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An Examination Of Adult Age Differences In Implicit And Explicit Memory For Prescription Drug Advertisements

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AN EXAMINATION OF ADULT AGE DIFFERENCES IN IMPLICIT AND EXPLICIT MEMORY FOR PRESCRIPTION DRUG ADVERTISEMENTS

By

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Prescription drug advertisements are commonly seen in magazines and on television, and as a result, the public is familiar with them. Many drug ads are targeted toward older adults, who tend to use more medications, because they suffer from more chronic conditions than younger adults. Nonetheless, the effectiveness of drug advertising at persuading older adults to ask physicians for specific medications remains uncertain. Older adults' explicit memory for drug ads is poor, but their implicit memory for drug ads may be better. Therefore, older adults may be implicitly persuaded by drug ads even when they cannot explicitly remember seeing them.

The current study measured implicit memory with an incidental ratings exercise and an indirect test of preference; explicit memory was measured with intentional studying and a direct test of recognition. The purposes of the study were to compare implicit and explicit memory for drug ads in older and younger adults, to determine whether age differences in memory are affected by salient information or anxiety, and to

demonstrate that a test of implicit memory may be useful in estimating advertising effectiveness.

The results showed no age difference for implicit memory for drug ads, but an age difference was found for explicit memory for drug ads. However, contrary to hypotheses, neither salient information nor anxiety had an effect on implicit or explicit memory. The results were consistent with previous research demonstrating implicit memory in the absence of explicit memory. Although older adults had slightly worse explicit memory, both implicit and explicit memory for drug ads was generally good in both groups.

The results were also obtained within the everyday context of prescription drug advertising, which extends memory research to an important real-world setting. Ethical considerations for research on aging and advertising are discussed. Drug ads are designed to be persuasive, but ads should be carefully designed to inform consumers, rather than to manipulate them. The implicit memory manipulation succeeded in demonstrating that ads are persuasive, suggesting that a complete assessment of advertising effectiveness should include a test of implicit memory.

DEDICATION

I dedicate this manuscript, as well as my entire educational process, to my Lord and Savior, Jesus Christ. In addition to what I have learned in graduate school, I have also, and most importantly, learned that Christ is faithful. Indeed, I will trust in Him.

Dear Jesus, I pray that my education will be validated by using it through service to others in order to bring You glory and to further Your kingdom. I also pray for Your direction and discernment, for without both, my education will have been attained in vain. I thank You for Your favor, and I pray that Your favor will always be upon my life. Moreover, I pray that You will help me to remember that You give and You take away– and that, in both, You are always there with me. Blessed be the name of the Lord, blessed be Your name, blessed be the name of the Lord, blessed be Your glorious name.

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CHAPTER I

INTRODUCTION

Prescription drug advertisements are frequently encountered in everyday media and, in fact, they are among the most common types of ads in magazines and on television. As a result, people are exposed to drug ads almost daily, and many have become accustomed to seeing them and are familiar with them. Such familiarity is evidenced by the escalating amounts of money spent annually on these ads and the increasing numbers of them selling to the public (Kaphingst, DeJong, Rudd, & Daltroy, 2004; Kaphingst, Rudd, DeJong, & Daltroy, 2004).

One set of these advertisements focuses on both prescription and over-the-counter medications. Multiple alternative medications appear to be available for every condition and circumstance. Many of the drug ads are targeted toward older adults (Bell, Kravitz, & Wilkes, 1999; Lipsky & Taylor, 1997), because this group is perceived to be more likely to use prescription drugs. However, not much is known about the impact of drug ads on older adults and, in particular, how memorable they are.

Older adults commonly experience a decline in various cognitive abilities, including memory performance (Craik, 1994; Hess, 2005; Salthouse, 2004). Previous research has indicated that older adults have poorer explicit memory for prescription drug advertisements than younger adults (Abernathy & Adams-Price, 2006). However, little is

known about older adults' implicit memory for drug ads. Implicit memory is exhibited when older adults have a favorable response toward drug ads even though they do not remember seeing them. If older adults' explicit memory for drug ads is poor but their implicit memory for ads is relatively good, it may suggest that advertisers are partially successful in getting their messages across to older adults. That is, drug ads may be better remembered and therefore, more effective, than some direct memory measures have indicated. Thus, some indirect memory measures may be needed in order to assess more fully memory for and the effectiveness of drug ads.

Older adults' memory for prescription drug advertisements is at present a matter of theoretical and practical importance for a couple of reasons. First, memory performance generally declines in older adults, and second, medication use by this group is commonplace and increasing. The primary purpose of the current study was to examine implicit and explicit memory for drug ads in both younger and older adults. A secondary purpose of the study was to explore differences in both types of memory for drug ads in both groups that may relate to other factors of interest, such as exposure to salient information and level of anxiety. The study also provides additional information and detail about the types of memory used in remembering such ads, and the relationship between aging, types of memory for ads, and the ads' overall effectiveness. In addition, the study expands our understanding of implicit and explicit memory within the contemporary, yet meaningful, everyday context of drug advertising.

History and Description

The study of factors related to measuring the effectiveness of advertising for products and services has been a popular area of research in business-related fields. However, advertising for prescription drugs is relatively new to the marketplace, and research on its effectiveness is limited. In particular, an interest in advertising effectiveness is important because drug ads are specifically targeting an increasingly growing segment of the population, older adults, whose ability to remember the ads may be limited by memory decline. Thus, an examination of the effectiveness of drug ads in older adults is needed.

Pharmaceutical drug companies continue to spend growing amounts of money promoting their products to older adults through advertising (Kaphingst, DeJong et al., 2004; Kaphingst, Rudd et al., 2004). The advertising, in turn, is supposed to increase awareness of the drugs and demand for them. Therefore, this research area is a topic of importance and interest to companies who heavily promote the drugs.

Prescription drug advertisements are presented through various forms of media communication, but magazine and television ads seem to be the most common techniques for drug advertising (Findlay, 2001). Magazine ads can be examined by consumers at their own pace, making it possible (and likely) for the consumers to pay more attention to the ads that are relevant to them, and less attention to the ads that are not relevant. Television ads, by contrast, only provide a limited window of exposure to consumers, and that makes paying attention to the ads more complicated.

Pharmaceutical companies have long placed colorful prescription drug advertisements in medical journals in order to promote and sell their products to physicians and other medical personnel. However, in 1997 the Food and Drug Administration (FDA) began permitting drug companies to increase their marketing dramatically by allowing direct advertising of prescription drugs to potential consumers in widely read magazines and on television. As a result of the change, the amount of health-related information strategically presented and readily available to the general public has grown exponentially (Morrow, Leirer, Andrassy, Hier, & Menard, 1998). In particular, the number of prescription drug ads in magazines and on television has greatly increased and advertising costs have reached into the billions (Bell, Kravitz et al., 1999, 2000; Bell, Wilkes, & Kravitz, 1999; "Direct-To-Consumer," 2001; "Drug Firms," 1999; Findlay, 2001; Schommer, Doucette, & Mehta, 1998; Woloshin, Schwartz, Tremmel, & Welch, 2001). The method of advertising is called direct-to-consumer-advertising (DTCA).

