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Jeffrey Duane Baker

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Memory bias and body image disturbance in normal weight body dysphoric women

Baker, Jeffrey Duane, Ph.D.
The Louisiana State University and Agricultural and Mechanical Col., 1993
MEMORY BIAS AND BODY IMAGE DISTURBANCE
IN NORMAL WEIGHT BODY DYSPHORIC WOMEN

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of
the requirements for the degree of
Doctor of Philosophy

in

The Department of Psychology

by
Jeffrey D. Baker
B.A. Carson-Newman College, 1982
M.A. Louisiana State University, 1988
May, 1993
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ABSTRACT

Body dysphoria is common in the general population and is thought to be associated with the development of eating disorders. Few studies have examined the role of cognitive processes in normal weight body dysphoric women. This study proposed an associative memory model of body dysphoria. The model predicted an increased memory bias for negative body words and increased body image disturbance in high body dysphoric subjects induced to a depressive mood. Based on the proposed model of body dysphoria, high dysphoric subjects were also predicted to give more depressive/negative body word associates on a word association task. Finally, the Pathfinder method for generating cognitive networks was used to investigate the association of depressive, and positive and negative body concepts in the cognitive networks of high and low body dysphoric subjects.

High and low body dysphoric subjects were assigned to either a neutral or depressive mood induction procedure (half of each group went into each mood condition). Prior to the mood induction, the subjects were assessed for body image disturbance and presented with a word list. Following the mood induction free recall and recognition memory tasks were given. The subjects were then assessed again for body image disturbance and given a word association task. Fifteen additional subjects in each group (no mood induction) were used for comparing the associative networks of high and
low dysphoric subjects with regards to depression and body image.

As predicted a memory bias for negative body words was found in the high dysphoric subjects only. The mood induction procedure provided mixed support for the proposed associative memory model of body dysphoria. The mood induction did not increase the recall of negative body words but did affect the judgements of current body image disturbance in high body dysphoric subjects. The results of the word association task and the Pathfinder networks also provided some support for the proposed model of body dysphoria. Therefore, cognitive processes and transient mood states appear to play some role in body dysphoria, however, the mixed results of the study suggest that more research is needed and that the associative memory model may require modification.
INTRODUCTION AND LITERATURE REVIEW

Body image disturbance has become the focus of much research aimed at identifying the psychological mechanisms that underlie eating disorders. According to Rosen (in press), one of the most obvious clinical features of patients with eating disorders is the patients' "obsessive-like preoccupation" with their body shape, weight, and eating. In addition to its prevalence in the eating disorder population, preoccupation with body size and shape exists in a nonclinical normal weight population referred to as body dissatisfied or "body dysphoric" (Cash et al., 1986). Many women are preoccupied with body size and weight and have negative feelings about their body size despite being normal weight. The present study examined the role of negative mood and cognitive processes in normal weight body dysphoric subjects. First, the literature on body image disturbance will be reviewed and then the literature on information processing biases in clinical disorders will be discussed. Finally, a cognitive model for the connection between mood and body dysphoria will be postulated based on the Human Associative Memory (HAM) model of Anderson and Bower (1973; Bower, 1981; 1987) and a study that tested this hypothesized cognitive connection between mood and body dysphoria will be described.
Body Dysphoria

Body dysphoria refers to negative feelings about one's body size or shape. Body dysphoria is one aspect of a broader construct called body image disturbance (Ben-Yovim, Walker, Murray, & Chin, 1990; Keeton, Cash, & Brown). In addition to body dysphoria, body image disturbance also includes misperception of body size. Body image disturbance is thought to be related to the development of clinical eating disorders such as anorexia nervosa and bulimia nervosa (for a review see Rosen, in press). Numerous studies have shown that body dysphoria is associated with eating disorders (Cooper & Taylor, 1988; Hsu & Sobkiewicz, 1991). Rosen (in press) has argued that anorexia nervosa and bulimia nervosa are primarily disorders of body image and he recommends that more research should be directed toward understanding body image disorder in clinical and non-clinical subjects.

In addition to being a part of the clinical symptomatology of anorexia nervosa and bulimia nervosa, problems with body dysphoria are prevalent in the normal weight nonclinical population (Cash et al., 1986). A large sample national survey of adolescents and adults by Cash et al. (1986) reported that 31% of female respondents and 24% of male respondents reported negative attitudes about their physical appearance. The authors reported
that the strongest dissatisfaction was with areas of the body that are potential stores of adipose tissue (such as stomach, thighs and hips). Body dysphoria in clinical and nonclinical samples is reported to be associated with poor self-esteem, depression, social anxiety and sexual dysfunctions (Cash, 1985; Cash & Butler, 1983; Lerner, Orlos & Knapp, 1976; Noles, Cash, & Winstead, 1985; Rosen & Ross, 1968).

Although body dysphoria is a well documented problem in the normal-weight nonclinical population, the problem is not well understood. Rosen (in press) argued that body dysphoria results from several interactive factors including cultural standards of beauty, social feedback about physical appearance, and disturbances in the development of self-identity and self-esteem. Furthermore, he argued that cognitive factors may contribute to the development or maintenance of body dissatisfaction. For example, selective attention may lead to focusing on aspects of the body which elicit negative feelings about the body.

Body image disturbance has been part of the clinical description of eating disorders for several decades. Body image disturbance was first introduced into the taxonomy of anorexia nervosa in 1962 by Hilde Bruch. Since that time the construct has become the focus of much empirical
research and theoretical debate. Body image disturbance has been conceptualized in terms of cognitive, emotional, and perceptual factors. Historically, body image was first described in the literature as a neural representation of how one experiences one's body (Head, 1920). Schilder (1935) described body image as a mental picture of our body. Secord and Jourand (1953) offered an emotion based definition and stated that body image is how one feels about one's body. Current views of body image disturbance generally divide the construct into two parts (Ben-Tovim, Walker, Murray, & Chin, 1990; Keeton, Cash, & Brown, 1990). First, there may be disturbance of body size perception, i.e., persons may not realistically perceive the size of their own body (typically eating disorder patients will overestimate their own body size). Second, there may be body size dissatisfaction or body dysphoria. Body size dysphoria has been defined as the disparity between perceived and ideal body size (Garner, Garfinkle, & O'Shaughnessy, 1985; Touyz, Beaumont, Collins, & Cowie, 1985; Williamson, Kelley, Davis, Ruggerio, & Blouin, 1985). Body dysphoria is typically studied as the attitude toward one's body. Williamson (1990) proposed a theoretical model describing the factors that influence body dysphoria. According to this model, body dysphoria is a function of body size distortion and preference for
extreme thinness. Williamson (1990) defined body size distortion as the disparity between current body size and a norm referenced mean current body size for someone of approximately the same height and weight on the Body Image Assessment Test (described in the Method section). Preference for thinness was defined as the disparity between ideal body size and a norm referenced mean ideal body size for people of approximately the same height and weight. Williamson proposed that body dysphoria is a dynamic and reactive phenomenon that is dependent on the degree of body image distortion, the intensity of preference for thinness or both. Furthermore, he argued that environmental variables can affect either of these components to heighten or lessen body dysphoria and trigger fear of weight gain in anorexia nervosa and bulimia nervosa.

Recently a role for information processing variables in the development of body image disturbance has been suggested by Williamson, Cubic and Gleeves (in press). Williamson et al. (in press) proposed that body image disturbance be viewed as a complex self-evaluative process that may be influenced by evaluative or judgement biases (Arkes, 1991). In a review of self-evaluation biases, Arkes (1991) described three kinds of errors that may bias judgements (strategy-based errors, association-based
errors and psychophysical-based errors). According to Arkes, strategy-based errors "occur when subjects use a suboptimal strategy to solve a problem." Association-based errors are automatic errors that occur as a result of semantic associative memory. Finally, Arkes described psychophysical-based errors as heightened sensitivity to particular internal or external stimuli that leads to distorted judgements about stimulus intensity. Williamson et al. (in press) proposed that two of these errors (association-based errors and psychophysical-based errors) may be important processes in the findings of body image disturbance in eating disorders. They suggested that association-based errors may occur when body image disturbed subjects are presented with stimuli that activate body schema and then lead to automatic processing of information linked to that body schema. Furthermore, they hypothesized that fear of weight gain may trigger psychophysical based errors (as described by Arkes, 1991) and sensitize these subjects to distorted judgements about their body size. The Williamson et al. (in press) model proposed that body image disturbance be viewed as a complex self evaluative and information processing task subject to the common biases found in other information processing tasks (information processing biases are discussed in more detail below). In addition to
Williamson et al. (in press), several other authors (Schlundt & Johnson, 1990; Vitousek & Hollon, 1990) have conceptualized body image within the framework of information processing, however, empirical research is needed to verify the validity and usefulness of considering body image within this framework.

The present study proposes a model of body dysphoria based on the human associative memory (HAM) model (Anderson & Bower, 1973; Bower, 1981; 1987). It is postulated that body size and shape in body dysphoric normal weight (NWBD) subjects are strongly associated in memory with depressed mood (Anderson & Bower, 1973; Bower, 1981; 1987). If body size and shape are connected to depressed mood in BDNW subjects as is being postulated then mood-congruent memory biases for body shape words should result from the induction of depressed mood in BDNW subjects. The next section reviews information processing biases with particular emphasis on memory biases. After the review of memory biases, the HAM model (Anderson & Bower, 1973; Bower, 1981; 1987) will be presented. Finally, a model of body dysphoria based on the HAM model will be presented and a study that tested this model of body dysphoria will be discussed.
Information Processing and Eating Disorders

The role of information processing variables in the etiology and maintenance of eating disorders has only recently become the focus of empirical research. Vitousek and Hollan (1990) pointed out that although cognitive treatments for eating disorder problems have been widely researched, the cognitive etiological models that inspired the treatments have been largely neglected as a focus of research. They suggested that cognitive factors such as "weight-related self-schemata" may lead to automatic effects on the processing of information about body, food, weight and other eating/weight related concepts.

Information processing theories view humans as active processors of information rather than passive recipients of stimulus input. Information processing involves the selective attending, coding, manipulation, storing, and retrieval of environmental cues and stimulation (Marx & Hillix, 1979). Information processing mechanisms have received increased attention in the study of psychopathology. Biases of attention, memory and response output are thought to play a determining role in some psychological disorders. One theme that has emerged in the study of information processes in psychopathology is the existence of biases that are specific for the unique content of the symptoms of a particular disorder.
(Dalgleish & Watts, 1990; Williams, Watts, Macleod, & Mathews, 1988). This finding is referred to as the "content-specificity hypothesis" (Dalgleish & Watts, 1990, p. 592). For example, the anxiety disorders are associated with biases of attention, however, this bias is most strong for stimuli that are related to the content of the persons particular anxiety. Watts and Sharrock (1986) found a bias in spider phobics for stimuli that are related to spiders or ambiguous stimuli that may be interpreted to have the appearance of a spider. Similar content-specific attentional biases have been found in other simple phobias (Dalgleish & Watts, 1990; Watts, Trwezise, & Sharrock, 1986). Furthermore, social phobics were shown to have a bias for semantic stimuli related to social concerns (Mathews & Macleod, 1985). Foa and McNally (1986) found a bias for contamination words in obsessive-compulsive patients with contamination fears. In affective disorders, biases of memory are more commonly found. Recall biases for affectively negative information have been found in depressed patients by numerous investigators (Bradley & Mathews, 1983; Mathews & Bradley, 1983; Teasdale & Fogerty, 1979).

