and anxiety.

This study however did not seek to create lasting changes in approach or avoidance motivation, but rather to see if some underlying mechanisms that drive negativity bias could be highlighted through this targeted experimental manipulation. While any clinical applications from this study are limited by the experimental and likely short-lived nature of these activations, we have learned that they are mechanistically related. Given the results of the study which found moderating effects for symptoms of depression and anxiety within groups of individuals with higher levels of symptoms, future research may also want to recruit clinical samples to examine if these effects remain true within clinical samples.

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## Appendix A

### Pre-screen

#### *MASQ-D30 (Wardenaar et al., 2010) (and 1 embedded attention check)*

Below is a list of feelings, sensations, problems, and experiences that people sometimes have.

Read each item and then click the appropriate choice that is next to each item. Use the choice

that best describes how much you have felt or experienced things this way during the past week,

including today.

	1..Not at all	2..A little bit	3..Moderately	4...Quite a bit	5..Extremely
Felt confused	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Startled easily	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt worthless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt nauseous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt really happy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt irritable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt dizzy or light-headed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt optimistic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt hopeless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt like I was having a lot of fun	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blamed myself for a lot of things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt dissatisfied with everything	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt like I accomplished a lot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Was trembling or shaking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt like I had a lot to look forward to	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt pessimistic about the future	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had pain in my chest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt really talkative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had hot or cold spells	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Was short of breath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt really 'up' or lively	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Felt inferior to others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Muscles were tense or sore	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Select “not at all” for this item</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had trouble making decisions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt like had a lot of energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heart was racing or pounding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Worried about a lot of things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt really good about myself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt Successful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had trouble swallowing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Full Study

*Avoidance and Mixed Approach/Avoidance Manipulation Task (based on McLaughlin et al., 2007; Muise et al. 2017; and Gable 2006).*

### *Avoidance Condition.*

**Goals** are areas in your life in which you have been or are expecting to be directing your energies. **Avoidance goals** are goals that are focused on outcomes you are aiming to avoid. The avoidance goals might be about something that might happen, or things that have happened or are currently happening.

Here is an example of an avoidance goal:

“I don’t want my best friend Sam to be angry with me anymore. When he is angry with me, I feel sad and alone. I want to stop feeling bad about this. I’m worried I will lose this friendship which has meant so much to me.”

Take a few minutes to think deeply about **Avoidance goals** you have. Think about 3 important avoidance goals, and please list each goal in at least 3 sentences. You may include details, thoughts, and feelings, surrounding each goal.

Goal 1.

Goal 2.

Goal 3.

---

Which of these avoidance goals do you have the most feelings about? (Select from 3 previously listed).

---

**During this next period, we would like you to create a state where you are fully engaged in thinking about this avoidance goal.**

[Relist Chosen Goal Here]

After thinking about this avoidance goal, you’ll be asked to share some of your thoughts and feelings.

Here is an example of what you might share after thinking deeply about your avoidance goal.

[Sample Vignette]

Goal: “I don’t want my best friend Sam to be angry with me anymore. When they are angry with me, I feel sad and alone. I want to stop feeling bad about this. I’m worried I will lose this friendship which has meant so much to me.”

**Details:** I don’t want Sam to be angry with me and maybe hate me. I’ve been close with Sam for 10 years, this relationship means a lot to me. I did probably hurt Sam when I said those things about him last week. I shouldn’t have betrayed his trust.

**Thoughts:** I know what I did was wrong. I understand that Sam is angry, and I think I know why. I don’t know the words to say to apologize, and I tried already to apologize. I don’t know exactly what will happen next.

**Feelings:** I feel terrible and guilty. I feel sad and alone because Sam won’t talk to me. It makes me feel like I cannot be loved or appreciated by anyone, because I always ruin things. I need this to stop feeling so bad. I’m anxious.

---

**During this next period, we would like you to create a state where you are fully engaged in thinking about this avoidance goal.**

[Relist Chosen Goal Here]

Before answering the next question, **please close your eyes and think deeply about this avoidance goal which you have the most feelings about. Please think about it in the way that you usually think about it, but as intensely as you can, for 2 minutes.**

After thinking about this avoidance goal, please share some of the details and your thoughts and feelings surrounding each goal. Please write at least 3 sentences for each section.