A group that may be particularly affected by the increase in prescription drug advertising is older adults. Three-quarters of all drug ads promote medications that treat chronic health conditions (Bell, Kravitz et al., 1999), such as allergies, anxiety, arthritis, cancer, cardiovascular disease, high cholesterol, and high blood pressure. Most chronic health conditions are more common in older adults and as a result, many of the drug ads target them (Bell, Kravitz et al.; Lipsky & Taylor, 1997). The DTCA strategy seems logical and effective, because the elderly use more health-related resources than any other segment of the population (Park, 1999). In addition, the vast majority of older adults report having seen or heard drug ads, and one-third of older adults report having spoken

with their physician about a drug from an ad, with nearly all of them purchasing the drug after the conversation ("Drug Firms," 1999; Sumpradit, Fors, & McCormick, 2002).

Nonetheless, research concerning prescription drug advertising effectiveness for older adults appears to be limited. To determine the effectiveness of drug ads for older adults, implicit and explicit memory research is needed and is the focus of the current study.

Direct-To-Consumer-Advertising and Consumer Response

The positives and negatives of DTCA of prescription drugs have been a matter of debate (Hoek, Gendall, & Feetham, 2001; Jones & Mullan, 2006). On the positive side, the method of advertising has encouraged potential patients to seek treatment for medical conditions they were not aware could be easily treated. On the negative side, however, the advertised drugs are often more expensive than less advertised, but equally effective, alternative drugs ("Drug Firms," 1999; Hoen, 1998). As a result, some have argued that the prevalence and popularity of DTCA of drugs has driven up the cost of health care in this country ("Arxcel Survey," 2004; McGinley, 1999). Moreover, increased DTCA of drugs has led to increased consumer demand for specific medications ("Drug Ads," 2006; Hoen). In fact, physicians report that patients request particular drugs they have seen advertised (Bell, Wilkes et al., 1999). Therefore, DTCA appears to have intentionally or unintentionally affected the physician-patient relationship ("Drug Ads;" Elliott, 1998; Hoek et al.; Schommer et al., 1998; Sumpradit et al., 2002).

When patients see these colorful drug ads, designed to be eye catching, they are frequently encouraged to ask their physicians about the drugs, and are at times inspired to

request them, even when the drugs may not be best suited for their particular condition. Furthermore, physicians report that patients who ask about and request specific drugs are disappointed when they are not prescribed, potentially injuring the physician-patient relationship. In some cases, the pressure to satisfy the patient may cause physicians to prescribe drugs that are not in the patient's best interest (Bell, Wilkes et al., 1999). Patient disappointment and physician pressure complicate the DTCA approach.

Another problem with drug ads is that the information in them may be ambiguous, overly simplistic, or only partially accurate. In addition, it has been suggested that drug ads may mislead potential consumers about the safety, efficacy, and side effects of specific medications. Both physicians and their patients have become concerned about these issues ("Direct-To-Consumer," 2001; Elliott, 1998; Hoen, 1998; Woloshin et al., 2001). Note that the word "patient" easily could be replaced with the word "consumer."

Prescription Drug Advertisements: Magazine Versus Television

As noted previously, prescription drug advertisements are frequently found in magazines and on television. Although television drug ads are the most common form of DTCA of prescription drugs (Brownfield, Bernhardt, Phan, Williams, & Parker, 2004), they may not be the most appropriate mode for drug advertising. Television drug ads are short, fast, and usually present only brief "sound bites" of information. Because older adults process information more slowly than younger adults, the pace of presentation in television ads may affect recall, with fast-paced ads being more difficult to remember (Ensley & Pride, 1991; Stephens, 1982). In addition, most of the ads spend more time providing information about the potential benefits, rather than the potential risks, of a

drug. Advertisers also have found it difficult to describe side effects clearly and fully, along with the attributes of a drug, in brief television ads (Kaphingst, DeJong et al., 2004; Kopp & Bang, 2000).

As a result of these factors, television drug ads may be easy for consumers to remember, but difficult to assess and evaluate, particularly concerning personal relevance. The FDA has reduced the already limited amount of side effect information required in television drug ads. Instead of listing possible side effects, advertisers can now refer consumers to a drug-associated website that describes them in further detail (Ingersoll & Ono, 1997; Kaphingst, Rudd et al., 2004). Unfortunately, no information is available on how many consumers visit a website in order to learn more about the drug's benefits and risks.

Prescription drug advertisements in magazines may be a more effective form of DTCA than drug ads on television. In contrast to television advertisers, magazine advertisers have the opportunity to include more complete drug information, such as the benefits and risks, in their ads. Thus, magazine ads are more likely than television ads to include and describe more complete and extensive information about the drug's benefits and risks ("Direct-To-Consumer," 2001). However, in order for additional information to be effective, it should be simple to remember and understand (Morrow & Leirer, 1999). An additional advantage of magazine drug ads is that they allow consumers ample time to examine product information at their own pace. Accordingly, consumers can decide how much or how little time to spend reviewing drug ads that interest them and may be personally relevant. As a result, consumers would be expected to remember information from magazine drug ads to which they pay close attention, especially when they consider

the ads personally relevant. Nonetheless, a disadvantage of magazine drug ads is that they may not attract as much consumer attention as television drug ads, because they have only a visual component and lack the complementary auditory component. Another disadvantage of magazine ads is that consumers only see the ads if they subscribe to or purchase magazines. In addition, the medication instructions provided to consumers can be difficult to follow (Morrow & Leirer) and colorful magazine drug ads can be somewhat ambiguous (Abernathy & Adams-Price, 2006), as can television drug ads. To the extent that medication instructions and drug ads are confusing, their main points may be difficult to remember and understand. The purpose of this study was to examine two different types of memory for magazine-style drug ads in older and younger adults, and to relate them to the concept of advertising effectiveness. Measuring memory within an everyday context, such as prescription drug advertising, is consistent with the current movement in memory research called everyday memory.

CHAPTER II

IMPLICIT MEMORY

History and Description

The study of memory has been central to psychological research and can be traced back to the work of Hermann Ebbinghaus (1850–1909). Ebbinghaus was the first researcher to develop a systematic methodology for examining memory (Gathercole & Collins, 1992; Masson & Graf, 1993; Roediger, 1990), and as a result, some consider him the "father of memory." Ebbinghaus' concept of memory was broad, including both conscious recollection and retention of past experiences without conscious awareness. Ebbinghaus suggested that past experiences could be preserved without an awareness or knowledge of having them (Masson & Graf; Roediger; Schacter, 1987). The study of memory is fundamental to learning more about everyday cognitive functioning.

