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Effects of Antihistamine, Age, And Gender on Task Performance

Kirby Gilliland
Department of Psychology
Robert E. Schlegel
School of Industrial Engineering
The University of Oklahoma
Norman, Oklahoma 73019

Thomas E. Nesthus
Civil Aeromedical Institute
Federal Aviation Administration
Oklahoma City, Oklahoma 73125

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16. Abstract

This investigation was designed to study the effects of the antihistamine, chlorpheniramine maleate, as well as the influence of age and gender, singly and in combination with chlorpheniramine maleate, on selected types of performance tasks. It was hypothesized that chlorpheniramine maleate would have a negative effect on a wide range of task performance and self-report measures of mood and performance capability, much as it did in previous research (Gilliland, Schlegel, & Nesthus, 1997). Increasing age was hypothesized to have a negative effect on performance, especially on dual tasks and those tasks that emphasized tracking or speeded responses. If gender differences emerged, it was hypothesized that men may have some advantage on tracking or speeded tasks, whereas women may have some advantage on verbal or memory-based tasks.

A total of 96 individuals representing two groups of women (25-30 years and 40-45 years of age) and three groups of men (25-30 years, 40-45 years, and 50-55 years of age) served as participants in the study. Participants were trained extensively and then performed a battery of performance tasks and provided self-report measures both prior to and following randomly presented, double-blind placebo and drug (4 mg chlorpheniramine maleate) conditions conducted on two consecutive days.

The results of this study yielded no significant drug main effects for the administration of chlorpheniramine maleate on any dependent measure for any performance task. However, several interactions of age and gender with chlorpheniramine maleate provided strong evidence that chlorpheniramine maleate may well have negative effects on a wide variety of performance tasks, but these effects may be complex interactive ones, at least at the dosage level used in this study. There was very strong evidence from self-report measures that participants were subjectively aware of the effects of the antihistamine. Not unlike previous research, the highly selected and well motivated participants in this study may have recruited effort to overcome the antihistamine effects on performance.

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PREFACE

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Effects of Antihistamine, Age, and Gender on Task Performance

1.0 INTRODUCTION

One of the many factors in the aviation work place that may compromise worker effectiveness is over-the-counter (OTC) drug use. In fact, the frequency of OTC drugs found in aviation fatalities increased substantially between 1988 and 1993 (Canfield, Flemig, & Hordinsky, 1995). The purpose of this study was to investigate the effects of a common OTC antihistamine, as well as age and gender, on a selected set of human performance tasks shown to be sensitive to antihistamine effects in a previous study (Gilliland, Schlegel, & Nesthus, 1997).

Among the many OTC drugs now available, antihistamines may pose one of the largest threats to job safety. In fact, two OTC antihistamines, chlorpheniramine and diphenhydramine, were among the most frequently found drugs in blood samples from the accident fatalities in the previously mentioned survey (Canfield, Flemig, & Hordinsky, 1995). While antihistamines were present in only 3.7% of the total cases, they had one of the highest frequency ratings of all drugs. The antihistamines were also one of the only drug types identified in these accidents that had a sedating effect and were clearly disproportionately represented among all drug categories (with only common analgesics rating noticeably higher). The authors suggested that, because these antihistamines have sedative properties, they may cause impairment of a pilot's ability to react in an emergency. While the authors of that report judiciously noted that the increased frequency may have been the result of improved biochemical analysis techniques, it may also have been due in part to the broader availability and use of OTC drugs during this period.

Such findings raise serious concerns regarding possible antihistamine effects in the aviation environment. Chlorpheniramine maleate is of particular interest because it is a traditional H_1 receptor site blocker and has moderately high sedating effects (see Goodman & Gilman, 1990; Manning & Gengo, 1993). It is also relatively inexpensive, easy to obtain, and commonly found in a wide variety of OTC cold, flu, and allergy medications—so much so that many people may not even be aware that they are taking an antihistamine as part of a multi-symptom preparation. One study provided early evidence that chlorpheniramine maleate might present significant problems in the aviation environment. Higgins, Davis, Fiorica, Iampietro, Vaughan, and Funkhouser (1968) studied the effects of chlorpheniramine maleate, singly and in combination with altitude. They found that administration of chlorpheniramine maleate at common OTC levels significantly reduced psychomotor performance. Equally important, the combination of chlorpheniramine maleate and altitude had a significant, and much larger, negative effect on psychomotor performance than the simple additive decrements of these factors.

Since that time, chlorpheniramine maleate has been shown to have fairly wide-ranging negative effects on a variety of performance abilities. For example, it has been shown to cause a significant degradation in pursuit-type tracking task performance (Clarke & Nicholson, 1978). The Clark and Nicholson findings were noteworthy because it was found that most negative effects on performance were found approximately 1.5 hours after ingestion and the participants in the study reported no subjectively perceived decline in performance ability as a result of consuming the drug. This disparity between the effects of chlorpheniramine maleate on measures of performance and self-reported mood has been noted by several authors (Manning & Gengo, 1993; Meltzer, 1990, 1991; Nicholson, 1985). This finding serves as a point of considerable concern because it suggests that an individual who has taken chlorpheniramine maleate can perceive little cognitive effect, yet demonstrate significant degradation in performance.

Chlorpheniramine maleate has also been shown to negatively affect letter cancellation task performance (Chapman & Rawlins, 1982), digit symbol substitution task performance (Khosla, Saha, Koul, Chakrabarti, Sankaranarayanan, & Sharma, 1993; Nicholson, Pascoe, Turner, Ganellin, Greengrass,

Casy, & Mercer, 1991), critical flicker fusion and digit cancellation task performance (Khosla et al., 1993), tapping rate performance (Lee, Lader, & Kitler, 1988), and reaction time performance (Lee, Lader, & Kitler, 1988; Witek, Canestrari, Miller, Yang, & Riker, 1995).

More recently, Gilliland, Schlegel, and Nesthus (1997) examined the role of antihistamine and work shift effects on a wide variety of performance tasks. Chlorpheniramine maleate had a negative effect on a wide range of tasks, including single, dual, and complex multi-tasks. Summarizing across tasks, it appeared that chlorpheniramine maleate had its strongest negative effects on tracking performance and response speed for both psychomotor tasks and verbal responses. Evidence for negative effects on spatial ability was found, but was less consistent. Self-report measures revealed some significant negative effects of chlorpheniramine maleate, but these were not as extensive as one might predict given the negative results evidenced in the behavior data.

Finally, one study investigated chlorpheniramine maleate effects on pilot performance. The performance of military pilots was examined under the influence of chlorpheniramine maleate (4 mg) and no negative influence on flight simulator performance or a wide range of psychological and neuropsychological tests was found (Philpot, Biegalski, & Brooker, 1993). However, the participants did report a wide range of negative symptoms associated with exposure to chlorpheniramine maleate. The authors of this study noted an important point with regard to chlorpheniramine maleate effects on performance. While many studies have reported degraded performance following administration of chlorpheniramine maleate, the results of this study suggested that highly motivated participants overcame these negative effects and performed to competent or even exceptional levels.

The actual locus of chlorpheniramine maleate effects remains unclear. Several studies have reported subjective influences of chlorpheniramine maleate that would be described as negative (Chapman & Rawlins, 1982; Gilliland, Schlegel, & Nesthus, 1997; Kulshrestha, Gupta, Turner, & Wadsworth, 1978; Nicolson et al., 1991; Philpot, Biegalski, & Brooker., 1993), while others have not (Clarke & Nicholson, 1978; Lee, Lader, & Kitler, 1988). Of course, one of the most critical findings in this regard was that, in some cases, individuals who had consumed chlorpheniramine maleate showed clearly negative effects on performance measures but no evidence of self-reported negative effects (Clarke & Nicholson, 1978; Manning & Gengo, 1993; Meltzer, 1990, 1991; Nicholson, 1985). At least two studies have provided another perspective on chlorpheniramine maleate effects. One of these studies examined the effect of chlorpheniramine maleate on reaction time and EEG activity (Lee, Lader, & Kitler, 1988). Chlorpheniramine maleate significantly slowed and disrupted the EEG pattern, and shifted it toward increasing alpha wave activity (8.0 - 13.0 Hz), a pattern commonly associated with lower activation states. In the second study, chlorpheniramine maleate caused significant slowing of the P300 cortical evoked response (Loring & Meador, 1989). The P300 response is an EEG measure that has been linked to both speed of cortical processing and sustained attention ability. The results of these EEG studies suggest that the degrading effects that chlorpheniramine maleate seems to exert on performance may well be mediated indirectly by the suppression of midbrain H_1 histaminergic receptors that play a central role in regulating general arousal level (see Goodman & Gilman, 1990; Manning & Gengo, 1993; Prell & Green, 1986).

In general, considerable evidence has suggested that chlorpheniramine maleate has the capacity to exert a negative influence on a wide range of performance capabilities and to negatively influence self-reported cognitive states. While some evidence to the contrary has been noted, the preponderance of research results has suggested fairly clear evidence of detrimental effects. Of additional importance is the possible relationship between the effects of chlorpheniramine maleate and other variables such as age and gender.

There are several reasons why age may have direct effects on performance, as well as interactive effects with OTC drug use. It has been noted that, with advancing age, deterioration of sleep patterns and diminution of circadian rhythms occur (Weitzman, Moline, Czeisler, & Zimmerman, 1982), and it is well known that sleep deprivation causes greater detrimental effects on performance among older (as compared with younger) adults (Webb & Levy, 1982). Advancing age has also been identified as a factor that compromises one's ability to perform shift work (Akerstedt & Torsvall, 1980).

Advancing age affects a wide range of performance abilities, and these have been extensively reviewed (Charness, 1985; Kausler, 1991; Ostrow, 1989). Early research suggested that age negatively affected simple vigilance task performance (Surwillo & Quilter, 1964), but more recent research revealed that simple vigilance task performance is probably comparable across age ranges (Giambra & Quilter, 1988). Conversely, complex vigilance task performance does appear to be negatively affected by aging (Kirchner, 1958; Parasuraman, Nestor, & Greenwood, 1989), presumably because complex vigilance tasks place greater demands on those cognitive and physical capacities most diminished by the aging process (see Kausler, 1991). In a like manner, complex monitoring performance has been shown to decline with age, and older participants showed declines in monitoring performance early in the test session well before other younger groups of participants (Thackray & Touchstone, 1981). Several carefully controlled studies have also shown that aging affected selective attention ability, specifically the searching process components of the task (Cerella, 1985; Rabbitt, 1965). Divided attention and dual task performance were also negatively affected by age (Broadbent & Gregory, 1965; Talland, 1962), but it may be the case that the negative effects were due more to the added complexity of dual tasks, as opposed to the attention-dividing demands (Salthouse, Rogan, & Prill, 1984; Somberg & Salthouse, 1982). Older participants also performed a complex multitask more poorly than younger participants (Mertens & Collins, 1986; Mertens, Higgins, & McKenzie, 1983), and increased workload accentuated this difference in performance (Collins & Mertens, 1988).

Among the tasks most commonly compromised by age have been reaction time, tracking, and memory tasks. Considerable research has been conducted on the effects of aging on response speed. The general findings have suggested that reaction time slowed across age ranges from young adulthood to old age (Salthouse, 1985; Spirduso, 1975; Welford, 1987). The locus of the slowing effect was found to reside in the pre-motor period, which includes central processing and programming of the motor response, as opposed to muscle activation and movement processes (Birren & Botwinick, 1955; Birren, Riegel, & Morrison, 1962; Botwinick, 1971; Weiss 1965). Tracking performance has long been known to be negatively correlated with age, with the largest declines occurring between the middle and older age ranges (Ruch, 1934). Similarly, elderly adults have been shown to have much poorer performance on bimanual movements (Stelmach, Amrhein, & Goggin, 1988) and timing responses that are coordinated with moving targets (Haywood, 1980).

The effect of aging on memory processes has been extensively studied. Any comprehensive survey is beyond the limits of this review (see recent reviews by Craik, 1994; Kausler, 1994; Light, 1991; Salthouse, 1991). However, there are some generalizations that can be drawn from the literature, and there are some important findings in one area that are particularly relevant to the human performance literature and the present study. This vast array of findings regarding aging and memory function can be more simply organized within the theoretical approach that gave rise to them. For example, stage theories of memory suggest that aging affects one or more of the various stages of memory: encoding, storage, or retrieval. One recent review of the encoding research has concluded that the results in this area are very inconsistent and suggest that very different processes may be taking place in younger and older adults, although they both may ultimately result in comparable encoding performance in many cases (Craik & Jennings, 1992). In general, no age differences have been established during the storage stage, but there is some evidence that verbal fluency declines with age, which seems to be most likely associated with degraded lexical access rather than organizational deficiencies (Light, 1992). Research evidence on retrieval processes is again mixed, largely because of the potential confound with encoding processes. However, older adults generally have poorer free recall performance (Craik & McDowd, 1987) and greater difficulty in recalling well-known words or faces (Burke & Laver, 1990).

An alternative view of aging and memory would be to take the resource theory approach. From this perspective, older adults have been shown to perform more poorly when self-initiated action for memory is required (Craik & McDowd, 1987), when deliberate versus automatic processing is emphasized (Jacoby, 1991), when the contextual cues are not clearly linked to the item to be remembered (Park, Smith, Morrell, Puglisi, & Dudley, 1990), when task-irrelevant material is present during working-memory processing (Hartman & Hasher, 1991), when simultaneous demands are made for remembering items and performing cognitive processing simultaneously

(i.e., working memory; Dobbs & Rule, 1989; Wingfield, Stine, Lahar, & Aberdeen, 1988), and when perceptual speed is required (Light & Spirduso, 1990; Salthouse, 1991; Welford, 1958).

Of additional interest to the present investigation have been the results of studies examining short-term memory. Short-term memory scanning refers to the ability to scan recently presented material and to recognize or recall that information. Many operational tasks require an operator to monitor information streams, select specific information, hold that information in short-term storage, act on various portions of that information, and then update or replace the information, all within a continual process. This is an important memory component in many tasks, and how this ability changes with age has been the object of considerable study. Research using the Sternberg Task (Sternberg, 1966, 1969) may be the best example of how this phenomenon has been studied in the laboratory. The Sternberg Task involves the presentation of a set of items (typically digits, letters, or words) followed by a probe stimulus, which the participant must identify as either being a member of the original set or not. Results from this area of research have revealed that, as aging occurs, many of the qualitative characteristics of the memory search function remain unaffected (Anders, Fozard, & Lillyquist, 1972; Eriksen, Hamlin, & Daye, 1973). That is, reaction time increases linearly with increases in set size, reaction time for both negative and positive probes remains about the same, and reaction time is unaffected by the serial position of the probe within the set. However, many of the quantitative aspects of memory search performance do change with age (Anders, Fozard, & Lillyquist, 1972; Eriksen, Hamlin, & Daye, 1973). As the age of participants increases, the rate of scanning items in memory sets (or overall response time) also increases, as does the time it takes for participants to encode the probe stimulus (or y-axis intercept). These results suggest that the Sternberg Task may be a valuable assessment tool for investigating the influence of age on memory performance. In addition, response time on the Sternberg Task has been shown to be slowed by the effects of chlorpheniramine maleate (Gilliland, Schlegel, & Nesthus, 1997).

Given this wide range of negative effects on performance associated with age, it should not be surprising that age has been identified as one of the most critical factors in job training and performance success among air traffic controllers (Collins, Boone, & VanDeventer, 1981; Mathews & Cobb, 1974) and has been of critical concern for defining pilot certification and mandatory retirement of air carrier pilots (Gerathewohl, 1977, 1978a, 1978b; Hilton Systems, 1994; Hyland, Kay, & Deimler, 1994; Hyland, Kay, Deimler, & Gurman, 1994; Kay, Harris, Voros, Hillman, Hyland, & Deimler, 1994). However, one additional age-related factor, the pharmacokinetics of drug clearance, is also of interest with regard to the present study. Typically, drug clearance time increases with advancing age (Nies & Spielberg, 1996). For example, the half-life clearance time for chlorpheniramine maleate in children is about 12 hours, while the comparable clearance time for adults and elderly adults is 20 hours and 23 hours, respectively (Rumore, 1984; Simons, Martin, Watson, & Simons, 1990). This suggests that, as age increases, the effects of various drugs such as antihistamines may vary. It is unclear how such an interaction might manifest itself in performance.

Another issue of growing interest has been the task performance of women. In recent years, the roles women have assumed in both the public and private sector work force have expanded dramatically. Yet, there is still a lack of data regarding the performance characteristics of women. Past debates over gender differences have added to this interest (Baumeister, 1988; Eagly, 1987,1990; McHugh, Koeske, & Frieze, 1986). These exchanges are beyond the scope of this review, but they point to important issues that influence how gender is viewed as an important variable of study and, thus, how it is viewed as an influence on cognition and performance.

More recently, the general view has been taken that the study of gender effects will illuminate the differences, not deficiencies, between women and men, and that empirical research on gender differences may be the only method for determining whether common beliefs and stereotypes held about men and women have any basis in fact (Eagly, 1990; Halpern, 1992). There have been numerous studies that have explored gender differences in human performance and activity level, and these have been summarized in comprehensive reviews (e.g., Baker, 1987; Eaton & Enns, 1986; Halpern, 1992; Nyborg, 1983). Some of these findings bear directly on the present investigation. For example, girls have been found to be more adept at computational ability at the elementary school level, and it has been reported that men and

women may differ in selected areas of mathematical ability into adulthood, but by adulthood men dominate in general mathematical problem-solving ability and are disproportionately represented at the highest computational ability levels (Hyde, Fennema, & Lamon, 1990; Benbow, 1988; Stones, Beckman, & Stevens, 1982). Another common finding has been that women appear to excel in most areas of verbal ability throughout the life span (Hyde & Linn, 1988; McGuiness, 1976; Shucard, Shucard, & Thomas, 1987), while men appear to excel in almost all areas of visual-spatial ability such as mental rotation, visual perception, and spatiotemporal skill (see McGee, 1979, and Nyborg, 1983, for reviews). Finally, women appear to have a maturational advantage in motor skills up to the age of about 10 years (Waber, 1979), after which, women appear to excel in fine motor skills, such as aiming, dotting, card sorting, and finger dexterity (Noble, 1978), while men excel at speeded tasks, gross motor tasks, athletic tasks, and tracking tasks (Bryden, 1982; Noble, 1978).

These various findings support the major objectives of the present study. Specifically, this study was designed to investigate the effects of the antihistamine, chlorpheniramine maleate, on selected types of performance tasks with the influence of age and gender, singly and in combination with chlorpheniramine maleate, also of prime interest. It was hypothesized that chlorpheniramine maleate would have a negative effect on task performance, much as it did in previous research (Gilliland, Schlegel, & Nesthus, 1997). Increasing age was also hypothesized to have a negative effect on performance, especially on dual tasks or those that emphasized tracking or speeded responses. If gender differences emerged, it was hypothesized that men may have some advantage on tracking or speeded tasks, whereas women may have some advantage on verbal or memory-based tasks.

2.0 METHODOLOGY

2.1 Participants

A total of 96 study participants were recruited from the Oklahoma City, Oklahoma regional community. There were three age groups of men (25-30 years, 40-45 years, and 50-55 years) and two age groups of women (25-30 years and 40-45 years). A minimum of twenty participants in each of the younger and middle-age groups participated in the study. However, due to factors such as highly inconsistent performance and attrition, only 92 participants completed the study. Recruiting participants for the 50-55 year-old group of men proved so difficult (see below) that only ten participants were identified for participation. Table 1 provides information on the participants' characteristics for each comparison group.

Participants were recruited primarily through newspaper advertisements and announcements posted on bulletin boards and distributed to civic groups and local schools. Interested participants were instructed to call and to talk with a laboratory staff member for an initial screening. Due to the nature of the study, participants underwent extensive screening procedures. All participants were surveyed for self-reported normal (or corrected-to-normal) vision, normal hearing, and the absence of any central nervous system stimulant or depressant medications. Additional information about alcohol, caffeine, medication, and possible drug use was also obtained. Of particular concern were medical conditions that might be exacerbated by antihistamine use, for example, asthma, glaucoma, cardiovascular, renal, gastrointestinal, endocrine, and urinary disorders. Women were also questioned about possible pregnancy. Any participant reporting any of these conditions was not allowed to participate in the study. Marginal cases, or those reporting current use of medications for other medical problems, were discussed in detail with a physician who served as the medical monitor for the study. If participants passed the oral screening, they were invited to the laboratory for additional screening and training. During their first session, all participants signed an Informed Consent Form approved by the University of Oklahoma Institutional Review Board-Norman Campus. This consent form informed the participants about the nature of the study and the risks associated with antihistamine use. All participants completed an additional written survey that screened once more for the relevant medical conditions noted above and for other medication use. Very few potential participants in the 25-30 year age group were excluded based on the in-depth screening. An increasing number of potential participants was excluded in the 40-45 year and 50-55 year age groups. Clearly, the increased frequency of cardiovascular, urinary, and endocrine disorders, as well as alcoholism, occurring in these age ranges was the primary reason for excluding participants. Approximately seven potential participants were screened and

excluded in the 25-30 year age groups for men and women, primarily for excessive alcohol use or endocrine disorders. Approximately 17 potential participants in the 40-45 year age groups were excluded, about equally for cardiovascular, endocrine and substance abuse problems, and about 33 potential participants were excluded in the 50-55 year age group of men. The much larger proportion of potential participants excluded in the screening process for the 50-55 year-old group of men was due primarily to the higher frequency of cardiovascular, urinary, and alcoholism problems found within this group. Thus, in addition to the 92 participants who completed the study, approximately 57 additional participants were fully screened and eliminated for medical reasons. The number of potential participants screened and excluded in each age group above was the best estimate available, because on several occasions participants revealed that they had a medical problem that would eliminate them from the study and then terminated the conversation before accurate data on age could be obtained. There were approximately 60-70 of these brief, unidentified contacts.

2.2 Test Battery

Performance Measures

A critical factor considered in the selection of tasks for this study was the specific information processing skills and abilities typically applied in safety-sensitive jobs, such as air traffic control and aircraft piloting. Another factor affecting task selection was the results of a recent study of antihistamine effects on a wide range of human performance tasks (Gilliland, Schlegel, & Nesthus, 1997). In that study, it was found that the tasks most often affected by antihistamines were complex tasks that involved tracking, speeded responses, complex cognitive abilities or memory demands. As a result of these considerations, two primary tasks were selected for inclusion in the study. These were a Dual Task that incorporated Unstable Tracking and the Sternberg Memory Task, and a Switching Task that incorporated the Manikin Task and the Mathematical Processing Task. A second critical tracking task was also used for training purposes and for establishing the group norm for the tracking portion of the Dual Task (as described below). In addition, two subjective scales of mood state were included in the study to assess whether subjective states were related to any performance changes. Descriptions of the tasks and subjective rating scales used in the study follow.

Dual Task — Tracking and Sternberg Memory Search (DUL). One of the most critical and potentially sensitive higher cognitive functions that might be susceptible to risk factor exposure is the ability of the participant to allocate attentional resources among several tasks. To investigate this function, the present study used the time-sharing paradigm that has been well studied in cognitive psychology (Damos, 1991; Damos & Wickens, 1980; O'Donnell & Eggemeier, 1986). The specific form of this paradigm was the Dual Task included in the Unified Tri-Services Cognitive Performance Assessment Battery, or UTC-PAB (Englund, Reeves, Shingledecker, Thorne, Wilson, & Hegge, 1985; Hegge, Reeves, Poole, & Thorne, 1985; Perez, Masline, Ramsey, & Urban, 1987; Schlegel & Gilliland, 1992). The Dual Task consists of the Tracking task and the Sternberg task being presented simultaneously.

Tracking Task. This task, developed by McRuer and Jex (1967), requires that the participant maintain an unstable target in the center of a horizontal line on the monitor screen by manipulating a track ball controller device. An input disturbance is produced by the computer-driven task making the target unstable. An instability parameter (lambda) is used to control the difficulty of the task.

Sternberg Memory Search Task. At the beginning of this task (Sternberg, 1969), a set of letters drawn randomly from a restricted alphabet is presented to the participant for memorization. The set of letters (positive set) stays on the screen for a maximum of five seconds, then the screen is cleared, and a series of single test letters is presented. The participant is instructed to respond as rapidly and accurately as possible to the letters. If the presented letter matches one of the letters in the previously memorized positive set, the participant responds "same" (with a designated key press). If a different letter appears (negative set), then the participant responds "different" (with an alternative designated key press), indicating a non-matching letter was presented. The Sternberg task included in the Dual Task for this study uses a set size of four letters. A different four-letter memory set was used for each session. Thus, a letter can be a target in one session and a distracter in another. In this implementation of the Dual Task, the tracking task is presented in the middle of the screen and the letters of the Sternberg task appear in a fixed location directly above the center null point of the tracking task. The target of the compensatory

tracking task moves laterally. The task lasts for three minutes. For a recent study discussing the implementation of the Dual Task when investigating the effects of antihistamines on military weapon system controllers, see Nesthus, Schiflett, Eddy, and Whitmore (1991; see also Gilliland, Schlegel, & Nesthus, 1997).

Attention Switching Task - Manikin and Mathematical Processing. Time-sharing, as explained above in the Dual Task, is different from attention switching, which is another required attentional process that could be sensitive to the factors studied in this investigation. Workers must often make rapid shifts in attentional focus, as well as in the skills required to respond to a change in task demands. This externally-directed behavior defies automaticity of task performance in any true sense, since it must be flexible enough to respond to unusual demands and requires continual and high levels of attention and effort. Thus, a test was needed to probe the participant's ability to shift attention and resource allocation in response to rapidly changing and unpredictable external demands. Such a procedure has been created using two tasks currently in the UTC-PAB (O'Donnell, 1991). In this Switching Task, the participant has two distinct and discrete tasks to perform: the Manikin Task and the Mathematical Processing Task.

Manikin Task (MAN). This task has had a long history of use (Benson & Gedye, 1963; Reader, Benel, & Rahe, 1981; Schlegel & Storm, 1983) and has been presented in a wide variety of formats by military psychologists (Miller, Takamoto, Bartel, & Brown, 1985). As implemented in this experiment, a manikin "stick figure" is presented facing either forward or backward. In addition, the figure is presented either upright or upside-down. The figure is standing on a box and inside the box is either a rectangle or a circle. In the figure's two hands are a rectangle and a circle. The participant's task is to note which symbol is inside the box, and then to determine which of the manikin's hands is holding the designated symbol. The participant then presses a key corresponding to the manikin's left or right hand.

Mathematical Processing Task (MTH). This task is based on a similar task described by Perez et al. (1987). It presents three, single-digit numbers that are to be added or subtracted. If the answer is greater than 5, one key response is given. If the answer is less than 5, another key response is required. This task has been reported by Shingledecker (1984) to be a relatively pure index of mathematical functioning.

As implemented in the Switching Task, the Manikin Task and the Mathematical Processing Task appeared side-by-side and simultaneously on every stimulus screen. However, an indicator also appeared in the screen at the same time directing the participant's attention to the task that was "active" (i.e., required a response on that trial). The participant had to make an exclusive response to the active task, where reaction time and percent correct data were obtained only for that task. Switching occurred between the two tasks from trial to trial on a random basis (within constraints). Therefore, the participant had to remember to watch the indicator, had to allocate the appropriate resources to respond to the specific task that was active on any specific trial, and then had to make the appropriate response. This task provides not only typical response measures such as response time and percent correct for each discrete task, but also measures of the switching skills described above by calculating scores for trials that occur immediately after the switch from one task to the other—or "transition" trials. It is suggested that performance on these trials may be a particularly sensitive measure of attentional switching capacity—presumably a capability that might vary with work load or demand from external factors such as stress, drugs, or environmental variables. The task lasts four minutes. Prior results using this test can be found in O'Donnell (1991), Gilliland and Schlegel (1997), Gilliland, Schlegel, and Nesthus (1997), and Schlegel, Shehab, and Gilliland (1994).

Critical Tracking Task (TRK). Much like the Tracking Task described above, the Critical Tracking Task also requires the participant to maintain an unstable target in the center of a horizontal line on the monitor screen by manipulating a trackball controller device. An input disturbance is produced by the computer-driven task making the target unstable. However, in the Critical Tracking Task, the instability parameter (lambda) begins at a low level and is incremented systematically, so that the task grows increasingly and rapidly more difficult until the participant eventually fails by not being able to maintain the target in the center region of the screen. When the participant loses control and the target violates the edge boundary, the task resets to the

initial low lambda value and begins to increment again. This variation of the tracking task was used early in the practice sessions to expose the participants to increasingly more difficult levels of tracking performance in an attempt both to improve their performance and to reduce the amount of time needed to learn the tracking task. This variation was not used in the testing sessions, and data for this task are not reported here.

Subjective (Self-Report) Measures

Antihistamine Symptoms Questionnaire (AHSQ) — consists of a checklist of common side-effects associated with the use of antihistamines. This scale was rationally constructed based on side-effects listed in the medical and pharmaceutical literature. The test takes approximately 1 to 2 minutes.

Activity State Questionnaire (ACTSQ) — consists of 25 items scored on a seven-point scale, which was an expanded form of the Pennebaker Physical Symptoms Checklist (Pennebaker, 1982) to assess the current state of physical health. Participants also responded to two questions regarding their level of preparedness for task performance. The test takes approximately 2 minutes.

Mood Scale II (MOOD)— The Mood Scale II (POMS; McNair, Lorr, & Droppleman, 1971) consists of 36 descriptive adjectives to assess the current mood. The adjectives were computer presented and were grouped in six categories: activity, happiness, depression, anger, fatigue and fear. Participants responded by pressing "1" if they felt the adjective did not describe their current mood, "2" if they felt the adjective moderately described their mood, and "3" if the adjective adequately described their current mood. The test takes approximately 2 minutes.

Monk Mood Scale (MONK)— The Monk Mood Scale (Monk, 1989) consists of four measures of global vigor (alertness, sleepiness, motivation loss, and weariness) and four measures of global affective state (happiness, sad, calmness, and tension). Each state was presented with an accompanying visual analogue scale, a simple line on the computer screen labeled from "very little" (zero) to "very much" (100), with 50 being the midpoint (or neutral feeling). Numeric values were not indicated on the display to ensure that the participants would not merely repeat previous responses. Participants placed the cursor at that point on the line that best represented how they felt. The four scores for each of the two dimensions were combined using the algebraic formulas suggested by Monk (1989).

Table 2 presents a summary of the task codes used throughout the remainder of the report when referring to the various tasks.