Details.

(Please write at least 3 sentences)

Thoughts.

(Please write at least 3 sentences)

Feelings.

(Please write at least 3 sentences)

---

***Mixed Approach/Avoidance Condition.***

**Goals** are areas in your life in which you have been or are expecting to be directing your energies. **Approach+Avoidance goals** are goals that are focused on an outcome that brings up conflicting feelings: you feel like this goal involves some things you want, and you also feel like it also involves some things you want to avoid. Approach+Avoidance goals might be about something that might happen, or things that have happened or are currently happening.

Here is an example of an approach+avoidance goal:

“I love Sam, but I’m not sure if I want to marry her. I’ve been unsure for about 2 years now.

There is a part of me that really wants to spend the rest of my life with her, but I’m also not sure if she is the best person for me, and if I should leave the relationship because I cannot decide.

I’ve been feeling confused, at times sad and pessimistic, and at times excited about the future.”

Take a few minutes to think deeply about **Approach+Avoidance goals** you have. Think about 3 important approach+avoidance goals, and please list each goal in at least 3 sentences. You may include details, thoughts, and feelings, surrounding each goal.

Goal 1.

Goal 2.

Goal 3.

---

Which of these approach+avoidance goals do you have the most feelings about? (Select from 3 previously listed).

---

**During this next period, we would like you to create a state where you are fully engaged in thinking about this approach+avoidance goal.**

[Relist Chosen Goal Here]

After thinking about this approach+avoidance goal, you'll be asked to share some of your thoughts and feelings.

Here is an example of what you might share after thinking deeply about your approach+avoidance goal.

[Sample Vignette]

**Goal:** "I love Sam but I'm not sure if I want to marry her. I've been unsure for about 2 years now. There is a part of me that really wants to spend the rest of my life with her, but I'm also not sure if she is the best person for me, and if I should leave the relationship because I cannot decide. I've been feeling confused, at times sad and pessimistic, and at times excited about the future."

**Details:** I've been dating Sam for 3 years. We've had a mostly good relationship. But I am really not sure if we should get married or not. There are a bunch of pros, but also some cons. I feel like I need to know and make a decision soon.

**Thoughts:** I know that Sam and I are pretty good communicators. We also have lots of shared interests like hiking and sports. But sometimes Sam is selfish, and sometimes I think that I would be better off with someone else who I haven't met yet.

**Feelings:** I feel confused because I am happy and excited about the future with Sam, at least sometimes. But I also just sometimes feel trapped in this relationship and indecision and not knowing. And that makes me sad and anxious. So it is just very hard to choose, and I feel pressure to do that.

---

**During this next period, we would like you to create a state where you are fully engaged in thinking about this approach+avoidance goal.**

[Relist Chosen Goal Here]

Before answering the next question, **please close your eyes and think deeply about this approach+avoidance goal which you have the most feelings about. Please think about it in the way that you usually think about it, but as intensely as you can, for 2 minutes.**

After thinking about this approach+avoidance goal, please share some of the details and your thoughts and feelings surrounding each goal. Please write at least 3 sentences for each section.

Details.

(Please write at least 3 sentences)

Thoughts.

(Please write at least 3 sentences)

Feelings.

(Please write at least 3 sentences)

---

**Control Condition.** (Muisse et al, 2017)

In detail, please describe 4 objects in the room/location that you are currently located in, in the box below. Please write at least 3 sentences about each object.

Here is an example of how you might describe an object in your room:

“I see a purple flower on the table in front of me. The purple flower has some white towards the center. It looks a little wilted, but is not drooping too much. It has a stem about 1 foot long.”

Object 1:

Object 2:

Object 3:

Object 4:

---

Which of these objects caught your eye the most? (Select from 4 previously listed).