Throughout the history of psychology, the term "memory" has generally been considered to reflect the conscious recall of information. In fact, most previous research on memory has emphasized conscious forms of memory, rather than unconscious forms (Graf & Schacter, 1985; Jacoby, 1991; Jacoby & Dallas, 1981; Jacoby & Witherspoon, 1982; Schacter, 1987). Therefore, conscious processes, rather than unconscious processes, have been given greater attention in research. Memory has been defined in many different ways, such as an ability, a process, or remembered information. This

ambiguity adds to the confusion about what memory really is. In fact, there has been ambiguousness surrounding the definition of memory from the beginning (Tulving, 1972). For a review of the history and various definitions of memory see Tulving (2000).

Memory theorists divide memory into many different categories, including the commonly known short-term and long-term categories, but also into sensory, primary/working, nondeclarative/declarative, procedural/semantic/episodic, and prospective memory. Although divided by category, the memory concepts above are also thought to be linked. The current study includes an account and examination of long-term memory.

Long-term memory is the ability to store permanently vast amounts of information and knowledge for lengthy periods of time. Thus, it has an unlimited capacity and a relatively slow rate of forgetting. Additionally, long-term memory is such an extensive category that it is commonly divided into subcategories. The primary division of long-term memory centers on the declarative and nondeclarative distinction (Kandel, Kupferman, & Iverson, 2000; Squire & Zola-Morgan, 1991). Declarative memory involves conscious awareness, whereas nondeclarative memory does not involve consciousness. Declarative memory is further subdivided into semantic and episodic memory, which are examples of explicit memory. Nondeclarative memory is involves procedural memory, which is an example of implicit memory. Therefore, the declarative/nondeclarative memory distinction is similar to the explicit/implicit distinction because memory that involves conscious or unconscious processing is called explicit or implicit, respectively (Kandel et al.; Schacter & Tulving, 1994; Squire, 1994; Squire & Zola-Morgan).

Explicit memory is conscious; it involves remembering with conscious awareness and deliberate, intentional processes, and it has been studied since the start of memory research (Graf & Masson, 1993; Graf & Schacter, 1985, 1987; Kihlstrom, 1987; Schacter & Graf, 1986). The level of conscious awareness is heightened in an explicit memory experiment, at both encoding and retrieval.

Implicit memory is unconscious; it involves remembering without conscious awareness and deliberate, intentional processes. Interest in memory for unconscious awareness dates back to the beginnings of psychology and implicit memory remains a leading research topic within psychology (Graf & Masson, 1993; Schacter, 1987). Research on implicit memory has increased noticeably in several subdisciplines of psychology, including neuropsychology, cognitive psychology, and lifespan-developmental psychology (Graf & Masson).

Implicit memory is also described as unconscious memory or memory without awareness or deliberate processing. Implicit memory involves processing that can be characterized in a variety of ways, such as automatic, passive, reflexive, unintentional, and involuntary. Implicit memory is seen when there is improvement in task performance as a result of previous exposure to or interaction with a stimulus (Graf & Schacter, 1985; Kihlstrom, 1987; Schacter, 1987), even when a person cannot remember being exposed to or interacting with the stimulus (Eich, 1984). Therefore, implicit memory functions without knowledge of the previous learning situation (Graf, Squire, & Mandler, 1984). In addition, implicit memory is said to influence decision making, such as when passive exposure to a stimulus affects later perceptions of that stimulus (Graf & Masson, 1993). In other words, preceding events and experiences influence and modify a person's

behavior or response without that person having conscious access to memory (Squire, 1994; Squire & Zola-Morgan, 1991). Lack of conscious awareness in memory performance or for memory of a situation is the key to distinguishing implicit memory from explicit memory. An appropriate examination of implicit and explicit memory involves particular measurement considerations and a review of those is next.

In practice, researchers distinguish implicit and explicit memory by noting differences in the instructions and tests employed in a memory experiment. The instructions involve the context of participants' exposure to the stimuli that will later be measured for memory. The tests determine whether or not participants' attention is directed back to the earlier stimuli exposure at the time of testing. The key difference between implicit and explicit memory tasks is whether participants are instructed to remember the target stimuli both during encoding and during retrieval.

Instructions can be intentional or incidental. Intentional instructions tell participants to study and memorize the material presented to them because they will be tested for it at a later time. Incidental instructions have participants perform a task involving the stimuli, such as a ratings exercise, without informing them to study and memorize it. Intentional instructions inform participants that a memory test is coming. By contrast, incidental instructions do not mention an upcoming test. As a result, participants intentionally or incidentally process the material.

Tests can be direct or indirect. Direct tests refer back to the earlier stimulus exposure and ask participants to recall or recognize that material. Indirect tests do not refer back to the earlier stimulus exposure. Instead, they ask participants to engage in an associated decision-making task requiring a preference or judgment. Direct tests remind

participants about the previous situation and by contrast, indirect tests do not. As a result, participants' memory for the stimuli exposure or material is measured directly or indirectly.

Explicit memory, or conscious awareness, is measured when intentional instructions and direct tests are used together. Implicit memory, or unconscious awareness, is measured when incidental instructions and indirect tests are used together. Explicit and implicit memory were measured in the current study using the instructions/test combinations described above. Although the combinations of intentional instructions and indirect tests and incidental instructions and direct tests are sometimes used to measure memory, they were not used in this study.

In explicit tasks participants are fully aware that a task directly measuring their memory will follow exposure to a stimulus, so they attempt to learn the material. Similarly, during the task they are fully aware that it is related to the earlier exposure, so they refer back to the material. By contrast, in implicit tasks participants lack conscious awareness or knowledge of the association between exposure to the target stimuli and the task indirectly measuring their memory for the target stimuli. For example, Graf et al. (1984) and Jacoby et al. (1993) exposed participants to a list of words and instructed them to perform a ratings or reading exercise with the words. Participants did not expect to see the words again. Later, however, participants were given word-stems, such as MOT _ _, and asked to fill in the blanks with the first word that came to mind. If implicit memory was functioning, participants tended to fill in the word-stems with a word from the original list (e.g., MOTEL), when appropriate.

The terminology used in experiments on implicit and explicit memory is inconsistent in the literature and difficult to follow. Researchers have used various terms to describe the same elements of an experiment, and overlap in use for the descriptive concepts can lead to confusion among readers. To eliminate inconsistent terminology in this study, the terms "incidental" and "intentional" will refer to instructions, "indirect" and "direct" will refer to the test, and "implicit" and "explicit" will refer to the memory types described above.

This terminology application does not appear to be consistent with any particular study. However, Roediger, Weldon, Stadler, and Riegler (1992) referred to incidental and intentional learning, Reingold and Merikle (1988), Merikle and Reingold (1991), and Jacoby et al. (1993) referred to indirect and direct tests, and Graf and Schacter (1985, 1987) referred to implicit and explicit memory. The terms implicit and explicit also have been used to describe both instructions and tests. For a full discussion and review of memory-related terminology, see Johnson and Hasher (1987) and Richardson-Klavehn and Bjork (1988).

The instructional type and testing measure used to measure implicit and explicit memory are critically important and can lead to discrepant results when experimental variations are used (Roediger et al., 1992). Therefore, implicit and explicit memory studies with methodological differences may not produce comparable results. Studies that appear to neither alternate the instructional and testing conditions nor use traditional instructions and tests to measure implicit and explicit memory may not be similar to ones that do. However, determining which procedure is most appropriate may be a challenge

for future research. In addition, ensuring the separation of conscious and unconscious influences in measures is difficult.