Although few empirical studies have examined the role of information processing variables in eating disorders, several articles have proposed information processing
models of eating and body image disturbances and urge empirical research to investigate how these variables may influence the etiology and maintenance of eating related problems (Button, 1983; Fransella & Crisp, 1970; Neimeyer & Kouzam, 1985; Vitousek & Hollon, 1990; Williamson et al., in press). Neimeyer and Khouzam (1985) proposed that eating disorder patients are resistant to behavior changes because they are "bound by highly negative, extremely polarized and overly constricted self-schemas." They suggested that restricted and negative self-image precludes these individuals from seeing themselves in a greater variety of non-disordered ways and, therefore, obstructs treatment. Neimeyer and Khouzam (1985) used a repertory grid test to examine the cognitive processes in a group of restrained eaters. The task involved a 10 X 10 ratings grid in which 10 different eating situations were rated across 10 affective constructs relevant to eating disorders. They found that high restraint versus low restraint subjects viewed themselves more negatively across all 10 affective constructs. Finally, they found that high restraint subjects showed less cognitive complexity across eating situations.

Channon, Hemsley and de Silva (1988) examined the selective processing of food words in anorexia nervosa patients versus normal controls using a modified version
of the Stroop color-naming task. They examined the speed of color-naming food words, such as, dinner, sugar and cream, as well as body size words such as weight, shape, and fat. The processing of these words was compared to control words for each group as well as a control color Stroop and a conflicting color Stroop. They found that anorexic patients had greater interference in color naming the food words. Body size words did not produce a significant interference effect, however. The authors concluded that the results showed that anorexics have a "cognitive preoccupation" with food. The results of this study suggest that anorexics may have an attentional bias for food related stimuli and this bias may play a role in the etiology or maintenance of the disorder. It should be noted that there is some dispute over the interpretation of Stroop interference as representing an attentional bias. Some researchers have argued that the Stroop task measures a more general kind of cognitive "interference" (Williams et al. 1988).

Ben-Tovim, Walker, Fok, and Yap (1989) studied cognitive preoccupation with food and body concerns in anorexia nervosa and bulimia nervosa patients using an adaptation of the Stroop color naming task. Anorexics, bulimics and normal controls were given the color naming task with cards containing circles, true-Stroop color
words, food words, shape words, and control words. The authors predicted that the eating disordered patients would show interference in processing food and shape words due to anxiety about eating and body shape. They found significant interference for the processing of food words in both clinical groups compared to normals and compared to the control words. The bulimia group also showed significant slower processing of the shape words. The authors concluded that anxiety about food leads to information processing interference in eating disorder patients and may aid in perpetuating the disorder by biasing what stimuli the patients attend to and therefore may help maintain their anxiety about food. This study has been criticized for the use of multiple ANOVAs (one for each stroop card) which elevates the possibility of a type one error (Fairburn, Cooper, Cooper, McKenna, & Anastasiades, 1991).

Fairburn et al. (1991) also utilized the Stroop paradigm to study the selective processing of eating and shape words among bulimia nervosa patients, and normals. However, this study also included weight related words and included males as a second comparison group. They found that the clinical group was slower in processing eating, shape, and weight words. No differences were found between male and female controls. The authors concluded
that their study supports the claim that bulimia nervosa is associated with the selective processing of information related to weight, shape, and eating.

Cooper, Anastasiades, and Fairburn (1992) also investigated the processing of eating, shape, and weight related words in patients with bulimia nervosa. They found greater cognitive interference among the clinical group with eating, shape, and weight related words as compared to the normal control group.

In a study designed to investigate cognitive overconcern with body shape and weight, Schotte, McNally, and Turner (1990) used a dichotic listening task to examine sensitivity to the word "fat" on the unattended channel. Bulimia nervosa patients and normal controls listened to a prose passage on the primary channel of a dichotic listening task. They were asked to detect the words "fat" and "pick" in the unattended channel. The authors found that bulimia nervosa patients but not normals detected the word "fat" significantly more than the word "pick." The authors conclude that this finding supports the hypothesis that bulimia nervosa patients have attentional bias for weight-related stimuli.

Although memory biases have not been the focus of much research in the eating disorders, the existence of memory biases in depressed persons has been a robust
finding. Mood-congruent memory refers to better recall of information that is consistent with the person's current emotional state (consistent with the content specificity hypothesis). Many studies have found mood-congruent memory for depressive words in persons that are depressed (for reviews see Blaney, 1986; Bower, 1981; Bower, 1987; Williams et al., 1988). Depressed persons have been shown to have biased recognition and recall for depressive stimuli and to have shorter latencies in identifying and recalling depressive stimuli. Two methods have been utilized in studying mood-congruent memory and depression. First, mood induction procedures involve experimental manipulation of mood and then presenting the subjects with a word list and then testing recall of the words some time later. The second method for examining mood-congruent memory is the individual differences method. This method compares depressed individuals with normal mood subjects for recall of negative versus neutral verbal stimuli.

Mood induction studies examining mood-congruent memory have utilized a variety of mood induction techniques. One of the most commonly used procedures is the Velten (1968) mood induction procedure. This procedure involves having subjects read negatively valenced self-referent statements (e.g., "I'm discouraged and unhappy with myself"). The subjects are further
instructed to concentrate on putting themselves in the frame of mind suggested by the statements. In addition to the Velten procedure sad music and hypnotic suggestion have been used as mood induction procedures. Several studies using the Velten procedure have demonstrated mood-congruent memory biases. Teasdale, Taylor, and Fogarty (1980) used the Velten mood induction procedure to produce positive and negative moods in two groups of subjects and then looked at recall of personal memories. They found that subjects in the negative mood recalled more negative memories and subjects in a positive mood recalled more positive memories. In another study that utilized Velten mood induction Madigan and Bollenbach (1982) found that subjects in the negative mood induction group recalled more negative personal memories than did subjects in the positive mood induction group. Brown and Taylor (1986) found that subjects induced to a negative mood using the Velten procedure had greater recall of negative words than did subjects induced to an elevated mood. A study by Mathews and Bradley (1983) incorporated both the Velten procedure and music for mood induction and examined recall of personal memories for subjects in a negative mood versus a positive mood. They found greater recall of negative personal memories for subjects in the depressed mood versus subjects in the neutral mood. Mecklenbräuker
and Hager (1984) failed to find mood-congruent memory in a study using the Velten mood induction procedure. This study examined recall of elements from a narrative story as the dependent variable. In a review of this literature, Blaney (1986) concluded that only those studies that look for recall of self-referent material have consistently demonstrate the mood-congruent memory effect. Studies utilizing music for mood induction have produced mixed support for mood-congruent memory. Teasdale and Spencer (1984) used music to induce depressed and elevated moods in two groups of subjects. They found that those subjects in the depressed mood condition recalled fewer successes at a previous experimental task. Clark, Teasdale, Broadbent, and Martin (1983) produced mood-congruent memory for positive and negative words in a study that used music to induce positive and negative moods. However, Clark and Teasdale (1985) used music for mood induction and failed to find a mood-congruent memory effect among men but did report the mood-congruent memory effect among women. Finally, a number of studies using hypnotic suggestion for mood induction have produced mood-congruent memory effects (Bower, Gilligan, & Monteiro, 1981; Bower & Mayer, 1985; Forgas, Bower, & Krantz, 1984; Lewis & Williams, 1989).
Mathews and Bradley (1983) investigated whether memory bias was dependent on stable individual characteristics (such as a negative self-schema) or on current mood state (suggested by Bower's HAM). They examined subjects who were extreme in their responses to the Self-referent Adjective Recall Task. The subjects were tested for bias recall initially and then following a negative mood induction. The authors hypothesized that if stable individual characteristics were most important in memory bias then initial recall would predict recall following the mood induction. If current mood was the most important determinant of mood bias, then change in mood was predicted to be correlated with change in bias. The results were mixed. Initial recall did not predict later recall. Whereas change in mood predicted the post-mood induction recall it did not predict change in recall. The authors concluded that the support for both factors (stable individual characteristics and current mood) was mixed.

Individual difference studies typically examine differential recall of negatively valenced versus non-negatively valenced (positive or neutral valenced) material in depressives and normals. Johnson, Petzel, Hartney, and Morgan (1983) examined the recall of successful and unsuccessful tasks performed under
experimental conditions among depressed and non-depressed undergraduates. They found that more failure tasks were recalled by depressed subjects. Several studies have exposed depressed subjects to verbal stimuli that varied on dimensions of positivity and negativity and found mood-congruent recall of the negatively valenced stimuli (Bradley & Mathews, 1983; Breslow, Kocsis, & Belkin, 1981; Dunbar & Lishman, 1984; Lobitz & Gasparikova-Krasnec, 1980). Other studies failed to find mood-congruent memory for negative stimuli among depressives (McDowell, 1984; Gotlib & McCann, 1984). Blaney (1986) argued that the studies that have successfully produced mood-congruent memory have required the subjects to focus on how the verbal stimuli is applicable to themselves.

The Human Associative Memory Model

Anderson and Bower (1973) proposed a conceptual framework to explain mood and memory effects. This framework is based on the notion of an associative network of memories and concepts and was labeled Human Associative Memory (HAM) by the authors. According to this framework, associative connections are formed between concepts and events and these associative connections help determine what is thought and remembered when some concept or event within that associative network serves as a current stimulus.
In an elaboration of the network model, Bower (1981) proposed that memory is tied to emotion through the existence of memory nodes that are specific for each distinct emotion. Each distinct emotion node was postulated to "collect together many other aspects of the emotion that are connected to it by associative pointers" (Bower, 1981, p.135). Bower supposed that these distinct emotion nodes and the associative network of memories explains the reliable findings of mood-congruent memory and state-dependent learning. In state-dependent learning one is more likely to recall information if the emotional state at the time of recall matches the emotional state at the time of encoding. In contrast to mood-congruent memory, the affective valence of the information is not relevant to state-dependent learning. Many studies have demonstrated the existence of state-dependent learning (e.g., Bartlett & Santrock, 1977; Bower, Montiero, & Gilligan, 1984; Mecklenbräuker & Hager, 1984; Weingartner, Miller & Murphy, 1977), however, a few other studies have failed to find state-dependent learning (e.g., Schare, Lisman, & Spear, 1984). Blaney (1986) and Williams et al. (1988) reviewed the studies examining state-dependent learning. To explain state-dependent learning and mood-congruent memory Bower (1987) argued that mood at the time of encoding, biases the way in which connections are
formed and that recall makes use of the connections made at the time of encoding. So that if mood at the time of recall is congruent with the encoding mood, recall will proceed along the same associative pathways. While the HAM framework is said to have much explanatory value (Williams et al., 1988), it has limitations. For example, Williams et al. (1988) have argued that HAM fails to account for the finding that depressed patients appear to use different retrieval strategies than normals.

Bower's model differs from schema theory in postulating a central role for emotion in the organization of some memories. Schemas are well-elaborated knowledge structures that influence our encoding and retrieval of information (Markus, 1980). Triggering a specific schema is thought to influence behavioral output according to what information is contained in the schema. Affect is seen as part of the content of a given schema or as an independent process from cognition (see Clark & Fiske, 1982). There is no theoretical basis in schema theory for the prediction of a relationship between the intensity of emotional arousal and the extent of an information processing bias. Bower (1987) on the other hand, argues that the activation of a given basic emotion node leads to the activation of concepts and events linked to that
emotion and increasing the emotional arousal spreads activation to more memories connected to the emotion.

The HAM model also predicts that emotion influences social and personal judgements (Bower, 1987). If a person is in a depressed mood they are more likely to remember the aspects of themself that are associated with that mood (Bower, 1987). Several studies support the influence of mood on personal judgements (Bower, 1981; Kavanaugh & Bower, 1985; Bandura, 1986).

Bower (1987) found further support for the relationship between mood and memory in the HAM model through the study of free associations. He reported "powerful effects" of people's moods on the free associations they make to neutral words. For example, subjects in a happy or angry mood were asked to give associates to the word life. The happy subjects produced the associates love, freedom, fun, open, and joy, whereas, the angry subjects responded with struggle, toil, fight, and compete. Bower concluded that these results show that "mood acts as a constant source of activation so that the associations receiving the highest activation lie at the intersection points in the network between the mood and the stimulus word" (Bower, 1987, p. 139). In a similar study Coleman (1975) found that depressed subjects versus
related subjects yielded more negative associates on a free association task.