2.3 Equipment

All tasks were presented on eight microcomputer workstations. Each workstation consisted of a Gateway™ 486-33 MHz processor with the necessary input devices ("Anykey" keyboard, Microsoft™ mouse, Kensington Expert Mouse™ 4.0 trackball). All data were recorded on these machines and on participant diskettes. Data were then downloaded to a central data management system (Gateway™ 486-66 MHz) for data reduction and analysis using Microsoft Excel™ and Statistical Analysis System™ (SAS). Testing was automated to allow a participant to perform the tests independently and in a minimal amount of time. Of course, multiple experimenters were present at all times to monitor the participants' safety and performance, and to provide assistance, if needed. The software automatically performed all functions, such as participant identification, file naming, test sequencing, and data backup.

2.4 Test Facilities

All testing was conducted in a computerized performance assessment laboratory located at the University of Oklahoma. The testing workstations were approximately 3 ft wide and 3 ft deep and were located in one room (approximately 13 ft by 20 ft). The stations were separated by acoustic panels. The computers and response devices were placed on tables in the individual participant testing stations positioned at a height of approximately 28 inches.

Another room of approximately the same size served as the data reduction and project management office. A third room served as an auxiliary room for interviewing, orientation, drug administration, and miscellaneous activities. All of these rooms represent well-lighted modern laboratory space with centrally controlled heating and air conditioning. Temperature in the testing room was maintained at approximately 68° F throughout the test sessions.

2.5 Experimental Procedure

Data were collected in six-day cycles from Monday through Saturday. The term "training day" will refer to a day from Monday through Thursday (on which training sessions occurred). The term "test day" will be used to refer to Friday or Saturday (on which testing

sessions occurred). The term "session" will refer to a series of task trials performed at a specific time on a training or test day. "Trial" will usually refer to a discrete response by a participant to the presentation of a single stimulus for any specific task. For example, participants performed a series of trials for each of the tasks (which collectively comprise a "session") on each "training" or "test" day within a cycle. Each participant participated in one cycle.

Participants were run in cycles made up of groups of up to eight participants that ran at approximately 2-hour intervals throughout the day (see details below). Because participant recruitment was exceptionally difficult, not all cycles had eight members in each group. In fact, some cycles had less than four groups, and many groups had fewer than eight members. Eight cycles were completed with variable numbers of weeks between cycles to allow for participant recruitment. The first cycle began in April, and the last cycle was run approximately eight months later in November of the same year.

Participants were scheduled for the same time period each day for all six days within a cycle. The daily periods began at the following times: 8:00 a.m., 10:00 a.m., 1:00 p.m., and 3:00 p.m. Each of the training days on Monday through Thursday involved a two-hour period. The test periods on Friday and Saturday were three hours long but, because the actual task performance time on these testing days was not as long, the same start times as the training days were possible (i.e., overlapping of groups was possible due to the long waiting period between pre- and post-testing sessions). Thus, participants generally started all training and testing sessions at the same time each day. A few participants were shifted through the week due to scheduling conflicts but never more than one time block (i.e., no more than one 2-hour shift). So, in general, participants did not deviate much from their assigned training/testing time periods throughout the cycle.

Participants arrived on Monday for the first two-hour, daily training session. The participants first completed informed consent forms and questionnaires concerning alcohol usage and general information on participant characteristics. All participants were provided additional information regarding the antihistamine to be administered and detailed information about the testing protocol for the remainder of the week. Because the antihistamine administration occurred over two days and because a double-blind administration protocol was used, participants were also required to sign agreements to comply with restrictions on their transportation and activities following both testing days during which they might have been administered antihistamines.

Training Protocol. A brief orientation was conducted on the first day, demonstrating how to perform each task. Each participant then completed a short test to confirm that they understood the correct procedures. Each block of training sessions on the first through the fourth day required approximately two hours.

Participants began each training day by completing a Performance Assessment Questionnaire to report any abnormal events or experiences (e.g., sleep loss or illness) that might affect their performance. On each of the first four days, the computerized test battery began with the three subjective (self-report) tasks. Table 3 lists the task sequence during each daily session. The sequence of tasks was selected to maximize training on the more difficult tasks, and to build systematically the skills and confidence to maximize learning rates. The test orders were also developed to minimize interference between sequential tasks (e.g., hand fatigue from consecutive tracking sessions).

The interval between tasks was participant-regulated, that is, the tasks did not start automatically. Participants were required to press a key to start the next task. This gave participants the opportunity to ask questions, receive feedback, and rest briefly, if needed. Summary feedback was presented to the participant at the end of each task during all sessions.

The Critical Tracking Task included in the sequence on the first day identified the participant's basic tracking ability by steadily increasing the task difficulty (lambda) until the participant lost control of the cursor (see Section 2.2, Test Battery, for a description of the Critical Tracking Task). The sensitivity level of the Dual Tracking Task (lambda) was initially set to 2.0, which provided a relatively easy tracking task in which few participants experienced any control losses by the end of the first day. The lambda level was increased to 3.7 beginning with Session 10 on the second day. A lambda of 3.7 has been used in previous studies (Schlegel, Shehab, & Gilliland, 1994; Gilliland & Schlegel, 1997; Gilliland, Schlegel, & Nesthus, 1997) and presents a challenging task. The level represents 70% of the maximum lambda typically achieved by the seventh and eight sessions of the Critical Tracking task.

Participants were carefully monitored during the first two to three sessions to ensure their understanding of the tasks and to verify their progress toward adequate baseline performance. In a few cases, participants whose performance failed to improve at a reasonable pace were interrupted and given additional instruction. Twelve participants received additional instruction on the use of the trackball. Six participants had problems with the Manikin portion of the Switching Task and were given further instruction. This typically resulted in an immediate improvement in performance.

Participants were again presented with the MOOD and MONK subjective tests approximately half way through the total number of sessions each day. The final task each day was the Fatigue scale (FAT), a subjective rating (from 1 to 7) of the participant's vigor.

Testing Protocol. The testing task sequences are outlined in Table 3. Testing was conducted on Friday and Saturday of each week. Due to the additional activities on test days (as described below), test sessions lasted 3 hours each. As an added precautionary measure, on Friday, participants completed a second informed consent form that once again explained the nature of antihistamine effects and possible side effects. Participants were advised to eat only light meals well in advance of the test session and to avoid any foods that might slow drug absorption rate (e.g., high fat foods or dairy products).

The daily testing protocol included the following series of activities. Participants entered the laboratory, completed the Performance Assessment Questionnaire, then completed one session of each of the tasks followed by the subjective assessment tests, a second session of each of the performance tasks, and then the Fatigue scale. Participants had been randomly assigned to counterbalanced orderings of the antihistamine-placebo conditions on the two test days. After completing the first 30-min testing period (which included two test sessions on each task), participants were given a beverage containing approximately 6 oz of fruit juice, 1 oz of crushed ice, and either 4 mg of ChlorTrimeton® brand chlorpheniramine maleate in syrup form or a placebo. The placebo beverage had only two to three drops of the chlorpheniramine maleate syrup floated on the surface. The fruit juice beverage masked very effectively the presence of the drug, and any slight difference in aroma was equalized in the placebo beverage by the few drops of the drug syrup that were floated on top. After consuming the beverage, participants waited 90 minutes for the drug to reach an effective blood level. During this time, participants were carefully observed, but encouraged to read, talk, or watch videos provided for their entertainment. After this waiting period, the participants completed a shortened version of the Performance Assessment Questionnaire and repeated the earlier task sequence. Following these post-test performance sessions, participants were given a debriefing questionnaire.

When participants were finished on each of the two test session days, they were escorted to their homes. Due to the potential sedating nature of antihistamines, no participant was allowed to drive from the laboratory or leave for activities that would involve physical risk or the use of machinery. At the end of the second and final test day, participants were paid for their involvement in the study and, once again, were escorted to their homes. A bonus payment system was used to increase motivation and study completion rate. Participants were paid a base rate ($8.00/hour) for the number of hours they participated and, upon completion of the study, were given an additional bonus ($2.00/hour) for every hour of participation. The total compensation for participants was typically about $200.00. In a few cases, some participants earned up to $250.00 due to the need for additional training or testing trials as a result of equipment malfunction or data loss.

3.0 RESULTS

3.1 Data Reduction

The procedure for data reduction involved several phases. Raw and summary data files from the individual participant PC diskettes and workstation hard drives were transferred to the Gateway™ 486/66 MHz data management computer. Statistical Analysis System™ (SAS) DATA step input programs were used to extract the data from the summary files and to create individual SAS databases for each task. The SAS UNIVARIATE procedure was used to provide extensive descriptive statistics for each dependent variable. These analyses were reviewed for questionable data points that could be the result of procedural errors or data outliers. The few deleted outlier observations were typically caused by identifiable hardware, software, or participant errors. Data points in question were corrected where possible and removed when clearly justifiable (as a result of issues noted above).

3.2 Training Data

To examine the pattern of learning or skill acquisition for the various tasks, data from the 30 training trials conducted during the Monday through Thursday sessions were summarized by Age-Gender group. Figures 1 and 2 present representative training data for the Dual Task and Switching Task performance measures. (A more detailed examination of learning rate data from this investigation can be found in Fry, Schlegel, & Gilliland, 1997.) Note that the graph of the Dual Task performance measure during training has a discontinuity in the data between Sessions 9 and 10. As explained in the Training Protocol portion of the Method section above, the tracking task lambda parameter (difficulty level) was initially set at a lower level for ease in training and then changed at Session 10 to a group difficulty level. This change in difficulty level required a reallocation of resources by the participant (resulting in a new learning period immediately following Session 10) that affected not only tracking performance, but also Sternberg memory task performance.

In general, performance improved rapidly over the first three to five training sessions for many performance variables and began a clear course of stabilization by approximately 10 sessions, for most variables. Continued improvement was seen in some variables for several additional sessions, although there was a much reduced rate of improvement during these sessions. Relative stability was seen in all tasks for Sessions 25-30, and many tasks demonstrated stability well before Session 25. Thus, it was concluded that the training protocol was successful in bringing participants to well-practiced and stable levels of performance.

While no formal tests of significance were applied across training data trials to determine group differences, it is noteworthy that, on the Dual Task, women age 40-45 performed noticeably worse than the other groups on both of the tracking task dependent measures, control losses and RMS error. Men age 50-55 also performed poorly in comparison to the other groups on control losses. The younger groups of men and women appeared to perform the best on tracking. On the Sternberg memory task portion of the Dual task, older men age 50-55 appeared to be among the slowest of the groups in response time and among the more accurate in percent correct—possibly reflecting an emphasis on accuracy in a speed-accuracy trade off. Males 25-30 years appeared to be both the fastest and reasonably accurate, which ranked them clearly as the best performing group on the overall throughput measure.

On the Switching Task, the older male participants (50-55 years) were typically slower to respond for almost all response time measures during later more stable baseline trials, although they did not appear to be all that dissimilar for response speed during initial training trials. For accuracy measures, this group of males was almost always quite inaccurate during initial trials compared to other groups, but quickly improved to performance levels not unlike the other groups during later baseline trials. To a much lesser degree, this same trend was seen for women age 40-45 years, but not necessarily for men age 40-45 years. It would appear that these older men (and to some degree, women age 40-45 years) tended to emphasize accuracy at the cost of speed in responding to this task as well.

3.3 Test Data: Task Performance Data

This investigation can be described as having a multifactorial design. The analysis of the data from this study was complicated by two factors. First, the Age variable was not completely crossed with the Gender variable within the design, that is, there was no group of 50-55 year-old females. Second, because of the potential for highly complex relationships between age and gender, independent main effect tests of these two variables are probably not as illuminating as multiple comparison tests across the five comparison groups. Certainly gender and age main effects are important to test, but it might be possible to find an overall gender or age main effect that would be virtually meaningless, especially if there were clear differences among age and gender groups that mediated the overall effect. For example, if women were found to be more accurate overall on some task (i.e., a main effect for gender), it might be the case that the main effect was produced primarily because the women 25-30 years were found to be more accurate than both men 40-45 years and men 50-55 years. Such a finding might belie the fact that women 40-45 years were performing poorly in comparison to other groups, and women and men 25-30 years were performing at comparable levels.

For these reasons, several approaches for analyzing the data from this investigation were taken. Initially, ANOVA (2 X 2 X 2) on post-test scores were used to test the main effects of DRUG (antihistamine or

placebo), GENDER (men or women), and AGE (25-30 or 40-45 years), leaving out the 50-55 year-old men. This provided a completely crossed and essentially orthogonal design that yielded the most stable and reliable ANOVA of the data. Additional ANOVA using a combined AGE-GENDER Group variable forming five groups (Women 25-30 years, Women 40-45 years, Men 25-30 years, Men 40-45 years, and Men 50-55 years) were also conducted. These Group-based analyses provided tests that included the older group of men, but compromised the competency of the ANOVA due to the introduction of non-orthogonality. In addition, because the age and gender variables were combined within the Group variable, any significant DRUG X GROUP interaction may well represent a two or three way interaction (i.e., a DRUG X GENDER X AGE interaction). However, additional multiple comparison tests (Tukey Studentized Range Test, HSD) across all five age and gender groups provided the opportunity to separate these issues and examine the influence of the older group of men in relation to the other comparison groups. Additional pre-post and difference score analyses were conducted, but because all of the findings of these analyses were consistent with the analyses previously outlined, only the post-test score analysis mentioned above will be reported.

Of added importance was the visual analysis of the data. While many studies limit the presentation of graphs to data representing only those main effects or interactions that are significant, the complexity of variables in this study warrant more inclusive figures. The figures included in the following description of the results present data from pre- and post-test sessions for men and women of all age groups. The figures clearly depict the simultaneous and independent contribution of the different variables.

The alpha level for statistical significance was set at $p = .05$ for this study. Setting the alpha level for statistical significance constitutes a tradeoff between the probabilities of Type I and Type II errors. It could be argued that in situations involving human safety, protecting against Type II errors ought to be favored somewhat. That is, it is always possible that by chance alone a truly significant effect will not be detected, which in this case would mean that an important potentially hazardous drug effect might go undetected due to a fairly stringent decision rule for statistical significance. To make it somewhat more difficult for this to occur in this study, alpha was set at $p = .05$. This has the simultaneous effect of increasing the probability of a Type I error—that is, detecting an apparent significant finding when in fact it is not significant—or a "false alarm." However, we believe that where human safety may be involved, the slightly higher probability of a false alarm has less potential risk than failing to detect real threats to safety.

Due to the complexity of the design and analysis of this investigation, means and standard deviations for all possible comparison groups are provided in Appendix A. Both pre-drug and post-drug mean and standard deviation values are included, however, it should be remembered that all statistical analyses were based on the post-drug data. Specific mean and standard deviation values thus are not cited throughout the discussion of the results.

Dual Task

Tracking. The major dependent variables for the Tracking Task were Control Losses and RMS Error. Control Losses refer to each time the participant allows the cursor to travel so far from the center null point of the monitor display that it violates the edge of the screen and resets to the center. The RMS Error variable is a root mean square deviation measure that summarizes the cursor's total amount of deviation from the center null point of the display during a session.

Figure 3 presents the mean pre- and post-test scores for the various groups for both drug conditions. No main effect for DRUG was found for Control Losses, $F(1, 79) = .02$, $p = .90$, but the DRUG X GENDER interaction was significant, $F(1, 79) = 4.26$, $p = .04$. Women had a slight increase in control losses after the administration of antihistamine, while men had a decrease in control losses after antihistamine. The DRUG X AGE interaction was not significant, $F(1, 79) = 1.20$, $p = .28$. However, there was a significant GENDER main effect, $F(1, 78) = 8.08$, $p = .006$, and a significant AGE main effect, $F(1, 78) = 13.37$, $p = .0005$, for Control Losses. On average, men committed fewer control losses than women, and participants in the 40-45 year-old group had more control losses than participants in the 25-30 year-old group. However, these data also reinforce the view mentioned previously about the need for careful evaluation of the main effects and interactions. While it is true that women, on average, had more control losses than men, and

that older participants, on average, had more control losses than younger participants, the most accurate summary of the relationship was represented in the significant AGE X GENDER interaction, $F(1, 78) = 8.95$, $p = .004$, as depicted in Figure 3. The multiple comparison analysis revealed that women in the 40-45 year-old group had far more control losses than younger women, as well as the men in both the 25-30 and 40-45 year-old groups. However, there were no significant differences between the control loss performances of women 25-30 years old and any of the groups of men. In general, age appeared to exert a negative influence on control loss performance, but age also appeared to interact with gender such that the decline in performance in women from the 25-30 year group to the 40-45 year group was far greater than the decline seen in men across comparable age groups, indeed across all three age groups of men.

For the RMS Error variable of the Tracking Task there was not a significant main effect for DRUG, $F(1,79) = 1.45$, $p = .23$, or for the DRUG X GENDER interaction, $F(1,79) = .53$, $p = .47$, but there was a significant DRUG X AGE interaction, $F(1,79) = 10.23$, $p = .002$. As seen in Figure 4, antihistamine administration produced a slight increase in RMS error in 25-30 year-old participants but resulted in a small improvement in RMS error in 40-45 year-old participants. No significant GENDER main effect, $F(1,78) = 2.16$, $p = .14$, or GENDER X AGE interaction, $F(1,78) = 1.52$, $p = .22$, was found. However, there was a significant AGE main effect $F(1,78) = 3.97$, $p = .05$, although this AGE main effect must once again be interpreted cautiously because it appears to be due primarily to heightened RMS error in the women 40-45 years old. In fact, multiple comparison analysis revealed that there were no significant differences between any of the comparison groups in terms of RMS error. Thus, while there was a significant main effect for AGE, the magnitude of the changes was notable only for women. In this case, statistical significance may not confer importance, with the possible exception of the changes observed in women.

Memory Search. The ANOVA for mean correct response time (MNCORRT), shown in Figure 5, yielded no significant main effects or significant interactions. The multiple comparison test of the Group variable did not reveal any significant differences among the five comparison groups.

Likewise, the ANOVA for both the accuracy measure for the Sternberg memory task (i.e., percent correct, PC) and the throughput measure (THRPUT) yielded no significant differences for any main effect or interaction (see Figures 6 and 7). Nor did the multiple comparison test yield any significant differences.

Switching Task

Manikin Task. Figure 8 presents the response time variable (MANCORRT) for the Manikin task. While the ANOVA for these data yielded no significant main effect for DRUG or GENDER, or any significant two-way interaction, there was a significant AGE main effect, $F(1,78) = 12.85$, $p = .0006$. Participants 40-45 years old were nearly 300 msec slower than participants 25-30 years old. Multiple comparison analysis also revealed that the men 50-55 years old were significantly slower than either men or women in the 25-30 year-old groups. Thus, the 20-25 year old participants, regardless of gender, were significantly faster than the older participants.

Not unlike the percent correct measure for many tasks, the percent correct measure for the Manikin task did not result in any significant differences when subjected to ANOVA. The data for this variable are presented in Figure 9.

Not surprisingly, the ANOVA for the throughput variable for the Manikin task was very similar to the results of the MANCORRT measure described above (see Figure 10). There were no significant differences for the main effects of DRUG or GENDER, or the two-way interactions. However, again the main effect of AGE was significant, $F(1,78) = 18.99$, $p = .0001$, and the multiple comparison test yielded trends similar to those seen for the MANCORRT data—that is, men 50-55 years old and women 40-45 years old were significantly less effective in throughput performance, as compared with both of the 25-30 year old groups.

One of the unique aspects of the Switching Task is the ability to provide a measure of attention switching capability—that is, scores are calculated for trials following the change from one task to the other, or "transition" scores. A significant AGE main effect was found for the response time transition scores for the Manikin Task, $F(1,78) = 7.30$, $p = .008$. Participants in the 40-45 year-old groups were significantly slower in their response time to transition trials than were the participants in the 25-30 year-old groups.

No other significant main effects or interactions were found for Manikin Task transition variables. Figures 11 and 12 present the data for the transition-based Manikin response time and percent correct measures, respectively.

Mathematical Processing Task. Analysis of the response time variable for Mathematical Processing yielded a significant DRUG X GENDER interaction, $F(1,79) = 4.80, p = .03$. Women took longer to respond after antihistamine administration, while men were faster after taking antihistamines—see Figure 13. This trend was consistent across all age groups within both genders. No other main effects or interactions were significant. However, there was a compelling trend toward slower reaction times with increasing age across both gender groups.

The ANOVA for percent correct for the Mathematical Processing task yielded no significant main effects or interaction effects. However, while not as apparent as the trend seen in the response time measure, the data for percent correct shown in Figure 14 do reveal a trend toward a slight increase in accuracy with increasing age across the 25-30 and 40-45 year-old groups. It should be noted however that the absolute change associated with this trend is quite small (no more than 2-3%).

The analysis of the throughput measure for the Mathematical Processing task yielded results similar to the response time and percent correct data discussed above. In the case of the throughput measure, a significant main effect for AGE was found, $F(1,78) = 5.97, p = .02$. Figure 15 clearly shows the decline in throughput performance across age categories, which was of approximately equal magnitude for women and men. No other main effects or interactions yielded significant differences.

Finally, the analysis of transition measures for Mathematical Processing yielded no significant main effects or interactions. The data for Mathematical Processing transition scores for response time and percent correct are presented in Figures 16 and 17, respectively.

3.4 Test Data: Subjective (Self-Report) Measures

Participants provided a variety of self-report measures prior to and after antihistamine administration. They were asked to provide assessments of their current feelings related to common antihistamine symptoms (AHSQ), general physical symptoms (ACTSQ), predominant emotional state (MOOD), and mood state (MONK). The following is a summary of the results for each of these measures.

Antihistamine Symptoms Questionnaire

No significant main effects or interactions were found in the analysis of the AHSQ data. Apparently, there was no significant change reported by the participants in the symptoms commonly experienced after antihistamine administration, at least at the level of a self-report measure. It is evident from Figure 18, however, that the trend seen for means for the Drug main effect were in the expected direction, demonstrating higher levels of symptoms after the antihistamine exposure.

Activity State Questionnaire

Figure 19 presents the data for the PHYSICAL variable, a general measure of physical symptoms experienced by the participants based on the Activity State Questionnaire (ACTSQ—an expansion of the Pennebaker Symptom/Emotion questionnaire; Pennebaker, 1982). The analysis of this scale yielded two significant findings. There was a significant main effect for DRUG, $F(1, 79) = 9.45, p = .003$, and a significant main effect for AGE, $F(1.78) = 7.43, p = .008$. Antihistamine administration was associated with a higher number of physical symptoms, as compared with the placebo group, and the 25-30 year-old participants reported a significantly higher level of physical symptoms, as compared with the older, 40-45 year-old participants.

Participants also rated their general level of perceived preparedness for performing the tasks on the ACTSQ, which was represented by the PREP scale score (see Figure 20). The PREP scale score analysis yielded only a significant main effect for DRUG, $F(1, 79) = 9.12, p = .003$. Following antihistamine administration, participants reported being less prepared to perform the tasks, as compared with the placebo condition.

Mood Scale II

Participants reported their moods before and after antihistamine administration by responding to adjectives on the Mood Scale II. Using a 3-point scale, participants recorded a response of "1" to indicate they did not feel that the adjective described their current mood, while a response of "3" indicated that the adjec-

tive adequately described the participant's mood. The adjectives are divided into six categories (Activity, Happiness, Depression, Anger, Fatigue, and Fear). Time taken to respond to each item is also recorded and summarized across all categories (RTALL).

Activity. The Activity scale analysis resulted in a number of significant findings (see Figure 21). The DRUG main effect, $F(1, 79) = 9.64$, $p = .003$, was significant. Participants rated their activity level significantly lower after antihistamine administration, as compared with their activity ratings after the placebo condition. The AGE main effect was also significant, $F(1, 79) = 5.25$, $p = .02$. Ratings of activity level by participants 40-45 years old were significantly higher than activity ratings of 25-30 year-old participants. The analysis also yielded a significant DRUG X AGE interaction, $F(1,79) = 4.80$, $p = .03$. The participants in the 25-30 year-old group rated their activity level lower following antihistamine administration, while the participants 40-45 years old evidenced no change in their activity level across drug conditions.

The analysis of response time for the Activity scale yielded significant main effects for Drug, $F(1, 79) = 4.00$, $p = .05$, and AGE, $F(1, 78) = 5.52$, $p = .02$. Response times following antihistamine administration were significantly slower that response times following the placebo condition, and the 40-45 year-old participants had response times significantly slower than participants 25-30 years old (see Figure 22).

Happiness. The analysis of the Happiness scale (see Figure 23) resulted in a significant main effect only for AGE, $F(1, 78) = 12.58$, $p = .0007$. Participants in the 40-45 year-old age group rated themselves significantly happier than the participants in the 25-30 year-old group. The analysis of response time to the Happiness scale resulted in a significant DRUG X GENDER interaction, $F(1, 79) = 4.13$, $p = .04$. As revealed in Figure 24, women evidenced an increase in happiness following antihistamine administration, while men showed a decrease in happiness.

Depression. Figures 25 and 26 present the mean ratings and response times, respectively, of the comparison groups for the Depression scale. Although there was a significant AGE main effect for mean ratings, $F(1,79) = 5.26$, $p = .02$, feelings of depression seemed to be largely unaffected by the manipulations in the study. The statistically significant yet very small group difference in mean ratings between the 25-30 and 40-45 year-old groups was probably due to very low variability overall, but was probably of very little practical importance. The only notable difference was seen in response time (see Figure 26). The 50-55 year-old men were significantly slower in response speed than the two other groups of men, but did not differ significantly from any of the groups of women.

Anger. The Anger scale analysis yielded a significant AGE main effect, $F(1,78) = 4.08$, $p = .05$ (see Figure 27). Participants 25-30 years old rated their anger level higher than participants 40-45 years old. There was also a significant DRUG X GENDER interaction found for the Anger scale, $F(1,79) = 4.19$, $p = .04$. Women had a slight decrease in reported anger from the placebo to antihistamine drug conditions, while men had a slight increase in anger across these conditions. In addition, there was a significant GENDER X AGE interaction, $F(1, 78) = 4.19$, $p = .04$, for the response time measure for this scale, as seen in Figure 28. Women reported their anger more rapidly with advancing age, while men took longer to respond with advancing age. However, in all of these cases, the amount of variability in this measure was so small that the actual difference in means, although statistically significant, probably does not constitute a meaningful difference.

Fatigue. The analysis of the Fatigue scale yielded a significant DRUG main effect, $F(1, 79) = 14.55$, $p = .0003$, and a significant AGE main effect, $F(1,78) = 5.04$, $p = .03$, see Figure 29. Participants reported significantly more fatigue after administration of antihistamine, as compared with the placebo condition, and participants 25-30 years old reported significantly more fatigue than participants 40-45 years old. Figure 30 presents the response time data for the Fatigue scale measure. A significant main effect for DRUG, $F(1, 79) = 9.64$, $p = .003$, revealed that participants were significantly slower in responding after antihistamine administration, as compared with the placebo condition.

Fear. There were no significant differences found for any main effect or interaction for self-reported level of fear (see Figure 31) or the associated response time measure (see Figure 32).

Overall Response Time for the Mood Scale II Ratings. Analysis of the response time for registering responses to the entire Mood Scale II questionnaire yielded one significant finding—a DRUG main effect, $F(1, 79) = 4.43$, $p = .04$ (see Figure 33). In general, participants responded faster under the placebo condition, as compared with the antihistamine condition.

Monk Mood Scale

The Monk Mood Scale has been shown to be a quick, efficient technique to measure the level of Vigor (alertness, vigilance) and Affective State (feelings, mood) of participants. Monk (1989) developed this scale using a visual analogue method that provides the participant a visual representation (a horizontal line) anchored by the labels "very little" and "very much." The participants place the cursor over the point on the line that best describes their current mood and then click the mouse button. The position of the participant's mouse is then converted to a 0-100 point scale. The Vigor measure includes four items (alertness, sleepiness, motivation loss and weariness), and the Affective State measure also includes four items (happiness, sadness, calmness and tension).

Each group of four measures was summed algebraically to give a single global value of Vigor (GV) and Affective State (GA). The formulas used to calculate Global Vigor (GV) and Global Affect (GA) were:

Global Vigor (GV) =
[Alert + 300 - Sleepy - Effort - Weary]/4
Global Affect (GA) =
[Happy + Calm + 200 - Sad - Tense]/4.

The GV and GA scores were calculated for each participant for each session and graphed for visual analysis. Inspection of the individual graphs led to elimination of the Monk data for participants 316, 318, 359, 370 and 390. The response patterns of these participants strongly suggested that their responses were either incorrectly entered or untruthful. This was indicated by an absolute lack of variation in their responses across the sessions. The basic response patterns of these participants was that all answers were given as either 49 and 51, or as 0 and 100. In retrospect, it appeared that these participants either did not understand how to respond to this scale or they were giving simplistic programmed responses.

Results of the ANOVA for the Global Vigor scores yielded significant DRUG, $F(1, 79) = 12.62$, $p = .0007$, and AGE, $F(1, 78) = 6.15$, $p = .02$, main effects (see Figure 34). Participants rated their vigor level significantly lower after antihistamine administration as compared to after the placebo condition, and participants in the 25-30 year-old group rated their vigor level lower than participants in the 40-45 year-old group. No significant main effects or interactions were found in the analysis of the Global Affect scores (see Figure 35).

In addition to the analysis of the Monk Mood Scale higher order factors of Vigor and Affective State, individual scale items were also analyzed because they had direct relevance to the common effects of antihistamines. For example, significant DRUG main effects were found for the variables Alert, $F(1, 75) = 13.31$, $p = .0005$ (see Figure 36), Weary, $F(1, 75) = 4.39$, $p = .04$ (see Figure 37), and Sleepy, $F(1, 75) = 19.55$, $p = .0001$ (see Figure 38). In comparison with the placebo condition, after participants had been administered antihistamines they reported feeling less alert, more weary, and more sleepy. In addition, a significant AGE main effect for the EFFORT variable, $F(1, 74) = 7.31$, $p = .008$, revealed that participants in the 40-45 year-old age group reported exerting more effort than participants in the 25-30 year-old group.