Implicit learning uses terminology similar to the terminology used in implicit memory, and distinguishing one concept from the other concept can be difficult to do because unconscious processes and processing are central to explaining them both. During experimentation both implicit learning and implicit memory employ incidental instructions (exposure to a stimulus without conscious awareness), but they differ in the tests that are used to measure each. Implicit learning is usually measured with a direct test (responding with conscious awareness of the exposure), whereas implicit memory is typically measured with an indirect test (responding without conscious awareness of the exposure). Therefore, when measuring implicit learning, participants are referred back to the earlier presentation of the stimulus information in order to assist them in responding, but they learn without conscious awareness of having done so during the exposure (Berry & Dienes, 1991; Dienes & Fahey, 1998; Stadler, 1997). Thus, implicit learning and implicit memory are the same during exposure, but distinct during testing. The current study will focus on implicit memory, not on implicit learning.

An additional way to describe implicit memory is as the residual, persisting influence an earlier exposure to stimuli has on later processing of the stimulus, such as in a memory test, and especially when a person is not aware of the earlier exposure. The availability of cues at both exposure and testing is a process commonly referred to as "priming." Priming is the facilitative effects an earlier learning episode has on later task performance (Graf & Schacter, 1985; Tulving, Schacter, & Stark, 1982) and thus, is

expected to improve memory. The manifestation of implicit memory can be thought of as a form of priming (Yoo, 2008).

In earlier research, indirect tests of implicit memory were commonly referred to as priming tests (Graf & Schacter, 1987). In fact, several studies cited as demonstrating implicit memory are actually studies that established the effects of direct, item, and repetition priming. For example, Graf and Schacter (1985, 1987), Light, Singh, and Capps (1986), Sloman, Hayman, Ohta, Law, and Tulving (1988), and Tulving et al. (1982) used priming to reveal implicit memory without referring to the effects of the priming as implicit memory. Therefore, measuring priming has been considered as a test of implicit memory because the earlier exposure to information affected later processing for that information. In addition, elaborative encoding tasks for advertisements used as a form of priming have been found to facilitate implicit memory for brand choice (Coates, Butler, & Berry, 2004; 2006). Two widely held perspectives of implicit memory are described next.

Tulving's (1985a, b) separate systems model and Jacoby's (1991) process dissociation framework are two popular paradigms describing the influence of implicit memory. Graf and Mandler's (1984) activation view is another less popular, but notable paradigm of implicit memory. Tulving proposed a memory model that consists of various interrelated systems, such as episodic, semantic, and procedural, and the level of consciousness is one method to differentiate the systems. For example, procedural memory involves the lowest level of conscious awareness, which is none at all. As such, implicit memory is involved in procedural memory. Jacoby, on the other hand, proposed a memory framework that includes various processes, such as automatic and intentional.

The influence of these processes during a task can be separated. In this example, implicit memory or unconscious processing is involved when automatic processes are activated in recognition memory. Graf and Mandler proposed a view of implicit memory evidenced through priming effects that are the result of briefly activated knowledge representations that already exist. Such activation occurs automatically without any elaborative processing.

Tulving (1985a, b) did not develop implicit memory per se, but he hinted at its presence when arguing for multiple memory systems and denoting the importance of consciousness in separating the various systems. Additionally, level of consciousness is a key component in distinguishing systems of memory.

The separate systems model has developed through the years from its original episodic and semantic classifications (Tulving, 1972). Procedural memory was added to the original dichotomy between episodic and semantic memory, and is separate from them in the model (Tulving, 1985a, b). Procedural memory was also defined as implicit memory. In addition, episodic memory cannot function without semantic memory just as it cannot function without procedural memory. Nonetheless, procedural memory can function separately from semantic memory, and it can function separately from episodic memory. Although each memory system is distinct, each system also interacts and engages with the other systems. Implicit memory is revealed through procedural memory because it involves no consciousness (Tulving, 1985a, b). Tulving's episodic-semantic distinction has been criticized for lacking testable hypotheses and a specific theoretical basis (McKoon, Ratcliff, & Dell, 1986), but it remains a seminal model for memory. Recent additions to the model include perceptual representation and primary memory,

with the former system contributing to an implicit memory effect. Although implicit memory is not a memory system, it is an example of memory expressed without conscious awareness through the procedural and perceptual representation memory systems (Schacter & Tulving, 1994).

Jacoby (1991) did not name implicit memory per se, but he implied that it is involved in the automatic processes of recognition memory tasks. Although intentional processes are consciously controlled, require attention, and are used in recall, automatic processes are faster, require less mental effort, and are involved in making familiarity judgments.

The significance of the influence of automatic processes was shown in a series of experiments that involved making judgments about famous and nonfamous names during an inclusion/exclusion testing procedure (Jacoby, Kelley, Brown, & Jasechko, 1989; Jacoby, Woloshyn, & Kelley, 1989). The experiments were designed to measure automatic processes by providing multiple exposures of a name or dividing attention during a familiarity test. The procedures either increased habituation or decreased purposeful processes, depending on the condition. Jacoby and colleagues coined the term "false fame effect" to describe the situation in which participants judged a nonfamous name as famous because they had seen it before and were distracted during the test. Similar results demonstrating the dissociation of automatic and intentional processes with word lists also have been observed (Jacoby, Toth, & Yonelinas, 1993).

Examples of recognition memory, such as those noted, involved data-driven processes and responses based on stimuli, whereas examples of recall involved concept-driven processes and responses based on meaning. Thus, recognition and recall processes

are contingent upon different kinds of information. In short, Jacoby's (1991; Jacoby, Kelley et al., 1989; Jacoby et al., 1993; Jacoby, Woloshyn et al., 1989) research showed that recognition or automaticity remained consistent even when recall or intentionality varied because of repetition and distraction during recognition tasks. Additionally, Jacoby noted the effects of intentional and automatic processes in both recognition memory and recall. Jacoby suggested that recognition memory can be influenced by intentionality, and recall can be influenced by automaticity. Therefore, the two processes are often used collaboratively, but are functionally independent of one another. However, completely separating conscious from unconscious influences in tasks can be challenging (Reingold & Merikle, 1988). In addition, implicit memory studies have concluded that unconscious processing influences conscious processing and that conscious awareness is not a requirement for complex cognition (Kihlstrom, 1987).

When the words unconscious or automatic processes are used, respectively, Tulving (1985a, b) and Jacoby (1991) are referring to the existence and impact of implicit memory. In fact, automaticity is an indication of unconscious processes (Kihlstrom, 1987). The primary difference between these two paradigms is that Tulving promotes implicit memory as an additional subsystem of memory that is instinctive, whereas Jacoby promotes it as a distinct process of memory that is involuntary. Whether memory is made up of multiple systems that work together or is a single system with various processes that collaborate on the task represents an ongoing debate in memory research.