The clinical implications of mood-congruent memory were discussed by Bower (1981) and Ingram (1984). Mood-congruent memory is thought to perpetuate a depressed mood and contribute to the cycle of depression (Bower, 1981; Ingram, 1984). The negative memories recalled during a depressed mood may strengthen the depression by causing the person to continue to focus on negative aspects of one's self or situation. Similarly, methods of thought distraction and restructuring negative thoughts may improve mood and stop the cycle of depression (Bower, 1981; Beck, Rush, Shaw, & Emery, 1979). Cognitive therapies based on this model have been shown to be very effective (Rehm, 1982).

Pathfinder Associative Networks

Schaneveldt (1990) describes a methodology for developing network representations of empirical data. The method involves generating proximity data by having subjects rate the similarity or relatedness of pairs of concepts. From the similarity ratings of all possible combinations of pairs of concepts Pathfinder generates a network model of the data. Pathfinder uses matrix algebra to identify the most efficient connections between concepts (for a detailed discussion of the mathematics of
 Pathfinder see Dearholt & Schaneveldt, 1990). This methodology has successfully been used to analyze semantic relatedness, knowledge structures, memory, and expert conceptual structure (Schaneveldt, 1990).

Pathfinder generates a graphic description of the networks using a program called Knowledge Network Organization Tool (KNOT, Schwanneveldt, 1990). KNOT identifies essential links in the network, establishes distances and spatial locations of the nodes. Knot can be used to generate individual and average networks.

In addition to graphic networks, Pathfinder can be used to compare the similarity of two networks. Similarity scores are the ratio of the number of links two networks have in common divided by the total number of links. Similarity scores range from 0 where the networks share no common links, to 1 where the networks are identical. Similarity can be considered a general measure of the similarity of two networks.

Pathfinder has been used to analyze how concepts are organized in memory or "schematically." Rumelhart, Smolensky, McClelland, and Hinton (1986) used Pathfinder to examine network representations of schemata using common furnishings in homes. They predicted that furnishings that fit different rooms would cluster together. For example, they included terms such as
television, easy-chair, bathtub, toilet, sink, bed, and refrigerator. It was expected that bathtub, toilet and sink would be more closely linked than say bathtub and television. They had subjects rate the co-occurrence of all paired combinations of 31 descriptors (furnishings).

The utility of Pathfinder was also illustrated in a study that examined the organization of knowledge in novice and expert U.S. Air Force pilots (Schvaneveldt, Durso, Goldsmith, Breen, Cooke, Tucker, and Demaio, 1985). Thirty concepts from air-to-air combat and thirty concepts from air-to-ground maneuvers were rated by expert and novice pilots. The authors predicted that adjacency information in the Pathfinder networks of the two groups could be used to discriminate between novices and experts. The results were highly successful. The networks of the novices and experts were compared and links found in novices but not in experts were assumed to be unnecessary to the cognitive structure of experts. Concepts poorly understood by novices were isolated and were used to predict the classification of pilots as novice or expert with 100% accuracy. Furthermore, it was found that Pathfinder was more accurate than expert pilots at classifying novices and experts. Finally, according to the authors, Pathfinder was useful in identifying conceptual relationships critical to expertise.
Pathfinder may be useful in identifying how the conceptual networks of persons with psychopathology differ from normals. This study examined the relationship of body concern concepts and depression concepts in subclinical subjects with body dysphoria and subjects with no body dysphoria. Consistent with the proposed model of body dysphoria it was proposed that the high body dysphoric subjects would show greater linkage between depressive concepts and negative body concepts.

**Problem**

Body dysphoria is a syndrome that is prevalent among normal weight women in the general population. Furthermore, the syndrome has been linked to the development of clinical eating disorders. While cognitive factors have been implicated in the etiology and maintenance of the syndrome and depression is known to be associated with the disorder no empirical studies have investigated the role of transient mood variables and memory biases in the syndrome.

The present study proposed an associative memory model of body dysphoria based on the HAM model of Anderson and Bower (1973; Bower, 1981; 1987). High and low body dysphoric subjects were used to test the proposed model. Negative memories and feelings about body shape and size were hypothesized to be highly cognitively associated with
depressed mood in BDNW subjects. Figure 1 illustrates the hypothesized high association of negative body size and shape and depressed mood in BDNW subjects. The research literature supports this linkage on the level of clinical self-report, i.e., depressed mood is prevalent among BDNW subjects (Cash, 1985; Cash & Butler, 1983). However, no empirical studies have attempted to directly study this association at the level of cognitive processing.

It was postulated that BDNW subjects versus control subjects would show a memory bias for negative body words in a memory task. This hypothesis is consistent with the proposed associative memory model of dysphoria and with a schema interpretation that BDNW subjects have a highly organized "negative" body schema. To test the two theoretical views of memory bias a mood induction procedure was used to examine the effects of transient depressed mood on memory bias in BDNW subjects. The proposed associative memory model postulated that body concepts are highly linked to the depression node in BDNW subjects. Because of the hypothesized linkage of body concepts with the depression node, BDNW subjects were predicted to show an increase in memory bias for negative body words and body image disturbance following the depressive mood induction procedure. The increased activation of depression was expected to spread activation
Figure 1

Hypothesized relationship between body image and depression in body dysphoric subjects
to more negative body concepts and enhance the memory bias for these concepts and increase body image disturbance.

Analogous to findings reported in the depression literature, since negative body concepts were hypothesized to be linked to depression, BDNW subjects were also expected to have a greater likelihood of producing depressive words as associates to negative body words and vice versa. Finally, the pathfinder methodology was used to analyze cognitive networks generated when depression, negative and positive body words were rated for relatedness. It was hypothesized that high body dysphoric subjects would produce networks consistent with the model proposed when compared to low body dysphoric subjects.

The Body Shape Questionnaire (BSQ, Cooper, Taylor, Cooper, Fairburn, 1987) was used to define subjects high and low in body dysphoria. The Beck Depression Inventory (BDI; Beck, 1978), Depressive Adjectives Checklist (DAC; Zuckerman & Lubin, 1965) and a subjective units of distress scale (SUDS) were used to assess depression so that the relationship between the intensity of depression and memory bias could be examined.

The study examined the effects of transient mood states on memory bias and body image disturbance using a mood induction procedure. Considerable controversy exists
over whether the mood-congruent memory effects found in depression are better explained by appeal to some fixed schematic structure or by Bower's HAM model. Bower's model suggests a greater role for transient mood states in determining mood congruent memory since he hypothesizes that certain memories are linked to the depression node and triggered when the mood is activated (Bower, 1981;1987; Mathews & Bradley, 1983). Both groups of subjects received one presentation of a word list containing neutral, negative, and positive and negative body words. The subjects were instructed to put themselves in a situation involving each word as it appears on the video screen. The purpose of this procedure was to better assure self-referent encoding (Blaney, 1986). Half of the subjects were given a negative mood induction and half a neutral mood induction. The Velten (1968) mood induction procedure was used for the induction of neutral and negative moods. This procedure involved having subjects read either neutral or negatively valenced self-referent statements (e.g., a negative statement would be "I'm discouraged and unhappy about myself"). They were instructed to read the statements and concentrate on putting themselves in the frame of mind suggested by the statements. This procedure has been widely used to demonstrate mood-congruent memory
for depressive words and its utility and validity are discussed by Bower (1981) and Blaney (1987). Whereas BDNW subjects were expected to show mood-congruent memory effects for body size words prior to mood induction, the use of a mood induction procedure was included to investigate whether or not inducing depression (or increasing depression in subjects already depressed) would intensify the memory bias and body image disturbance (see Mathews & Bradley, 1983). The hypothesized reactivity of memory bias and body image disturbance to transient mood is consistent with Bower's emphasis on the role of emotional priming in memory biases (Bower, 1981; Mathews & Bradley, 1983) and with model of body dysphoria proposed in the present study but is not consistent with the interpretation that memory biases are due to some stable schematic structure. The subjects rated their moods prior to and following the mood induction (using SUDS and DAC) procedures to insure that mood changes actually occurred and to allow an investigation of the relationship between change of mood and intensity of the memory bias. Following the induction of the mood the subjects were asked to free recall the previously learned word list and were given a recognition memory task. The order of the memory tasks (recall and recognition) was counterbalanced
in each group. The recognition distractor list is given in Appendix J.

The associative model of body dysphoria was also tested by examining word associations made to body words while subjects were in a depressed or neutral mood. According to the associative model of body dysphoria, BDNW subjects were expected to produce more depressive associates to body words and more negative body shape associates to depressive words than control subjects. Subjects in this study were asked to give four associates to each of the depressive, neutral, and positive and negative body words used in the memory study.

Pathfinder networks were generated to test the hypothesized link between depression and negative body concerns in high dysphoric subjects. High and low body dysphoric subjects were presented with 5 depression words, 5 positive body words and 5 negative body words. They were presented with all possible paired-combinations of the concepts. The subjects were asked to rate on a scale from 1 to 9 how related the paired-concepts were in "their experience." A rating of one represented concepts that were not at all related in their experience and a rating of 9 represented concepts highly related in their experience. Based on the proposed body dysphoria model, high dysphoric subjects were hypothesized to generate
networks with more depression to negative body links than the control group.

To investigate the existence of body image disturbance and the effects of depressed mood on body image disturbance in body dysphoria, subjects were assessed for body image disturbance in the pre-screening step of the study and then reassessed following the mood induction procedures. According to the HAM model, emotion influences personal judgements (Bower, 1981) and therefore based on the proposed body dysphoria model, BDNW subjects were expected to recall more negative information about their bodies when induced to a depressed mood. Because depressed mood is expected to trigger more negative memories about body shape and size among the BDNW subjects, they were expected to show increased body image disturbance following the depression mood induction procedure. This hypothesis is consistent with the HAM model and with views of body image that posit some role for information processing biases in the etiology of the syndrome (Schlundt & Johnson, 1990; Vitousak & Hollon, 1990; Williamson et al., in press). The predicted effects of negative mood on memory and body image disturbance in BDNW subjects are illustrated in Figure 2. Body Image disturbance was assessed using multi-trait multi-method procedures with all subjects prior to the memory task and
Figure 2

The hypothesized effects of negative mood induction on memory and body image disturbance in high body dysphoric subjects.
again following the mood induction procedure. The following dependent measures were used for assessing body image: Body Image Assessment (BIA), and the Body Shape Questionnaire (BSQ), and the body dissatisfaction scale of the Eating Disorders Inventory (EDI). Each of these instruments is reviewed in detail in the next section. The design for the study is illustrated in Figure 3. The following hypotheses represent the expected findings for the study:

**Hypothesis 1**—BDNW subjects were expected to show a mood-congruent memory bias for negative body related words when compared to control subjects. On the free recall task the BDNW subjects were expected to recall more negative body-related words and less positive body-related words than control subjects (see Figure 4). On recognition tasks, BDNW subjects were expected to recognize more negative body-related words and less positive body-related words (see Figure 5) and to have shorter latencies in recognizing positive body-related words (see Figure 6).

**Hypothesis 2**—The proposed association model of body dysphoria suggests that the mood induction will spread activation to memories and concepts related to depression. Therefore, those BDNW subjects who were administered the induction of a depressive mood were expected to show a
Figure 3

Flow chart for study design
Predicted results for free recall of body words

Figure 4
Figure 5

Predicted results for recognition of body words
Figure 6

Predicted results for recognition latencies of body words

Group: Control [either mood cond.] Y—-—- Y
Body dysphoric [neutral mood] X ———— X
Body dysphoric [negative mood] 0 ——— 0
greater memory bias than those BDNW subjects in the neutral mood condition.

**Hypothesis 3** - Consistent with the associative memory model, the extent of memory bias found in BDNW subjects in the depressive mood was expected to be correlated with change in mood.