---

**During this next period, we would like you to create a state where you are fully engaged in thinking about this object.**

[Relist Chosen Object Here]

After thinking about this object, please share some of your thoughts about the object. You might think about the physical details of the object, where the object came from, or what you’ve done or might do with the object.

Here is an example of what you might share after thinking deeply about the object.

“I see a purple flower on the table in front of me. The purple flower has some white towards the center. It looks a little wilted, but is not drooping too much. It has a stem about 1 foot long.”

Additional Descriptions about the Object: This purple flower looks pretty. I like flowers. It is sitting in a vase and I purchased it to add a little decoration to the living room. Its been in the house for about 1 week. It came from the marketplace 3 mile away. The shape of the purple flower is mostly circular, and the petals look a little like raindrops. The white in the center adds a nice contrast of colors with the purple. I think I may need to throw out the flower in another few days. At that point, the flower will probably be too droopy to keep around.

---

**During this next period, we would like you to create a state where you are fully engaged in thinking about this object.**

[Relist Chosen Object Here]

Before answering the next question, **please examine the object and think deeply about this object in your room that caught your eye. Please think about it in the way that you might usually think about it, but as intensely as you can, for 2 minutes.** You might think about the physical details of the object, where the object came from, or what you’ve done or might do with the object.

After thinking about this object, please share some of your thoughts about the object. Please write at least 8-10 sentences. Please include some information relating to the physical details of the object, where the object came from, or what you have done or might do with the object.





Additional Descriptions about the Object:

(Please write at least 3 sentences)

---



**Manipulation Check** (Depicted Action Tendencies Instrument, OToole & Mikkelsen, 2021).

<p>To what degree does this image feel like it describes the way you are feeling in this moment?</p> <p><input type="checkbox"/> 1...Not at all how I feel in this moment</p> <p><input type="checkbox"/> 2</p> <p><input type="checkbox"/> 3</p> <p><input type="checkbox"/> 4</p> <p><input type="checkbox"/> 5...Exactly how I feel in this moment</p>	
<p>To what degree does this image feel like it describes the way you are feeling in this moment?</p> <p><input type="checkbox"/> 1...Not at all how I feel in this moment</p> <p><input type="checkbox"/> 2</p> <p><input type="checkbox"/> 3</p> <p><input type="checkbox"/> 4</p> <p><input type="checkbox"/> 5...Exactly how I feel in this moment</p>	
<p>To what degree does this image feel like it describes the way you are feeling in this moment?</p> <p><input type="checkbox"/> 1...Not at all how I feel in this moment</p> <p><input type="checkbox"/> 2</p> <p><input type="checkbox"/> 3</p> <p><input type="checkbox"/> 4</p> <p><input type="checkbox"/> 5...Exactly how I feel in this moment</p>	
<p>To what degree does this image feel like it describes the way you are feeling in this moment?</p> <p><input type="checkbox"/> 1...Not at all how I feel in this moment</p> <p><input type="checkbox"/> 2</p> <p><input type="checkbox"/> 3</p> <p><input type="checkbox"/> 4</p> <p><input type="checkbox"/> 5...Exactly how I feel in this moment</p>	

***Scrambled Sentences Task*** (Wenzlaff & Bates, 1998)

Next, you will see a series of scrambled sentences. Please write a number (1-5) above five of the six words you see in each scrambled sentence to indicate their sequence. Please complete as many sentences as possible in the time provided and do not go back and correct any errors.

While unscrambling these sentences, please remember the following number: 678739

(Presented with 2 blocks, given 2.5 minutes to complete)

Emotional content

1. "looks bright future the dismal very"
2. "is interesting life my boring quite"
3. "to dislike people me like tend"
4. "others equal am inferior I to"
5. "life truly worth is not living"
6. "a worthwhile I worthless am person"
7. "a am failure quite success I"
8. "loved I do deserve don't being"
9. "about do people me don't care"
10. "have I lost my helped friend"
11. "is impossible to happiness possible attain"
12. "appearance unchanged physical my worsening is"
13. "me well people of poorly think"
14. "is not college worth well it"
15. "seem misunderstand to people understand me"
16. "am I ruining life improving my"
17. "person am inadequate I adequate an"
18. "others' cannot I can meet expectations"
19. "I little offer have much to"
20. "my wasted I utilized have opportunities"