Another relevant debate in the literature is the debate about the experimental appropriateness of studying everyday memory, which is memory performance in real-world contexts or settings (Gathercole & Collins, 1992). The goal of everyday memory

research is research with a high level of ecological validity, or meaningfulness, concerning day-to-day living applications. The study of everyday memory has contributed to a more extensive understanding of memory applications beyond the laboratory (Gathercole & Collins; Neisser, 1991). The debate began when Neisser (1978) proposed that laboratory-based controlled experimentation had reached its limit and was no longer making progressive scientific advances. Neisser (1978) charged researchers to begin naturalistic studies of memory processes, and to become more concerned about how such processes affect everyday life.

In criticism of Neisser's (1978; 1991) proposal, Banaji and Crowder (1989; 1991) suggested that although studying memory in naturalistic contexts or settings may appear experimentally appropriate and have practical implications, it lacks an acceptable degree of generalizability, which is an important objective in research. However, they also admitted that their view has limited ecological validity, another important objective in research.

The central debate centers on the level of experimental control as well as on the use abstract versus everyday stimuli. Both matters have implications for the tradeoff between ecological validity and generalizability; in fact, Banaji and Crowder (1989) explored this tradeoff by reviewing various studies emphasizing one approach or the other. On one hand, the everyday memory approach enhances ecological validity, but diminishes generalizability. On the other hand, a laboratory-based approach improves generalizability, but sacrifices ecological validity. Accordingly, ecological validity and generalizability are best achieved in memory research when naturalistic and laboratory perspectives are used together.

The current study combined both of the research perspectives. In order to test implicit and explicit memory, the study employed stimuli very similar to real prescription drug advertisements, and the procedure took place in a controlled environment. Therefore, the study had practical relevance to everyday living. In addition, because the stimuli were properly pretested and pilot-tested, the influence of extraneous variables should have been controlled. Taken together, the everyday stimuli and experimental control enabled the study to establish ecological validity and achieve generalizability.

A fundamental attribute of implicit memory is that cognitive processes, which are below conscious awareness, are influential in decision making. Thus, informal exposure to an item affects a later action or response to that item. Because the exposure is informal, people are typically unaware of how it may be affecting their response. Zajonc (1980, 2000) proposed that affect (feeling) may influence people's preferences, attitudes, impressions, and decisions (thinking) separately from conscious cognitive processing, and that often affective judgments are made with more certainty and speed than cognitive judgments. In summary, affective experiences are generated at the unconscious level without cognitive engagement resulting in the separation of affect and cognition. This led to a reconsideration of affect and its importance in decision making, and was called the mere exposure effect.

The mere exposure effect is a phenomenon demonstrated when brief exposure to an item increases subsequent liking for that item, even when a person cannot remember being exposed to the item. The mere exposure effect is thought to be caused by the tendency to become comfortable with items that are familiar; what may be surprising is that only one exposure is needed for familiarity to occur.

As such, the mere exposure effect is an excellent example of implicit memory. In addition, the mere exposure effect illustrates implicit memory that is relevant to the goal of persuasion in advertising. Advertisers aim to persuade consumers to like their products, in the hope that they will eventually purchase them. A test aimed at measuring explicit memory or conscious awareness for ads would be ineffective at measuring the increasingly favorable emotional response successful ads should produce. However, the capacity to assess advertising effectiveness at both the conscious and unconscious levels allows researchers to more fully measure consumer responses to a product based on ad exposure. To that end, it makes sense to assess advertising effectiveness using a test that measures implicit memory or unconscious processing (Goode, 2007; Krishnan & Shapiro, 1996; Shapiro, MacInnis, Heckler, & Perez, 1999). In support of that recommendation, Goode suggested that a test of preference following exposure to ads is in fact a test of implicit memory, and a significant and plausible way to measure advertising effectiveness.

To a limited degree, advertisers have considered the impact prior exposure to an item has on subsequent affect for it; however, explicit, rather than implicit, memory measures were used in the studies. In summary, the implicit memory paradigm and its associated measures provide another practical means to estimate consumer memory for an advertisement, which assists in determining ad effectiveness, by evaluating affective response to a product (Butler & Berry, 2001; Duke & Carlson, 1993; Finlay, Marmurek, & Morton, 2005; Shapiro et al., 1999). Thus, implicit memory for advertising is one way to demonstrate advertising effectiveness.

Research Findings

Many researchers have examined the differences between implicit and explicit memory (e.g., Graf & Schacter, 1985; Light et al., 1986; Tulving et al., 1982). Evidence for differences between the two types of memory has come from various groups, including brain-damaged adults with deficient functioning, cognitively intact adults with normal functioning, and the elderly. In general, the three groups have shown stability and instability in implicit and explicit memory, respectively.

Studies measuring implicit memory employ numerous tasks, such as word completion (using stems or fragments), anagrams, object/perceptual/word identification, picture naming, and lexical decision-making. Word-stem and -fragment tests are perhaps the most popular measurements of implicit memory, and when compared with tests of explicit memory, both tests have been found to capture unconscious processing from studies of priming, elaboration, and forgetting (Roediger et al., 1992). By contrast, studies measuring explicit memory commonly employ either free- or cued-recall or recognition tasks. In addition, in implicit memory tasks, participants are unaware of an earlier learning episode and are not encouraged to remember items from it. However, in explicit memory tasks, they are aware of earlier learning and are encouraged to remember (Graf & Schacter, 1987; Roediger, 1990; Schacter, 1987).

Early evidence on implicit memory came from neuropsychological research with persons suffering from amnesia (Warrington & Weiskrantz, 1968, 1970). Amnesia is the inability to retrieve old memories as well as create and form new memories. Persons suffering from amnesia are at times affected by past experiences and events, even though they cannot remember them. A classic example of the condition is that amnesics have to

be reintroduced to people they have met because they have no memory of meeting them. Although amnesics cannot remember meeting the people, the previous introduction will probably shape how they respond to them. Thus, previous experiences and events, although not consciously remembered, affect current responses. The early studies on amnesia initiated a renewed interest in implicit memory that continues today (Roediger, 1990).

In seminal studies examining the retention of information in persons with amnesia, Warrington and Weiskrantz (1968, 1970) found that similarities and differences existed between the amnesic patients and patients without any memory deficits. In contemporary terms, their studies demonstrated that the implicit memory of amnesic patients is similar to control patients on indirect tests, such as picture- and word-completion tasks. However, the explicit memory of amnesic patients was found to be markedly different from that of control patients on direct tests, such as recall and recognition tasks. In summary, their studies showed that amnesic patients experience deficits in explicit, but not implicit, memory tasks. The findings have been replicated by researchers who have conducted experiments with amnesic patients with memory deficits for a variety of neuropsychological reasons (Light & Singh, 1987; Light et al., 1986; Roediger, 1990).

Amnesics usually have impaired memory for facts and episodes based on declarative information, but intact memory for skills and procedures based on nondeclarative information. Thus, amnesics usually perform well on a task measuring procedural (implicit) memory, but have no episodic (explicit) memory of a previous exercise or experience that primed or prepared them for the task (Kihlstrom, 1987).