4.0 DISCUSSION

This investigation was designed to explore the effects of chlorpheniramine maleate, age, and gender on a range of performance tasks. Previous research suggested that chlorpheniramine maleate ought to have a detrimental effect on tracking (Clarke & Nicholson, 1978; Gilliland, Schlegel, & Nesthus, 1997), reaction time (Gilliland, Schlegel, & Nesthus, 1997; Lee, Lader, & Kitler, 1988; Witek et al., 1995), and dual or complex multi-tasks (Gilliland, Schlegel, & Nesthus, 1997). The results of this study did not demonstrate unequivocal support of this hypothesis. There were no significant main effects found for the administration of chlorpheniramine maleate on any dependent measure for any performance task. However, several interactions with chlorpheniramine maleate provided results that *were* consistent with this hypothesis. For example, the analysis of the Tracking task data revealed that chlorpheniramine maleate interacted with both age and gender. Younger participants had greater tracking variability (RMS error) under antihistamine, as compared with older participants. These data could be seen as consistent with other studies that have found tracking psychomotor performance decrements with antihistamine administration typically in younger participants (Clarke & Nicholson, 1978; Gilliland, Schlegel, & Nesthus, 1997; Higgins, Davis, Fiorica, Iampietro, Vaughan, & Funkhouser, 1968). Somewhat at odds with this view was the finding that female participants

had more control losses while taking antihistamine, but males actually had fewer control losses while taking antihistamine. The analysis of the Mathematical Processing task data also revealed that females had slower response times after antihistamine administration, while males actually improved in response speed after antihistamine use.

Exactly how these performance results integrate with past research is difficult to assess. The results of this study did not show clear and unmistakable effects due solely to antihistamine across all participants. The interaction effects demonstrated in this study suggest that chlorpheniramine maleate may well have negative effects on a wide variety of performance tasks, but that these effects may be complex interactive ones. One point that may be important to consider in reconciling these results is that the dose of chlorpheniramine maleate used in this study was a single, over-the-counter dose at the level of 4 mg. This dose is moderate and lower than dosages used in many studies of the effects of chlorpheniramine maleate on task performance. That this single dosage showed interactive effects on performance could be viewed as impressive. It could be that this single dose created a somewhat marginal level of impairment in comparison to higher doses or the effects of compounding doses as seen in the recent study by Gilliland, Schlegel, and Nesthus (1997). This marginal level of drug action may not have been enough to produce drug main effects, such as those seen in other studies, but was enough to combine and interact effectively with other variables, such as age or gender, in mediating task performance

There is another perspective on the possible effects that antihistamines and other variables may have had on performance in this study. The present results need to be considered within the context of this study and in contrast to the methodologies of other studies. Participants in this study were very carefully screened, resulting in participants who were essentially free of any confounding concomitant medical disorders or drug use/abuse. The participants were also well-trained and seemingly well-motivated. Under such conditions, these participants may have responded much like the participants of Philpot, Biegalski, and Booker. (1993), who noted that highly motivated participants could overcome the negative effects of antihistamines. Nonetheless, in the present study some participants did show signs of degraded performance due to antihistamines on two complex multi-tasks. While not quite as pervasive as the findings of other studies, these results do raise serious questions about the indiscriminate use of antihistamines during safety sensitive job performance.

Another very important finding of this study was found in the self-report data. As noted previously, some studies have shown detrimental effects of antihistamines on task performance without any indication in the self-reports of participants that they were aware of the negative influence antihistamines were having on their performance ability (Clarke & Nicholson, 1978, Lee, Lader, & Kitler, 1988). The data from this study might appear anomalous in this regard. Performance was not as clearly affected in this study, yet subjective measures across a number of self-report instruments offered fairly impressive agreement and support for the detrimental effects of antihistamines. Participants in this study clearly reported a greater number of physical symptoms, a feeling of being less well prepared to perform, a lower activity level, and greater fatigue after antihistamine administration, as compared with a placebo condition. However, some aspects of this study may have increased the ability to detect such self-reports. Several questionnaires were utilized to assess a wider range of possible areas where antihistamines might have their effects. Self-report instruments with varying degrees of sensitivity were also used. Finally, participants were well instructed about the use of the questionnaires and were both encouraged to respond thoughtfully and were given adequate time to respond in that manner.

Age demonstrated perhaps the most unambiguous negative effects on performance. Older participants had more control losses and variability during tracking, a finding that was generally more pronounced for women, as compared with men. Older participants also had slower response time to the Manikin Task and trends toward slower response time in the Mathematical Processing task, as well as poorer levels of throughput in both tasks. These findings were quite consistent with past research suggesting poorer tracking ability (Ruch, 1934) and slower response time (Salthouse, 1985; Spirduso, 1975; Welford, 1987) with advancing age.

Interestingly, no significant findings were found for the Memory Search task for any of the variables explored in this study. Given the nature of the participant sample, as noted above, it may have been that the difficulty level of the memory task, even in

combination with the Tracking task, was not sufficient to produce experimental effects. While there was no evidence in instructional sets to suggest that participants were systematically biased to favor one task over another, it may have been the case that many of the participants did concentrate on the memory task to the detriment of the Tracking task. If so, it was probably because the tracking task was considerably more difficult in relation to the Memory Search task, and this greater level of difficulty may have imparted more importance and perhaps a concomitant level of engagement.

Gender did not play an overwhelmingly important role in determining performance with the exception of interactive effects. Younger women appeared to perform just as well as younger men on all tasks, but advancing age seemed to have a greater detrimental effect on women, as compared with men. This was true primarily for the tracking task (both Control Losses and RMS error). The locus of this effect is intriguing. While age seems to have a general degrading effect on both men and women, women appear to show more rapid decline in performance ability across age categories. The data from this study do not provide an explanation of this effect, but at least two reasons are possible. The Age by Gender interactions could be biologically or cognitively based. Women could have a faster decline in the neurological or cognitive processes that form the foundation for psychomotor skill performance. On the other hand, these differences could be explained by social variables. Until the last few decades, men may have traditionally had more exposure to psychomotor task performance activities related to tracking, as compared with women. That is probably not as true today. This might explain why older women might not perform as well as older men—simply the lack of comparable experience—and why younger women perform just as well as younger men.

Finally, it is important to note one additional methodological issue. Many of the tasks used in this study are modernized and computerized versions of tasks that have evolved from a long line of traditional laboratory human performance tasks. Some of the earliest computerized versions of these tasks were designed to be benchmark tasks for a variety of human performance assessment purposes and were thus designed to be stable and robust to confounding variables (AGARD, 1989). Thus, the computer implementation of many of these tasks may not be as sensitive in detecting subtler drug effects. Simply increasing the difficulty of these tasks may provide a method for addressing this problem, or it may be necessary to look more closely at task batteries designed for neurological or drug assessment.

In summary, the results of this study provided some evidence that chlorpheniramine maleate has a negative effect on task performance for some individuals. This study also supported the view that age is related to poorer task performance, in fact, in a more universal manner than antihistamine effects. Finally, gender appears to moderate performance, but more likely it moderates performance in a significant way when in combination with age.

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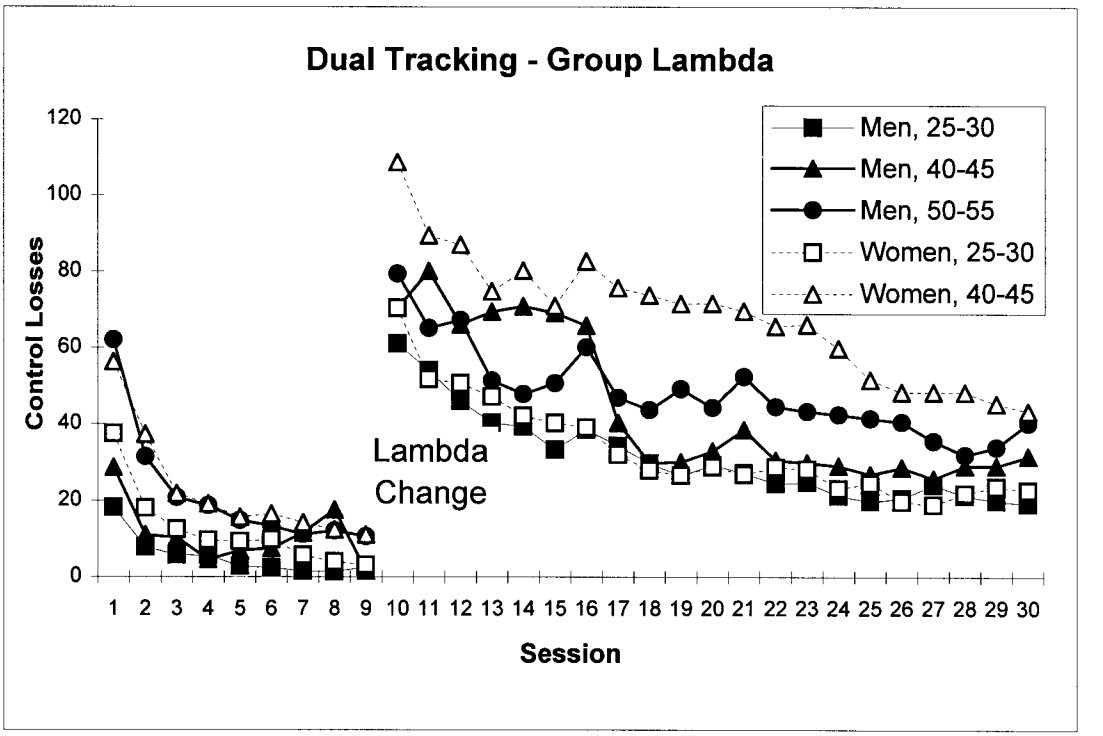

Figure 1. Training Data by Group for Dual Tracking Control Losses.

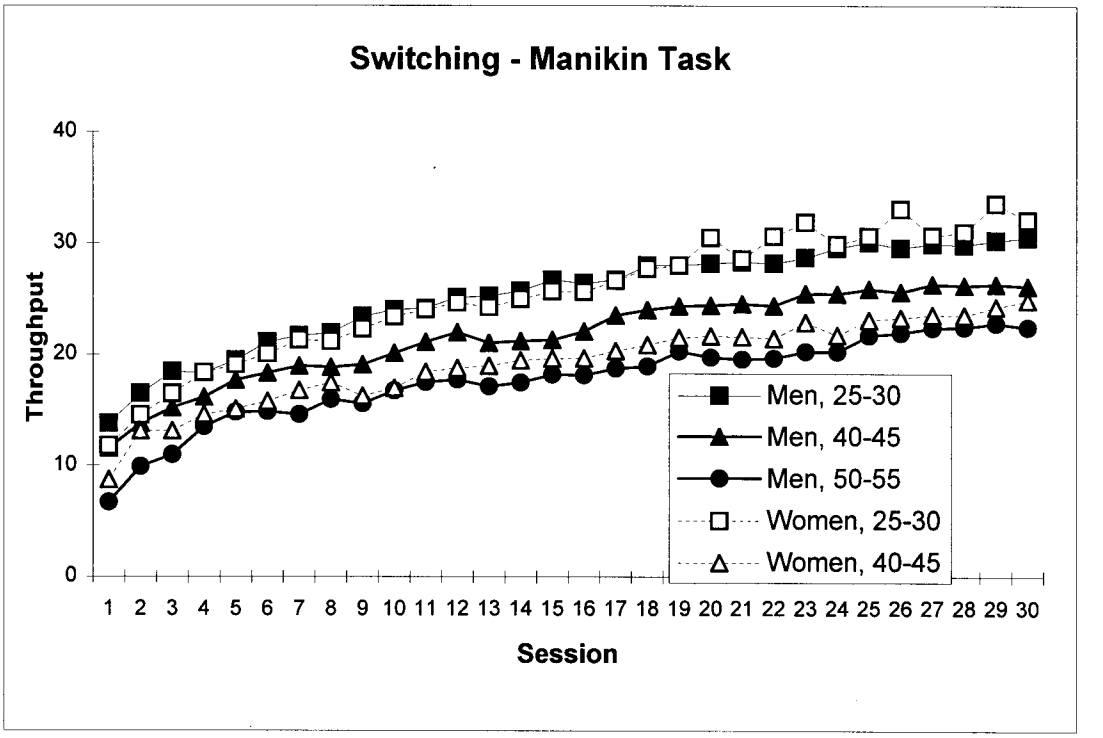

Figure 2. Training Data by Group for Manikin Task Throughput.

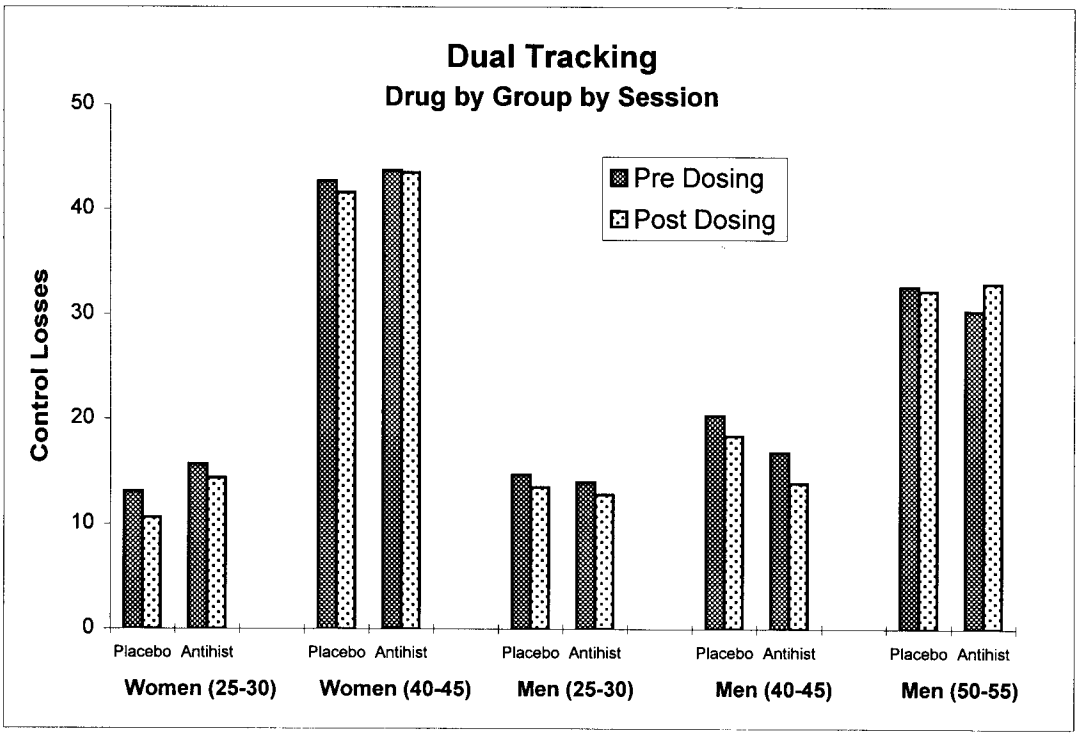

Figure 3. Dual Tracking Control Losses.

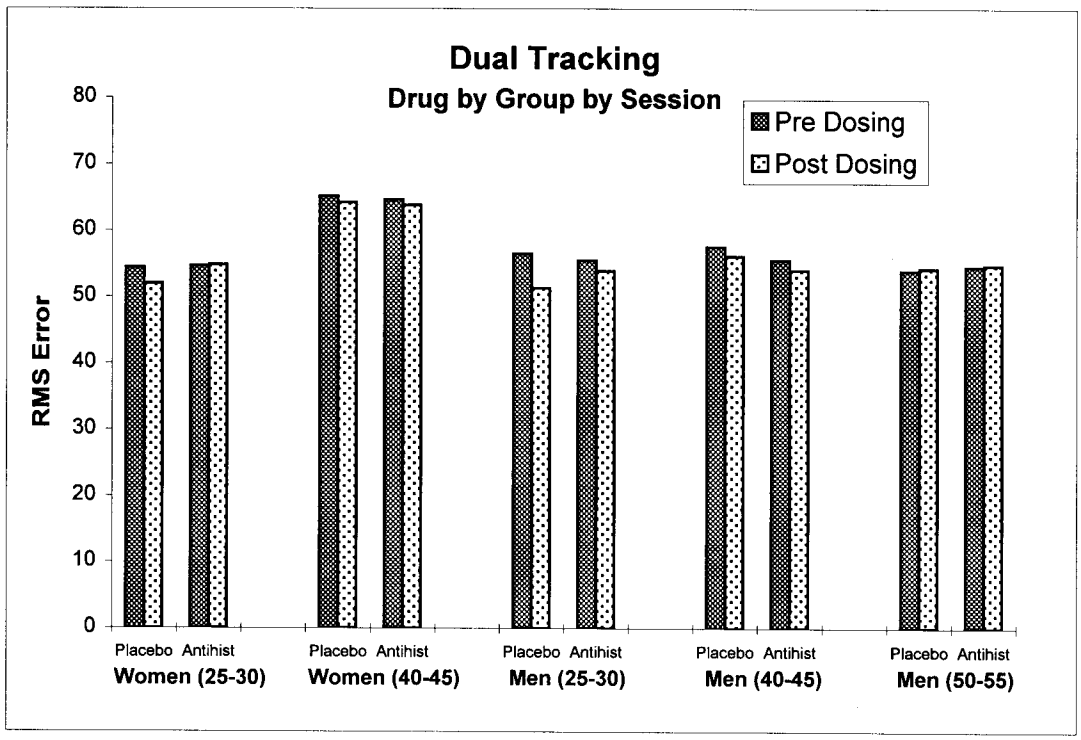

Figure 4. Dual Tracking RMS Error.

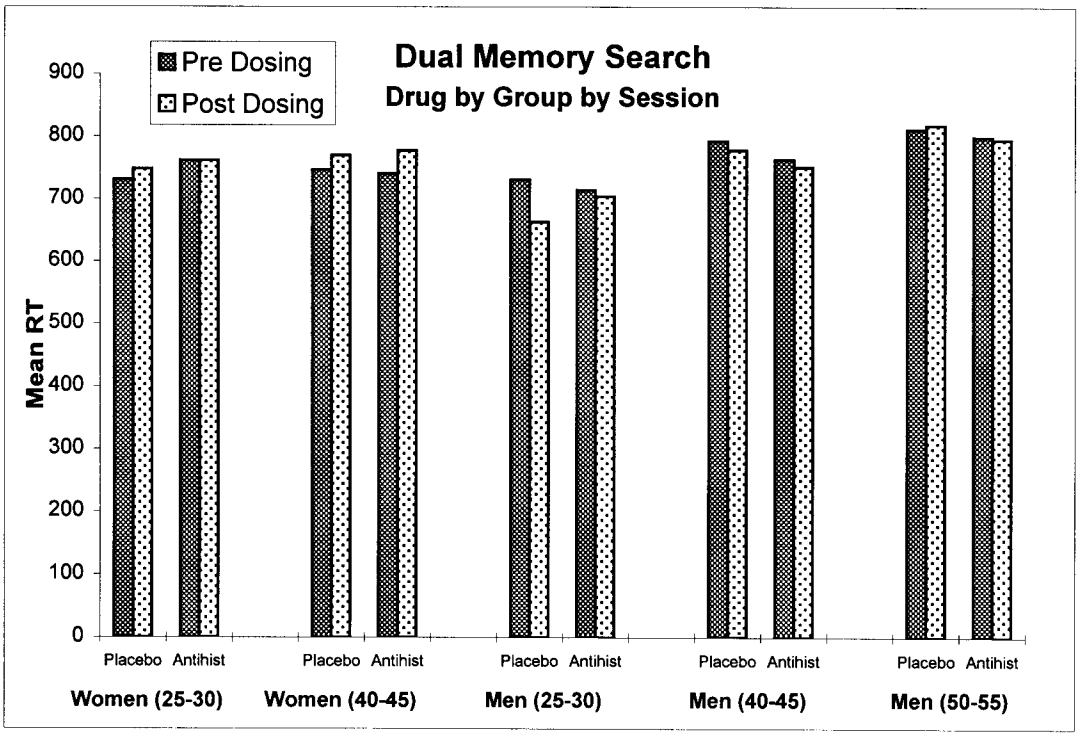

Figure 5. Dual Memory Search Mean RT.

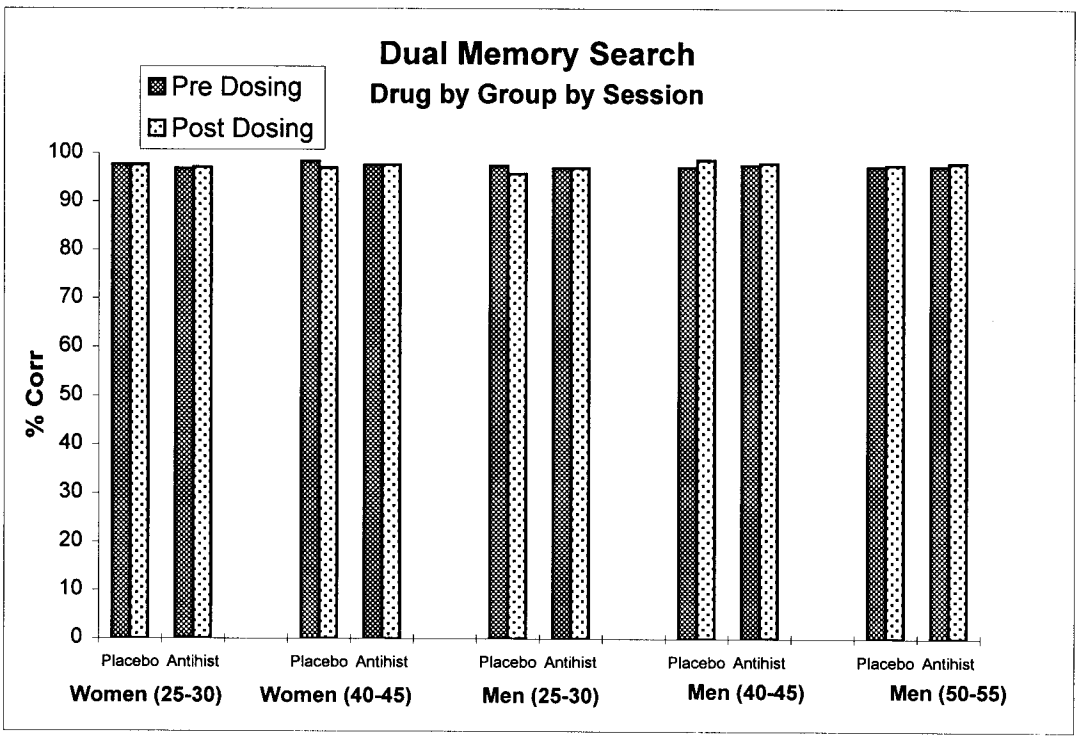

Figure 6. Dual Memory Search Percent Correct.

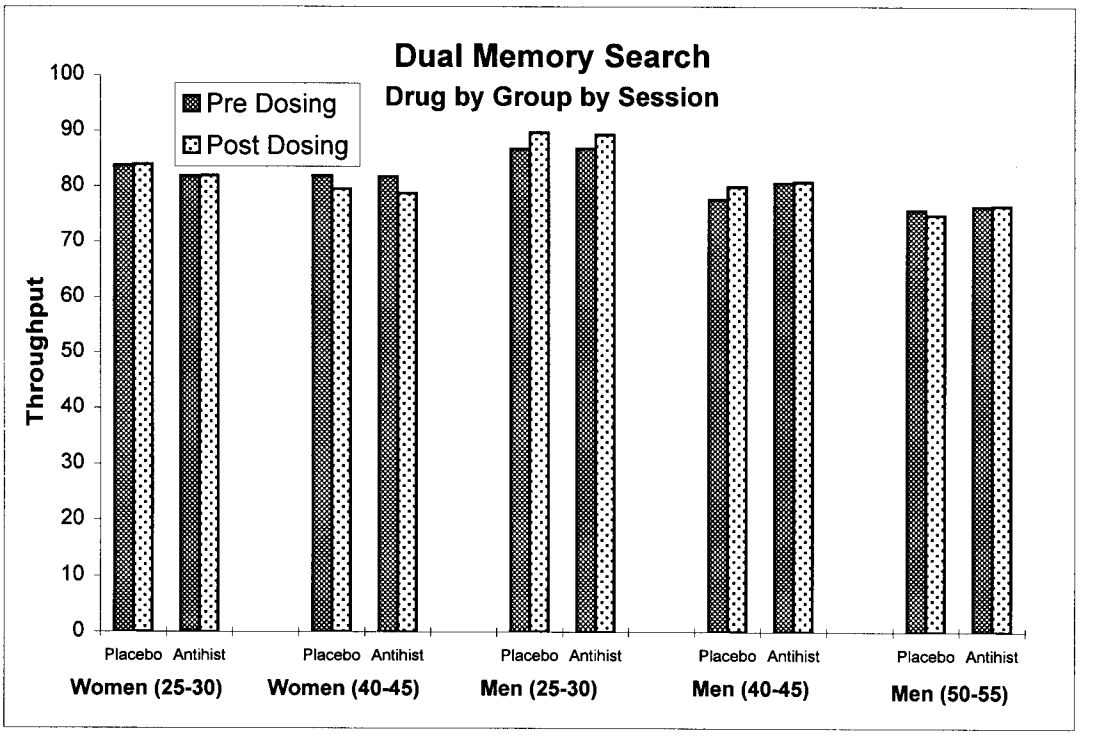

Figure 7. Dual Memory Search Throughput.

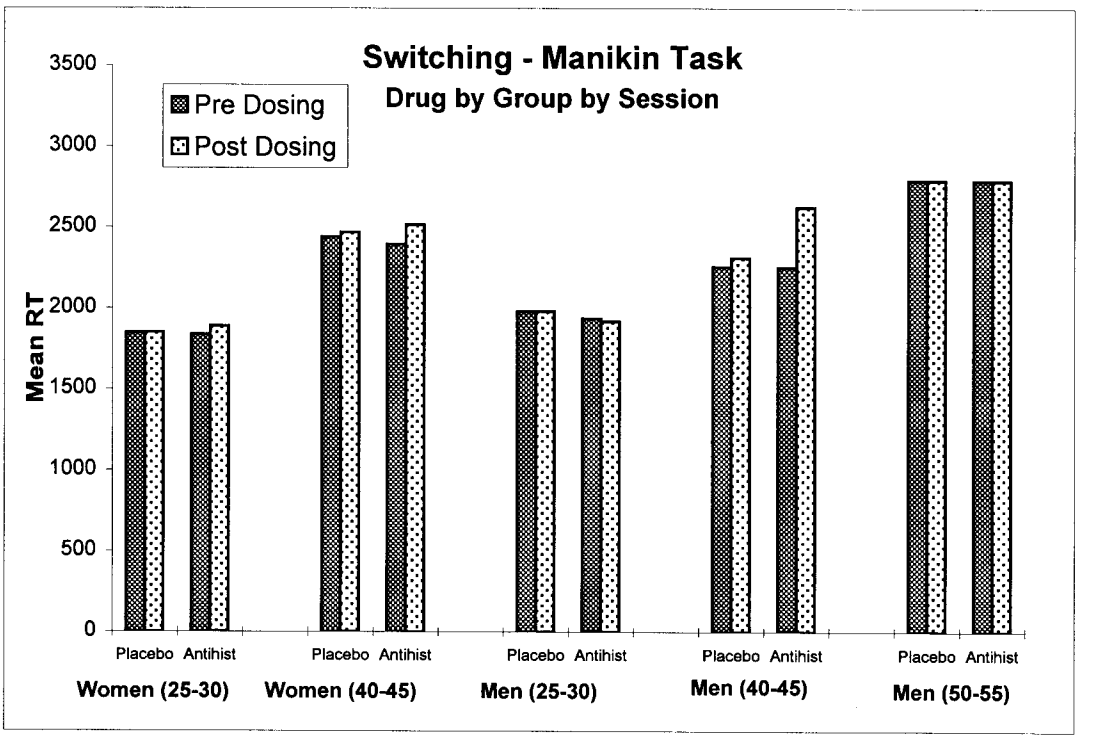

Figure 8. Switching - Manikin Task Mean RT.

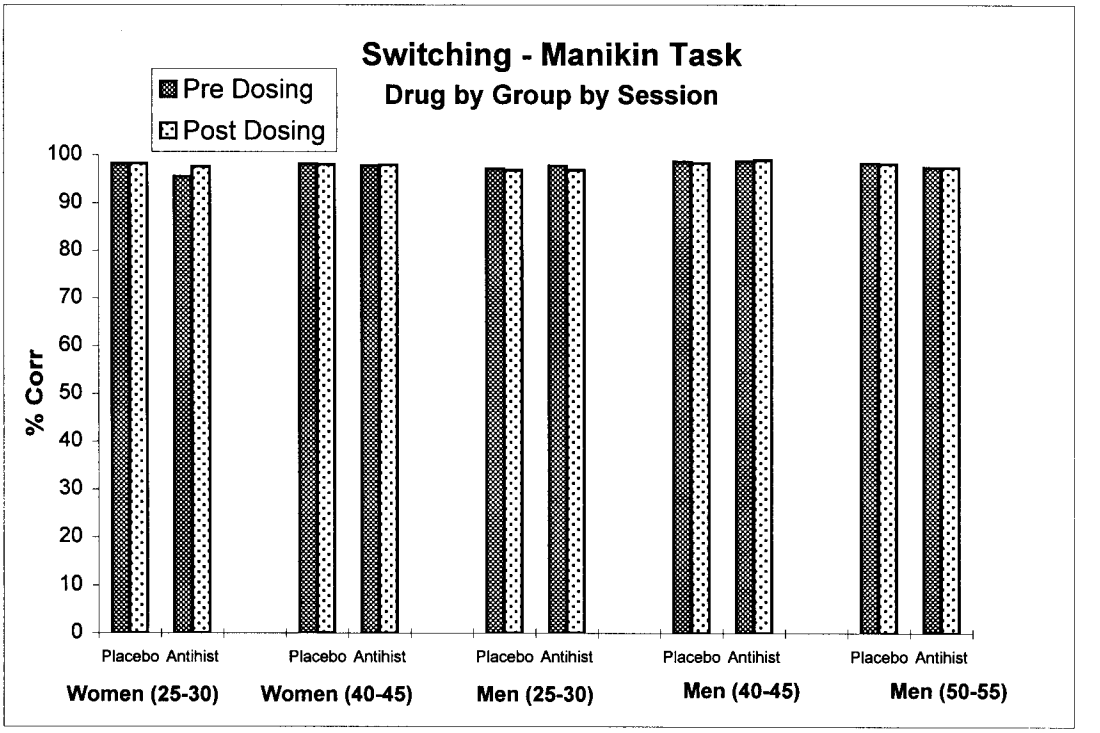

Figure 9. Switching - Manikin Task Percent Correct.