**Hypothesis 4** - The body dysphoria group was hypothesized to show greater body image disturbance than the control group in the pre-assessment phase. Negative mood was hypothesized to lead to an increase in body image disturbance among the BDNW subjects as a result of activating more negative memories about body size and shape (see Figure 7). This effect was expected to occur in BDNW subjects but not controls, because BDNW subjects were assumed to have greater association of negative memories and feelings about their body with depressed mood than do normal subjects, according to the proposed model.

**Hypothesis 5** - Consistent with the findings of word association biases in subjects in different mood states by Bower (1987), and based on the hypothesized linkage of depressed mood and body concerns in BDNW subjects, it was hypothesized that BDNW subjects would be more likely to give body-related associates to depressed stimuli and depressive-related associates to body stimuli than would control subjects.
Figure 7

Predicted effects of mood induction on body image
Hypothesis 6—Based on the proposed model of body dysphoria, the Pathfinder networks were hypothesized to show more first order links between depression concepts and negative body concepts in high versus low dysphoric subjects. Furthermore, it was predicted that when the similarity scores generated by comparing the networks of high dysphoric subjects with each other high dysphoric network were compared with similarity scores obtained by comparing each high dysphoric networks with each low dysphoric network, the high dysphoric networks would be shown to be more similar to themselves than to the networks of the low dysphoric subjects.
METHOD

Subjects

Undergraduate females were screened for the presence and absence of body dysphoria using the Body Shape Questionnaire (Cooper et al., 1987). A total of 51 normal weight body dysphoric subjects (score ≥ 110 on BSQ) and 51 normal weight low body dysphoric subjects (score ≤ 50) were selected for inclusion in the study. Thirty-six subjects from each group served as subjects for the mood-induction, memory, and body image part of the study. Fifteen subjects from each group participated in the Pathfinder part of the study. The subjects were matched on height and weight. The control and experimental subjects were also matched on verbal IQ using the Shipley Institutes of Living Scale (Pollack, 1942). In addition, the experimental group and control group were matched on age and race.

Assessment Instruments

Beck Depression Inventory

The BDI is a 21 item self report measure of depression. The BDI has been widely used in research and extensive normative date has been collected regarding the reliability and validity of this measure. Split-half reliability has been reported at .93 and item-total correlations range from .31-.68 (Beck, 1972). Test-retest reliability is reported
to be .75 in the normal population (Miller & Seligman, 1973). According to Beck (1972) the scale has good correlations with other measures of depression.

**Body Shape Questionnaire**

The BSQ is a 34 item self report questionnaire designed to assess body concerns (Cooper et al., 1987). Each of the items relates to concern about body size and shape and is responded to on a 6-point Likert scale ("never," "rarely," "sometimes," "often," "very often," "always"). The authors report good validity for the BSQ. It correlates with the body dissatisfaction scale of the EDI and with total score on the EAT for patients with bulimia nervosa. Furthermore the authors found the test could be used to discriminate bulimia nervosa patients from normals. A sample of 535 women in the general population yielded a mean score of 80 and a standard deviation of 30. A copy of the BSQ can be found in Appendix A.

**Body Image Assessment**

The Body image assessment (BIA) procedure was first used by Williamson, Kelley, Davis, Ruggerio, and Blouin (1985). This assessment method involves the use of seven full body silhouettes of varying body size. The silhouettes were made by taking the silhouette of an actual body and then making 2.5, 5, and 7.5% increases and decreases in size. The subjects are asked to choose which silhouette
represents their current body size (CBS) and then which one represents their ideal body size (IBS). The authors have developed norms which allow the raw scores to be converted to standard scores based on comparisons to normals of approximately the same height and weight.

Several studies have investigated the reliability and validity of the BIA. The reliability of the BIA was investigated by one and two week test-retest reliability studies. The BIA showed reliabilities of .9 at both intervals (Williamson, Davis, Goreczny, & Mckenzie, 1989).

Concurrent validity studies of the BIA have shown the measure to be correlated with the Bulimia Test (BULIT, Smith & Thelen, 1984), and the Eating Attitudes Test (EAT, Garner & Garfunkel, 1979). High CBS and low IBS were associated with severe eating disorder problems (Williamson et al., 1989). Furthermore, high CBS scores were associated with large weight gains, binge eating, and frequent dieting as measured by the Eating Questionnaire (EQ, Williamson, Kelley, Cavell, & Prather, 1987). Low IBS scores were associated with self-induced vomiting and laxative use as a weight control technique.

Studies looking at the discriminant validity of the BIA found that the test could discriminate normals from bulimia nervosa patients. Bulimics chose a larger CBS and a thinner
IBS than same sized normals. A copy of the BIA can be found in Appendix B.

**Depressive Adjectives Checklist**

The DAC contains 22 positive and 10 negative adjectives to describe mood. The scale is thought to measure current mood state rather than syndromal depression. Internal consistency reliabilities for the scale was reported to range from .85 to .90 for females (Lubin, 1967). Split-half reliabilities ranged from .83 to .92 for normals and from .89 to .92 for patients (Lubin, 1967). The scale was found to correlate well with the depression scale of the MMPI (Lubin, 1967).

**Eating Disorders Inventory** (EDI). The EDI assesses symptoms and behaviors associated with anorexia nervosa and bulimia nervosa. It is a 64 item, self-report questionnaire that is scored on eight subscales including: 1) Drive for Thinness, 2) Bulimia Symptoms, 3) Body Dissatisfaction, 4) Ineffectiveness, 5) Perfectionism, 6) Interpersonal Distrust, 7) Interoceptive Awareness, and 8) Maturity Fears. Each item is responded to on a six-point, forced choice format. Only the Body Dissatisfaction subscale will be used for the present study. The EDI has moderate to good levels of convergent and discriminate validity (Garner & Olmstead, 1984). A copy of the EDI is included in Appendix C.
Shipley Institutes of Living Scale

This scale was developed by Pollack (1942) to assess verbal intelligence. The scale generates a vocabulary score and an abstraction score. The validity of this scale has been established (Pollack, 1942; Prado & Taub, 1966). A copy of this scale can be found in Appendix D.

Subjective Units of Distress

The use of SUD scales is discussed by Bellack and Hersen (1988). These scales involve having the subject rate their mood on a fixed scale. In this study subjects will rate their moods from 0 to 100, where 0 is the worst mood they have ever experienced and 100 is the best mood they have ever experienced. Hersen and Bellack (1988) report that these scales have adequate reliability and validity.

Verbal Stimuli

A list of body concern words was generated from a variety of measures of body size and shape concern. Forty undergraduate females were asked to rate the words on two dimensions. First they rated the words on a scale of 1 to 7 as to how relevant they were to concerns about body size and shape. Second they rated whether they had a positive or negative emotional reaction to the word. Only words that were rated by 80% of the raters to be either positive or negative were included. The 12 words with the highest ratings in both categories were used for the memory study.
A list of depression words was generated from depression inventories and other studies examining the effects of mood on memory. These words were also rated regarding how relevant they were to depressed mood. The 12 highest rated words were used in the memory study. Finally, furnishing words (e.g., chair) were generated by the experimenter and colleagues and rated by the undergraduates as to their relevance to household furnishings. The 12 highest rated words were used for neutral words. The frequency of use of each word type and the length of the words were matched (Kucera & Francis, 1967). These verbal stimuli were used for the memory tasks and the word association task. The final word lists are shown in Appendix E.

**Velten Statements**

The statements used in the velten procedures were taken from previous studies and measures of depression. Neutral statements were taken from factual statements about the birth date, birth place, church affiliation, party affiliation and number of children of the first thirty presidents of the United States. The mood induction statements are included in Appendix F.

**Word Association Task**

The word association task involved having subjects give 4 associates to each of the 48 words used in the memory task (see Appendix E). The subjects were instructed to write the
first 4 terms that came to mind. Hypothesis-consistent associates only included giving depressive associates to negative body words or vice versa. The depression and negative body word hypothesis-consistent associates were only counted if the associates produced appeared on the list of empirically rated depression and negative body words and obtained an interrater reliability of 0.8.

**Pathfinder**

Pathfinder is a computer program that generates network representations of proximity data. The theoretical justification for Pathfinder is discussed by Schvaneveldt (1990). The Pathfinder task for this study required subjects to rate pairs of depression, and positive and negative body words on how related the concepts were in their experience. Five concepts from each category were included and all possible pairs of the concepts were rated on a scale from 1 to 9 for relatedness. Based on the ratings Pathfinder generated networks representing the relatedness of these concepts for each subject.

**Procedure**

The subjects were pre-screened using the BSQ, Shipley, BDI, EDI, and BIA. The subjects' heights and weights were assessed in the lab. Following the pre-screening the subjects were instructed that they might be contacted to return within one week to participate in the remainder of
the experiment. The first 36 normal weight subjects to score $>110$ on the BSQ were assigned to the BDNW group. Normal weight was defined according to the New York Life tables (New York Public Library Desk Reference, 1989, p. 607). The first 36 normal weight subjects to score $\leq 50$ were assigned to the control group. The subjects in each group (BDNW and control) were randomly assigned to either the neutral or negative mood induction condition so that each cell had 18 subjects.

On return to the lab, the verbal stimuli were randomly presented to the subjects. The words were presented on a Magnavox VGA color monitor using the Micro Experimental Laboratory (MEL, Psychology Software Tools, 1990). Each word was presented for 10 seconds and subjects were asked to imagine themselves in a scene involving themselves and the word. The purpose of this procedure was to facilitate encoding. Following the encoding task the subjects were asked to rate their mood using the SUDS and the DAC. The subjects were randomly assigned to a mood induction procedure. Each subject read either 30 negative self-referent statements or 30 neutral self-referent statements. Each statement was typed in all capital letters and presented for 20 seconds on the VGA monitor. The subjects were instructed to imagine how the statements applied to them and to try to feel the mood suggested by the
statements. Following the mood induction the subjects again filled out the SUDS and the DAC. Memory for the verbal stimuli was assessed by having subjects write down all the words they could remember (free recall) and recognition of words was assessed by presenting the original words and distractors on the VGA monitor and asking the subjects if the word was previously presented and having the subjects push a button corresponding to either "yes" or "no." Response latencies were automatically calculated by MEL. The order of the memory task was counterbalanced. Following the memory tasks the subjects were reassessed on the body image measures (BIA, BSQ, and the body dissatisfaction scale of the EDI). Subjects then completed the word association task. Following this task subjects were asked to fill out an exit interview and were questioned by the interviewer regarding their interpretation of the experimenter's expected findings. Finally, subjects in the depression mood induction were presented with positive statements to restore normal mood. Fifteen additional normal weight subjects who screened high on the BSQ and 15 normal weight subjects who screened low on the BSQ were given the Pathfinder task. The 5 highest rated depression words, 5 highest rated negative body words and the 5 highest positive body words were included in this task (a discussion of word selection is included in the method section). These words are included
in Appendix H. The subjects were instructed that they would be presented with pairs of concepts and told to rate how related they found the concepts to be with each other in their experience. They were told to give their first impressions as to the relatedness of the concepts. All possible pairs of the concepts were presented to each subject.

Data Analysis

The free recall, recognition and latency data were analyzed separately since they represent different measures of memory. Each measure of memory was analyzed using a 2X2X4 repeated measures ANOVA (group X mood X stimulus type). Figure 8 illustrates the design for this part of the study. Because of the number of analyses, the alpha level was set at .025 to protect against increased probability of Type 1 error. Simple effects analysis was used to analyze significant interactions. Specific hypotheses regarding within group differences on the differential recall of word-types were analyzed using orthogonal contrasts. Hypothesis 6 predicted that BDNW subjects would produce more depressive/body associates than the control subjects. The word association task was analyzed by a 2X2 ANOVA (group X mood). The body image measures were analyzed separately since they represent different constructs and no interactions were hypothesized. Each construct was analyzed
Figure 8

Experimental design for memory effects
using a 2X2X2 (group X mood valence X pre-post) repeated measures ANOVA (see Figure 9). Alpha was set at .01 to control for the number of analyses. Significant interactions were analyzed using simple effects analysis.