Comparable implicit and explicit memory performance has also been found in older adults with Alzheimer's disease, which produces cognitive deficits similar to amnesia and results in physical and functional deterioration of the brain in older age. In particular, although perceptual-motor learning was present in the patients, memory measured by recall and recognition tests was absent (Eslinger & Damasio, 1986). Additional neuropsychological research has found that people with various other visual, attentional, recognition, reading, and comprehension deficits show evidence of implicit memory and knowledge that cannot be expressed explicitly (Schacter, 1987).

Similar to the research on brain-damaged adults, studies have confirmed differences between implicit and explicit memory in cognitively intact adults (e.g., Graf & Mandler, 1984; Graf & Schacter, 1987). Evidence has been found for implicit memory in the absence of explicit memory. Perhaps the most noted early study in normal adults involves work on priming effects by Tulving et al. (1982). The researchers found comparable memory performance on word-fragment and recognition tests after a 1-hour delay. However, after a 7-day delay, the priming effects, as measured by the word-fragment test, were the same, whereas ability on the recognition test had diminished considerably. The findings revealed the long-lasting and persisting effects of implicit memory as opposed to the relatively temporal effects of explicit memory, even when performance was similar at the outset.

CHAPTER III

COGNITIVE AGING

Deficits and Theories

Cognitive aging is a popular specialty area in psychology, and it specifically intersects the cognitive and developmental fields. Cognitive aging involves the study of such mental abilities as memory, comprehension, decision-making, reasoning, and perception in adults. The focus is on the elderly or those considered to be older adults, who are usually close to retirement age or beyond. Cognitive aging is best examined using a multidisciplinary approach (Hess, 2005; Salthouse, 1996). For a full discussion and review of memory and aging see Light (1991, 1996) and Smith (1996).

Research has repeatedly shown that older adults typically show a range of cognitive deficits, including memory deficits, when compared to younger adults in both laboratory and ecologically valid tasks and situations. There are a number of cognitive aging theories that address and explain the deficits. Processing efficiency is crucial, and a person's ability to process information effectively generally decreases as age increases (Craik, 1994; Hess, 2005; Salthouse, 2004). Moreover, there is extensive empirical evidence about cognitive aging, specifically memory deficits in the elderly.

For example, it is generally known that memory performance in the elderly tends to decline when the task lacks environmental support, requires self-initiated, deliberate

processing, or involves the integration of to-be-remembered material with contextual information. Furthermore, additional memory declines will occur when the task requires significant working memory demands, involves inhibiting irrelevant information, or is based on perceptual and/or processing speed (Craik, 1994; Craik & McDowd, 1987; Hess, 2005; Salthouse, 2004). Many memory tasks may involve more than one of the preceding factors.

In addition, older adults are worse at recall than at recognition, perform more poorly on working memory tasks than on simple storage tasks, and are worse on explicit memory tasks than on implicit memory tasks. In fact, the performance of older adults on recognition, simple storage, and implicit memory tasks in many instances is comparable to younger adults (Craik, 1994; Craik & McDowd, 1987). Taken together, recall, working memory, and explicit memory tasks all involve greater encoding and retrieval requirements.

Further, the deficits are also related to the escalating limitations in an older adult's computational and/or attentional capacity (Craik, 1994; Craik & McDowd, 1987). The memory problems older adults appear to experience with various tasks can be generally explained and summarized by the complexity hypothesis (Cerella, Poon, & Williams, 1980), which proposes that memory performance declines more with age as the task becomes more complex.

There are many theories of cognitive aging deficits. The self-initiated processing hypothesis proposes that when older adults are involved in self-initiated or deliberate processing, which requires a great deal of effort and is much less automatic, their performance declines (Hasher & Zacks, 1979). The slowing hypothesis proposes that as

we age, our ability to process information slows, based on processing speed and perceptual speed (Birren, 1974; Salthouse, 1996). The working memory hypothesis proposes that older adults experience challenges when the task involves simultaneously processing and storing information (Salthouse, 1992; Salthouse & Babcock, 1991). The research supporting the theories is consistent with finding larger age differences in explicit than in implicit memory. The self-initiated processing theory is most relevant to implicit memory because it predicts few age differences in memory that does not require effort; implicit memory by definition requires no effort.

Research Findings

Similar to the research with brain-damaged and cognitively intact adults, various studies focusing on memory and aging have verified differences in implicit and explicit memory in the elderly (e.g., Light & Singh, 1987, Light et al., 1986). In particular, between mentally and physically healthy older and younger adults, no performance difference exists in implicit memory, but there is a difference in explicit memory.

One objective of cognitive aging research is to determine what functions remain stable in older age and what functions become unstable. There is a normal cognitive decline in older adults; however, the cognitive aging process does not appear to affect implicit memory as much as it does explicit memory. In fact, a consistent pattern emerges with older adult memory performance on tests of implicit and explicit memory. Although older adults generally perform poorly on direct tests of explicit memory involving recall and recognition, they perform as well as younger adults on indirect tests of implicit memory involving word completion, identification, and decision-making (Graf, 1990;

Light & Singh, 1987; Light et al., 1986; Mitchell, 1989). In summary, implicit memory ability remains largely intact in older age, whereas explicit memory ability declines.

In an experimental replication of the Tulving et al. (1982) study, Light et al. (1986) compared priming effects in older and younger adults. The researchers found an age difference on the recognition test, with older adults doing worse, but comparable performance on the word-fragment test between the groups immediately after the study. However, after a 7-day delay, performance on both tests was worse for both groups, with the most significant decline coming in the recognition test for older adults. In addition, Light and Singh (1987) found similar results of priming effects in older and younger adults. Age differences in performance were seen in free- and cued-recall and recognition tests, but were not revealed in word completion and perceptual identification tests. Thus, comparisons of older and younger adults have shown similar performance on tests of implicit memory, but age differences on tests of explicit memory.

Equivalent results also have been obtained in additional research comparing implicit and explicit memory in older and younger adults. For example, one study found that older adults performed the same as younger adults on indirect tests of name generation, but poorer on direct tests of name cued-recall. In addition, implicit memory was unaffected by elaboration, whereas explicit memory was affected by it (Brooks, Gardiner, Kaminska, & Beavis, 2001). Moreover, another study used various conceptual and perceptual tests to measure implicit memory and found it to be stable across the life-span, whereas age differences were found in free- and cued-recall tests used to measure explicit memory (Mitchell & Bruss, 2003). Furthermore, O'Hanlon, Wilcox, and Kemper (2001) used unrelated word pairs and word-stem completion tests to measure older

adults' ability for associative learning and found that they do not perform well on this type of task because conscious processing is necessary.

Therefore, research has consistently shown no significant differences in implicit memory between older and younger adults, but has shown differences in explicit memory between the groups. As a result, this pattern of results suggests that memory ability on indirect tests is preserved and retained in older adults, but memory ability on direct tests is impaired (Graf, 1990). Because implicit memory is better than explicit in older adults, the effectiveness of advertising, in general, and drug advertising, in particular, is likely to be greater than previously thought.