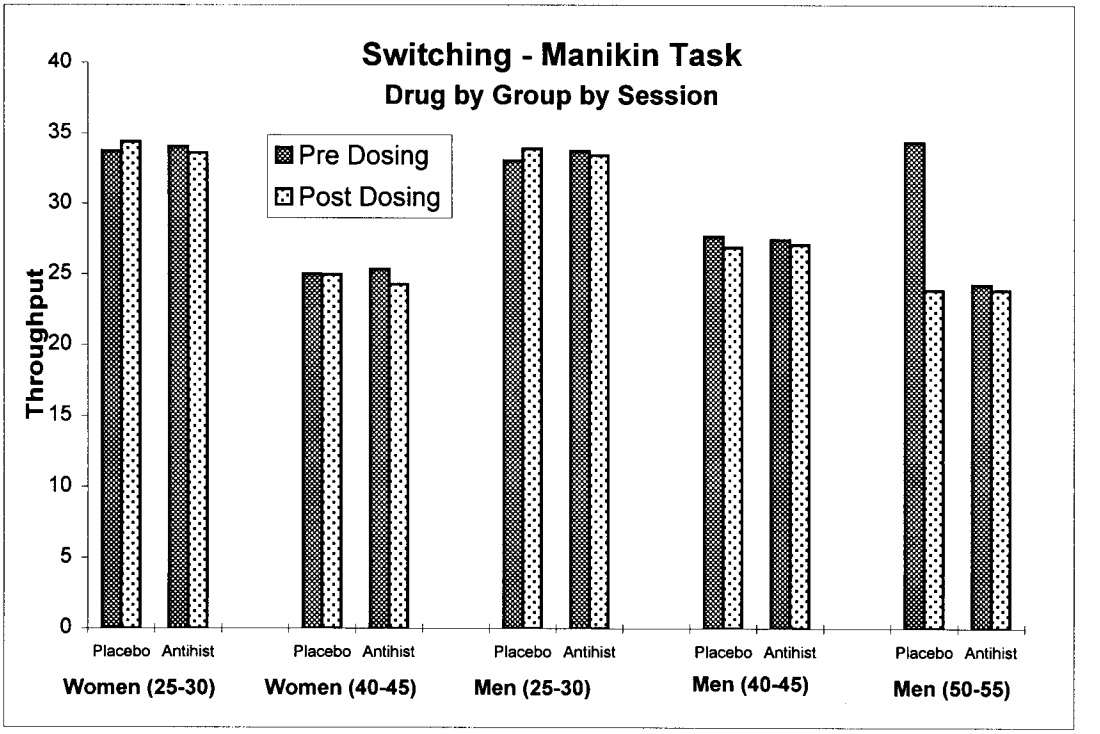

Figure 10. Switching - Manikin Task Throughput.

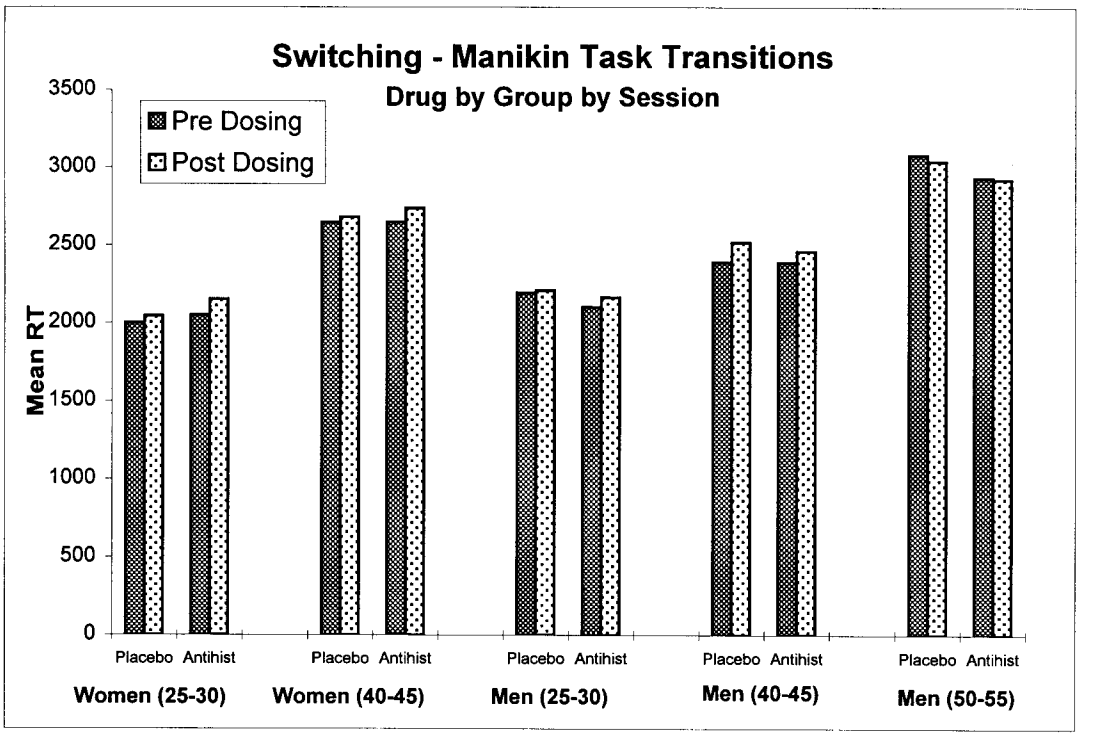

Figure 11. Switching - Manikin Task Mean RT for Transitions.

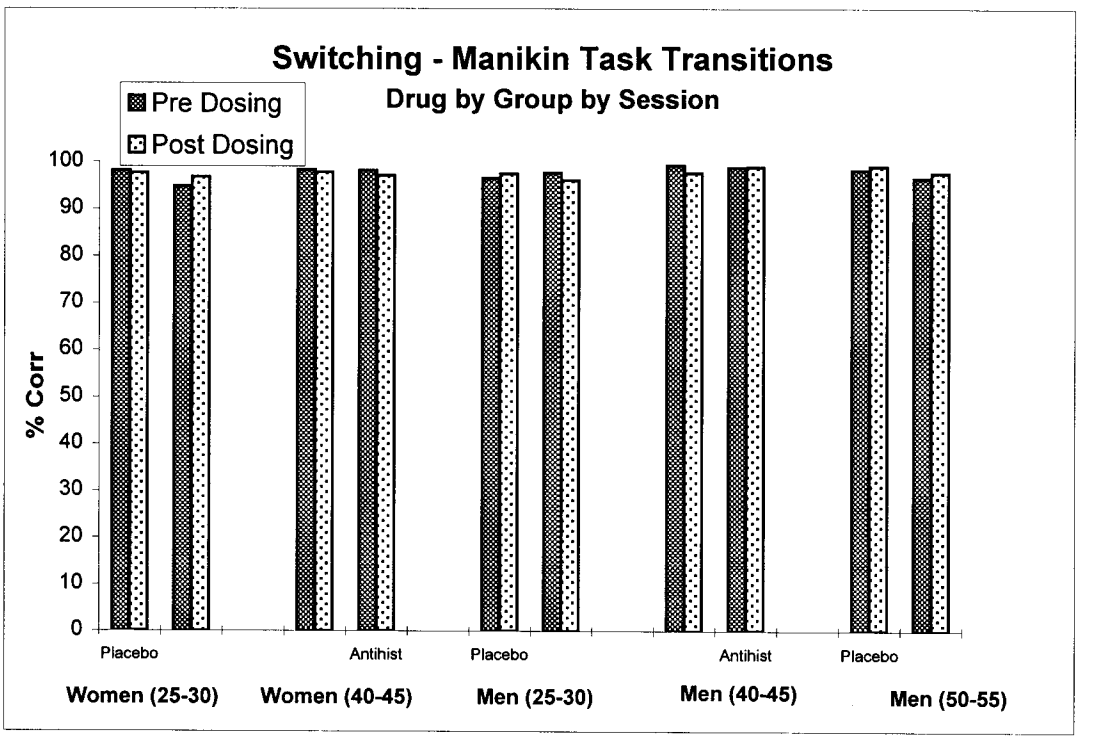

Figure 12. Switching - Manikin Task Percent Correct for Transitions.

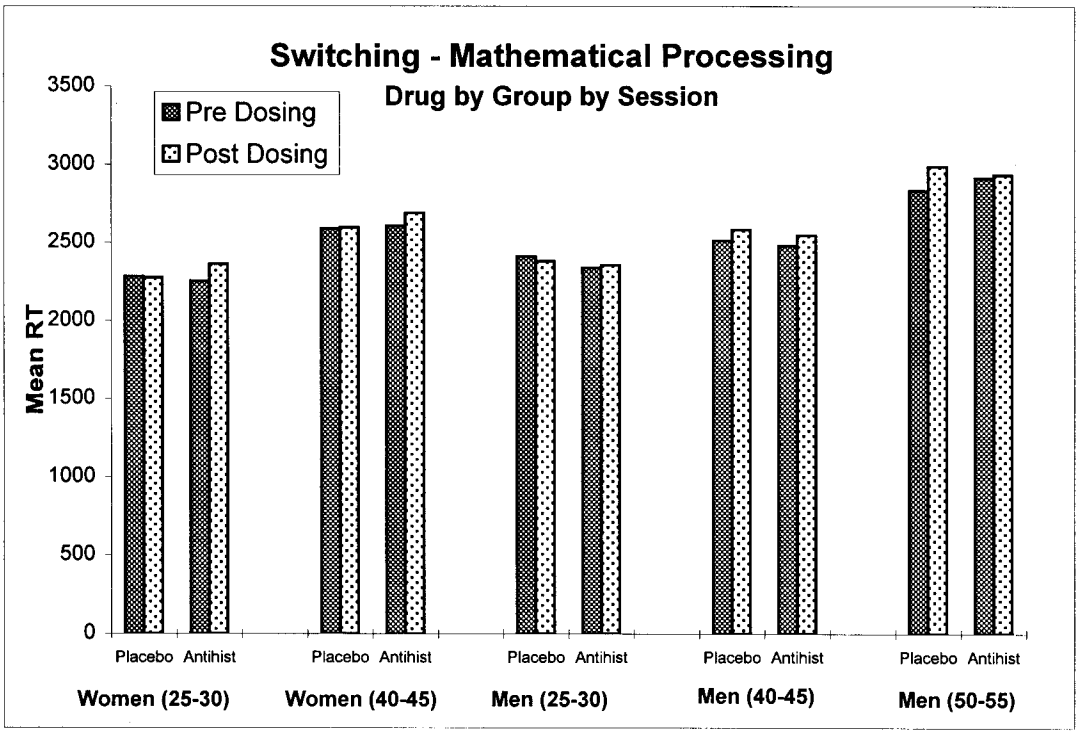

Figure 13. Switching - Mathematical Processing Mean RT.

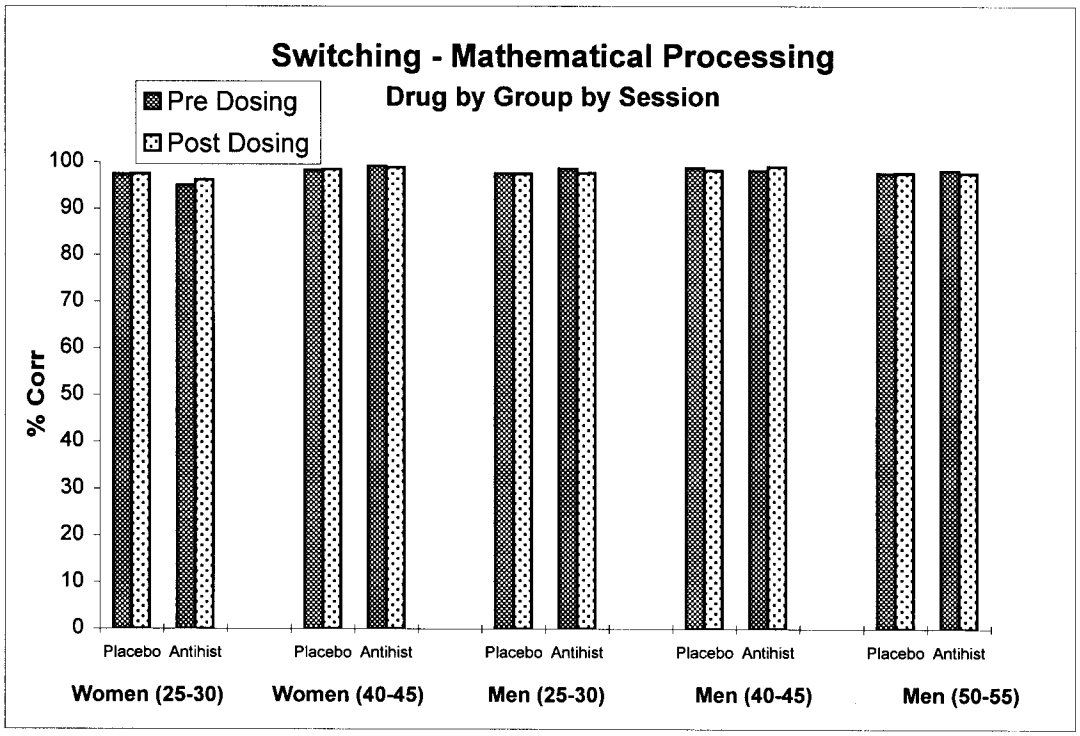

Figure 14. Switching - Mathematical Processing Percent Correct.

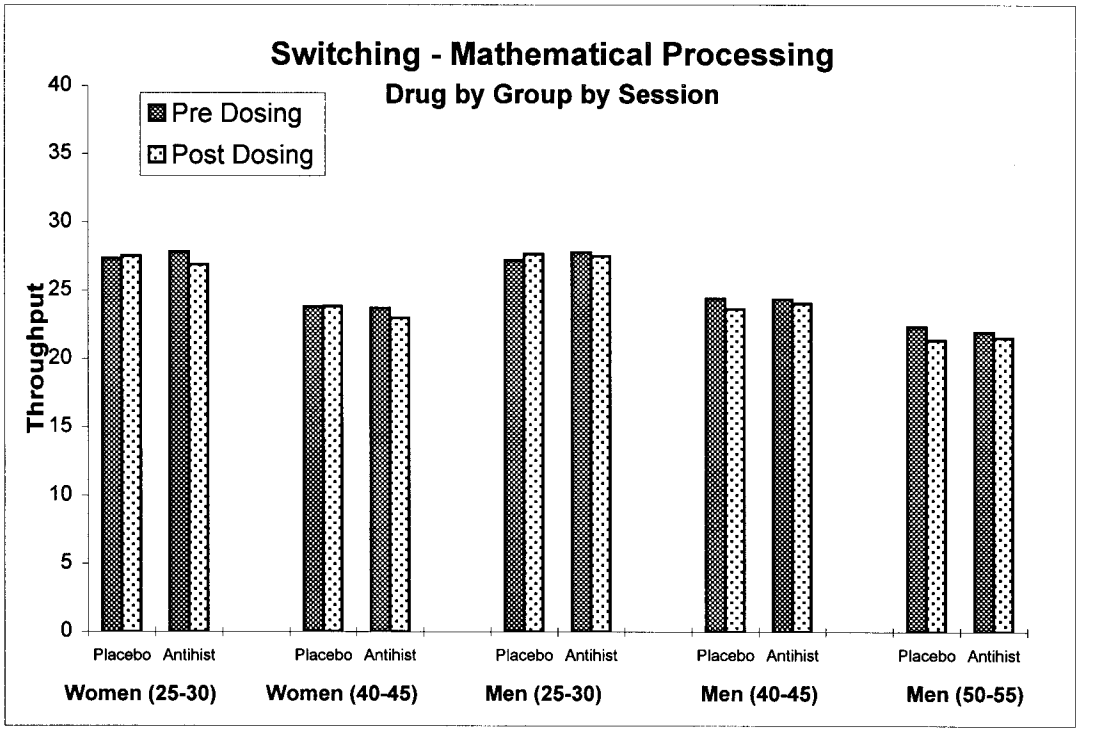

Figure 15. Switching - Mathematical Processing Throughput.

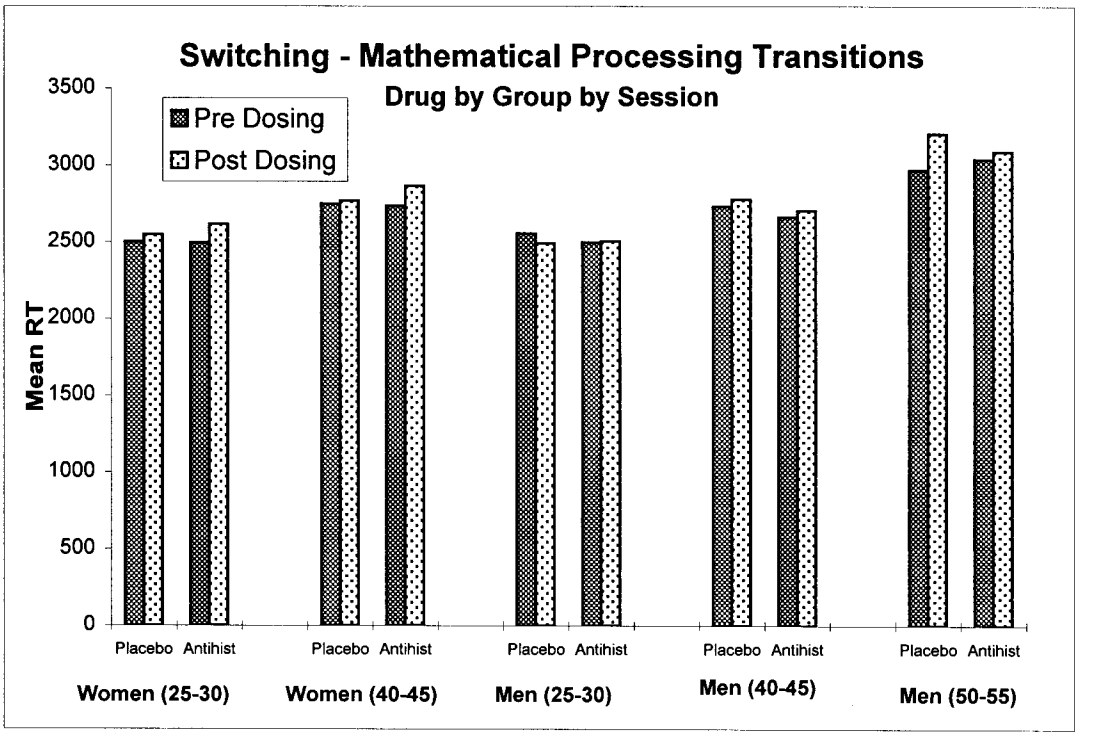

Figure 16. Switching - Mathematical Processing Mean RT for Transitions.

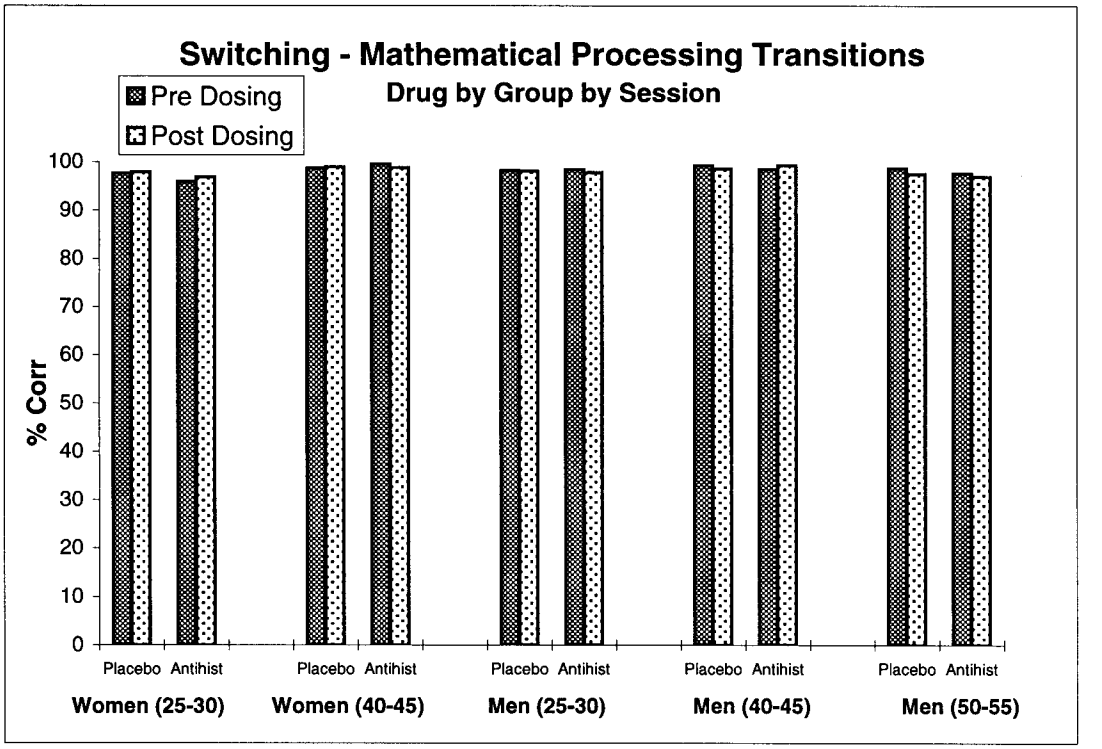

Figure 17. Switching - Mathematical Processing Percent Correct for Transitions.

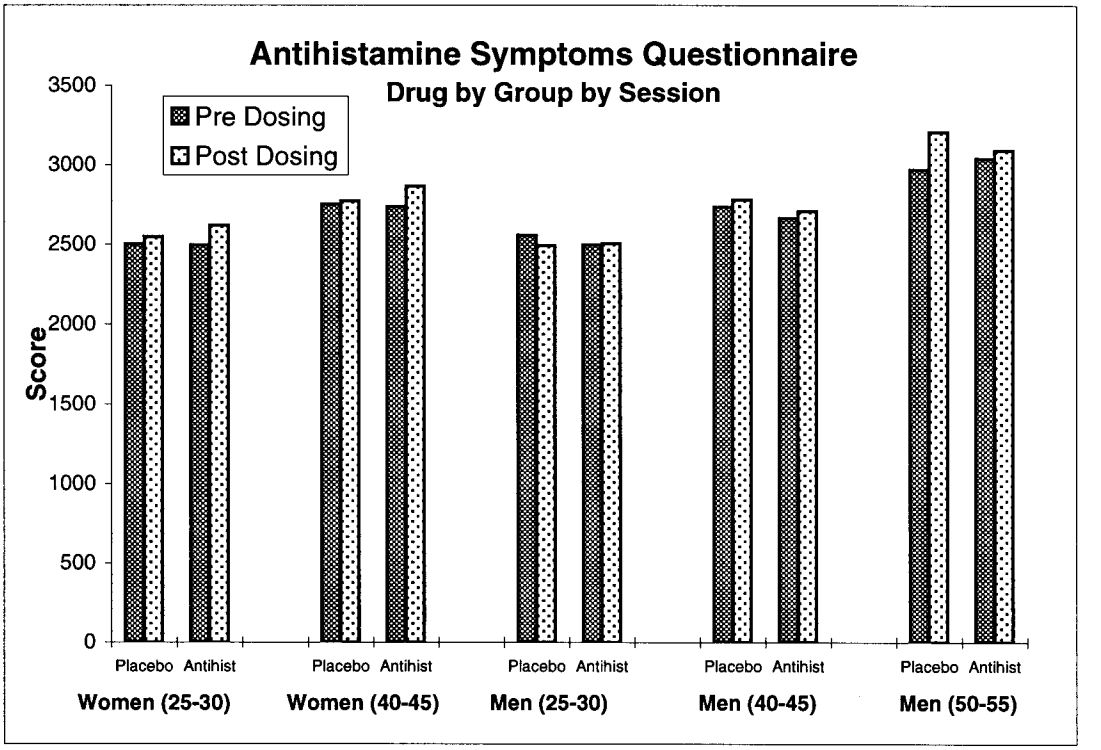

Figure 18. Antihistamine Symptoms Questionnaire Total Score.

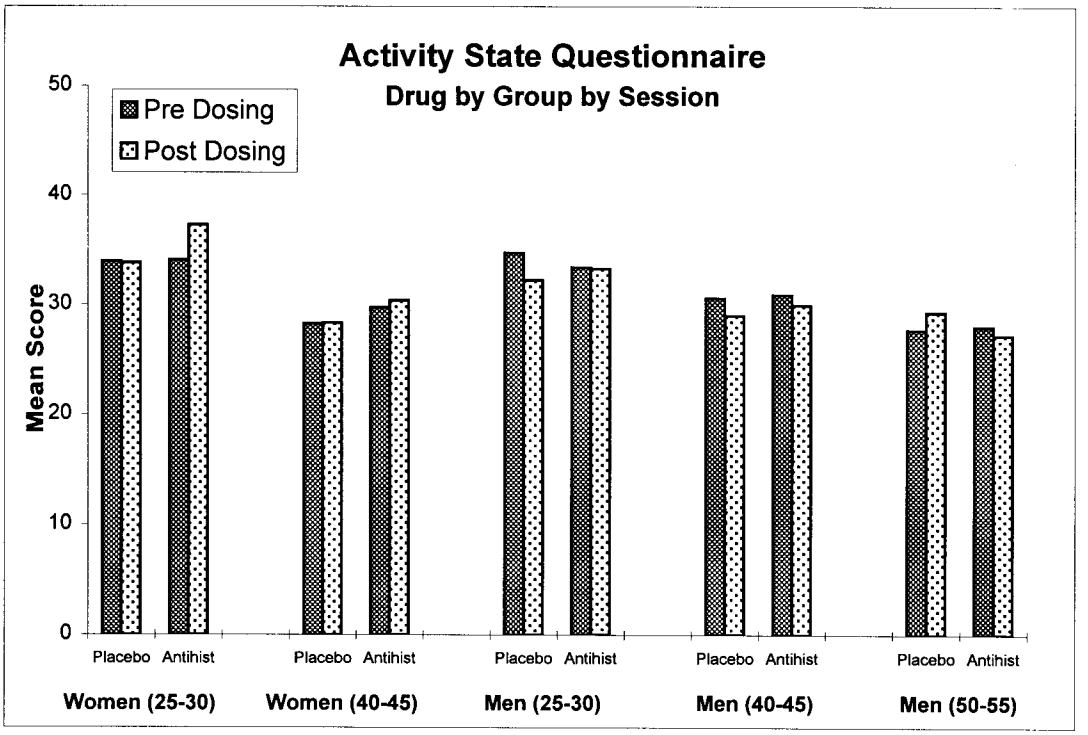

Figure 19. Activity State Questionnaire Mean PHYSICAL Score.

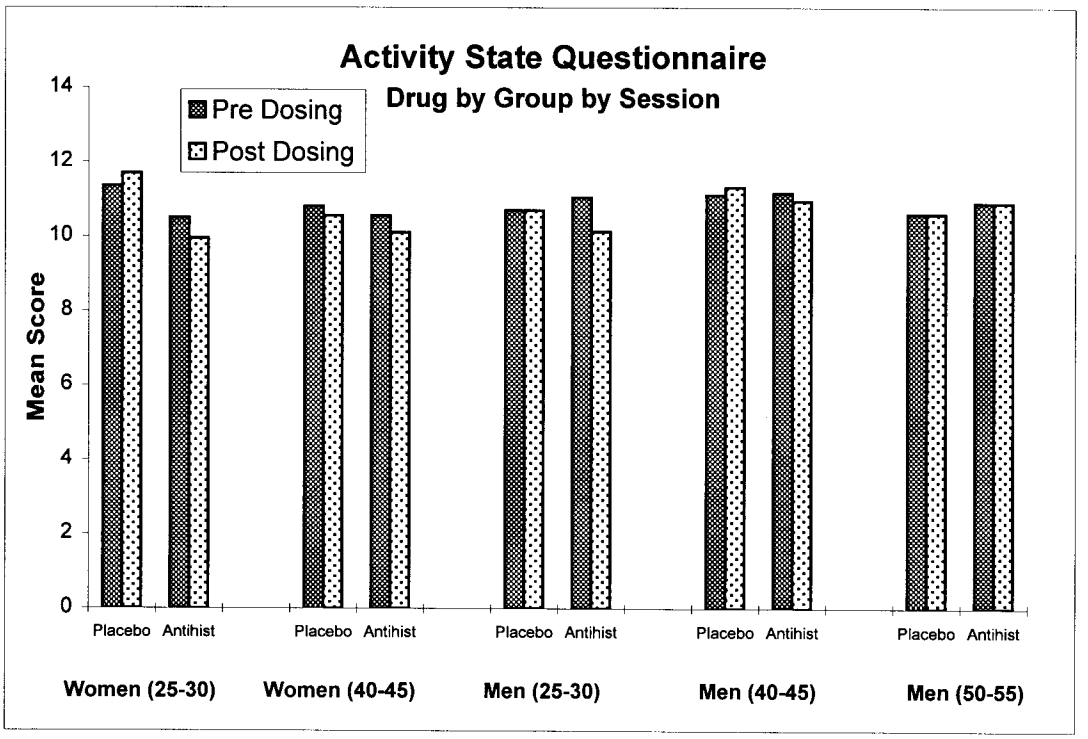

Figure 20. Activity State Questionnaire Mean PREP Score.