The Pathfinder data were analyzed using t-tests to compare the number of hypothesis-consistent links in the two groups. Additionally, the similarity scores for high dysphoria with high dysphoria were compared with similarity scores for high dysphoria with low dysphoria using a t-test.
Figure 9

Experimental design for body image effects
RESULTS

Group Characteristics

The high and low body dysphoric groups were compared for age, height, weight and on the Shipley Institutes of Living Scale (a measure of verbal intelligence), and BDI. No group differences were found for age ($F(1,71)=0.138$), height ($F(1,71)=0.125$), weight ($F(1,71)=3.94$) and verbal intelligence ($F(1,71)=0.690$). The high dysphoria group scored significantly higher than the low dysphoria group on the BDI. The group means and $F$ values for these variables are presented in Table 1.

Mood Induction

The dysphoric mood induction procedure resulted in scores reflecting a more dysphoric mood as measured by the DAC and SUDS. The neutral mood condition did not significantly change mood. Table 2 gives the mean change in SUDS and DAC for subjects in each mood condition.

Memory Tasks

Hypothesis 1 predicted that the high body dysphoric subjects would show a biased recall for negative body words when compared to the low body dysphoria group. The free recall data were consistent with hypothesis 1. The ANOVA indicated a significant group X wordtype interaction $F(3,204)=5.5$ $p<.001$. This interaction is illustrated in Figure 10.
Table 1
Means for Descriptive Characteristics of Each Group

<table>
<thead>
<tr>
<th>Group</th>
<th>Age (yrs)</th>
<th>Height (&quot;</th>
<th>Weight (lbs)</th>
<th>Shipley</th>
<th>BDI*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>19.2 (2.0)</td>
<td>64.3 (2.70)</td>
<td>115 (14.0)</td>
<td>49.0 (5.1)</td>
<td>4.8</td>
</tr>
<tr>
<td>High</td>
<td>19.0 (1.7)</td>
<td>64.3 (2.63)</td>
<td>121 (12.7)</td>
<td>50.1 (6.5)</td>
<td>11.6</td>
</tr>
</tbody>
</table>

Note: * indicates that the two groups differed significantly on this variable at p<.05. Standard deviations are enclosed in parentheses.
Table 2

Effects of Mood Induction on SUDS & DAC

<table>
<thead>
<tr>
<th>Mood</th>
<th>Pre-Post</th>
<th>SUDS</th>
<th>DAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysphoric</td>
<td>Pre</td>
<td>70.1a</td>
<td>40.5b</td>
</tr>
<tr>
<td>Dysphoric</td>
<td>Post</td>
<td>48.7a</td>
<td>47.2b</td>
</tr>
<tr>
<td>Neutral</td>
<td>Pre</td>
<td>73.6</td>
<td>38.7</td>
</tr>
<tr>
<td>Neutral</td>
<td>Post</td>
<td>71.0</td>
<td>39.3</td>
</tr>
</tbody>
</table>

Note: Means with the same letter differ significantly at p<.001.
Figure 10

Mean Free Recall by Group and Wordtype

Note: D indicates depressive words, N indicates neutral words, NB indicates negative body words, and PB indicates positive body words.
High body dysphoric subjects recalled significantly more negative body words than low dysphoric subjects, $F(1, 68)=78.57 \ p<.001$. Furthermore, the high dysphoric subjects recalled fewer positive body words as predicted, $F(1, 68)=11.11 \ p<.001$. The groups did not differ in the recall of depressive or control words. Table 3 presents the means and standard deviations for the word type for each group.

Within group analysis of word type recall differences were analyzed using planned orthogonal contrasts. As predicted high dysphoric subjects recalled significantly more negative body words than control words $F(1, 68)=21.9 \ p<.001$; less positive body words than control words $F(1, 68)=4.21 \ p<.050$; and contrary to the expected findings, high dysphoric subjects recalled fewer depressive words than control words $F(1, 68)=29.9 \ p<.001$.

The group X wordtype interaction for word recognition was found to be non-significant, $F(3, 204)=1.44 \ p=.231$ (see Figure 11). One possible explanation for the lack of a significant effect on this task is a ceiling effect in the recognition of the words. Subjects in both groups often recalled all 12 words in each category. The group means were between 9.3 and 11.3 with total possible recall of only 12. The means and standard deviations for the recognition memory task are presented in Table 4.
Table 3
Mean Free Recall of Words by Group and Word Type

<table>
<thead>
<tr>
<th>Group</th>
<th>Depressed</th>
<th>Neutral</th>
<th>Neg. Body</th>
<th>Pos. Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>3.50</td>
<td>4.61</td>
<td>4.03&lt;sup&gt;c&lt;/sup&gt;</td>
<td>4.70&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>(1.64)</td>
<td>(1.91)</td>
<td>(1.21)</td>
<td>(1.76)</td>
</tr>
<tr>
<td>High</td>
<td>3.06</td>
<td>4.06</td>
<td>6.72&lt;sup&gt;c&lt;/sup&gt;</td>
<td>3.48&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>(2.70)</td>
<td>(2.05)</td>
<td>(1.45)</td>
<td>(1.54)</td>
</tr>
</tbody>
</table>

Note: Means with the same letter differ significantly at p<.05. Standard deviations are given in parentheses.
Recognition
Recall 9.5

11.5
11.0
10.5
10.0
9.5
9.0

D  N  NB  PB

Word Type

** - Low Body Dysphoric Subjects

- High Body Dysphoric Subjects

Note: D indicates depressive words, N indicates neutral words, NB indicates negative body words, and PB indicates positive body words.

Figure 11

Mean Recognition by Group and Wordtype
### Table 4
Mean Recognition Recall of Words by Group and Word Type

<table>
<thead>
<tr>
<th>Group</th>
<th>Depressed</th>
<th>Neutral</th>
<th>Neg. Body</th>
<th>Pos. Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Dysphoria</td>
<td>9.28</td>
<td>9.72</td>
<td>10.8</td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td>(1.84)</td>
<td>(1.82)</td>
<td>(1.31)</td>
<td>(1.36)</td>
</tr>
<tr>
<td>High Dysphoria</td>
<td>9.85</td>
<td>10.7</td>
<td>11.3</td>
<td>10.6</td>
</tr>
<tr>
<td></td>
<td>(1.92)</td>
<td>(1.13)</td>
<td>(0.84)</td>
<td>(1.24)</td>
</tr>
</tbody>
</table>

Note: There were no significant group differences. Standard deviations are given in parentheses.
The high dysphoric group was predicted to show shorter response latencies for the recognition task than the low dysphoric group on negative body words. The group X wordtype interaction was not significant for response latencies, $F(3,204)=2.43$ $p=.066$ (see Figure 12). The mean latencies by group and mood are presented in Table 5.

The second hypothesis predicted that high body dysphoric subjects in the depression mood induction would recall more negative body words and depressive words (group X mood X wordtype interaction) than the high body dysphoric subjects in the neutral mood condition. The depression mood induction was hypothesized to increase only the recall of depressive words when the low body dysphoric subjects in each mood condition were compared. Contrary to prediction, the group X mood X wordtype interaction was not significant $F(3,204)=1.73$ $p=.162$. Therefore, the depressive mood induction did not result in a differential effect in the recall of word types between the two groups. The means for free recall by group and mood are included in Appendix K. A significant mood X wordtype interaction was found for free recall, $F(3,204)=5.50$ $p<.001$. Consistent with the second prediction of hypothesis two, a simple effects analysis found that more depressive words were recalled in the depressive mood condition (collapsed across group) than in
Note: D indicates depressive words, N indicates neutral words, NB indicates negative body words, and PB indicates positive body words.
Table 5

Mean Response Latencies for Recognition Task
by Group Word Type

<table>
<thead>
<tr>
<th>Group</th>
<th>Depressed</th>
<th>Neutral</th>
<th>Neg. Body</th>
<th>Pos. Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1214</td>
<td>1036</td>
<td>959.6</td>
<td>1001</td>
</tr>
<tr>
<td></td>
<td>(268)</td>
<td>(237)</td>
<td>(181)</td>
<td>(166)</td>
</tr>
<tr>
<td>High</td>
<td>1197</td>
<td>931.2</td>
<td>821.3</td>
<td>967.7</td>
</tr>
<tr>
<td></td>
<td>(218)</td>
<td>(188)</td>
<td>(149)</td>
<td>(192)</td>
</tr>
</tbody>
</table>

Note: Response latencies are reported in milliseconds. N indicates neutral mood induction and D indicates depressive mood induction. There were no significant group differences. Standard deviations are given in parentheses.
the neutral mood condition (collapsed across groups) F(1,68)=8.23 p<.005. The simple effects analysis on the other three word types failed to show a significant effect for mood. Mean recall data for each mood condition are presented in Table 6. This result supports the prediction that depressive mood induction would result in increased recall of depressive words in both groups. However, the expectation that depression would increase the recall of negative body words in the high dysphoria group was not supported.

Contrary to the hypothesized effects of group and mood on recognition, the mood X wordtype effect was not significant, F(3,204)=.16 p=.921. Furthermore the group X mood X wordtype interaction was also found to be nonsignificant for the recognition task F(3,204)=1.81 p=.146 (see Appendix L for means). The possibility of a ceiling effect in the recognition task equivocates the conclusions that can be drawn from these results.

Similarly, results of the group X wordtype interaction on the latency task were not significant F(3,204)=2.43 p=.066. The depressive mood induction was predicted to decrease the latencies for depression words in both groups, however, the mood X wordtype effect was not significant F(3,204)=2.06 p=.107. The depressive mood induction was expected to decrease latencies to negative
Table 6

Mean Recall of Words by Mood and Wordtype

<table>
<thead>
<tr>
<th>Mood</th>
<th>Depressed</th>
<th>Neutral</th>
<th>Neg. Body</th>
<th>Pos. Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>2.70a</td>
<td>4.78</td>
<td>5.20</td>
<td>4.17</td>
</tr>
<tr>
<td></td>
<td>(1.61)</td>
<td>(2.01)</td>
<td>(1.64)</td>
<td>(1.57)</td>
</tr>
<tr>
<td>D</td>
<td>3.86a</td>
<td>3.89</td>
<td>5.59</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>(1.78)</td>
<td>(1.97)</td>
<td>(1.14)</td>
<td>(1.54)</td>
</tr>
</tbody>
</table>

Note: N denotes neutral mood induction and D denotes depressive mood induction. Means with the same letter differ significantly. Standard deviations are given in parentheses.
body words in the high body dysphoria group but not the low dysphoria group, however, the group X mood X wordtype interaction for response latencies was not significant, $F(3,204)=0.62 \ p=.606$ (see Appendix M for means).

**Correlational Analysis**

Correlational analyses were performed to investigate the relationship between mood and post-mood measures of negative body recall, BSQ, BD, and CBS in the high dysphoric subjects induced to a depressed mood. Each measure of depressed mood (SUDS and DAC) was analyzed with each post-mood measure. Because of the number of analyses the alpha level was set at .01. No significant correlations were found. Table 7 gives the correlation values.