The memory dissociations in implicit and explicit memory have been displayed with numerous stimuli and in various groups. The empirical evidence in neuropsychology, cognitive psychology, and life-span developmental psychology indicates that implicit memory functions differently from explicit memory. In other words, implicit memory appears to be present and available when explicit memory is absent and unavailable.

CHAPTER IV

ADVERTISING

Implicit and Explicit Memory for Advertising

In order for advertising to be effective, an element of persuasion is necessary. Carl Hovland (1912–1961) was a noted psychologist in the area of persuasion, as it applied it to personality and communication. His research is also applicable to advertising effectiveness (Cox, 1961; Michael, 1960). Effective advertising that is persuasive can produce one of two outcomes. First, it can prompt an instant response from a person or second, it can influence a person's perception of a product, and bring about a delayed response. For example, after viewing an advertisement a person might immediately dial a telephone number or enter a website address. An ad might also lead a person to develop positive perceptions of a product, which would increase the likelihood that they would purchase it later (Plassmann, Ambler, Braeutigam, & Kenning, 2007). Implicit memory is demonstrated in the latter example, especially when a person is not consciously aware of the earlier ad.

One way advertising can be persuasive is to change affect toward brands, which should increase purchase intent for those brands. Purchase intent is used as a measure of ad effectiveness and it is predicted by brand feeling. Advertising should enhance brand salience, which is an increased likelihood of being aware of brands when making relevant

purchasing decisions (Cramphorn, 2006). Therefore, advertising influences purchase decision making through favorably changing affect.

Conventional models of advertising effectiveness have argued that memory plays a central role in influencing consumer opinions about a product, and that ad effectiveness should be measured by high recall of ad information. Recall demonstrates conscious awareness of information, and awareness is seen as an indicator of ad success (Brown, 1985; Colman & Brown, 1983). Advertisers also commonly equate ad effectiveness solely with explicit recall for ad information (Puntoni & Tavassoli, 2007). Goode (2007), however, questions whether recall is an appropriate or complete measure of ad effectiveness, suggesting that some aspects of advertising are not measured by explicit recall.

Some traditional models of advertising involve hierarchical stages such as Attention, Interest, Desire, and Action or Awareness, Knowledge, Liking, Preference, Conviction, and Purchase (e.g., Huey, 1999). The early stages considered purchase decision making to be conscious and intentional. However, the later stages include both a thinking (conscious) component and a feeling (nonconscious) component, consistent with the implicit/explicit distinction. In fact, the later models realized that an implicit component should be included in advertising frameworks (Cramphorn, 2006; Huey).

Another aspect of advertising effectiveness, as reflected by contemporary hierarchical models, is the creation or augmentation of positive brand feeling, also known as brand equity. Brand equity is defined as the sum of all thoughts, feelings, perceptions, and intentions toward brands, conscious or unconscious, which can be affected by advertising. Therefore, one component of brand equity, which builds over time and may

be a better predictor of ad effectiveness than conscious recall, is brand feeling (Cramphorn, 2006; Plassmann et al., 2007).

Effective advertising is any advertising that enhances brand equity, which in the long run, influences purchase decision making and buying behavior. An important component of brand equity is affect; advertising should aim to elicit positive emotions toward brands. Cramphorn (2006) suggests that advertisers need to understand how advertising that makes emotions toward brands more positive are effective. In addition, Plassmann et al. (2007) suggest that advertising that improves brand equity should lead to higher sales over the long term, which is more important than sales over the short term. Advertising may affect implicit and explicit memory differently, and a review of research on implicit and explicit memory for advertising is next.

The majority of research on memory and advertising involves testing conscious awareness of a product or service. In addition, most measures of advertising effectiveness that advertisers use attempt to tap explicit memory (Holden & Vanhuele, 1999; Law & Braun-LaTour, 2004; Shapiro & Krishnan, 2001; Perfect & Askew, 1994; Puntoni & Tavassoli, 2007). For example, advertisers want to know if consumers can recall or recognize an advertised product. However, some studies have directly examined explicit and implicit memory for advertising.

Most of the studies on explicit memory for advertisements have found that it is generally poor (Holden & Vanhuele, 1999; Krishnan & Shapiro, 1996; Shapiro & Krishnan, 2001; Shapiro, MacInnis, & Heckler, 1997). In fact, there has been some debate as to whether explicit tests of memory for advertising accurately assess ad effectiveness (Holden & Vanhuele; Perfect & Askew, 1994). However, research has

shown that many purchasing decisions tend to be made without having explicit memory for a product (Finlay et al., 2005; Shapiro et al.), so the poor recall may not matter much. Implicit memory may be more relevant to the assessment of advertising effectiveness.

Research on implicit memory and advertising involves testing unconscious awareness for a product or service. Studies on implicit memory for advertisements have found that it is in general robust (Holden & Vanhuele, 1999; Krishnan & Shapiro, 1996; Shapiro & Krishnan, 2001; Shapiro et al., 1997). In fact, implicit tests of memory for advertising have consistently shown more favorable and positive attitudes, judgments, and preferences for ads that participants have been previously exposed to, regardless of whether or not they can recall the ads (Perfect & Askew, 1994; Perfect & Edwards, 1998; Perfect & Heatherley, 1997). In addition, implicit memory for a product may be more closely linked to purchasing decisions than explicit memory (Cramphorn, 2006; Law & Braun-LaTour, 2004; Shapiro & Krishnan). Thus, research has revealed implicit memory in the absence of explicit memory, when testing memory for advertising information.

Research measuring explicit memory for advertisements has generally used standard recall and recognition tasks (e.g., Finlay et al., 2005; Fung & Carstensen, 2003; Krishnan & Shapiro, 1996; Shapiro & Krishnan, 2001; Shapiro et al., 1997; Stapel, 1998; Perfect & Askew, 1994; Perfect & Heatherley, 1997). In addition, measurements of implicit memory for ads have included preference ratings and judgments as well as decision-making, listing, and word-stem completion tasks. For example, Perfect and Askew (1994), Perfect and Heatherley (1997), and Fung and Carstensen (2003) asked participants to rate ads on various factors such as them being perceived as likable, memorable, distinctive, etc. Moreover, Shapiro and Krishnan (2001) had participants

select brand names in a purchase decision-making exercise, Shapiro et al. (1997) had participants list products for a specific buying situation, and Butler and Berry (2001) had participants select the better label between pairs in a preference judgment task. Furthermore, Krishnan and Shapiro (1996) and Finlay et al. (2005) asked participants to complete word-stems for brand names and for previously seen words, respectively. Repeated exposure and mere exposure effects also have been observed in some of the implicit memory tasks from the studies above.