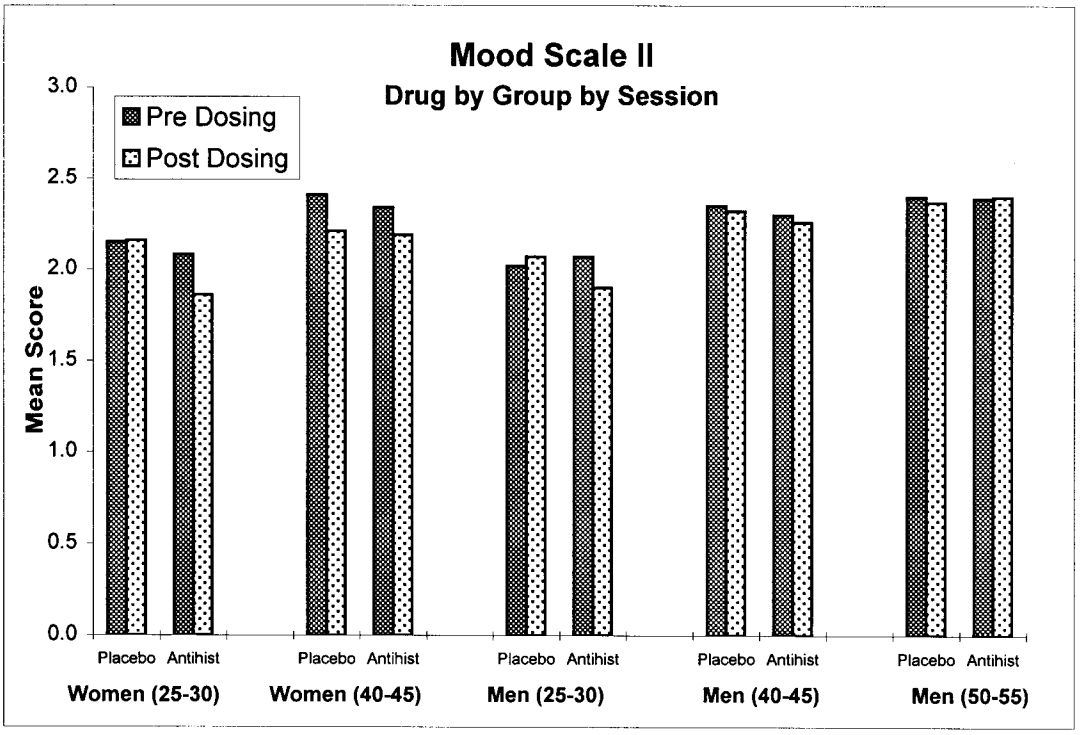

Figure 21. Mood Scale II Activity Scale.

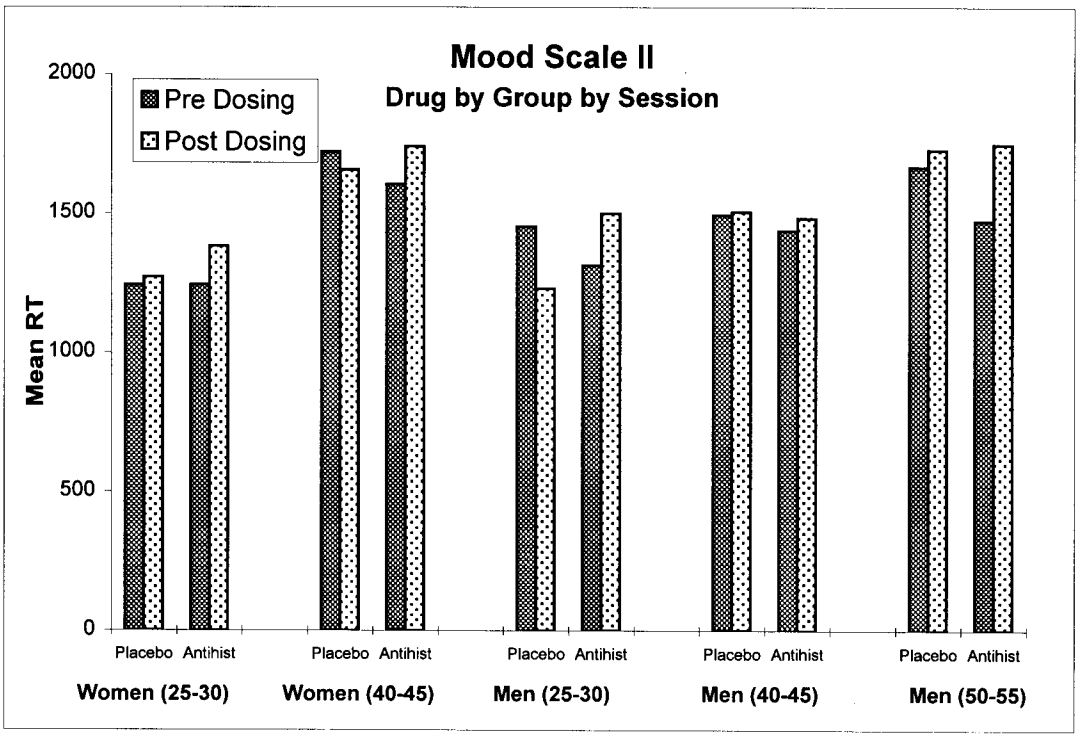

Figure 22. Mood Scale II Activity Mean RT.

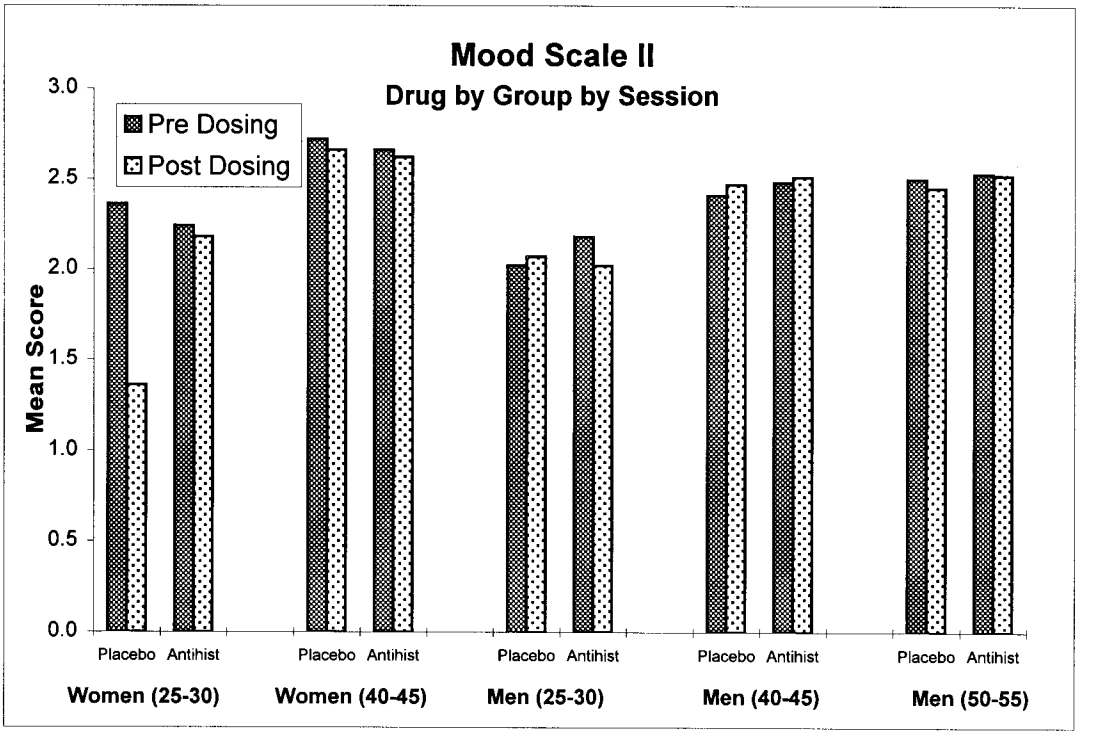

Figure 23. Mood Scale II Happiness Scale.

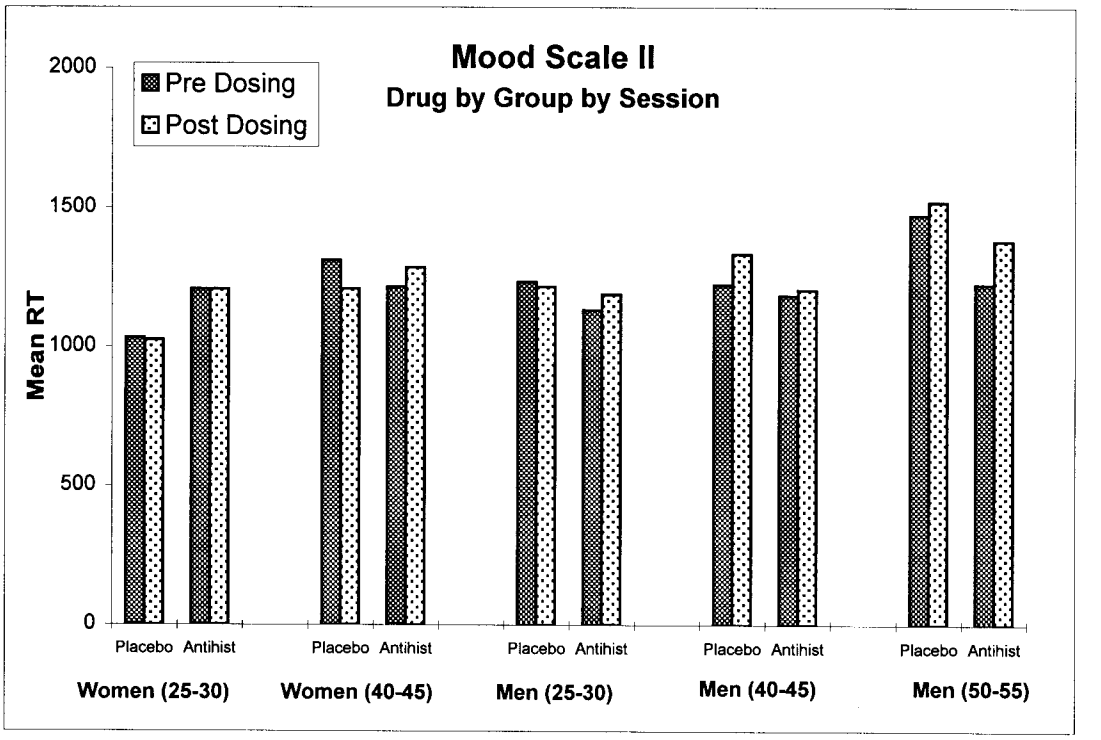

Figure 24. Mood Scale II Happiness Mean RT.

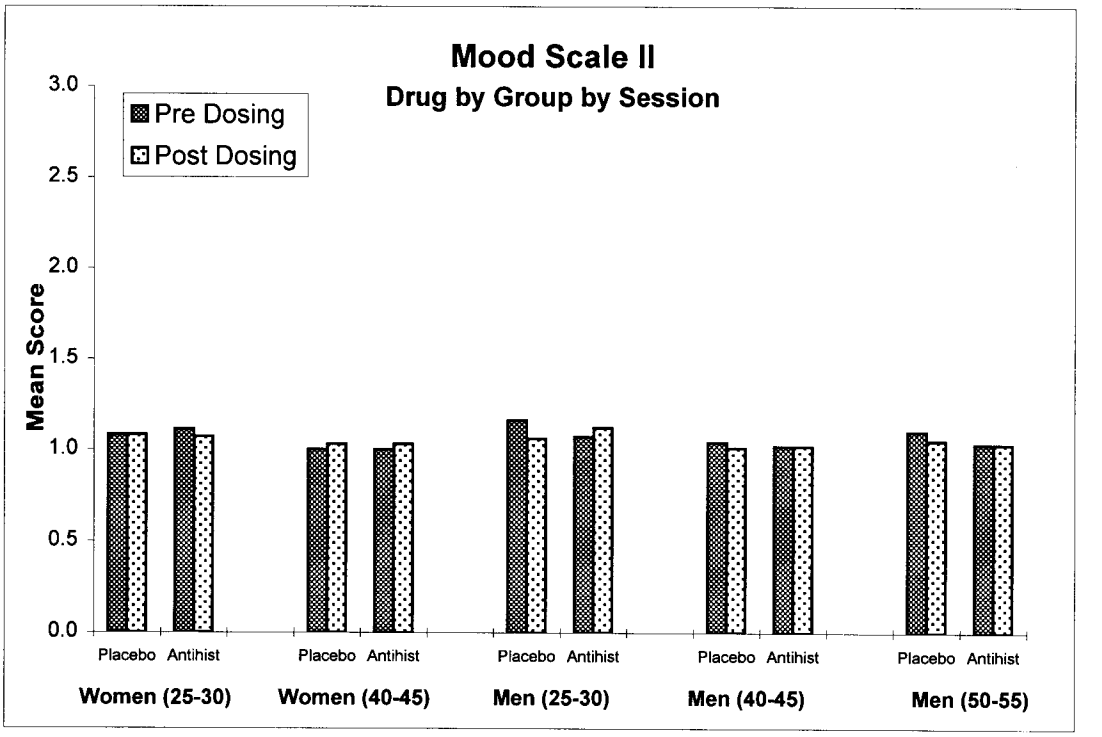

Figure 25. Mood Scale II Depression Scale.

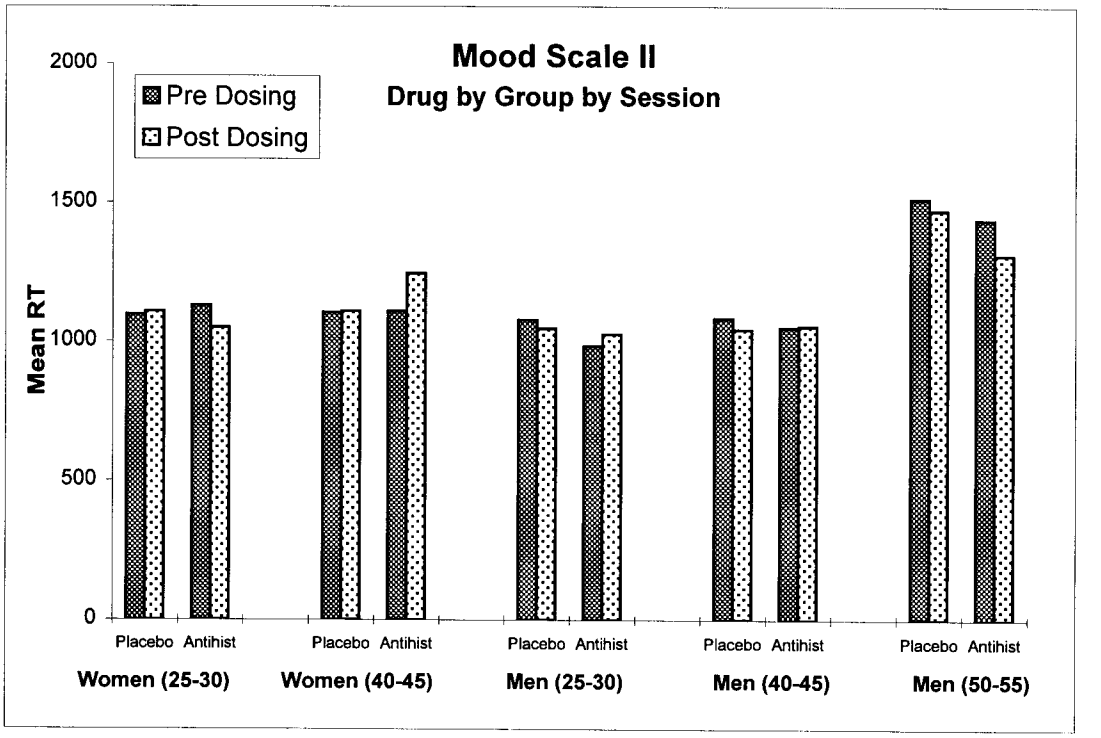

Figure 26. Mood Scale II Depression Mean RT.

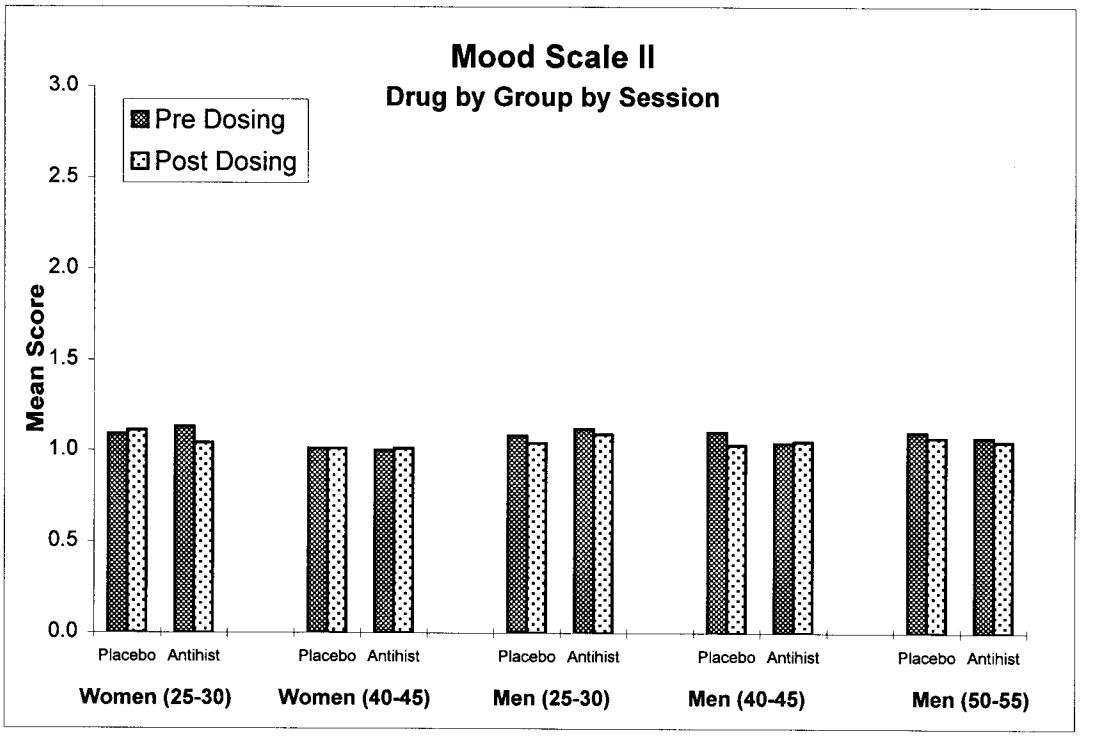

Figure 27. Mood Scale II Anger Scale.

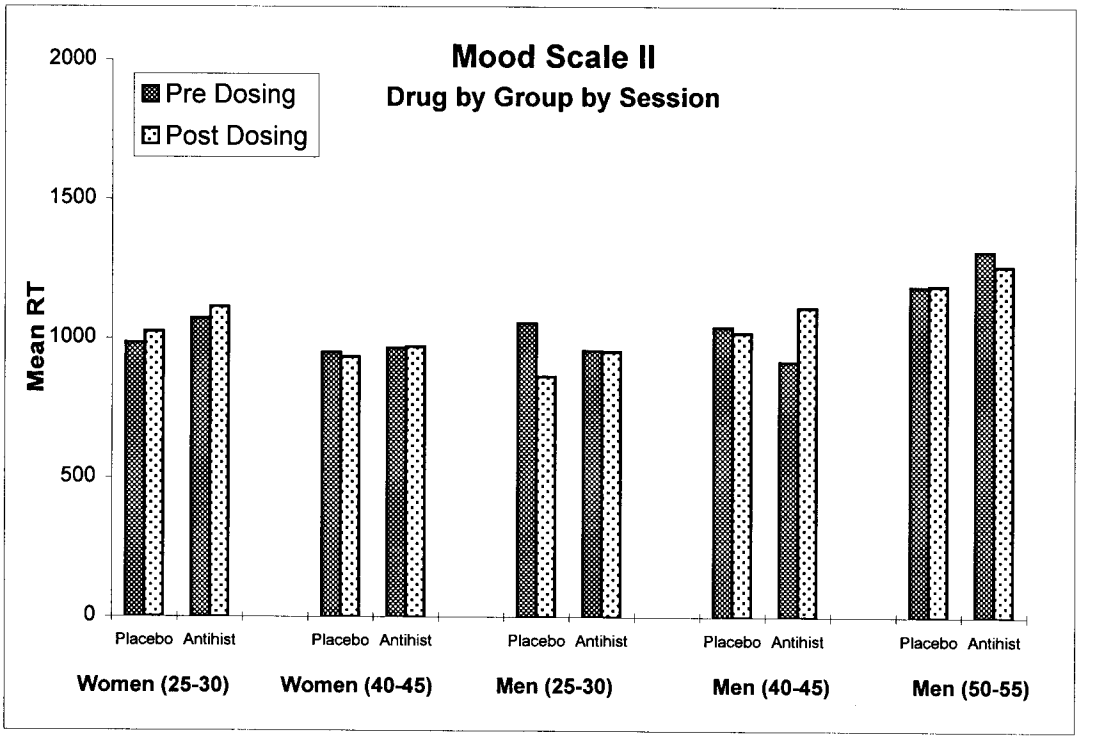

Figure 28. Mood Scale II Anger Mean RT.

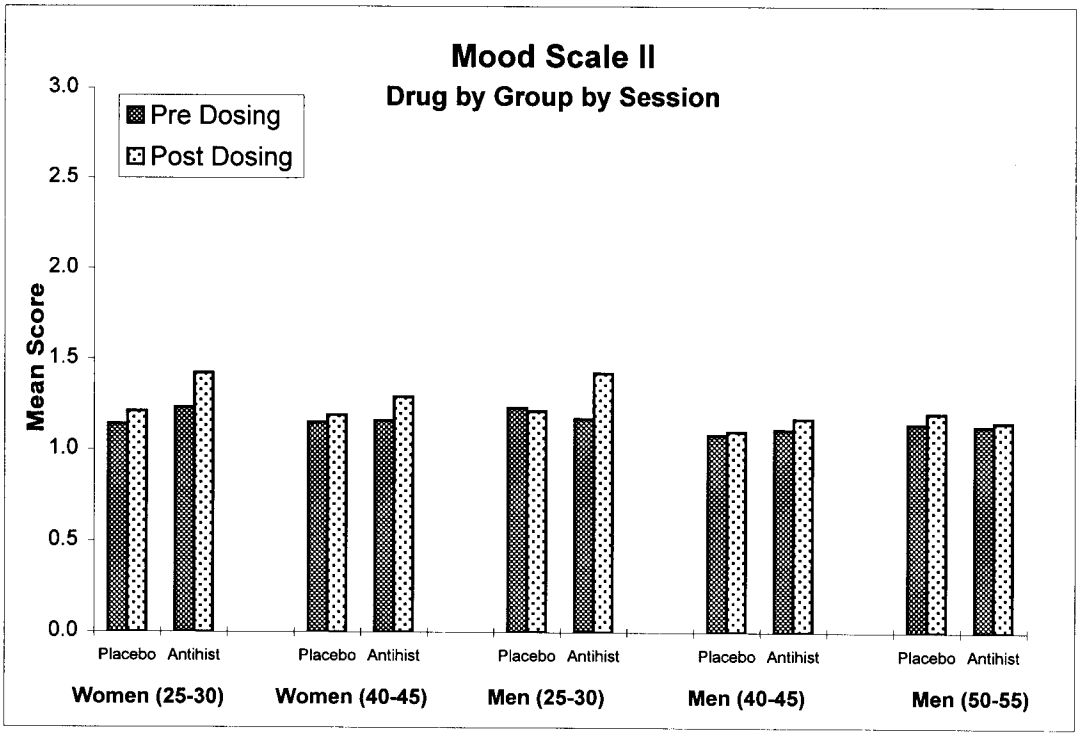

Figure 29. Mood Scale II Fatigue Scale.

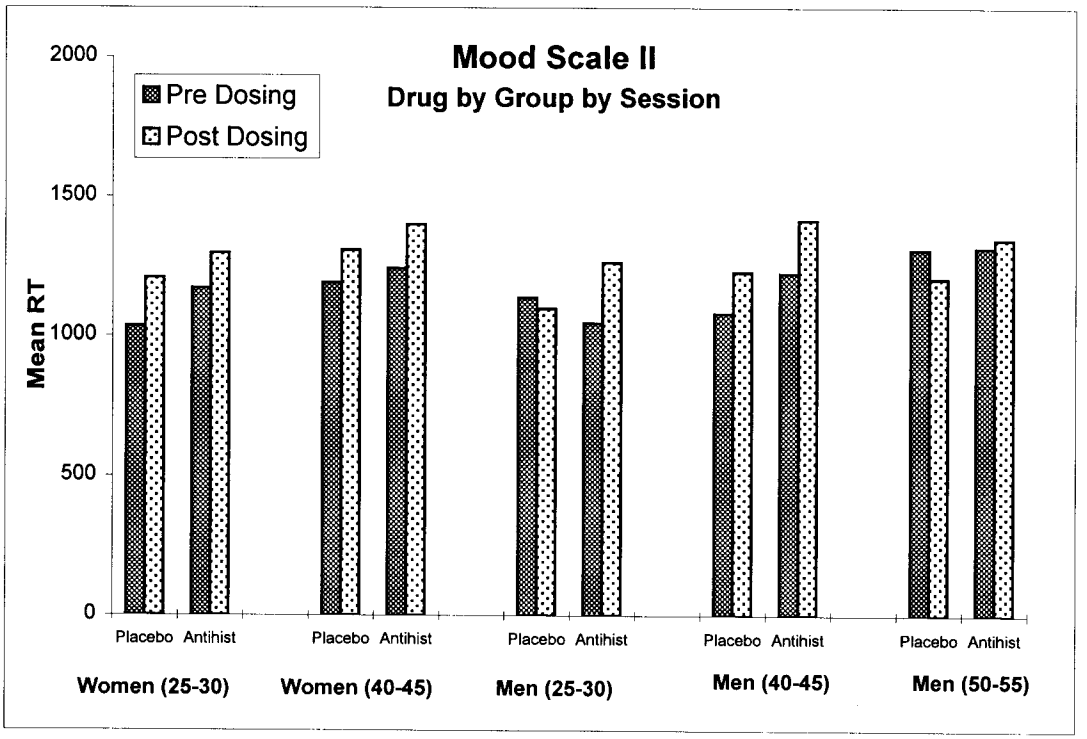

Figure 30. Mood Scale II Fatigue Mean RT.

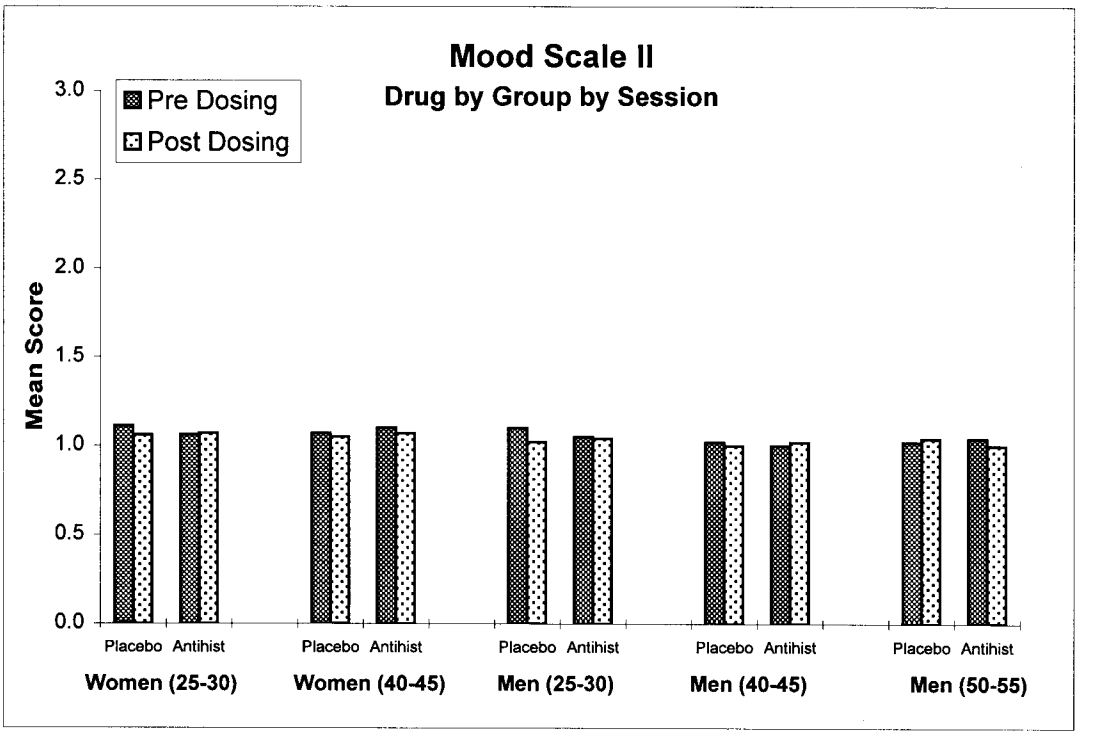

Figure 31. Mood Scale II Fear Scale.

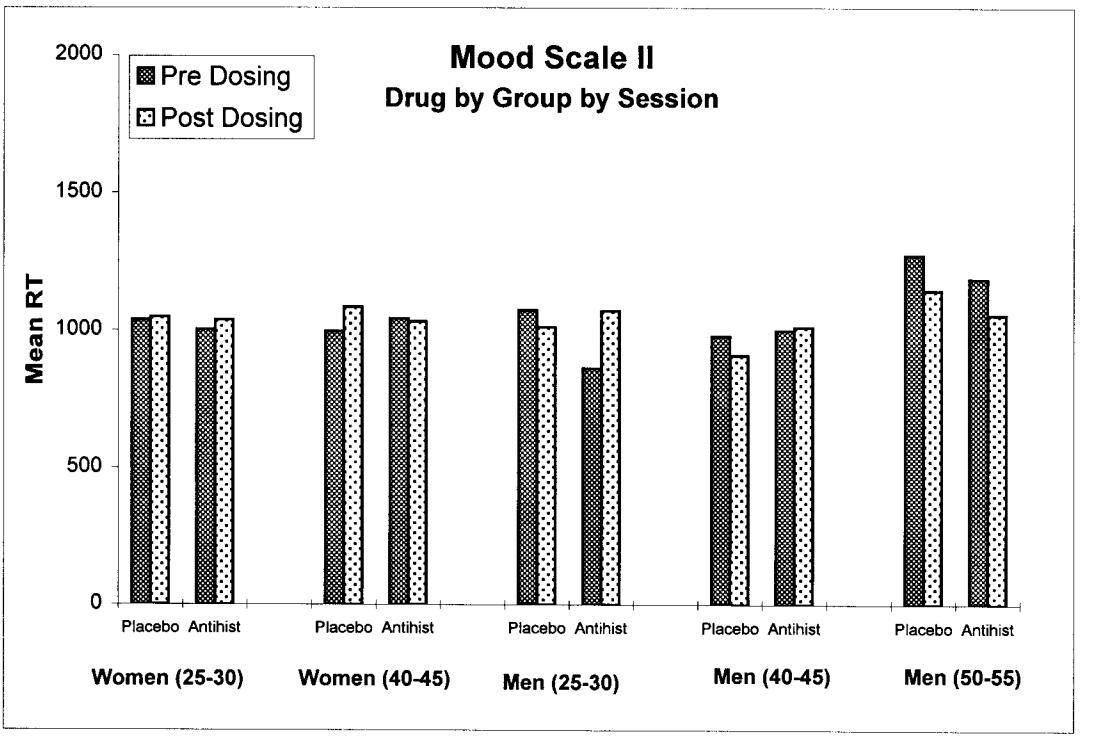

Figure 32. Mood Scale II Fear Mean RT.