**Body Image**

The body image measures, CBS and IBS, were analyzed separately. Analysis of the CBS data revealed a significant overall effect for group $F(1,68)=75.88 \ p<.001$; and group X mood X pre-post $F(1,68)=7.80 \ p<.007$. Figure 13 illustrates the interaction of CBS scores by group, mood and pre-post. The interaction was analyzed using a post-hoc contrast (Tukey HSD). The post-hoc procedure indicated that the two groups differed in the neutral mood condition and that there was a significant effect for mood only in the high dysphoric subjects (high
Table 7

Correlations of Depressed Mood with Negative Body Recall and Body Image Measures in High Dysphorics Following the Depression Mood Induction

<table>
<thead>
<tr>
<th>CBS</th>
<th>BSQ</th>
<th>BD</th>
<th>NB Recall</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUDS</td>
<td>-.18</td>
<td>-.24</td>
<td>-.18</td>
</tr>
<tr>
<td>DAC</td>
<td>-.10</td>
<td>-.04</td>
<td>-.02</td>
</tr>
</tbody>
</table>

Note: SUDS and DAC represent measures of depression post-mood induction. NB recall refers to the free recall of negative body words. No correlations were significant at p<.01.
Figure 13

CBS by group and pre-post
Table 8
Mean T-Scores on CBS by Group and Mood

<table>
<thead>
<tr>
<th>Group</th>
<th>Mood</th>
<th>CBS (pre)</th>
<th>CBS (post)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>N</td>
<td>35.4</td>
<td>36.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(7.8)</td>
<td>(10.5)</td>
</tr>
<tr>
<td>Low</td>
<td>D</td>
<td>38.5</td>
<td>39.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(9.5)</td>
<td>(10.1)</td>
</tr>
<tr>
<td>Low</td>
<td>Total</td>
<td>37.0\textsuperscript{a}</td>
<td>38.0\textsuperscript{c}</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(14.4)</td>
<td>(16.3)</td>
</tr>
<tr>
<td>High</td>
<td>N</td>
<td>52.7</td>
<td>52.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(10.3)</td>
<td>(11.4)</td>
</tr>
<tr>
<td>High</td>
<td>D</td>
<td>52.9\textsuperscript{b}</td>
<td>65.5\textsuperscript{b}</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(10.5)</td>
<td>(11.3)</td>
</tr>
<tr>
<td>High</td>
<td>Total</td>
<td>52.8\textsuperscript{a}</td>
<td>59.2\textsuperscript{c}</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(16.4)</td>
<td>(17.4)</td>
</tr>
</tbody>
</table>

Note: N denotes neutral mood and D denotes depressed mood induction procedure. Pre refers to prior to mood induction and post refers to after mood induction. Means with the same letter differ significantly. Standard deviations are given in parentheses.
dysphoric subjects had higher CBS scores when the depression induction was compared to the neutral mood condition). The low dysphoric subjects did not differ on CBS scores when the two mood conditions were compared. The CBS means and standard deviations for pre-post mood induction by group and mood are presented in Table 8.

In contrast to CBS, analysis of IBS scores resulted in nonsignificant effects for group $F(1,68)=0.01 \ p=.961$; group X pre-post $F(1,68)=0.47 \ p=.496$; and group X mood X pre-post $F(1,68)=0.01 \ p=.934$. The means and standard deviations for IBS by pre-post, group and mood are presented in Table 9. Figure 14 illustrates these data.

Since BSQ was used to define the high and low body dysphoria groups the only result of interest was the effect of the mood induction procedure on BSQ scores. The group X mood X pre-post interaction was significant. Tukey's HSD showed that high dysphoric subjects in the depression mood induction had higher BSQ scores than those in the neutral mood condition. Therefore, consistent with the hypothesis, the depression mood induction increased body dysphoria in high body dysphoric subjects but not in low body dysphoria subjects. The means and standard deviations for BSQ pre-post by mood and group are presented in Table 10. Figure 15 illustrates the
Table 9
Mean T-Scores on IBS by Group and Mood

<table>
<thead>
<tr>
<th>Group</th>
<th>Mood</th>
<th>IBS(pre)</th>
<th>IBS(post)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>N</td>
<td>53.7</td>
<td>51.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(12.8)</td>
<td>(11.5)</td>
</tr>
<tr>
<td>Low</td>
<td>D</td>
<td>54.4</td>
<td>47.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(9.9)</td>
<td>(8.6)</td>
</tr>
<tr>
<td>Low</td>
<td>Total</td>
<td>54.1</td>
<td>49.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(18.5)</td>
<td>(19.3)</td>
</tr>
<tr>
<td>High</td>
<td>N</td>
<td>52.8</td>
<td>49.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(12.4)</td>
<td>(12.4)</td>
</tr>
<tr>
<td>High</td>
<td>D</td>
<td>57.0</td>
<td>47.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(10.1)</td>
<td>(10.1)</td>
</tr>
<tr>
<td>High</td>
<td>Total</td>
<td>54.9</td>
<td>48.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(18.9)</td>
<td>(21.3)</td>
</tr>
</tbody>
</table>

Note: N denotes neutral mood and D denotes depressed mood induction procedure. Pre refers to scores prior to mood induction and post refers to scores following the mood induction. No group or mood differences were significant. Standard deviations are given in parentheses.
Figure 14

IBS by group and pre-post
Table 10

Mean Scores on BSQ and Body Dissatisfaction Scales by Group and Mood

<table>
<thead>
<tr>
<th>Group</th>
<th>Mood</th>
<th>BSQ(pre)</th>
<th>BSQ(post)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>N</td>
<td>45.8</td>
<td>49.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4.6)</td>
<td>(8.2)</td>
</tr>
<tr>
<td>Low</td>
<td>D</td>
<td>44.2</td>
<td>45.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5.4)</td>
<td>(6.2)</td>
</tr>
<tr>
<td>Low</td>
<td>Total</td>
<td>45.0⁺</td>
<td>47.7⁻</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8.9)</td>
<td>(11.3)</td>
</tr>
<tr>
<td>High</td>
<td>N</td>
<td>131</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(24.1)</td>
<td>(25.7)</td>
</tr>
<tr>
<td>High</td>
<td>D</td>
<td>125ᵇ</td>
<td>143ᵇ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(16.0)</td>
<td>(14.7)</td>
</tr>
<tr>
<td>High</td>
<td>Total</td>
<td>128ᵃ</td>
<td>136ᶜ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(34.2)</td>
<td>(31.8)</td>
</tr>
</tbody>
</table>

Note: N denotes neutral mood and D denotes depression mood induction procedure. Pre refers to score prior to mood induction and post refers to scores following the mood induction. Means with the same letter differ significantly. Standard deviations are given in parentheses.
Figure 15
BSQ by group and pre-post
interaction of pre- and post- mood induction BSQ scores by group and mood.

Analysis of the BD subscale of the EDI indicated a main effect for group \( F(1,68)=319.17 \quad p<.001 \); group X pre-post was not significant \( F(1,68)=1.55 \quad p=.217 \); mood X pre-post was not significant \( F(1,68)=2.28 \quad p=.136 \); and the group X mood X pre-post was not significant \( F(1,68)=0.30 \quad p=.588 \). These results suggest that while the groups differed on body dissatisfaction prior to the mood induction, the induced depression did not affect body dissatisfaction in either group. The means and standard deviations for BD by group are presented in Table 11. Figure 16 illustrates these data.

**Word Association Task**

A main effect for group was found in the word association task \( F(1,68)=4.10 \quad p<.05 \). High body dysphoric subjects made more hypothesis-consistent word associations (depressive words to negative body words and vice versa) than low body dysphoria subjects. The main effect for mood was not significant \( F(1,68)=0.75 \quad p=.389 \), which shows that the depressive mood induction did not increase the number of hypothesis-consistent word associations in either group. The interaction of group and mood was also not significant \( F(1,68)=.037 \quad p=.848 \). The mean hypothesis-
Table 11
Mean Scores on the Body Dissatisfaction Scale by Group

<table>
<thead>
<tr>
<th>Group</th>
<th>BD(pre)</th>
<th>BD(post)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>29.6(^a)</td>
<td>28.2(^b)</td>
</tr>
<tr>
<td></td>
<td>(20.8)</td>
<td>(22.3)</td>
</tr>
<tr>
<td>High</td>
<td>82.5(^a)</td>
<td>85.6(^b)</td>
</tr>
<tr>
<td></td>
<td>(19.8)</td>
<td>(18.1)</td>
</tr>
</tbody>
</table>

Note: BD refers to the body dissatisfaction subscale of the EDI. Means with the same letter differ significantly. Standard deviations are given in parentheses.
Figure 16

Body dissatisfaction by group and pre-post
consistent word associations for each group are illustrated in Figure 17.

**Pathfinder**

High dysphoric subjects were predicted to have more links between depression concepts and negative body concepts in their networks than the low dysphoric subjects. T-test analysis was consistent with this hypothesis $t(28)=3.58 \ p<.001$. Figure 18 illustrates the difference in depression to negative body links for the two groups. However, comparison of the similarity scores generated by comparing the networks of high dysphoric subjects with the networks of the other high dysphoric subjects and the similarity scores generated by comparing the networks of high dysphoric subjects with the networks of all the low dysphoric subjects did not result in a significant difference $t(318)=.04 \ p=.966$. This result failed to support the hypothesis that the networks of the high dysphoric subjects would be more similar to each other than they would be to the networks of the low dysphoric subjects.
Note: Hypothesis-consistent associations include depressive words given to negative body words and vice versa. The two groups differed significantly at p<.05.

Figure 17

Mean Hypothesis-Consistent Word Associations by Group
Note: The two groups differed significantly at p<.05.

Figure 18

Mean Depression/Negative Body Word Links by Group
DISCUSSION

An associative memory model of body dysphoria was proposed in this study. The model hypothesized an associative link between depression and negative body concerns in body size dysphoric normal weight women. The results of this study are mixed in their support of the proposed body dysphoria model. A general memory bias for negative body-related words was found for the high dysphoria group versus the low body dysphoria group. This finding is consistent with both a schema theory interpretation and an associative memory interpretation. The failure of the depression mood induction to increase memory for body-related words did not support the hypothesized associative memory model for body dysphoria. On the other hand, the depression mood induction did increase body image disturbance as measured by the CBS and body dysphoria as measured by the BSQ. Furthermore, the use of Pathfinder to generate associative networks of depressive, positive and negative body words supported the proposed greater association of depression and negative body concerns in high versus low body dysphoric women. Finally, the word association task supported the prediction that high body dysphoric subjects would generate more associations congruent with the proposed model for body dysphoria (depression words to negative
body words and vice versa) than the low body dysphoric subjects.

**Methodological Considerations**

The two groups in this study were equated on several personal characteristics that were thought to be potential confounds. The two groups did not differ statistically in age, height or weight. Since verbal intelligence may influence the recall of semantic stimuli the two groups were evaluated using the Shipley measure of verbal intelligence and found to not differ. Finally, the two groups did differ statistically on the BDI. Differences in depression were expected based on reports from the literature regarding depression in body dysphoria (Cash, 1985). However, depression scores were not correlated with memory bias or body image disturbance in this study.

The finding of group effects for recall memory, Pathfinder links, word association and body image tasks suggests that the study was designed with adequate statistical power. Furthermore, the increased recall of depression words and increased CBS and BSQ scores in the depression mood induction condition provides some assurance that the Velten procedure did have an appreciable effect on the subjects' mood. While the self-report measures of mood change were vulnerable to demand responses, the differential outcomes for the two groups
(high and low body dysphoria) in the depression mood induction on body image disturbance change weakens the interpretation that the mood difference was merely a demand characteristic. The inclusion of a neutral mood induction control condition strengthened the interpretation that the increased depression recall and the increased body image disturbance were determined by the depressed mood induced by the Velten procedure.

Finally, the recognition task was possibly influenced by ceiling effects. Many subjects in both groups and both mood conditions recognized almost all of the words in each wordtype. While the recall task was piloted to insure that the use of 12 words of each type could be sensitive to group differences, other considerations limited the use of more words in each category. An interrater reliability minimum of .8 was set for the inclusion of words in each wordtype category. Only 12 positive body words obtained the minimum reliability and, therefore, set the limit for words in each category. By assuring that the words used reliably fit their respective categories the recognition task was vulnerable to ceiling effects. Many subjects were able to recognize nearly all of the words in each category. Therefore, the hypothesized bias that high dysphoric subjects would recognize more negative body -
related words than low body dysphoric subjects was not adequately tested.