Neutral Content

1. "playing computer fun is boring games"
2. "is hearing worse getting vision my"
3. "environment riding busses helps bicycles the"
4. "to books read magazines I prefer"
5. "much fun hiking going dancing is"
6. "very child my is pet cute "
7. "breakfast cereal eat eggs I for"
8. "is watch expensive necklace my very"
9. "Chinese difficult a simple is language"
10. "I up early getting late love"
11. "politicians conservative too much liberal promise"
12. "long shower take I bath a"
13. "foreign exciting countries expensive is visiting"
14. "animals snakes very bunnies entertaining are"
15. "an appetizing snack donuts unhealthy are"
16. "want Asia visit I Europe to"
17. "to letters I emails write prefer"
18. "of introverts know extroverts I lots"
19. "too coffee my tea is bitter"
20. "my beautiful needs ugly repairs car"

**Memory/Recall Bias** (methods adapted from Chepenik et al., 2007; words from White et al., 2014 & Tarsia et al, 2003)

Free Recall:

Words will be presented 1 at a time for 2 seconds, 36-point Helvetica font, in black on a white background, in set of 16 words (4 depression related, 4 anxiety related, 8 neutral). After each set participants are asked:

In the boxes below, please write as many of the words that you just saw as possible. Only list words you just saw in this last set of words presented.

Recognition:

Now you will see some old words that were already presented to you in the past 3 sets, and you will also see new words which were not yet presented. For each word, please answer whether the word was or was not already presented to you.

Was this word already presented?

Yes

No

Depression-related words(first 12 for recall, 13-24 for recognition)	Anxiety/threat related words(first 12 for recall, 13-24 for recognition)	Neutral words for recall (24)	Neutral words for recognition (24)
Awful	Accident	Absurd	Activate
Crying	Attack	Corner	Alley
Deserted	Casualty	Detail	Cabinet
Exhausted	Emergency	Excuse	Elevator
Grief	Harm	Glass	Horse
Lost	Panic	Lump	Paint
Unfortunate	Urgent	Umbrella	Unit
Alone	Afraid	Alley	Ankle
Despair	Ambulance	Golfer	Headlight
Discouraged	Criticism	Headlight	Highway
Gloomy	Disgrace	Fabric	Humble
Guilty	Mistake	Icebox	Invest

Hopeless	Paralyzed	Jacket	Passage
Pessimistic	Tragedy	Pamphlet	Trumpet
Upset	Uneasy	Village	Wagon
Dreadful	Danger	Custom	Dentist
Deprived	Disease	Errand	Farm
Dull	Embarrassed	Jelly	Indifferent
Isolated	Nervous	Metal	Nursery
Horrible	Pain	Statue	Plant
Rejected	Persecuted	Radiator	Poetry
Sad	Terrified	Ship	Teacher
Terrible	Victim	Truck	Violin
Worthless	Worry	Windmill	Writer