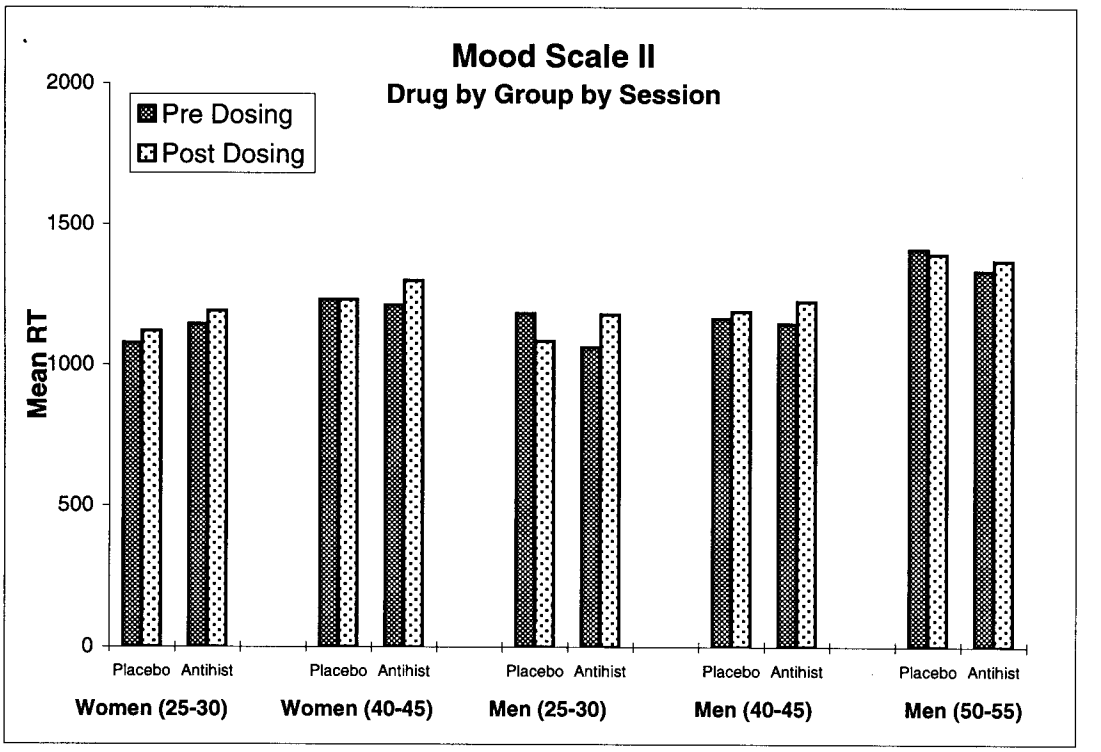

Figure 33. Mood Scale II Overall Mean RT.

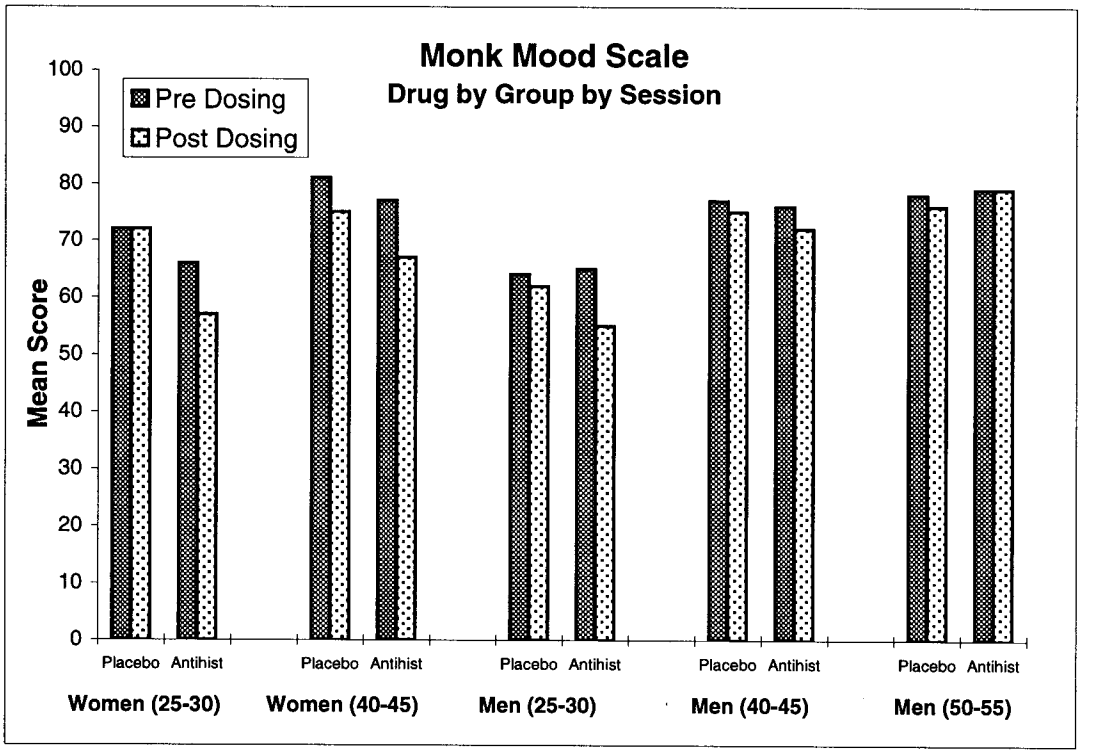

Figure 34. Monk Mood Scale Mean Global Vigor Score.

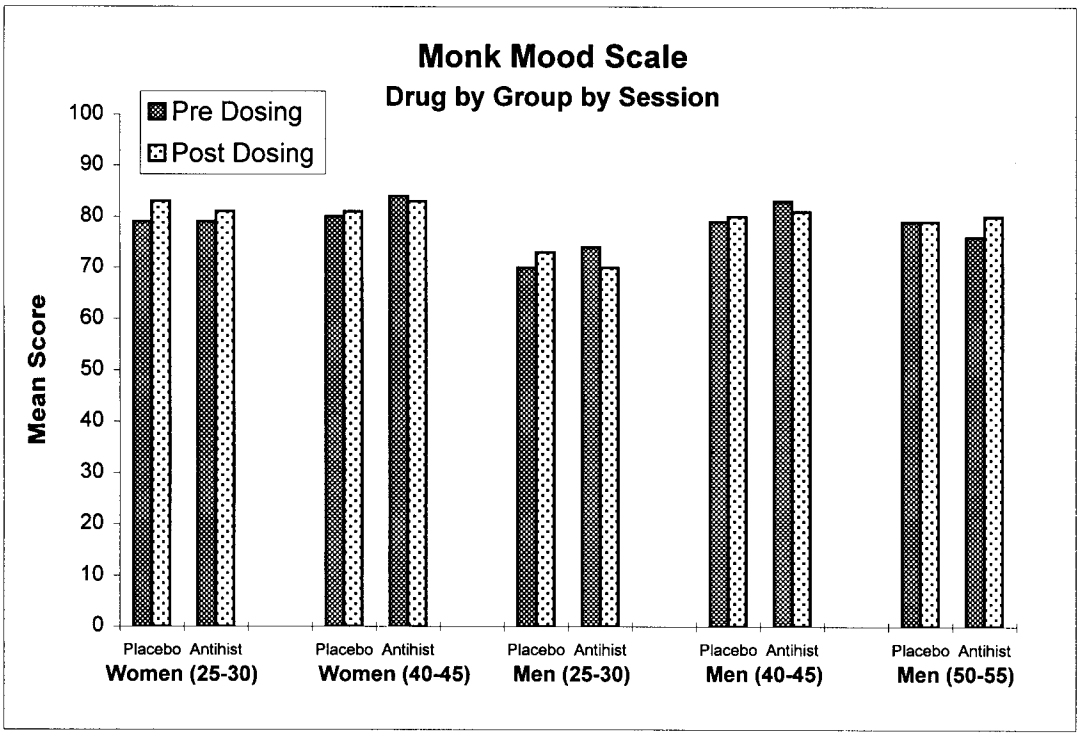

Figure 35. Monk Mood Scale Mean Global Affect Score.

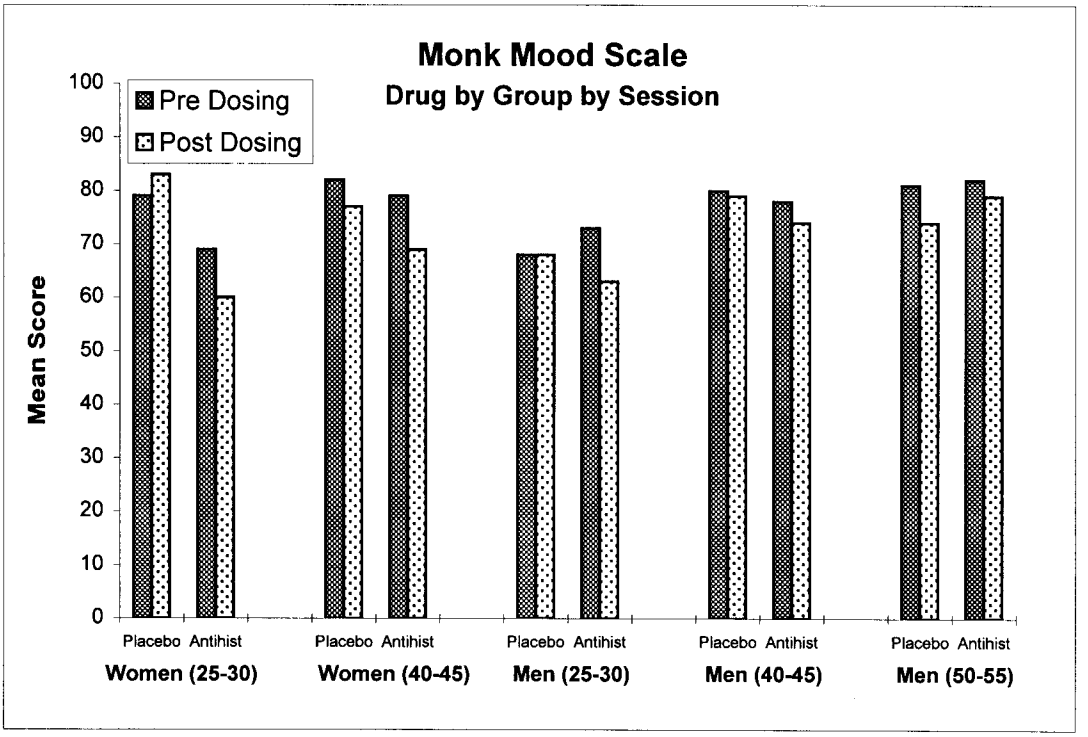

Figure 36. Monk Mood Scale Mean Alert Score.

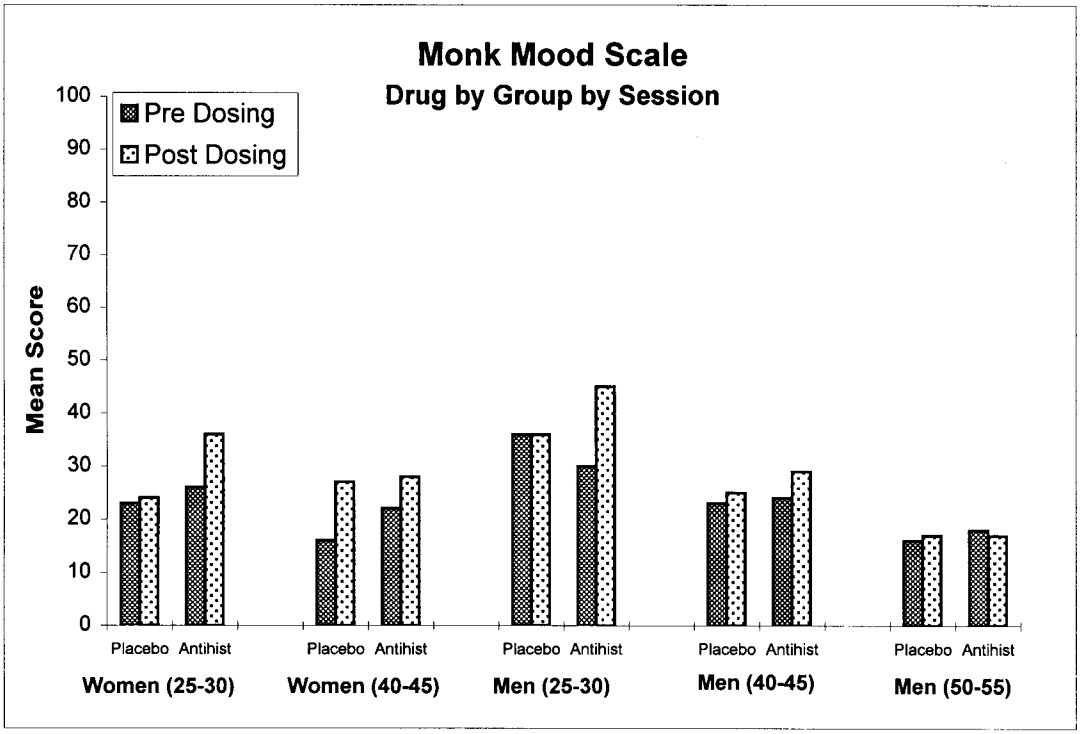

Figure 37. Monk Mood Scale Mean Weary Score.

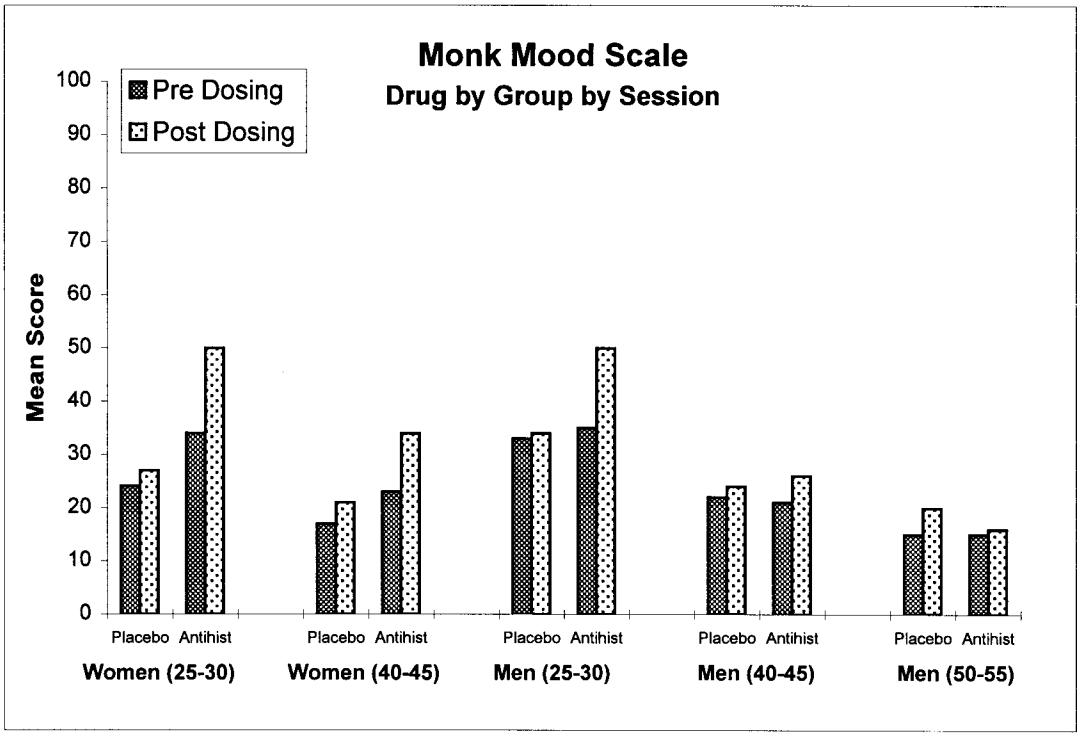

Figure 38. Monk Mood Scale Mean Sleepy Score.

TABLES

Table 1. Summary of Participant Group Characteristics.

Group	Count	Mean Age	Std. Dev. Age	Min Age	Max Age
Women, 25-30	20	27.2	2.11	24.08	31.17
Women, 40-45	20	42.7	1.33	40.50	45.17
Men, 25-30	23	27.5	1.96	25.08	30.92
Men, 40-45	19	42.6	1.83	39.75	45.25
Men, 50-55	10	52.8	1.82	50.25	55.75
Total	92				

Table 2. Summary of Task Codes.

Task	Code
Dual Task	DUL
PAWS Attention Switching	
Manikin Task	MAN
Mathematical Processing	MTH
Antihistamine Symptoms Questionnaire	AHSQ
Activity State Questionnaire	ACTSQ
Mood Scale II	MOOD
Monk Mood Scale	MONK

Table 3. Training and Testing Task Sequence.

Date	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6	Session 7	Session 8
Monday	Moodscale II Physical Symptoms Monk Moodscale Critical Tracking PAWS Switching Dual Tracking	Critical Tracking PAWS Switching Dual Tracking	Critical Tracking PAWS Switching Dual Tracking	Critical Tracking PAWS Switching Dual Tracking	Moodscale II Monk Moodscale Critical Tracking PAWS Switching Dual Tracking	Critical Tracking PAWS Switching Dual Tracking	Critical Tracking PAWS Switching Dual Tracking	Critical Tracking PAWS Switching Dual Tracking Fatigue
Date	**Session 9**	**Session 10**	**Session 11**	**Session 12**	**Session 13**	**Session 14**	**Session 15**	
Tuesday	Moodscale II Physical Symptoms Monk Moodscale Critical Tracking PAWS Switching Dual Tracking	Dual Tracking PAWS Switching	Dual Tracking PAWS Switching	Moodscale II Monk Moodscale Dual Tracking PAWS Switching	Dual Tracking PAWS Switching	Dual Tracking PAWS Switching	Dual Tracking PAWS Switching Fatigue	
Date	**Session 16**	**Session 17**	**Session 18**	**Session 19**	**Session 20**	**Session 21**	**Session 22**	**Session 23**
Wednesday	Moodscale II Physical Symptoms Monk Moodscale Dual Tracking PAWS Switching	Dual Tracking PAWS Switching	Dual Tracking PAWS Switching	Dual Tracking PAWS Switching	Moodscale II Monk Moodscale Dual Tracking PAWS Switching	Dual Tracking PAWS Switching	Dual Tracking PAWS Switching	Dual Tracking PAWS Switching Fatigue
Date	**Session 24**	**Session 25**	**Session 26**	**Session 27**	**Session 28**	**Session 29**	**Session 30**	
Thursday	Moodscale II Physical Symptoms Monk Moodscale Dual Tracking PAWS Switching	Dual Tracking PAWS Switching	Dual Tracking PAWS Switching	Dual Tracking PAWS Switching	Moodscale II Monk Moodscale Dual Tracking PAWS Switching	Dual Tracking PAWS Switching	Dual Tracking PAWS Switching Fatigue	
Date	**Session 31**	**Session 32**	**Session 33**	**Session 34**				
Friday	Dual Tracking PAWS Switching	Moodscale II Physical Symptoms AH Symptoms Monk Moodscale Dual Tracking PAWS Switching Fatigue	Dual Tracking PAWS Switching	Moodscale II Physical Symptoms AH Symptoms Monk Moodscale Dual Tracking PAWS Switching Fatigue				
Date	**Session 35**	**Session 36**	**Session 37**	**Session 38**				
Saturday	Dual Tracking PAWS Switching	Moodscale II Physical Symptoms AH Symptoms Monk Moodscale Dual Tracking PAWS Switching Fatigue	Dual Tracking PAWS Switching	Moodscale II Physical Symptoms AH Symptoms Monk Moodscale Dual Tracking PAWS Switching Fatigue				

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Dual Tracking											
Control Losses			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	21.6	21.6	22.4	20.8	22.3	20.9	22.4	20.8	21.6
		Std	23.9	24.8	24.0	24.7	23.5	24.3	24.5	25.1	24.3
Gender	Women	Mean	29.3	27.0	28.8	27.5	29.7	29.0	27.9	26.1	28.2
		Std	26.4	26.2	26.1	26.5	26.1	26.9	26.4	26.3	26.3
	Men	Mean	14.3	16.5	16.2	14.5	15.2	13.3	17.2	15.7	15.4
		Std	18.5	22.3	19.9	21.0	18.3	18.8	21.6	23.0	20.5
Age Group	25-30	Mean	14.2	13.0	14.4	12.8	14.8	13.5	13.9	12.1	13.6
		Std	17.8	17.5	17.2	18.1	17.6	18.0	16.9	18.2	17.6
	40-45	Mean	29.8	31.0	31.2	29.7	30.6	29.1	31.8	30.3	30.4
		Std	27.0	28.1	27.2	27.9	26.3	27.7	28.1	28.2	27.5
Group	Women	Mean	15.1	11.8	14.4	12.5	15.7	14.4	13.1	10.6	13.4
	25-30	Std	15.7	12.7	14.5	14.2	16.0	15.6	12.8	12.6	14.3
	Women	Mean	43.6	42.1	43.2	42.5	43.7	43.5	42.7	41.6	42.9
	40-45	Std	27.3	27.6	27.3	27.5	26.8	28.1	28.2	27.3	27.3
	Men	Mean	13.4	14.1	14.3	13.1	14.0	12.8	14.7	13.5	13.7
	25-30	Std	19.4	20.9	19.4	21.0	19.0	20.0	19.9	22.1	20.1
	Men	Mean	15.4	19.3	18.5	16.1	16.8	13.9	20.3	18.4	17.3
	40-45	Std	17.4	23.6	20.5	21.1	17.5	17.5	23.3	24.2	20.8
	Men	Mean	31.6	32.4	31.5	32.6	30.3	32.9	32.6	32.2	32.0
	50-55	Std	33.5	31.0	32.4	32.2	33.7	34.2	31.9	31.0	32.1

Dual Tracking											
RMS Error			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	57.0	57.0	57.9	56.1	57.5	56.5	58.3	55.7	57.0
		Std	15.5	15.6	15.2	15.8	15.7	15.4	14.8	16.2	15.5
Gender	Women	Mean	59.4	58.9	59.7	58.7	59.6	59.3	59.7	58.1	59.2
		Std	14.4	14.4	14.5	14.3	15.2	13.8	13.9	14.9	14.4
	Men	Mean	54.7	55.2	56.2	53.7	55.5	54.0	57.0	53.5	55.0
		Std	16.1	16.4	15.7	16.7	15.9	16.4	15.6	17.1	16.3
Age Group	25-30	Mean	54.7	53.5	55.3	53.0	55.1	54.3	55.5	51.6	54.1
		Std	16.0	16.2	16.0	16.1	16.5	15.6	15.7	16.6	16.1
	40-45	Mean	59.6	60.8	60.8	59.6	60.2	59.0	61.4	60.3	60.2
		Std	14.5	13.9	13.8	14.6	14.3	14.8	13.3	14.6	14.2
Group	Women	Mean	54.7	53.2	54.5	53.4	54.6	54.8	54.4	52.0	53.9
	25-30	Std	16.6	16.3	16.6	16.4	17.8	15.7	15.5	17.1	16.4
	Women	Mean	64.2	64.6	64.8	64.0	64.6	63.8	65.1	64.2	64.4
	40-45	Std	9.8	9.3	9.7	9.4	9.9	9.9	9.7	9.0	9.5
	Men	Mean	54.7	53.9	56.0	52.6	55.5	53.9	56.5	51.3	54.3
	25-30	Std	15.5	16.2	15.6	16.0	15.4	15.8	15.9	16.2	15.8
	Men	Mean	54.8	56.8	56.5	55.1	55.5	54.0	57.5	56.1	55.8
	40-45	Std	17.0	16.6	16.0	17.6	16.7	17.4	15.4	18.0	16.8
	Men	Mean	54.6	54.0	54.2	54.4	54.5	54.7	53.9	54.2	54.3
	50-55	Std	17.1	16.2	16.1	17.1	17.4	17.2	15.1	17.5	16.5

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Dual Memory Search											
Mean RT			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	745	743	746	742	743	747	749	736	744
		Std	203	206	201	208	204	204	199	213	205
Gender	Women	Mean	760	749	744	764	750	769	738	759	754
		Std	204	186	181	208	201	208	160	209	195
	Men	Mean	731	737	748	720	736	726	759	715	734
		Std	203	224	219	207	207	199	231	217	213
Age Group	25-30	Mean	733	717	733	717	736	731	731	703	725
		Std	225	218	213	229	216	234	212	224	221
	40-45	Mean	758	771	760	769	751	764	768	774	764
		Std	177	190	187	180	190	164	184	196	183
Group	Women	Mean	761	740	746	755	761	761	731	748	750
	25-30	Std	240	203	210	234	246	237	169	234	222
	Women	Mean	758	757	743	773	740	777	746	769	758
	40-45	Std	162	167	147	179	145	178	151	183	164
	Men	Mean	709	697	722	684	714	704	731	663	703
	25-30	Std	209	229	216	220	187	231	244	209	219
	Men	Mean	757	785	778	765	763	751	792	778	771
	40-45	Std	193	211	220	182	230	150	213	211	202
	Men	Mean	797	814	805	806	799	795	811	818	805
	50-55	Std	156	177	175	158	170	144	183	174	166

Dual Memory Search											
Percent Correct			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	97.29	97.39	97.41	97.26	97.21	97.37	97.62	97.15	97.34
		Std	3.64	6.25	3.47	6.35	3.78	3.50	3.13	8.28	5.11
Gender	Women	Mean	97.26	97.64	97.59	97.31	97.18	97.34	97.99	97.28	97.45
		Std	3.18	3.45	3.25	3.39	3.69	2.61	2.71	4.04	3.32
	Men	Mean	97.32	97.15	97.24	97.22	97.23	97.40	97.26	97.03	97.23
		Std	4.04	8.07	3.67	8.24	3.89	4.20	3.46	10.91	6.37
Age Group	25-30	Mean	96.95	97.07	97.21	96.81	96.90	97.00	97.51	96.62	97.01
		Std	4.19	7.95	3.70	8.18	4.19	4.21	3.13	10.81	6.34
	40-45	Mean	97.67	97.73	97.63	97.77	97.54	97.79	97.73	97.74	97.70
		Std	2.89	3.54	3.19	3.27	3.26	2.48	3.13	3.92	3.23
Group	Women	Mean	96.95	97.65	97.25	97.35	96.84	97.06	97.66	97.64	97.30
	25-30	Std	3.67	2.59	3.66	2.64	4.47	2.69	2.62	2.59	3.18
	Women	Mean	97.58	97.63	97.93	97.28	97.53	97.63	98.33	96.93	97.60
	40-45	Std	2.59	4.15	2.75	4.02	2.70	2.52	2.79	5.11	3.45
	Men	Mean	96.95	96.57	97.17	96.34	96.96	96.93	97.39	95.74	96.76
	25-30	Std	4.61	10.60	3.76	10.92	3.98	5.21	3.54	14.60	8.15
	Men	Mean	97.76	97.85	97.33	98.29	97.56	97.97	97.10	98.60	97.81
	40-45	Std	3.19	2.78	3.59	2.13	3.81	2.45	3.39	1.73	2.98
	Men	Mean	97.62	97.37	97.25	97.74	97.30	97.95	97.21	97.54	97.50
	50-55	Std	2.24	2.27	2.61	1.79	2.68	1.70	2.62	1.90	2.24

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Dual Memory Search											
Throughput			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	82.91	83.11	82.81	83.21	82.91	82.90	82.71	83.51	83.01
		Std	18.88	19.62	18.70	19.79	18.77	19.05	18.68	20.57	19.24
Gender	Women	Mean	81.04	82.27	82.32	80.99	81.81	80.27	82.82	81.72	81.66
		Std	17.60	17.87	16.84	18.58	17.26	18.00	16.51	19.23	17.72
	Men	Mean	84.69	83.91	83.29	85.32	83.97	85.41	82.60	85.22	84.30
		Std	19.92	21.18	20.35	20.72	20.15	19.77	20.64	21.74	20.53
Age Group	25-30	Mean	85.16	86.19	84.94	86.42	84.49	85.83	85.38	87.01	85.68
		Std	21.66	21.85	21.07	22.40	21.55	21.88	20.71	23.02	21.73
	40-45	Mean	80.42	79.72	80.47	79.67	81.17	79.67	79.77	79.66	80.07
		Std	14.92	16.24	15.40	15.78	15.08	14.81	15.78	16.79	15.57
Group	Women	Mean	81.88	83.89	82.84	82.93	81.86	81.89	83.82	83.96	82.89
	25-30	Std	19.49	19.07	18.62	19.97	19.42	19.81	17.97	20.33	19.25
	Women	Mean	80.20	80.65	81.79	79.06	81.75	78.65	81.83	79.48	80.43
	40-45	Std	15.55	16.56	14.96	16.99	15.04	16.08	15.07	18.04	16.02
	Men	Mean	88.02	88.20	86.76	89.46	86.78	89.26	86.74	89.65	88.11
	25-30	Std	23.11	23.93	22.94	24.01	23.21	23.20	22.93	25.05	23.46
	Men	Mean	80.65	78.73	79.08	80.31	80.56	80.75	77.60	79.86	79.69
	40-45	Std	14.32	15.94	15.82	14.49	15.30	13.48	16.40	15.60	15.13
	Men	Mean	76.37	75.22	75.98	75.61	76.30	76.44	75.66	74.77	75.80
	50-55	Std	16.22	16.65	16.84	16.04	17.16	15.66	16.96	16.77	16.34