Recall Memory Task

Based on the proposed model, a memory bias for negative body words was predicted in high body size dysphoric women but no bias was expected in low body dysphoric women. This study found a significant bias for negative body words compared to control words within the high body dysphoria group but not within the low body dysphoria group. Memory bias in depression has been argued to influence information processing and to be a possible source of automatic changes in mood (Bower, 1987). Analogous to the process in depression, a bias toward negative body concepts in body dysphoric subjects may lead to automatic negative feelings toward one's body. These automatic processes are not necessarily viewed as etiological determinants of mood disturbance (or in this case body dysphoria), however, it is argued that such automatic processes may at least serve as variables that maintain mood disturbance and make therapeutic change more difficult. Similarly, a bias toward the recall of negative aspects of one's body may aid in maintaining body dysphoria and as discussed above may predispose one toward the development of a clinical eating disorder.
Based on the associative network model of body dysphoria, the induction of a depressive mood was expected to enhance the memory bias for negative body words in the high dysphoric women but was not expected to increase the bias in the low dysphoria group. Contrary to the prediction, this study failed to find that depression increased the bias for negative body words. However, the expectation that the depressive mood induction would also increase the recall of depression words was observed in both the high and low body dysphoria groups. This finding is consistent with other studies in the literature that report memory bias for depressive stimuli in depressive mood induction studies (c.f. Blaney, 1986). More important to this study, the finding of increased bias for depression words following the depression mood induction (as well as increased body image disturbance) supports the validity of the mood induction procedure and strengthens the interpretation that the lack of enhanced negative body word bias was not due to a failure of the induction procedure to produce the desired mood change.

The failure to find increased recall bias toward negative body words in high body dysphoric subjects induced to a depressed mood opposes the model of body dysphoria proposed in this study. If body dysphoria is linked to the depression node in memory as the model
proposes (based on Bower's HAM), then increasing depression should have spread activation to more body dysphoric cues and heightened recall of these concepts. The bias in recall between the two groups and the failure of induced mood to affect the recall of negative body words is consistent with a schema based interpretation of body dysphoria. Schemas are well-elaborated knowledge structures that influence our encoding and retrieval of information (Markus, 1980). Schema theory may predict that high body dysphoric subjects have self-schemas related to body size and shape that are mostly negative in content, activation of this schema would bias memory toward recall of negative body concepts. Unlike the HAM model of Bower, schema theory suggests that transient mood states would have little influence over memory recall. The negative body schema is either activated or not and degrees of emotional arousal have no causal influence on bias (see Mathews and Bradley, 1983 for a discussion of schema theory versus transient mood in determining memory bias). Therefore, it could be argued that the finding of a bias toward negative body words that was not enhanced by the mood induction in high dysphoric subjects favors schema theory over Bower's HAM model. An alternative explanation would be that body concerns are simply not linked to the node of the emotion induced in this study.
An additional confound to the interpretation of the recall memory results is the difference in depressed mood between the two groups prior to the mood induction procedure. It could be argued that differences in depression across the two groups accounted for memory bias for negative body-related words. However, depression has been shown to bias memory toward depression words and the differences in depression did not result in differences in the recall of depressive words across the two groups, therefore, it is unlikely that the differences in recall of negative body words are due solely to differences in depression.

The recognition memory and response latency measures failed to show a memory bias for group or mood. As previously discussed results related to the recognition task were probably attenuated by a ceiling effect. Furthermore, recall tasks have been the more reliable measure of memory bias in the empirical literature (Blaney, 1986). While the response latencies to affectively valenced material have been shown to be sensitive to mood (e.g., Teasdale & Fogarty, 1979), this finding is also much less reliable than bias in free recall (see Blaney, 1986 for review). Therefore, while recognition recall and response latency data do not support the prediction of biased memory in high body
dysphoria, they may not be as reliable measures of mood-congruency effects as the free recall task.

**Body Image Disturbance**

The two groups differed significantly in the pre-induction phase on all measures of body image disturbance except the ideal body size measure of the BIA. This finding supports an association between negative feelings about body size (BSQ and BD) and perceived current body size (as measured on the BIA). The failure to find between group differences on the IBS subscale of the BIA suggests that ideal body size is not associated with body dysphoria.

Based on the hypothesized associative link between depression and body concerns in the high body dysphoria group, the induction of depression was predicted to increase body image disturbance in the high body dysphoria group but not the low body dysphoria group. The depression mood induction procedure significantly increased perceived current body size (CBS score) in the high body dysphoria group, increased body dysphoria as measured by the BSQ, but failed to significantly increase BD and IBS scores. The mood induction procedure in the low dysphoria group did not affect any of these measures.

Unlike the recall of negative body words following depressive mood induction, these results support the model
that body concerns are linked to depression in high body
dysphoric women. It is not clear why CBS and BSQ measures
increased with the mood induction, whereas the recall of
negative body words did not increase with the depressed
mood. One possible explanation may be the level of
rehearsal of the responses required in each task.
Rehearsal or elaboration of material in memory is known to
influence retrieval in mood induction studies (see Blaney,
1986 for review). Although the subjects in the memory
task were instructed to imagine themselves in situations
involving each negative body word as they appeared on the
screen limited rehearsal of these associations was
possible. The recall task involved having the subjects
retrieve specific verbal stimuli. Recall is expected to
be influenced by the number of cues and associations
available to the specific verbal stimuli. Whereas, some
of the stimuli may be well rehearsed in the subjects' own
experiences (words such as "fat"), other specific words
(such as "obesity") may not be a part of the subjects'
normal vocabulary and, therefore, may be less well
elaborated in their memories. The group differences may
represent words well rehearsed in the high body dysphoric
subjects' everyday experience yet the encoding task did
not allow for enough elaboration of less familiar stimuli
to produce enhanced recall with the mood induction
procedure. Evaluation of current body size and feelings about current body size, on the other hand, may be well elaborated tasks for high body dysphoric subjects. It might be expected that these subjects would frequently evaluate their own body size and that the CBS task would be well rehearsed and perhaps more elaborately associated with depressed mood (unlike the specific verbal stimuli less rehearsed by the subjects) and, therefore, CBS may be more responsive to the induction of a depressed mood. However, this explanation for the discrepant effects of the mood induction on recall and body image disturbance is speculative. Alternative explanations are discussed below.

The results of this study may be interpreted as suggesting that some aspects of body image and memory are reactive to depressed mood while others (such as IBS) are more stable. McKenzie, Williamson, and Cubic (in press) also found "stable" and "reactive" aspects of body image disturbance in a study that evaluated the effects of activation of fear of weight gain on body image disturbance. They found similar results with regards to CBS and IBS changes in response to activation of fear of weight gain. CBS worsened in bulimics whose fears were activated, whereas, IBS did not change. They proposed that CBS may be a "reactive or dynamic variable," i.e. it
may change in a relatively short period of time in response to situational factors. IBS, on the other hand, may represent a more "stable" or "trait" like variable, i.e., IBS may not quickly change in response to transient or situational factors such as the temporary activation of fear of weight gain.

Several other studies have examined changes in body image disturbance in response to the activation of weight fears (Crisp & Kalucy, 1974; Freeman, Thomas, Solyom, & Miles, 1983; Garfinkle, Moldofsky, & Garner, 1979; and Lohr & Barrios, 1988). The results of these studies are mixed in finding increased body image disturbance following activation of weight fears (see Slade, 1988 for a review). Slade (1988) has argued that the mixed reports of "reactivity" of body image disturbance to the activation of fear of weight gain are a function of the different techniques used to assess body image disturbance. Slade (1988) proposed that techniques that involve distorting an image of a whole body evaluate "fixed" attitudes about body, whereas, techniques that involve the estimation of body parts measure "fluid" aspects of body image that are influenced by emotional factors (p.20). The McKenzie et al. (in press) study suggests that Slade's interpretation may be incorrect since they found reactive and non-reactive aspects of body
image within a single methodology (BIA). Their study was also the first to assess the reactivity of ideal body size to emotional factors. The present study supports the McKenzie et al. (in press) finding that a difference in methodology is not enough to account for reactive and non-reactive aspects of body image.

While neither the McKenzie et al. (in press) study nor the present study was designed to investigate the nature of these "reactive" and "stable" aspects of body image disturbance some conjecture and possible future directions of research can be offered. While it seems undisputable that CBS is reactive in the sense described above, it is not as clear that IBS is "stable" or non-reactive. One way in which IBS may differ from CBS that was not investigated in the present study nor in the McKenzie et al. (in press) study is affective valence. Both studies involved inducing negative emotional states. If CBS has a negative affective valence (that is body dysphoric subjects or bulimics feel negative about current body size) but IBS has a positive affective valence (in the same way positive body words did in the memory study), one would expect CBS to worsen with negative mood or fear but not necessarily IBS. It may be that IBS is a reactive variable but only to oppositely valenced situations or moods. Studies have shown that the induction of euphoric
mood affects the recall of positively valenced material. One way to investigate the possibility that IBS is reactive but to positive affective situations would be to induce a euphoric mood and investigate changes in IBS.

Another dimension of body image that may influence the relative "stability" and "reactivity" of body image variables may be the depth of elaboration. Mood induction studies suggest that while MCM is a reliable finding, it is most reliably produced when the material has been elaborately rehearsed in memory during a given mood state (Blaney, 1986; Watkins, Mathews & Williamson, 1992). It may be that CBS is more elaborately associated with negative emotions than is IBS. If high body dysphoric subjects obsessionally think about current body size but not ideal body size when they are depressed, current body size would be more elaborated around the depression node. It is possible that while high and low body dysphoric subjects show baseline differences in CBS the activation of greater negative emotion results in increased CBS scores (more cues are available) but not IBS because it has fewer associations with the negative emotional state.

While these interpretations of the reactivity of CBS and the nonreactivity of IBS are consistent with factors that influence the "reactivity" of memory in the information processing literature, other interpretations
are equally viable. It may be that IBS is an aspect of body image that is truly stable in response to any situational or emotional variable. It may represent a separate schematic structure that is not influenced by emotional arousal, whereas, CBS and body dysphoria are reactive at least to depression and fears of weight gain.

Finally, Johnson and Magaro (1987) have argued that memory processes in psychological disorders are influenced by both mood state and severity of psychopathology. It may be argued that the bias in CBS but not IBS following mood induction in high body dysphoric subjects implies that while current body size is central to the problem of body dysphoria, ideal body size may not be a central part of the syndrome. This interpretation is strengthened by the failure to find differences between the high and low body dysphoric subjects in the pre-assessment phase of the study. However, the data from the McKenzie et al. (in press) study are less amenable to this interpretation since there were group differences (at baseline) on the IBS measure between normals and bulimics.

Word Association Task

Consistent with predictions, high dysphoric subjects produced more word associations that were consistent with the proposed body dysphoria model. Bower (1987) reports that mood reliably influences word associations in a
manner consistent with his HAM model. The results of this task therefore, may be interpreted as supportive of the proposed associative memory model of body dysphoria. However, alternative interpretations are plausible. The production of more hypothesis-consistent word associations among the high dysphoric subjects may simply represent a response bias. That is, body dysphoric subjects may be more likely to produce negative body words or depressive words to any stimuli. However, an analysis of responses to neutral stimuli on the word association task does not support this interpretation since high dysphoric subjects did not produce more negative body and depressive words to the neutral stimuli. Finally, demand characteristics cannot be ruled out although post-experimental interviews did not reveal the presence of demand responses.

Pathfinder

The results of the comparison of depression to negative body links in high and low body dysphoric subjects provides conceptual support for the hypothesized associative memory model of body dysphoria. Body dysphoric subjects showed an increased likelihood to report that depression and negative body concerns were related in their experience. Pathfinder had not previously been used to investigate cognitive networks in subclinical populations. The results of this study
suggest that Pathfinder may be useful in investigating network differences between normal and psychopathological populations.