**SPSQR** (Trait Avoidance Motivation, Torrubia et al., 2001) (and 1 attention check, Huang et al, 2015)

- |  |    |     |
|--|----|-----|
| 1. Do you often refrain from doing something because you are afraid of it being illegal?   | No | Yes |
| 2. Does the good prospect of obtaining money motivate you strongly to do some things?  | No | Yes |
| 3. Do you prefer not to ask for something you are not sure you will obtain it?   | No | Yes |
| 4. Are you frequently encouraged to act by the possibility of being valued in your work, in your studies, with your friends or with your family? | No | Yes |
| 5. Are you often afraid of new or unexpected situations?   | No | Yes |
| 6. Do you often meet people that you find physically attractive?   | No | Yes |
| 7. Is it difficult for you to telephone someone you do not know?   | No | Yes |
| 8. Do you like taking some drugs because of the pleasure you get from them?  | No | Yes |
| 9. Do you often renounce your rights when you know you can avoid a quarrel with a person or an organization?                                     | No | Yes |
| 10. Do you often do things to be praised?  | No | Yes |
| 11. As a child, were you troubled by punishments at home or in school?   | No | Yes |
| 12. Do you like being the center of attention at a party or a social meeting?  | No | Yes |
| 13. In tasks that you are not prepared for, do you attach great importance to the possibility of failure?  | No | Yes |
| 14. Do you spend a lot of your time on obtaining a good image?   | No | Yes |
| 15. Are you easily discouraged in difficult situations?  | No | Yes |
| 16. Do you need people to show their affection for you all the time?   | No | Yes |
| 17. Are you a shy person?  | No | Yes |
| 18. When you are with a group, do you try to make your opinions the most intelligent or the funniest?  | No | Yes |
| 19. Whenever possible, do you avoid demonstrating your skills for fear of being embarrassed?   | No | Yes |
| 20. Do you often take the opportunity to pick up people you find attractive?   | No | Yes |
| 21. When you are with a group, do you have difficulties selecting a good topic to talk about?  | No | Yes |
| 22. As a child, did you do a lot of things to get people's approval?   | No | Yes |
| 23. Is it often difficult for you to fall asleep when you think about things you have done or must do?   | No | Yes |
| 24. Does the possibility of social advancement, move you to action, even if this involves not playing fair?                                      | No | Yes |
| 25. Do you think a lot before complaining in a restaurant if your meal is not well prepared?   | No | Yes |
| 26. Do you generally give preference to those activities that imply an immediate gain?   | No | Yes |
| 27. Would you be bothered if you had to return to a store when you noticed you were given the wrong change?                                      | No | Yes |
| 28. Do you often have trouble resisting the temptation of doing forbidden things?  | No | Yes |
| 29. Whenever you can, do you avoid going to unknown places?  | No | Yes |
| 30. Do you like to compete and do everything you can do to win?  | No | Yes |
| 31. Are you often worried by things you said or did?   | No | Yes |
| 32. Is it easy for you to associate tastes and smells to very pleasant events?   | No | Yes |
| 33. Would it be difficult for you to ask your boss for a raise (salary increase)?  | No | Yes |
| 34. Are there a large number of objects or sensations that remind you of pleasant events?  | No | Yes |
| 35. Do you generally avoid speaking in public?   | No | Yes |
| <b>36. Have you ever used a computer?</b>  | No | Yes |

- |  |    |     |
|--|----|-----|
| 37. When you start to play with a slot machine, is it often difficult for you to stop?                                     | No | Yes |
| 38. Do you, on a regular basis, think that you could do more things if it was not for your insecurity or fear?             | No | Yes |
| 39. Do you sometimes do things for quick gains?  | No | Yes |
| 40. Comparing yourself to people you know, are you afraid of many things?  | No | Yes |
| 41. Does your attention easily stray from your work in the presence of an attractive stranger?                             | No | Yes |
| 42. Do you often find yourself worrying about things to the extent that performance in intellectual abilities is impaired? | No | Yes |
| 43. Are you interested in money to the point of being able to do risky jobs?   | No | Yes |
| 44. Do you often refrain from doing something you like in order not to be rejected or disapproved by others?               | No | Yes |
| 45. Do you like to put competitive ingredients in all of your activities?  | No | Yes |
| 46. Generally, do you pay more attention to threats than to pleasant events?   | No | Yes |
| 47. Would you like to be a socially powerful person?   | No | Yes |
| 48. Do you often refrain from doing something because of your fear of being embarrassed?                                   | No | Yes |
| 49. Do you like displaying your physical abilities even though this may involve danger?                                    | No | Yes |

**Current Affect. (PANAS, Watson, Clark, & Tellegen, 1988)**

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way, right now. Use the following scale to record your answers.

	1..Very slightly or Not at all	2..A little	3..Moderately	4...Quite a bit	5..Extremely
Interested	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Distressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Excited	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upset	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strong	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Guilty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hostile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enthusiastic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irritable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ashamed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspired	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nervous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Determined	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Attentive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jittery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Active	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Afraid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>