Switching - Manikin Task											
Mean RT			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	2122	2133	2109	2146	2095	2148	2123	2144	2128
		Std	624	672	613	681	615	633	612	728	648
Gender	Women	Mean	2157	2150	2128	2179	2114	2199	2142	2158	2153
		Std	589	594	563	618	577	602	552	637	591
	Men	Mean	2089	2117	2091	2115	2078	2100	2104	2130	2103
		Std	656	739	658	737	653	662	667	808	698
Age Group	25-30	Mean	1895	1919	1903	1911	1888	1903	1918	1920	1907
		Std	632	708	643	698	661	607	629	783	670
	40-45	Mean	2371	2370	2336	2405	2323	2419	2349	2390	2370
		Std	511	539	487	559	469	549	508	571	524
Group	Women	Mean	1861	1849	1841	1868	1835	1886	1847	1850	1855
	25-30	Std	534	478	493	521	539	534	448	513	505
	Women	Mean	2452	2452	2415	2490	2392	2513	2438	2467	2452
	40-45	Std	487	546	479	550	474	497	488	604	515
	Men	Mean	1926	1980	1957	1949	1935	1917	1979	1981	1953
	25-30	Std	708	858	749	823	753	669	752	960	785
	Men	Mean	2286	2282	2253	2315	2251	2322	2255	2309	2284
	40-45	Std	525	522	485	557	458	589	517	531	522
	Men	Mean	2785	2787	2786	2786	2785	2785	2787	2788	2786
	50-55	Std	1006	991	1047	947	1049	989	1073	929	992

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Switching - Manikin Task											
Percent Correct			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	97.52	97.83	97.62	97.73	97.32	97.71	97.91	97.75	97.68
		Std	5.46	4.64	5.01	5.12	5.77	5.15	4.12	5.12	5.07
Gender	Women	Mean	97.12	98.09	97.33	97.88	96.55	97.69	98.11	98.06	97.60
		Std	6.05	2.75	5.86	3.19	7.84	3.40	2.54	2.97	4.72
	Men	Mean	97.90	97.59	97.89	97.60	98.06	97.74	97.73	97.45	97.74
		Std	4.82	5.90	4.04	6.46	2.39	6.40	5.21	6.55	5.38
Age Group	25-30	Mean	96.87	97.51	97.09	97.28	96.62	97.13	97.57	97.44	97.19
		Std	7.12	5.97	6.54	6.61	7.56	6.68	5.35	6.57	6.57
	40-45	Mean	98.23	98.19	98.20	98.22	98.10	98.36	98.29	98.09	98.21
		Std	2.46	2.41	2.26	2.60	2.48	2.44	2.03	2.75	2.43
Group	Women	Mean	96.48	98.19	96.81	97.85	95.45	97.50	98.18	98.20	97.33
	25-30	Std	8.00	2.96	7.84	3.49	10.60	3.88	2.88	3.07	6.07
	Women	Mean	97.76	97.99	97.85	97.90	97.65	97.88	98.05	97.93	97.88
	40-45	Std	2.97	2.55	2.66	2.88	3.08	2.89	2.18	2.89	2.76
	Men	Mean	97.22	96.91	97.34	96.79	97.63	96.80	97.04	96.78	97.07
	25-30	Std	6.28	7.66	5.19	8.42	2.86	8.43	6.80	8.51	6.98
	Men	Mean	98.72	98.41	98.57	98.57	98.58	98.87	98.55	98.26	98.57
	40-45	Std	1.65	2.26	1.68	2.24	1.54	1.76	1.84	2.63	1.98
	Men	Mean	97.33	98.13	97.75	97.70	97.30	97.35	98.20	98.05	97.73
	50-55	Std	3.21	2.29	2.73	2.90	3.34	3.17	1.94	2.65	2.80

Switching - Manikin Task											
Throughput			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	30.02	30.09	30.14	29.97	30.28	29.75	29.99	30.19	30.05
		Std	9.09	9.27	9.01	9.34	9.08	9.12	8.97	9.58	9.17
Gender	Women	Mean	29.30	29.50	29.52	29.29	29.69	28.92	29.35	29.66	29.40
		Std	9.08	8.74	8.75	9.08	9.21	8.99	8.31	9.21	8.90
	Men	Mean	30.70	30.65	30.72	30.62	30.85	30.54	30.60	30.71	30.67
		Std	9.07	9.73	9.25	9.57	8.97	9.22	9.56	9.96	9.39
Age Group	25-30	Mean	33.67	33.73	33.60	33.80	33.85	33.49	33.36	34.11	33.70
		Std	10.09	10.28	10.11	10.26	10.25	9.97	10.01	10.59	10.17
	40-45	Mean	25.98	26.08	26.31	25.75	26.35	25.62	26.28	25.88	26.03
		Std	5.55	5.80	5.54	5.81	5.35	5.76	5.75	5.89	5.67
Group	Women	Mean	33.81	34.05	33.88	33.98	34.04	33.59	33.72	34.37	33.93
	25-30	Std	10.17	9.42	9.72	9.89	10.54	9.92	8.95	9.97	9.78
	Women	Mean	24.79	24.96	25.15	24.59	25.34	24.24	24.97	24.95	24.87
	40-45	Std	4.61	4.82	4.58	4.84	4.69	4.52	4.52	5.16	4.70
	Men	Mean	33.55	33.46	33.36	33.64	33.69	33.41	33.04	33.88	33.50
	25-30	Std	10.06	11.02	10.48	10.62	10.11	10.12	10.93	11.20	10.52
	Men	Mean	27.24	27.26	27.53	26.97	27.41	27.07	27.65	26.87	27.25
	40-45	Std	6.18	6.51	6.19	6.49	5.84	6.58	6.60	6.49	6.33
	Men	Mean	24.03	24.08	24.27	23.84	24.22	23.84	24.32	23.84	24.06
	50-55	Std	9.98	9.54	9.95	9.57	10.45	9.75	9.69	9.64	9.70

NOTE: *Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.*

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Switching - Manikin Task Transitions											
Mean RT			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	2328	2328	2295	2361	2288	2368	2302	2354	2328
		Std	727	818	720	823	707	746	734	896	773
Gender	Women	Mean	2396	2343	2336	2402	2349	2443	2324	2362	2369
		Std	693	672	648	716	677	711	621	724	683
	Men	Mean	2264	2315	2256	2322	2230	2297	2282	2348	2289
		Std	753	937	782	913	734	775	830	1038	850
Age Group	25-30	Mean	2116	2117	2090	2144	2077	2156	2104	2131	2117
		Std	785	929	799	917	775	798	826	1027	859
	40-45	Mean	2562	2561	2521	2601	2521	2602	2521	2601	2561
		Std	574	595	539	624	539	607	542	646	584
Group	Women	Mean	2100	2022	2025	2097	2050	2150	2000	2044	2061
	25-30	Std	678	592	591	679	656	703	524	659	636
	Women	Mean	2692	2663	2648	2708	2649	2736	2647	2680	2678
	40-45	Std	575	593	546	618	560	593	539	648	582
	Men	Mean	2131	2201	2147	2184	2100	2162	2194	2207	2166
	25-30	Std	872	1142	943	1085	872	880	1017	1266	1014
	Men	Mean	2424	2453	2387	2489	2387	2461	2388	2518	2438
	40-45	Std	542	583	500	615	488	596	518	641	561
	Men	Mean	2927	3060	3006	2980	2932	2921	3079	3040	2993
	50-55	Std	1067	1219	1237	1051	1141	1017	1352	1106	1140

Switching - Manikin Task Transitions											
Percent Correct			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	97.26	97.82	97.68	97.40	97.37	97.16	98.00	97.65	97.54
		Std	7.04	5.75	5.86	6.95	6.21	7.80	5.50	6.00	6.43
Gender	Women	Mean	96.71	97.97	97.35	97.33	96.48	96.95	98.23	97.71	97.34
		Std	6.87	3.94	6.23	4.97	8.04	5.51	3.46	4.36	5.63
	Men	Mean	97.79	97.68	98.00	97.47	98.21	97.36	97.79	97.58	97.74
		Std	7.18	7.07	5.49	8.44	3.58	9.52	6.91	7.25	7.11
Age Group	25-30	Mean	96.38	97.44	96.84	96.98	96.36	96.41	97.33	97.56	96.91
		Std	9.03	7.21	7.52	8.81	7.94	10.05	7.09	7.38	8.18
	40-45	Mean	98.23	98.24	98.61	97.87	98.47	97.99	98.74	97.74	98.24
		Std	3.59	3.46	2.92	4.00	3.13	4.01	2.72	4.02	3.52
Group	Women	Mean	95.80	97.91	96.50	97.21	94.83	96.78	98.18	97.65	96.86
	25-30	Std	8.66	4.40	8.11	5.54	10.58	6.18	3.94	4.85	6.93
	Women	Mean	97.63	98.03	98.20	97.45	98.13	97.13	98.28	97.78	97.83
	40-45	Std	4.29	3.43	3.31	4.36	3.66	4.83	2.96	3.87	3.88
	Men	Mean	96.89	97.03	97.14	96.78	97.70	96.09	96.59	97.48	96.96
	25-30	Std	9.35	8.98	7.00	10.91	4.26	12.54	8.96	9.08	9.14
	Men	Mean	98.87	98.47	99.04	98.30	98.84	98.89	99.24	97.71	98.67
	40-45	Std	2.56	3.49	2.40	3.57	2.44	2.70	2.38	4.22	3.06
	Men	Mean	97.15	98.68	97.45	98.38	96.60	97.70	98.30	99.05	97.91
	50-55	Std	5.13	2.78	4.68	3.59	5.77	4.49	3.18	2.33	4.17

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Switching - Mathematical Processing											
Mean RT			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	2449	2450	2431	2468	2415	2483	2446	2453	2449
		Std	647	653	635	664	636	658	635	672	649
Gender	Women	Mean	2477	2435	2432	2480	2429	2525	2435	2435	2456
		Std	653	587	609	632	648	659	572	606	620
	Men	Mean	2423	2464	2430	2457	2402	2443	2457	2471	2443
		Std	642	711	660	694	628	658	693	732	676
Age Group	25-30	Mean	2329	2340	2325	2344	2299	2359	2350	2330	2335
		Std	755	749	739	765	755	758	725	775	751
	40-45	Mean	2582	2570	2547	2605	2544	2620	2551	2589	2576
		Std	469	503	471	499	442	494	502	506	485
Group	Women	Mean	2307	2278	2267	2318	2253	2362	2281	2274	2293
	25-30	Std	727	576	649	662	739	720	554	604	654
	Women	Mean	2647	2592	2596	2642	2605	2689	2588	2596	2619
	40-45	Std	521	559	520	560	490	552	555	571	539
	Men	Mean	2347	2395	2375	2367	2339	2356	2411	2379	2371
	25-30	Std	782	871	809	847	774	798	849	902	826
	Men	Mean	2514	2548	2496	2565	2479	2548	2513	2582	2531
	40-45	Std	400	438	411	426	381	420	443	435	418
	Men	Mean	2923	2910	2873	2960	2913	2934	2834	2986	2917
	50-55	Std	802	769	782	787	830	794	751	799	781

Switching - Mathematical Processing											
Percent Correct			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	97.80	97.88	97.82	97.87	97.72	97.88	97.91	97.85	97.84
		Std	5.02	4.09	4.79	4.35	5.58	4.40	3.86	4.31	4.57
Gender	Women	Mean	97.27	97.88	97.41	97.73	97.03	97.51	97.80	97.95	97.57
		Std	6.70	3.96	6.26	4.65	7.63	5.66	4.51	3.36	5.51
	Men	Mean	98.30	97.89	98.20	97.99	98.38	98.23	98.02	97.76	98.10
		Std	2.46	4.22	2.72	4.06	2.21	2.69	3.15	5.08	3.45
Age Group	25-30	Mean	96.91	97.46	97.17	97.20	96.88	96.93	97.45	97.47	97.18
		Std	6.54	4.88	5.98	5.56	7.35	5.67	4.23	5.47	5.77
	40-45	Mean	98.78	98.35	98.53	98.60	98.64	98.92	98.42	98.28	98.57
		Std	2.03	2.93	2.83	2.19	2.19	1.86	3.36	2.44	2.52
Group	Women	Mean	95.56	97.44	96.18	96.83	94.95	96.18	97.40	97.48	96.50
	25-30	Std	9.05	4.28	8.07	6.05	10.37	7.59	4.62	3.97	7.12
	Women	Mean	98.98	98.31	98.65	98.64	99.10	98.85	98.20	98.43	98.64
	40-45	Std	1.64	3.59	3.27	2.27	1.30	1.93	4.42	2.57	2.80
	Men	Mean	98.08	97.48	98.03	97.52	98.57	97.59	97.50	97.46	97.78
	25-30	Std	2.53	5.37	3.03	5.11	1.61	3.13	3.91	6.55	4.19
	Men	Mean	98.58	98.39	98.41	98.57	98.16	99.00	98.66	98.13	98.49
	40-45	Std	2.36	2.04	2.30	2.11	2.78	1.80	1.70	2.33	2.20
	Men	Mean	97.80	97.58	97.80	97.58	98.05	97.55	97.55	97.60	97.69
	50-55	Std	1.95	2.55	2.45	2.07	1.96	1.96	2.89	2.23	2.26

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Switching - Mathematical Processing											
Throughput			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	25.71	25.75	25.86	25.59	25.99	25.43	25.74	25.75	25.73
		Std	7.22	7.21	7.20	7.24	7.17	7.29	7.25	7.20	7.21
Gender	Women	Mean	25.33	25.61	25.65	25.29	25.75	24.91	25.55	25.67	25.47
		Std	7.34	6.72	6.95	7.11	7.24	7.45	6.69	6.79	7.02
	Men	Mean	26.07	25.87	26.06	25.88	26.21	25.93	25.91	25.83	25.97
		Std	7.12	7.67	7.44	7.36	7.14	7.14	7.78	7.62	7.39
Age Group	25-30	Mean	27.49	27.41	27.51	27.39	27.78	27.20	27.24	27.58	27.45
		Std	8.52	8.31	8.38	8.46	8.40	8.67	8.39	8.28	8.40
	40-45	Mean	23.75	23.91	24.04	23.61	24.01	23.49	24.08	23.73	23.83
		Std	4.76	5.20	5.06	4.90	4.83	4.70	5.31	5.12	4.98
Group	Women	Mean	27.33	27.41	27.56	27.18	27.81	26.86	27.32	27.50	27.37
	25-30	Std	8.63	7.44	7.91	8.20	8.48	8.86	7.40	7.57	8.03
	Women	Mean	23.33	23.81	23.74	23.40	23.69	22.97	23.79	23.83	23.57
	40-45	Std	5.07	5.37	5.22	5.24	5.07	5.11	5.43	5.39	5.21
	Men	Mean	27.62	27.41	27.46	27.57	27.76	27.49	27.17	27.65	27.52
	25-30	Std	8.46	9.05	8.80	8.72	8.43	8.59	9.24	8.94	8.74
	Men	Mean	24.18	24.01	24.36	23.83	24.34	24.03	24.39	23.63	24.10
	40-45	Std	4.39	5.04	4.90	4.54	4.61	4.22	5.23	4.89	4.71
	Men	Mean	21.73	21.84	22.14	21.44	21.94	21.53	22.34	21.35	21.79
	50-55	Std	6.98	7.22	7.16	7.01	7.15	6.98	7.35	7.23	7.05

Switching -Mathematical Processing Transitions											
Mean RT			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	2630	2635	2612	2654	2593	2667	2631	2640	2633
		Std	752	730	722	759	733	770	712	750	740
Gender	Women	Mean	2678	2642	2620	2700	2615	2741	2625	2659	2660
		Std	760	692	716	736	768	751	664	723	726
	Men	Mean	2585	2629	2605	2609	2573	2596	2636	2622	2607
		Std	743	766	730	779	703	785	759	778	754
Age Group	25-30	Mean	2527	2524	2513	2538	2496	2557	2530	2518	2525
		Std	875	818	824	870	861	894	791	849	846
	40-45	Mean	2744	2758	2721	2781	2701	2788	2741	2775	2751
		Std	567	598	572	591	547	586	600	599	581
Group	Women	Mean	2556	2524	2497	2583	2494	2617	2500	2548	2540
	25-30	Std	867	742	795	817	894	845	693	796	804
	Women	Mean	2800	2760	2742	2817	2735	2865	2749	2770	2780
	40-45	Std	617	622	607	629	604	630	619	632	617
	Men	Mean	2501	2524	2527	2498	2497	2505	2557	2492	2513
	25-30	Std	887	884	853	916	840	940	875	901	883
	Men	Mean	2686	2756	2699	2743	2665	2707	2733	2780	2721
	40-45	Std	507	575	536	549	485	533	587	570	541
	Men	Mean	3065	3088	3005	3148	3040	3090	2970	3206	3077
	50-55	Std	908	927	896	934	943	897	870	989	912

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Switching - Mathematical Processing Transitions											
Percent Correct			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	98.08	98.33	98.21	98.20	98.05	98.12	98.37	98.29	98.21
		Std	4.96	3.78	4.61	4.20	5.26	4.66	3.86	3.71	4.41
Gender	Women	Mean	97.74	98.22	97.89	98.08	97.70	97.79	98.08	98.36	97.98
		Std	6.33	3.79	5.73	4.65	6.88	5.78	4.33	3.18	5.21
	Men	Mean	98.40	98.43	98.51	98.33	98.38	98.43	98.64	98.23	98.42
		Std	3.12	3.78	3.18	3.74	3.01	3.26	3.35	4.18	3.46
Age Group	25-30	Mean	97.27	97.93	97.56	97.65	97.22	97.33	97.90	97.97	97.60
		Std	6.36	4.34	5.70	5.19	6.77	5.95	4.39	4.31	5.44
	40-45	Mean	98.97	98.77	98.92	98.82	98.96	98.99	98.88	98.65	98.87
		Std	2.40	3.01	2.82	2.62	2.50	2.31	3.13	2.90	2.72
Group	Women	Mean	96.36	97.73	96.74	97.35	95.90	96.83	97.58	97.88	97.04
	25-30	Std	8.48	4.13	7.37	5.95	9.32	7.64	4.66	3.58	6.68
	Women	Mean	99.13	98.71	99.04	98.80	99.50	98.75	98.58	98.85	98.92
	40-45	Std	2.22	3.36	3.03	2.67	1.54	2.71	3.97	2.67	2.85
	Men	Mean	98.07	98.11	98.27	97.90	98.37	97.76	98.17	98.04	98.09
	25-30	Std	3.49	4.52	3.58	4.44	2.92	3.98	4.17	4.90	4.03
	Men	Mean	98.82	98.83	98.80	98.84	98.39	99.24	99.21	98.45	98.82
	40-45	Std	2.59	2.59	2.60	2.58	3.15	1.81	1.86	3.14	2.58
	Men	Mean	97.23	98.05	98.08	97.20	97.55	96.90	98.60	97.50	97.64
	50-55	Std	3.72	3.32	3.01	3.97	2.95	4.41	3.05	3.56	3.53

Antihistamine Symptoms Questionnaire											
Total Score			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	2.57	2.34	2.07	2.84	2.15	3.00	2.00	2.68	2.46
		Std	2.54	2.50	2.42	2.56	2.40	2.62	2.45	2.51	2.52
Gender	Women	Mean	2.59	2.58	2.08	3.09	2.05	3.13	2.10	3.05	2.58
		Std	2.36	2.63	2.32	2.58	2.12	2.49	2.52	2.69	2.49
	Men	Mean	2.56	2.12	2.07	2.61	2.24	2.88	1.90	2.33	2.34
		Std	2.72	2.35	2.53	2.54	2.67	2.76	2.41	2.30	2.54
Age Group	25-30	Mean	2.83	2.98	2.60	3.20	2.53	3.12	2.67	3.28	2.90
		Std	2.59	2.61	2.61	2.55	2.49	2.67	2.76	2.45	2.59
	40-45	Mean	2.29	1.64	1.49	2.45	1.72	2.87	1.26	2.03	1.97
		Std	2.48	2.17	2.05	2.53	2.26	2.59	1.82	2.43	2.35
Group	Women	Mean	2.70	3.35	2.58	3.48	2.40	3.00	2.75	3.95	3.03
	25-30	Std	2.26	2.68	2.38	2.53	2.06	2.45	2.71	2.58	2.49
	Women	Mean	2.48	1.80	1.58	2.70	1.70	3.25	1.45	2.15	2.14
	40-45	Std	2.49	2.37	2.16	2.59	2.18	2.59	2.19	2.54	2.44
	Men	Mean	2.93	2.65	2.63	2.96	2.65	3.22	2.61	2.70	2.79
	25-30	Std	2.86	2.53	2.82	2.57	2.85	2.91	2.86	2.22	2.69
	Men	Mean	2.11	1.47	1.39	2.18	1.74	2.47	1.05	1.89	1.79
	40-45	Std	2.49	1.96	1.95	2.47	2.40	2.59	1.35	2.38	2.25
	Men	Mean	1.55	1.65	1.35	1.85	1.30	1.80	1.40	1.90	1.60
	50-55	Std	1.88	2.11	1.93	2.03	2.11	1.69	1.84	2.42	1.97

NOTE: *Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.*

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Activity State Questionnaire											
Physical Symptoms			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	32.41	31.44	32.02	31.83	32.07	32.76	31.98	30.90	31.93
		Std	9.91	8.92	10.23	8.58	10.54	9.29	9.97	7.75	9.43
Gender	Women	Mean	32.84	31.06	31.48	32.43	31.88	33.80	31.08	31.05	31.95
		Std	10.13	7.50	9.19	8.69	10.47	9.82	7.83	7.26	8.93
	Men	Mean	32.01	31.80	32.55	31.26	32.26	31.76	32.83	30.76	31.90
		Std	9.74	10.12	11.16	8.48	10.74	8.75	11.69	8.28	9.90
Age Group	25-30	Mean	34.41	33.64	34.01	34.03	33.70	35.12	34.33	32.95	34.02
		Std	11.18	9.85	11.47	9.53	12.21	10.15	10.82	8.85	10.51
	40-45	Mean	30.22	29.01	29.83	29.40	30.28	30.15	29.38	28.64	29.62
		Std	7.78	7.06	8.18	6.65	8.12	7.54	8.32	5.61	7.43
Group	Women	Mean	35.65	33.85	33.98	35.53	34.05	37.25	33.90	33.80	34.75
	25-30	Std	12.36	9.30	11.59	10.26	13.32	11.44	9.92	8.89	10.90
	Women	Mean	30.03	28.28	28.98	29.33	29.70	30.35	28.25	28.30	29.15
	40-45	Std	6.24	3.40	4.90	5.30	6.13	6.50	3.24	3.64	5.07
	Men	Mean	33.33	33.46	34.04	32.74	33.39	33.26	34.70	32.22	33.39
	25-30	Std	10.06	10.41	11.50	8.74	11.45	8.71	11.76	8.94	10.18
	Men	Mean	30.42	29.79	30.74	29.47	30.89	29.95	30.58	29.00	30.11
	40-45	Std	9.21	9.51	10.60	7.89	9.93	8.68	11.50	7.23	9.30
	Men	Mean	27.60	28.50	27.85	28.25	28.00	27.20	27.70	29.30	28.05
	50-55	Std	4.62	5.86	4.73	5.80	5.83	3.26	3.62	7.62	5.23

Activity State Questionnaire											
Preparedness			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	10.54	11.01	10.90	10.66	10.82	10.27	10.98	11.05	10.78
		Std	2.72	2.35	2.46	2.64	2.56	2.86	2.37	2.34	2.55
Gender	Women	Mean	10.28	11.10	10.80	10.58	10.53	10.03	11.08	11.13	10.69
		Std	3.04	2.36	2.64	2.86	2.88	3.21	2.38	2.37	2.75
	Men	Mean	10.80	10.93	10.99	10.74	11.10	10.50	10.88	10.98	10.86
		Std	2.36	2.35	2.29	2.42	2.21	2.50	2.39	2.34	2.35
Age Group	25-30	Mean	10.42	11.08	10.90	10.60	10.79	10.05	11.00	11.16	10.75
		Std	2.89	2.48	2.60	2.81	2.71	3.04	2.51	2.48	2.70
	40-45	Mean	10.68	10.94	10.90	10.72	10.85	10.51	10.95	10.92	10.81
		Std	2.54	2.21	2.32	2.44	2.41	2.67	2.25	2.21	2.37
Group	Women	Mean	10.23	11.53	10.93	10.83	10.50	9.95	11.35	11.70	10.88
	25-30	Std	3.39	2.40	2.90	3.11	3.30	3.55	2.46	2.39	2.99
	Women	Mean	10.33	10.68	10.68	10.33	10.55	10.10	10.80	10.55	10.50
	40-45	Std	2.69	2.27	2.38	2.60	2.48	2.94	2.33	2.26	2.48
	Men	Mean	10.59	10.70	10.87	10.41	11.04	10.13	10.70	10.70	10.64
	25-30	Std	2.39	2.51	2.33	2.54	2.12	2.60	2.57	2.51	2.44
	Men	Mean	11.05	11.21	11.13	11.13	11.16	10.95	11.11	11.32	11.13
	40-45	Std	2.34	2.15	2.26	2.23	2.36	2.37	2.21	2.14	2.23
	Men	Mean	10.90	10.60	10.75	10.75	10.90	10.90	10.60	10.60	10.75
	50-55	Std	2.31	2.60	2.51	2.43	2.28	2.47	2.84	2.50	2.44

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Mood Scale II											
Activity			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	2.12	2.20	2.21	2.11	2.19	2.05	2.22	2.18	2.16
		Std	0.53	0.49	0.48	0.53	0.48	0.57	0.48	0.49	0.51
Gender	Women	Mean	2.12	2.23	2.25	2.11	2.21	2.03	2.28	2.19	2.18
		Std	0.56	0.50	0.51	0.55	0.51	0.60	0.51	0.49	0.53
	Men	Mean	2.12	2.17	2.17	2.12	2.17	2.06	2.17	2.18	2.15
		Std	0.50	0.47	0.45	0.52	0.46	0.54	0.45	0.50	0.49
Age Group	25-30	Mean	1.98	2.09	2.08	2.00	2.07	1.88	2.08	2.11	2.04
		Std	0.49	0.52	0.48	0.54	0.47	0.51	0.50	0.55	0.51
	40-45	Mean	2.27	2.32	2.35	2.24	2.32	2.22	2.38	2.26	2.30
		Std	0.53	0.42	0.44	0.50	0.47	0.58	0.42	0.41	0.47
Group	Women	Mean	1.97	2.16	2.11	2.01	2.08	1.86	2.15	2.16	2.06
	25-30	Std	0.53	0.55	0.52	0.57	0.51	0.55	0.54	0.57	0.55
	Women	Mean	2.27	2.31	2.38	2.20	2.34	2.19	2.41	2.21	2.29
	40-45	Std	0.55	0.45	0.47	0.52	0.48	0.62	0.46	0.41	0.50
	Men	Mean	1.98	2.04	2.04	1.98	2.07	1.90	2.02	2.07	2.01
	25-30	Std	0.46	0.50	0.45	0.51	0.44	0.48	0.47	0.54	0.48
	Men	Mean	2.28	2.33	2.33	2.29	2.30	2.26	2.35	2.32	2.31
	40-45	Std	0.50	0.39	0.41	0.49	0.46	0.56	0.37	0.42	0.45
	Men	Mean	2.39	2.39	2.39	2.39	2.39	2.40	2.40	2.37	2.39
	50-55	Std	0.45	0.43	0.46	0.41	0.51	0.40	0.44	0.44	0.43

Mood Scale II											
Activity RT			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	1459	1441	1435	1465	1395	1524	1475	1406	1450
		Std	575	508	525	560	563	583	484	533	542
Gender	Women	Mean	1491	1471	1451	1511	1423	1560	1480	1462	1481
		Std	585	514	518	581	516	646	525	510	549
	Men	Mean	1429	1412	1419	1422	1368	1490	1470	1353	1421
		Std	567	504	534	539	610	521	448	554	535
Age Group	25-30	Mean	1361	1300	1316	1345	1279	1443	1353	1247	1331
		Std	527	434	464	503	506	541	420	447	482
	40-45	Mean	1568	1595	1566	1598	1522	1614	1609	1582	1582
		Std	609	541	560	592	602	621	519	569	574
Group	Women	Mean	1310	1255	1241	1324	1241	1379	1240	1270	1283
	25-30	Std	513	422	373	548	375	623	380	470	467
	Women	Mean	1672	1687	1662	1697	1604	1740	1720	1655	1680
	40-45	Std	603	512	560	558	580	633	548	485	556
	Men	Mean	1405	1340	1382	1363	1312	1498	1452	1228	1372
	25-30	Std	541	446	526	466	604	465	436	436	494
	Men	Mean	1459	1499	1465	1493	1437	1481	1493	1504	1479
	40-45	Std	604	560	549	615	628	595	472	650	579
	Men	Mean	1609	1696	1568	1736	1471	1746	1665	1726	1652
	50-55	Std	861	745	640	936	548	1106	737	792	796

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Mood Scale II											
Happiness			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	2.35	2.37	2.37	2.35	2.38	2.32	2.36	2.37	2.36
		Std	0.57	0.58	0.57	0.58	0.55	0.59	0.60	0.56	0.58
Gender	Women	Mean	2.42	2.52	2.49	2.45	2.45	2.40	2.54	2.51	2.47
		Std	0.60	0.55	0.58	0.58	0.60	0.62	0.57	0.55	0.58
	Men	Mean	2.28	2.22	2.26	2.24	2.31	2.24	2.20	2.25	2.25
		Std	0.53	0.57	0.55	0.56	0.50	0.57	0.60	0.56	0.55
Age Group	25-30	Mean	2.15	2.19	2.19	2.15	2.21	2.10	2.18	2.20	2.17
		Std	0.59	0.61	0.61	0.59	0.58	0.60	0.64	0.58	0.60
	40-45	Mean	2.57	2.57	2.57	2.56	2.57	2.56	2.57	2.56	2.57
		Std	0.46	0.48	0.46	0.48	0.44	0.48	0.49	0.49	0.47
Group	Women	Mean	2.21	2.36	2.30	2.27	2.24	2.18	2.36	2.36	2.29
	25-30	Std	0.68	0.59	0.65	0.64	0.68	0.69	0.62	0.58	0.64
	Women	Mean	2.64	2.69	2.69	2.64	2.66	2.62	2.72	2.66	2.66
	40-45	Std	0.43	0.46	0.43	0.46	0.42	0.45	0.45	0.48	0.44
	Men	Mean	2.10	2.04	2.10	2.04	2.18	2.02	2.02	2.07	2.07
	25-30	Std	0.51	0.59	0.57	0.53	0.50	0.51	0.63	0.55	0.55
	Men	Mean	2.49	2.44	2.44	2.49	2.48	2.51	2.41	2.47	2.46
	40-45	Std	0.49	0.48	0.47	0.50	0.45	0.53	0.49	0.49	0.48
	Men	Mean	2.53	2.47	2.52	2.48	2.53	2.52	2.50	2.45	2.50
	50-55	Std	0.43	0.42	0.43	0.42	0.46	0.42	0.43	0.44	0.42