The failure to find that the networks of the high dysphoric subjects were more similar to each other than to the networks of the low dysphoric subjects suggests that their may be highly ideographic networks within the high dysphoria group. This interpretation is strengthened by an examination of the individual and average networks for each group. The individual networks suggested that specific body areas are often the central concern for individual subjects. For example, one subject showed many associations between buttocks and depressive words but fewer links between other body areas (such as stomach) and depressive words. Other subjects had other body words as the more central concern. When the group networks were averaged these ideographic differences appeared to "wash out" and revealed little group differences in the average networks.

Conclusions

This study provided the first demonstration of a memory bias for negative body-related versus neutral stimuli in high body dysphoric subjects. Low body dysphoric subjects did not demonstrate the same bias. This finding may be interpreted as supportive of the
proposed associative memory model of body dysphoria, however, a schema based interpretation of the memory bias is equally supported. The use of a depressive mood induction procedure to test the importance of transient mood in the memory bias led to mixed results. If the bias was due to a stable schematic structure no effect for mood state would have been expected. However, the associative memory model predicted that the induction of a depressed mood would lead to greater activation of the associated negative body concepts and enhance the memory bias. The results of the mood induction procedure are mixed in their support for the proposed associative memory model. The induced depression did not increase the memory bias for negative body-related stimuli, however it did increase body dysphoria and perceived current body size as measured by the CBS measure of the BIA task. These results might suggest that memory for negative body words is stable at least in response to depressed mood. The memory bias for negative words in high dysphoric subjects could represent a stable but negative body schema that is not linked to the depression node as suggested in the proposed model. In order to test that the memory bias for negative words is not reactive under most circumstances it would be necessary to induce other emotional states while measuring memory bias for negative body words. For example,
activation of fear of weight gain may be an emotional variable more associated with body dysphoria and hence may produce reactive memory bias for negative body words. Similarly, the nonreactivity of IBS needs to be investigated further by inducing other mood states, such as euphoria.

It cannot completely be ruled out that the mood induction failed to produce the degree of emotional change required to produce the enhancement of memory bias for negative body words. Although the depression induction increased the recall of depression words, there still was no bias toward depression words relative to neutral words. Furthermore, the increase in the recall of depression words could be interpreted as a result of thematic priming rather than as a result of emotional state. Therefore, future studies may want to examine body dysphoric subjects with clinical levels of depression versus body dysphoric subjects without clinical levels of depression for differences in memory bias for negative body words.

This study demonstrated that a memory bias for negative body-related words exists in high body dysphoric subjects. This memory bias may serve as a maintenance variable in the dysphoric feelings about body found in some normal weight women. Furthermore, the study demonstrated that perception of current body size and
feelings about body shape are influenced by transient depressed mood. Other variables such as ideal body size and the memory bias for negative body words were non-reactive to transient mood in this study. Future research should investigate the nature of these reactive and non-reactive variables in body dysphoria. Understanding these differences may aid in learning to attenuate the negative effects of transient mood on cognitive processes and self-evaluation.
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APPENDIX A
THE BECK DEPRESSION INVENTORY
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APPENDIX B
THE BODY SHAPE QUESTIONNAIRE
APPENDIX C
BODY IMAGE ASSESSMENT CARDS
APPENDIX D
THE DEPRESSIVE ADJECTIVES CHECKLIST
PLEASE NOTE

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University Microfilms International
APPENDIX E
EATING DISORDERS INVENTORY
APPENDIX G
VERBAL STIMULI FOR MEMORY TASKS
Negative body words

weight
thigh
stomach
obesity
plump
hips
fat
chunky
chubby
buttocks
shape
cellulite

mean word length = 5.9
mean word frequency = 24 in a sample of 1,014,232 words
(Kucera & Frances, 1967)
Positive body words

slim
figure
petite
attractive
trim
lean
toned
dainty
slender
sleek
gorgeous
thin

mean word length =5.8
mean word frequency=24 in a sample of 1,014,232 words
(Kucera & Francis, 1967).
Furnishings words

chair
bookcase
cabinet
dresser
drapes
desk
footstool
lamp
recliner
rug
sofa
vase

mean word length= 5.8
mean word frequency= 25 in a sample of 1,014,232 words
(Kucera & Frances, 1967)
Negative words

sad
failure
grief
inferior
dejected
depressed
loss
gloomy
despise
sorrow
rejected
hopeless

mean word length= 6.5
mean word frequency= 23 in a sample of 1,014,232 words
(Kucera & Francis, 1967)
APPENDIX H
VERBAL STIMULI FOR PATHFINDER TASK
Depression Words
hopeless
depressed
rejected
inferior
grief

Negative Body Words
fat
stomach
buttocks
plump
weight

Positive Body Words
thin
lean
slim
petite
trim
APPENDIX I

VELTEN MOOD INDUCTION STATEMENTS
Negative mood induction statements

I feel sad and disgusted with myself.
I am disappointed in myself.
In some ways I have failed the people most important to me.
I feel very alone.
I am not totally pleased with my physical appearance.
I have made many mistakes in my lifetime.
The future looks very bleak.
I feel that nobody understands me.
I feel empty inside.
I don't have as much energy as I used to.
I feel bored with most everything.
It takes a lot of effort to get things done.
I don't feel worthy as a person.
I probably will fail in achieving my goals.
I don't get pleasure from any activity.
I feel blue.
Most people probably don't like me.
When I look in the mirror I don't like what I see.
Life seems pointless at times.
I feel a heavy weight on my shoulders.
My family is disappointed in me.
I don't feel I have accomplished much in my life.
I feel discouraged about the future.
My thoughts are mostly negative.
I feel I'm in a hole and can't get out.
Most people who know me don't like me.
I feel pessimistic.
Most people have accomplished more than me.
I feel lethargic.
I feel so depressed I can't stand it.
Neutral mood induction statements

President John Tyler was born March 29, 1790.
President Andrew Johnson was born in Raleigh, North Carolina.
President John Adams had 5 children.
President George Washington was born February 22, 1732.
President Martin van Buren was a member of the democratic party.
President James Garfield had 5 children.
President Abraham Lincoln was born in Hardin, Kentucky.
President Warren G. Harding was a member of the Baptist church.
President Grover Cleveland was a member of the democratic party.
President John Quincy Adams was born July 18, 1767.
President Zachary Taylor was a member of the Episcopal church.
President William Mckinley was a member of the Methodist church.
President Chester A. Arthur was a member of the Republican party.
President James Buchanan had no children.
President Millard Fillmore was a member of the Whig party.
President Thomas Jefferson was born in Shadwell, Virginia.
President Ulyssess S. Grant had 4 children.
President James Monroe was born April 28, 1758.
President Rutherford B. Hayes was a member of the Republican party.
President James Knox Polk was a member of the Methodist church.
President Calvin Coolidge was born in Plymouth, Vermont.
President Grover Cleveland had 5 children.
President William Henry Harrison was a member of the Whig party.
President Theodore Roosevelt was born October 27, 1858.
President William H. Taft was born in Cincinatti, Ohio.
President Andrew Jackson was a member of the Presbyterian Church.
President James Madison was born March 16, 1751.
President Woodrow Wilson had 3 children.
President Benjamin Harrison was born in North Bend, Ohio.
President Franklin Pierce was a member of the Episcopal church.
Destractor words

leg
hair
feet
arm
back
face
knee
chin
calf
ankle
table
television
mantle
stereo
mirror
guilty
blue
moody
doomed
unhappy
APPENDIX K

MEAN FREE RECALL
<table>
<thead>
<tr>
<th>Group</th>
<th>Mood</th>
<th>Depressed</th>
<th>Neutral</th>
<th>Neg. Body</th>
<th>Pos. Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>N</td>
<td>2.89º</td>
<td>4.72</td>
<td>4.06</td>
<td>4.56</td>
</tr>
<tr>
<td>Low</td>
<td>D</td>
<td>4.11º</td>
<td>4.50</td>
<td>4.00</td>
<td>4.83</td>
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<tr>
<td>Low</td>
<td>total</td>
<td>3.50</td>
<td>4.61</td>
<td>4.03c</td>
<td>4.70d</td>
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<td>N</td>
<td>2.50b</td>
<td>4.83</td>
<td>6.33</td>
<td>3.78</td>
</tr>
<tr>
<td>High</td>
<td>D</td>
<td>3.68b</td>
<td>3.28</td>
<td>7.17</td>
<td>3.17</td>
</tr>
<tr>
<td>High</td>
<td>total</td>
<td>3.06</td>
<td>4.06</td>
<td>6.72c</td>
<td>3.48d</td>
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</table>

Note: N indicates neutral mood induction and D indicates depressive mood induction. Means with the same letter differ significantly at p<.05.
APPENDIX L

MEAN RECOGNITION RECALL

153
<table>
<thead>
<tr>
<th>Group Mood</th>
<th>Depressed</th>
<th>Neutral</th>
<th>Neg. Body</th>
<th>Pos. Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low N</td>
<td>9.67</td>
<td>9.72</td>
<td>11.0</td>
<td>10.6</td>
</tr>
<tr>
<td>Low D</td>
<td>8.89</td>
<td>9.72</td>
<td>10.6</td>
<td>10.4</td>
</tr>
<tr>
<td>Low total</td>
<td>9.28</td>
<td>9.72</td>
<td>10.8</td>
<td>10.5</td>
</tr>
<tr>
<td>High N</td>
<td>9.39</td>
<td>10.6</td>
<td>11.2</td>
<td>10.7</td>
</tr>
<tr>
<td>High D</td>
<td>10.3</td>
<td>10.7</td>
<td>11.4</td>
<td>10.4</td>
</tr>
<tr>
<td>High total</td>
<td>9.85</td>
<td>10.7</td>
<td>11.3</td>
<td>10.6</td>
</tr>
</tbody>
</table>

Note: N indicates neutral mood induction and D indicates depressive mood induction.
APPENDIX M

MEAN RESPONSE LATENCIES
<table>
<thead>
<tr>
<th>Group</th>
<th>Mood</th>
<th>Depressed</th>
<th>Neutral</th>
<th>Neg. Body</th>
<th>Pos. Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>N</td>
<td>1141</td>
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<td>965.4</td>
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<tr>
<td>Low</td>
<td>D</td>
<td>1286</td>
<td>1043</td>
<td>958.1</td>
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<tr>
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<td>total</td>
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<td>1036</td>
<td>959.6</td>
<td>1001</td>
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<tr>
<td>High</td>
<td>N</td>
<td>1124</td>
<td>918.6</td>
<td>766.4</td>
<td>938.9</td>
</tr>
<tr>
<td>High</td>
<td>D</td>
<td>1269</td>
<td>943.8</td>
<td>876.2</td>
<td>996.5</td>
</tr>
<tr>
<td>High</td>
<td>total</td>
<td>1197</td>
<td>931.2</td>
<td>821.3</td>
<td>967.7</td>
</tr>
</tbody>
</table>

Note: Response latencies are reported in milliseconds. N indicates neutral mood induction and D indicates depressive mood induction.
LOW AVERAGE
HIGH AVERAGE
Vita

Jeffrey Duane Baker was born March 7, 1960 in Middlesboro, Kentucky. After graduating from Middlesboro High School he attended Carson-Newman College. Carson-Newman is a 4 year liberal arts college in Jefferson City, Tennessee. He graduated from Carson-Newman in 1982 with a dual major in chemistry and philosophy. For the next three years he worked as an analytical chemist for IT corporation based in Knoxville, Tennessee. Most of those three years were spent in Louisiana working on a major train derailment and chemical spill in Livingston, Louisiana. After three years he returned to graduate work in psychology at Louisiana State University. Here he completed his M.A. and Ph.D. degrees with a specialization in clinical psychology.

Currently, Baker is an associate professor at Southeastern Louisiana University where he teaches and performs research in the areas of eating disorders and personality disorders.
DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Jeffrey D. Baker

Major Field: Psychology

Title of Dissertation: Memory Bias and Body Image Disturbance in Normal Weight Body Dysphoric Women

Approved:

[Signatures of Major Professor and Chairman and Dean of the Graduate School]

EXAMINING COMMITTEE:

[Signatures of committee members]

Date of Examination: 12-15-92