Mood Scale II											
Happiness RT			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	1202	1199	1192	1208	1183	1221	1202	1196	1200
		Std	460	418	424	455	451	471	397	441	439
Gender	Women	Mean	1229	1145	1192	1182	1212	1247	1172	1117	1187
		Std	449	393	411	436	430	472	396	392	423
	Men	Mean	1176	1250	1193	1233	1156	1196	1230	1270	1213
		Std	472	437	438	473	474	474	400	475	455
Age Group	25-30	Mean	1183	1134	1154	1163	1167	1198	1140	1128	1158
		Std	448	388	430	409	500	395	352	424	418
	40-45	Mean	1224	1270	1235	1258	1201	1247	1269	1270	1247
		Std	475	441	415	498	397	546	436	451	457
Group	Women	Mean	1207	1029	1120	1117	1207	1207	1032	1026	1118
	25-30	Std	419	314	392	371	472	372	276	356	379
	Women	Mean	1251	1261	1264	1248	1217	1286	1312	1209	1256
	40-45	Std	481	432	423	489	396	561	453	415	454
	Men	Mean	1161	1226	1184	1203	1133	1189	1234	1217	1193
	25-30	Std	475	424	463	439	531	422	389	465	449
	Men	Mean	1195	1279	1204	1270	1185	1205	1224	1335	1237
	40-45	Std	473	455	411	514	408	541	424	490	463
	Men	Mean	1303	1497	1349	1451	1225	1381	1473	1521	1400
	50-55	Std	472	516	477	525	425	525	516	543	498

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Mood Scale II											
Depression			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	1.06	1.06	1.06	1.05	1.05	1.06	1.07	1.05	1.06
		Std	0.20	0.18	0.22	0.16	0.23	0.16	0.20	0.15	0.19
Gender	Women	Mean	1.05	1.05	1.05	1.05	1.05	1.05	1.04	1.05	1.05
		Std	0.20	0.17	0.22	0.15	0.26	0.13	0.17	0.17	0.18
	Men	Mean	1.06	1.07	1.07	1.05	1.04	1.07	1.10	1.04	1.06
		Std	0.20	0.19	0.22	0.16	0.21	0.20	0.23	0.12	0.19
Age Group	25-30	Mean	1.09	1.10	1.10	1.08	1.09	1.09	1.12	1.07	1.09
		Std	0.27	0.23	0.29	0.20	0.32	0.21	0.26	0.19	0.25
	40-45	Mean	1.02	1.02	1.01	1.02	1.01	1.03	1.02	1.02	1.02
		Std	0.07	0.07	0.06	0.07	0.04	0.09	0.08	0.05	0.07
Group	Women	Mean	1.09	1.08	1.09	1.08	1.11	1.07	1.08	1.08	1.08
	25-30	Std	0.27	0.23	0.30	0.19	0.36	0.14	0.23	0.23	0.25
	Women	Mean	1.02	1.01	1.00	1.03	1.00	1.03	1.00	1.03	1.01
	40-45	Std	0.08	0.05	0.00	0.09	0.00	0.12	0.00	0.06	0.07
	Men	Mean	1.09	1.11	1.11	1.09	1.07	1.12	1.16	1.06	1.10
	25-30	Std	0.26	0.23	0.28	0.21	0.28	0.25	0.28	0.16	0.25
	Men	Mean	1.02	1.02	1.03	1.01	1.02	1.02	1.04	1.01	1.02
	40-45	Std	0.05	0.09	0.09	0.05	0.05	0.05	0.12	0.04	0.07
	Men	Mean	1.03	1.08	1.07	1.04	1.03	1.03	1.10	1.05	1.05
	50-55	Std	0.10	0.14	0.15	0.09	0.10	0.10	0.18	0.08	0.12

Mood Scale II											
Depression RT			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	1078	1082	1077	1083	1064	1091	1089	1075	1080
		Std	320	367	353	335	322	319	383	352	343
Gender	Women	Mean	1133	1103	1109	1127	1118	1147	1099	1107	1118
		Std	321	368	342	349	324	321	363	378	344
	Men	Mean	1025	1062	1046	1041	1012	1038	1079	1044	1043
		Std	312	366	362	318	315	312	405	327	340
Age Group	25-30	Mean	1043	1080	1068	1055	1050	1036	1086	1074	1062
		Std	330	394	388	339	362	300	416	376	363
	40-45	Mean	1115	1085	1086	1114	1079	1152	1093	1076	1100
		Std	305	336	311	331	275	333	348	328	320
Group	Women	Mean	1089	1101	1112	1078	1128	1050	1096	1107	1095
	25-30	Std	311	385	367	331	356	262	387	393	348
	Women	Mean	1176	1105	1106	1176	1108	1245	1103	1108	1141
	40-45	Std	328	355	319	363	298	350	347	372	342
	Men	Mean	1003	1061	1030	1035	982	1024	1077	1046	1032
	25-30	Std	345	405	405	347	360	335	448	367	375
	Men	Mean	1051	1063	1066	1048	1049	1054	1082	1043	1057
	40-45	Std	269	318	306	283	253	291	357	281	293
	Men	Mean	1374	1493	1476	1391	1438	1310	1513	1472	1433
	50-55	Std	648	563	661	550	760	546	584	572	602

NOTE: *Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.*

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Mood Scale II											
Anger			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	1.06	1.06	1.07	1.05	1.07	1.05	1.07	1.04	1.06
		Std	0.17	0.14	0.18	0.13	0.19	0.14	0.17	0.12	0.16
Gender	Women	Mean	1.04	1.05	1.06	1.04	1.06	1.03	1.05	1.06	1.05
		Std	0.14	0.14	0.16	0.11	0.18	0.07	0.13	0.14	0.14
	Men	Mean	1.08	1.06	1.08	1.05	1.08	1.07	1.09	1.03	1.07
		Std	0.19	0.15	0.19	0.14	0.19	0.18	0.20	0.08	0.17
Age Group	25-30	Mean	1.09	1.08	1.10	1.07	1.12	1.07	1.09	1.07	1.09
		Std	0.20	0.16	0.21	0.15	0.23	0.15	0.18	0.15	0.18
	40-45	Mean	1.02	1.03	1.03	1.02	1.02	1.03	1.05	1.02	1.03
		Std	0.11	0.12	0.12	0.11	0.08	0.14	0.15	0.06	0.12
Group	Women	Mean	1.08	1.10	1.11	1.08	1.13	1.04	1.09	1.11	1.09
	25-30	Std	0.18	0.18	0.21	0.15	0.24	0.09	0.18	0.19	0.18
	Women	Mean	1.00	1.01	1.00	1.01	1.00	1.01	1.01	1.01	1.01
	40-45	Std	0.03	0.04	0.03	0.04	0.00	0.04	0.04	0.04	0.03
	Men	Mean	1.10	1.06	1.10	1.06	1.12	1.09	1.08	1.04	1.08
	25-30	Std	0.21	0.15	0.21	0.14	0.23	0.18	0.19	0.09	0.18
	Men	Mean	1.04	1.06	1.07	1.04	1.04	1.05	1.10	1.03	1.05
	40-45	Std	0.16	0.16	0.17	0.15	0.12	0.19	0.21	0.08	0.16
	Men	Mean	1.06	1.08	1.08	1.06	1.07	1.05	1.10	1.07	1.07
	50-55	Std	0.12	0.18	0.18	0.12	0.14	0.11	0.23	0.14	0.15

Mood Scale II											
Anger RT			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	1005	981	992	994	977	1032	1007	955	993
		Std	339	361	353	346	327	350	380	341	349
Gender	Women	Mean	1030	972	992	1010	1018	1041	966	978	1001
		Std	357	329	329	359	366	352	290	368	343
	Men	Mean	981	990	993	979	938	1023	1047	934	986
		Std	321	390	377	336	284	352	449	316	356
Age Group	25-30	Mean	1018	979	1015	982	1010	1027	1021	938	999
		Std	372	407	409	371	392	355	429	385	389
	40-45	Mean	990	984	967	1007	941	1038	993	975	987
		Std	299	304	281	319	235	349	322	288	300
Group	Women	Mean	1092	1004	1028	1068	1071	1113	984	1023	1048
	25-30	Std	403	336	355	391	430	383	262	403	371
	Women	Mean	967	941	957	951	965	970	949	933	954
	40-45	Std	295	323	301	318	288	310	321	333	308
	Men	Mean	954	958	1005	907	956	952	1053	863	956
	25-30	Std	334	463	454	339	357	318	538	361	402
	Men	Mean	1013	1029	978	1065	917	1110	1039	1019	1021
	40-45	Std	305	279	262	314	165	380	325	233	291
	Men	Mean	1285	1187	1249	1224	1312	1259	1185	1189	1236
	50-55	Std	481	252	384	390	453	531	313	192	382

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Mood Scale II											
Fatigue			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	1.25	1.17	1.16	1.26	1.17	1.33	1.15	1.19	1.21
		Std	0.34	0.26	0.27	0.33	0.28	0.37	0.25	0.26	0.30
Gender	Women	Mean	1.28	1.17	1.17	1.28	1.20	1.35	1.15	1.20	1.22
		Std	0.38	0.25	0.31	0.34	0.35	0.40	0.26	0.24	0.33
	Men	Mean	1.22	1.17	1.15	1.24	1.14	1.31	1.16	1.17	1.20
		Std	0.29	0.26	0.22	0.32	0.19	0.34	0.25	0.28	0.28
Age Group	25-30	Mean	1.31	1.21	1.19	1.32	1.20	1.42	1.19	1.22	1.26
		Std	0.38	0.29	0.30	0.36	0.32	0.40	0.28	0.30	0.34
	40-45	Mean	1.18	1.13	1.13	1.19	1.14	1.23	1.12	1.15	1.16
		Std	0.27	0.22	0.22	0.27	0.22	0.31	0.22	0.22	0.25
Group	Women	Mean	1.33	1.18	1.19	1.31	1.23	1.42	1.14	1.21	1.25
	25-30	Std	0.43	0.26	0.34	0.37	0.42	0.44	0.25	0.26	0.36
	Women	Mean	1.23	1.17	1.15	1.24	1.16	1.29	1.15	1.19	1.20
	40-45	Std	0.31	0.25	0.27	0.29	0.27	0.35	0.28	0.23	0.28
	Men	Mean	1.29	1.23	1.20	1.33	1.17	1.42	1.23	1.23	1.26
	25-30	Std	0.33	0.31	0.26	0.36	0.22	0.37	0.30	0.33	0.32
	Men	Mean	1.14	1.09	1.10	1.13	1.11	1.17	1.08	1.10	1.11
	40-45	Std	0.21	0.17	0.15	0.23	0.16	0.25	0.14	0.19	0.19
	Men	Mean	1.14	1.17	1.14	1.18	1.13	1.15	1.14	1.20	1.16
	50-55	Std	0.28	0.26	0.22	0.31	0.25	0.32	0.21	0.31	0.27

Mood Scale II											
Fatigue RT			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	1252	1159	1138	1273	1165	1340	1112	1206	1206
		Std	490	418	383	513	425	535	336	484	457
Gender	Women	Mean	1276	1185	1159	1302	1205	1348	1112	1257	1231
		Std	491	426	383	519	423	547	338	493	461
	Men	Mean	1229	1134	1119	1245	1126	1332	1111	1157	1182
		Std	491	412	384	509	429	531	339	477	454
Age Group	25-30	Mean	1191	1119	1096	1214	1103	1279	1089	1149	1155
		Std	434	420	357	483	372	476	345	487	427
	40-45	Mean	1320	1203	1185	1338	1233	1407	1137	1269	1261
		Std	540	414	408	540	473	593	329	480	483
Group	Women	Mean	1233	1121	1102	1252	1170	1297	1035	1208	1177
	25-30	Std	459	434	326	536	358	544	283	539	447
	Women	Mean	1320	1249	1216	1353	1241	1399	1190	1307	1284
	40-45	Std	523	414	430	503	486	558	377	451	470
	Men	Mean	1155	1117	1091	1181	1046	1264	1136	1098	1136
	25-30	Std	412	413	385	435	382	420	391	443	411
	Men	Mean	1320	1155	1152	1322	1224	1415	1081	1229	1237
	40-45	Std	564	414	386	584	471	643	269	518	499
	Men	Mean	1331	1257	1313	1276	1316	1346	1309	1206	1294
	50-55	Std	559	386	490	472	588	559	401	384	476

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Mood Scale II											
Fear			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	1.05	1.05	1.07	1.04	1.05	1.05	1.08	1.03	1.05
		Std	0.14	0.17	0.17	0.14	0.13	0.15	0.20	0.13	0.15
Gender	Women	Mean	1.08	1.07	1.09	1.06	1.08	1.07	1.09	1.06	1.07
		Std	0.16	0.19	0.17	0.18	0.14	0.18	0.20	0.17	0.17
	Men	Mean	1.03	1.04	1.05	1.02	1.03	1.03	1.07	1.01	1.03
		Std	0.10	0.15	0.16	0.08	0.10	0.10	0.20	0.06	0.13
Age Group	25-30	Mean	1.06	1.07	1.08	1.05	1.06	1.06	1.11	1.04	1.06
		Std	0.15	0.21	0.20	0.16	0.13	0.17	0.25	0.15	0.18
	40-45	Mean	1.05	1.04	1.05	1.04	1.05	1.05	1.05	1.03	1.04
		Std	0.12	0.11	0.12	0.11	0.12	0.12	0.12	0.10	0.11
Group	Women	Mean	1.07	1.09	1.09	1.07	1.06	1.07	1.11	1.06	1.08
	25-30	Std	0.18	0.22	0.20	0.21	0.13	0.23	0.25	0.20	0.20
	Women	Mean	1.09	1.06	1.09	1.06	1.10	1.07	1.07	1.05	1.07
	40-45	Std	0.14	0.14	0.15	0.14	0.15	0.13	0.15	0.14	0.14
	Men	Mean	1.05	1.06	1.08	1.03	1.05	1.04	1.10	1.02	1.05
	25-30	Std	0.12	0.20	0.21	0.09	0.14	0.10	0.26	0.08	0.16
	Men	Mean	1.01	1.01	1.01	1.01	1.00	1.02	1.02	1.00	1.01
	40-45	Std	0.06	0.05	0.05	0.06	0.00	0.09	0.06	0.00	0.06
	Men	Mean	1.02	1.03	1.03	1.02	1.04	1.00	1.02	1.04	1.03
	50-55	Std	0.06	0.07	0.07	0.06	0.08	0.00	0.06	0.08	0.07

Mood Scale II											
Fear RT			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	1005	1019	998	1026	972	1039	1023	1014	1012
		Std	381	421	387	415	336	421	432	412	401
Gender	Women	Mean	1028	1041	1019	1050	1022	1034	1016	1066	1035
		Std	390	412	395	407	368	416	424	403	400
	Men	Mean	983	998	977	1004	924	1043	1030	965	991
		Std	373	431	380	424	299	430	444	419	402
Age Group	25-30	Mean	991	1042	992	1042	927	1055	1056	1029	1017
		Std	412	490	417	485	289	502	510	474	452
	40-45	Mean	1021	993	1004	1010	1021	1021	987	999	1007
		Std	345	330	353	323	379	313	328	336	337
Group	Women	Mean	1020	1042	1020	1043	1003	1037	1037	1048	1031
	25-30	Std	393	416	373	435	279	489	454	386	403
	Women	Mean	1037	1040	1019	1058	1042	1031	995	1084	1038
	40-45	Std	392	413	420	383	447	341	403	428	400
	Men	Mean	966	1042	967	1041	862	1070	1072	1012	1004
	25-30	Std	430	550	455	530	287	523	564	548	493
	Men	Mean	1005	944	989	959	999	1010	979	909	974
	40-45	Std	293	205	269	239	303	290	237	167	253
	Men	Mean	1120	1208	1229	1099	1185	1055	1272	1143	1164
	50-55	Std	410	416	502	292	528	260	499	328	410

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Mood Scale II											
Overall Mean RT			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	1179	1158	1151	1187	1137	1221	1164	1153	1169
		Std	321	306	298	327	298	338	300	313	313
Gender	Women	Mean	1211	1165	1166	1210	1177	1244	1154	1176	1188
		Std	315	293	281	326	290	339	275	313	304
	Men	Mean	1149	1152	1136	1165	1099	1199	1173	1131	1151
		Std	325	319	315	328	305	340	325	315	321
Age Group	25-30	Mean	1142	1116	1116	1142	1099	1184	1133	1100	1129
		Std	327	327	319	335	313	338	327	330	326
	40-45	Mean	1221	1204	1189	1236	1179	1262	1199	1210	1213
		Std	311	274	271	312	280	338	266	286	293
Group	Women	Mean	1167	1098	1110	1155	1143	1190	1076	1120	1132
	25-30	Std	306	284	261	327	277	337	247	322	295
	Women	Mean	1255	1231	1221	1265	1211	1298	1232	1231	1243
	40-45	Std	323	290	292	320	306	341	285	302	305
	Men	Mean	1120	1132	1121	1131	1061	1178	1182	1083	1126
	25-30	Std	346	363	364	344	342	346	383	343	353
	Men	Mean	1185	1176	1154	1207	1145	1225	1164	1188	1181
	40-45	Std	299	258	247	306	253	340	247	275	277
	Men	Mean	1351	1401	1371	1380	1333	1368	1410	1392	1376
	50-55	Std	523	419	446	500	480	587	432	428	468

Monk Mood Scale											
Alert			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	70	76	76	71	75	66	77	76	73
		Std	23	19	19	22	20	25	19	18	21
Gender	Women	Mean	69	80	77	72	74	64	80	80	75
		Std	26	17	21	24	23	28	18	17	23
	Men	Mean	72	73	74	70	75	68	73	73	72
		Std	19	19	18	20	16	21	20	20	19
Age Group	25-30	Mean	67	74	72	68	71	62	73	75	70
		Std	24	20	21	24	21	25	21	20	22
	40-45	Mean	75	79	80	74	78	71	81	78	77
		Std	21	16	17	20	18	24	16	16	19
Group	Women	Mean	65	81	74	71	69	60	79	83	73
	25-30	Std	28	18	23	26	26	29	19	16	25
	Women	Mean	74	79	80	73	79	69	82	77	76
	40-45	Std	24	17	18	23	19	27	17	17	21
	Men	Mean	68	68	70	66	73	63	68	68	68
	25-30	Std	19	21	18	21	16	22	21	22	20
	Men	Mean	76	79	79	77	78	74	80	79	78
	40-45	Std	18	15	16	18	16	20	16	15	17
	Men	Mean	80	78	81	77	82	79	81	74	79
	50-55	Std	17	19	18	18	17	17	19	20	18

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Monk Mood Scale											
Sad			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	10	12	11	11	9	11	13	11	11
		Std	16	20	19	17	15	17	21	18	18
Gender	Women	Mean	7	9	8	8	7	8	10	8	8
		Std	13	17	16	14	13	13	19	15	15
	Men	Mean	13	15	14	14	12	14	17	14	14
		Std	19	22	21	19	18	20	23	20	20
Age Group	25-30	Mean	12	14	13	12	10	13	16	12	13
		Std	17	21	21	18	16	18	24	18	19
	40-45	Mean	8	10	9	9	8	8	10	10	9
		Std	15	17	16	16	15	15	17	18	16
Group	Women	Mean	6	9	8	7	5	6	11	7	7
	25-30	Std	9	17	15	13	7	11	20	14	14
	Women	Mean	9	9	9	9	9	9	9	9	9
	40-45	Std	15	17	17	16	16	15	17	17	16
	Men	Mean	17	19	18	17	15	19	21	16	18
	25-30	Std	20	23	24	20	20	21	27	20	22
	Men	Mean	7	11	9	9	7	7	11	11	9
	40-45	Std	15	18	16	17	14	15	17	20	16
	Men	Mean	12	13	13	12	13	12	13	13	13
	50-55	Std	17	17	17	17	18	18	17	17	17

Monk Mood Scale											
Tense			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	24	26	24	25	23	25	26	26	25
		Std	24	25	25	24	24	24	25	25	24
Gender	Women	Mean	24	26	25	25	24	24	25	26	25
		Std	26	26	26	26	26	26	27	26	26
	Men	Mean	24	26	24	25	23	25	26	26	25
		Std	22	24	23	23	22	22	24	23	23
Age Group	25-30	Mean	30	28	30	27	31	28	30	26	29
		Std	26	25	27	24	27	26	27	24	26
	40-45	Mean	17	23	18	23	14	20	21	25	20
		Std	19	24	20	24	17	21	23	26	22
Group	Women	Mean	30	25	30	25	33	27	27	23	28
	25-30	Std	30	27	30	27	31	29	29	25	28
	Women	Mean	18	27	19	25	15	22	24	29	22
	40-45	Std	20	26	21	25	17	22	25	27	23
	Men	Mean	30	31	31	30	29	30	32	29	30
	25-30	Std	23	24	24	23	24	23	25	23	23
	Men	Mean	16	20	16	20	14	19	18	21	18
	40-45	Std	18	22	19	22	17	20	21	24	20
	Men	Mean	23	21	22	22	24	22	21	21	22
	50-55	Std	20	22	21	22	20	21	22	23	21

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Monk Mood Scale											
Effort			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	39	37	37	39	38	40	36	37	38
		Std	30	31	31	30	30	30	31	30	30
Gender	Women	Mean	36	33	33	36	34	38	32	35	35
		Std	33	33	33	33	33	34	33	33	33
	Men	Mean	42	40	41	41	41	42	41	40	41
		Std	26	28	27	26	27	25	29	28	27
Age Group	25-30	Mean	48	47	48	47	49	48	47	46	47
		Std	29	30	30	29	29	29	31	31	29
	40-45	Mean	29	26	25	30	26	32	24	28	27
		Std	28	27	27	28	27	29	27	27	27
Group	Women	Mean	46	45	45	45	47	45	44	46	45
	25-30	Std	35	35	34	35	34	36	35	36	35
	Women	Mean	27	23	21	28	22	32	21	25	25
	40-45	Std	29	26	27	28	28	30	27	26	28
	Men	Mean	50	48	50	48	50	50	51	46	49
	25-30	Std	22	26	25	23	24	21	26	26	24
	Men	Mean	31	30	29	32	30	32	28	31	30
	40-45	Std	26	28	26	28	26	28	27	29	27
	Men	Mean	32	36	35	33	34	31	37	35	34
	50-55	Std	32	31	31	32	32	33	31	32	31

Monk Mood Scale											
Happy			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	75	74	74	75	76	74	72	76	75
		Std	22	23	23	22	22	23	24	21	22
Gender	Women	Mean	80	82	80	82	80	81	79	84	81
		Std	20	19	22	17	22	19	22	16	20
	Men	Mean	70	67	69	68	73	66	65	69	68
		Std	23	24	23	24	21	24	25	23	23
Age Group	25-30	Mean	71	72	72	71	73	69	70	74	71
		Std	25	24	25	24	25	26	25	23	25
	40-45	Mean	80	77	77	79	80	79	75	79	78
		Std	17	21	20	18	18	18	23	19	19
Group	Women	Mean	77	82	78	81	76	78	80	84	79
	25-30	Std	24	17	23	18	27	21	19	16	21
	Women	Mean	84	82	82	84	84	83	79	84	83
	40-45	Std	16	21	20	16	15	17	25	16	18
	Men	Mean	65	64	66	63	71	60	62	65	65
	25-30	Std	25	26	25	26	23	27	28	25	26
	Men	Mean	75	72	73	74	75	74	70	73	73
	40-45	Std	18	20	19	20	19	18	19	22	19
	Men	Mean	75	74	74	75	74	76	73	74	74
	50-55	Std	17	17	18	16	18	16	18	17	17

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Monk Mood Scale											
Weary			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	30	27	25	32	26	35	25	28	28
		Std	27	26	25	28	25	29	25	26	27
Gender	Women	Mean	28	22	21	29	24	32	19	25	25
		Std	29	27	26	29	27	31	25	28	28
	Men	Mean	33	31	29	34	27	38	30	31	32
		Std	26	24	24	26	23	27	25	23	25
Age Group	25-30	Mean	34	30	29	36	28	41	30	30	32
		Std	29	27	27	29	26	30	28	27	28
	40-45	Mean	26	23	21	27	23	29	19	26	24
		Std	25	23	22	26	23	27	21	25	24
Group	Women	Mean	31	23	24	30	26	36	23	24	27
	25-30	Std	31	29	29	31	29	32	30	29	30
	Women	Mean	25	21	19	28	22	28	16	27	23
	40-45	Std	27	25	23	28	25	30	20	28	26
	Men	Mean	37	36	33	40	30	45	36	36	37
	25-30	Std	27	24	25	26	24	28	25	24	25
	Men	Mean	27	24	24	27	24	29	23	25	25
	40-45	Std	23	22	22	23	22	25	23	21	22
	Men	Mean	17	16	17	17	18	17	16	17	17
	50-55	Std	24	21	22	22	24	24	21	22	22

Monk Mood Scale											
Calm			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	75	75	74	76	75	75	73	76	75
		Std	20	21	21	20	21	19	22	20	20
Gender	Women	Mean	78	77	76	79	77	79	75	79	77
		Std	21	21	22	20	23	20	22	21	21
	Men	Mean	72	72	72	73	73	72	71	74	72
		Std	19	20	20	18	19	18	21	19	19
Age Group	25-30	Mean	73	73	73	74	73	74	72	74	73
		Std	22	21	22	21	22	21	22	21	21
	40-45	Mean	77	77	76	78	77	78	75	78	77
		Std	18	20	21	18	20	17	22	18	19
Group	Women	Mean	78	77	76	78	77	78	76	78	77
	25-30	Std	21	22	20	22	22	21	19	24	21
	Women	Mean	78	77	76	80	77	80	75	79	78
	40-45	Std	22	21	24	18	24	20	25	17	21
	Men	Mean	70	70	69	71	70	69	68	72	70
	25-30	Std	21	21	23	19	23	20	23	19	21
	Men	Mean	76	76	75	76	76	75	74	77	76
	40-45	Std	14	19	17	17	14	14	19	19	16
	Men	Mean	73	76	72	76	68	78	77	75	74
	50-55	Std	23	20	24	18	28	17	21	19	21

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Monk Mood Scale											
Sleepy			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	35	26	27	34	29	41	24	27	30
		Std	30	25	27	29	28	31	25	25	28
Gender	Women	Mean	35	22	25	33	29	42	21	24	29
		Std	33	25	28	31	30	34	25	25	30
	Men	Mean	34	29	28	34	29	39	28	30	31
		Std	28	25	25	28	26	29	25	26	27
Age Group	25-30	Mean	42	30	32	40	34	50	29	31	36
		Std	32	27	28	31	30	32	26	28	30
	40-45	Mean	26	21	21	26	22	30	19	22	24
		Std	27	23	24	25	25	28	23	22	25
Group	Women	Mean	42	25	29	39	34	50	24	27	34
	25-30	Std	35	27	31	33	34	35	27	28	32
	Women	Mean	29	19	20	28	23	34	17	21	24
	40-45	Std	29	22	25	28	26	32	23	21	26
	Men	Mean	42	34	34	42	35	50	33	34	38
	25-30	Std	29	26	26	29	27	30	25	28	28
	Men	Mean	24	23	21	25	21	26	22	24	23
	40-45	Std	23	24	23	23	24	23	24	24	23
	Men	Mean	15	17	15	18	15	16	15	20	16
	50-55	Std	21	21	20	22	21	21	20	23	21

Monk Mood Scale											
Global Vigor			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	66	72	72	67	70	62	73	71	69
		Std	23	20	20	22	21	24	20	20	22
Gender	Women	Mean	67	75	74	68	71	62	77	73	71
		Std	25	20	22	24	23	27	20	20	23
	Men	Mean	66	69	69	65	69	63	69	68	67
		Std	20	19	19	21	19	22	20	19	20
Age Group	25-30	Mean	61	67	66	62	65	56	68	67	64
		Std	22	20	20	22	20	23	20	21	21
	40-45	Mean	73	77	78	72	77	69	79	75	75
		Std	22	18	19	21	20	24	19	18	20
Group	Women	Mean	61	72	69	64	66	57	72	72	67
	25-30	Std	25	21	23	25	23	27	22	22	24
	Women	Mean	72	78	79	71	77	67	81	75	75
	40-45	Std	24	18	19	23	21	27	18	18	21
	Men	Mean	60	63	64	59	65	55	64	62	61
	25-30	Std	18	18	17	19	18	19	18	19	18
	Men	Mean	74	76	76	73	76	72	77	75	75
	40-45	Std	20	19	19	20	19	22	20	18	20
	Men	Mean	79	77	79	77	79	79	78	76	78
	50-55	Std	19	18	19	19	19	20	19	19	19

NOTE: ***Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.***

Appendix A.
Means and Standard Deviations for All Comparison Groups.

Monk Mood Scale											
Global Affect			Dose		Pre_Post		Antihistamine		Placebo		
			Antihist	Placebo	Pre	Post	Pre	Post	Pre	Post	All
Overall		Mean	79	78	78	79	80	78	77	79	78
		Std	15	17	16	16	15	16	18	16	16
Gender	Women	Mean	81	81	80	82	81	82	79	82	81
		Std	15	15	15	15	15	15	16	15	15
	Men	Mean	76	75	76	75	78	75	74	76	76
		Std	15	17	17	16	15	15	19	16	16
Age Group	25-30	Mean	76	76	75	76	76	75	75	78	76
		Std	16	18	18	16	16	17	20	15	17
	40-45	Mean	83	80	81	81	83	82	79	80	81
		Std	13	15	14	15	13	14	15	16	14
Group	Women	Mean	80	81	79	82	79	81	79	83	80
	25-30	Std	15	16	16	15	15	16	17	14	15
	Women	Mean	83	80	82	82	84	83	80	81	82
	40-45	Std	15	15	15	15	14	16	15	16	15
	Men	Mean	72	72	72	71	74	70	70	73	72
	25-30	Std	17	18	19	15	17	16	21	15	17
	Men	Mean	82	79	81	80	83	81	79	80	80
	40-45	Std	12	15	13	15	11	13	14	17	14
	Men	Mean	78	79	78	79	76	80	79	79	79
	50-55	Std	16	17	16	16	16	16	17	17	16

NOTE: *Statistics in the overall, gender, and age group cells do not include men in the 50-55 year-old age group.*

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