Indirect measures of implicit memory show that repeated exposure to advertisements or simple repetition creates and increases positive feelings for brands (Braun-LaTour & LaTour, 2004). In addition, repeated exposure to brands favorably influences brand familiarity and therefore, improves the likelihood of those brands being included during the purchase decision-making process, which gives them an advantage. Exposure to old or new brands leads to an increased preference for those brands. In fact, a single exposure to brands was found to be effective (Coates et al., 2004; 2006). This process of responding positively to previously seen items is similar to what advertisers expect to do when they introduce new brands (or drugs) through repeated exposure to them in ads.

Advertisers who attempt to develop effective product advertisements should be knowledgeable of research in psychology as well as in advertising. John Watson (1878–1958), a renowned behaviorist, was one of the first to examine and document the relationship between psychology and advertising, as both a researcher and practitioner. His work is broadly recognized as influential in this area (Kreshel, 1990). In particular, advertisers should be aware of the relationship between implicit and explicit memory and

advertising effectiveness. A fuller understanding about the relationship will help advertisers better evaluate which ads are and are not effective. Simply because consumers cannot remember the exact name or a specific feature of a product noted in an ad does not imply the ad was ineffective.

Research in both psychology and advertising has increasingly shown that learning and persuasion about a product can occur without a person being aware of it (e.g., Grunert, 1996; Finlay et al., 2005; Perfect & Edwards, 1998; Perfect & Heatherley, 1997). Therefore, assessments of advertising effectiveness should include both the implicit and explicit memory paradigm. Advertisers might also discover that they can develop ads that activate both implicit and explicit memory for a product because a combination of unconscious and conscious processes involving various levels of attention is invariably involved in the perception of advertising (Grunert; Finlay et al.; Law & Braun-LaTour, 2004; Shapiro & Krishnan, 2001). Because implicit and explicit memory are used in processing drug advertisements, both processes should then be measured to determine what information is remembered, consciously and unconsciously, from them.

Interestingly, Holden and Vanhuele (1999) replicated the "false fame effect" coined by Jacoby and colleagues (e.g., Jacoby, Kelley et al., 1989; Jacoby, Woloshyn et al., 1989) using brand names that appeared familiar because of previous exposure. Moreover, Shapiro et al. (1999) refer to the usefulness of the process dissociation framework when explaining a method to create and identify unconscious processing within a marketing context. Furthermore, Goode (2007) cites the significance of automatic processing, the "false fame effect," and the process dissociation framework in describing the relationship between implicit memory and advertising effectiveness. In

short, measuring ad effectiveness only with direct tests of recall and recognition with awareness may be a mistake, because this is only a partial assessment of ad success (Holden & Vanhuele, 1999; Perfect & Askew, 1994; Perfect & Heatherley, 1997). An additional, complementary measurement of ad effectiveness with indirect tests of familiarity and preference without awareness should also be employed in order to address the mistake.

In summary, an assessment of both implicit and explicit memory for advertising may provide important information on the effectiveness of advertisements. Implicit memory for advertising demonstrates that it has been effective even though consumers are unaware of having seen it, whereas explicit memory for advertising demonstrates that it has been effective because they are aware of it. The roles of implicit and explicit memory during exposure to prescription drug advertisements are of particular interest in the current study. Previous research connecting implicit and explicit memory for drug ads in the elderly appears to be limited. Thus, an examination of implicit and explicit memory for drug ads may provide some valuable information about ad effectiveness in an applied, real-world context.

Prescription Drug Advertising and Older Adults

As noted earlier, many prescription drug advertisements are targeted toward older adults (Bell, Kravitz et al., 1999; Lipsky & Taylor, 1997). However, even though older adults are the primary target of drug ads, these ads may not always be developed with the information-processing capabilities of the elderly in mind (Morrow et al., 1998). Also noted earlier, older adults perform more poorly on a number of cognitive tasks compared

to younger adults (Craik, 1994; Hess, 2005; Salthouse, 2004). For example, the processing capability of older adults is limited when a task requires the initiation of deliberate processing, the integration of contextual information with to-be-remembered information, or the inhibition of irrelevant information. These capabilities may be involved when the elderly reviews and evaluates drug ads. Advertisers should be aware of the relationship between drug ad development and the processing capability of older adults, in order to maximize ad effectiveness and minimize memory and comprehension problems.

Research in both gerontology and marketing suggests that the usefulness of prescription drug advertisements for informing consumers about drugs decreases as age increases (Ensley & Pride, 1991). For example, Abernathy and Adams-Price (2006) found that older adults were worse than younger adults at recalling the purpose of drugs in magazine ads. Also, Schommer et al. (1998) found that older adults made more mistakes than younger adults in recalling drug information in television ads. Finally, Morrell, Park, and Poon (1989, 1990) found that older adults performed more poorly than younger adults in recalling prescription label information. By contrast, Perri and Nelson (1987) found that older adults were better than younger adults at recalling drug information in magazine ads, when the medication in the ads targeted them. Therefore, previous research on drug ad effectiveness in the elderly has produced mixed results, but when the drug ads were relevant to them, they were more likely to remember it.

As noted previously, magazines constitute one of the most common formats for prescription drug advertising. The format is both practical and logical because older adults, particularly those who are affluent, read magazines more frequently than younger

adults (Burnett, 1991; Mehta & Purvis, 2003). In addition, older adults have more positive attitudes toward drug ads in magazines than ads on television (Mehta & Purvis). Therefore, advertisers may find that magazine drug ads are more believable, credible, and closely attended to (and thus, more effective) than television ads, when promoting prescription drugs to older adults. Again, additional advantages of magazine ads over television ads for older adults include the fact that they can be conveniently examined at a self-selected pace and that they can provide more comprehensive information than other ad forms. Taken together, the advantages may make magazine ads easier to review, understand, and remember, particularly when they are personally relevant.

Design issues, especially in colorful ads, constitute one potential problem with the comprehension of magazine drug advertisements. Older adults may be at a disadvantage in comprehending ads that are incompatible with their processing abilities. Many magazine drug ads contain complex information and graphics that are difficult to understand. For example, information is at times disconnected and details are randomly displayed. In addition, the language used is complicated, and a considerable amount of information is provided. Older adults have difficulty interpreting complex or crowded visual fields (Sekuler, Bennett, & Mamelak, 2000). Moreover, older adults experience problems fully understanding complex information (Adams-Price, 1993), such as medical information about drug dosage and label instructions (Morrell et al., 1989, 1990; Park, 1999). Furthermore, understanding in older adults is hindered by illustrations, but facilitated by better organization (Hartley, 1998; Morrell et al., 1990; Morrow et al., 1998). Unfortunately, complicated wording and diagrams continue to be found in magazine drug ads.

In order to help maximize older adults' comprehension, health-related web sites should avoid designs with complex, multifaceted patterns or backgrounds (Echt, 2002). Moreover, more information does not always result in better understanding, because supplemental information without proper organization will probably add to comprehension problems. As noted earlier, improved organization in magazine drug advertisements may be especially helpful to older adults (Abernathy & Adams-Price, 2006; Morrow et al., 1998). Furthermore, a comparison of drug ads with some containing more information and others containing less information found no memory differences between the ads in older adults (Jones & Mullan, 2006). Thus, more information in ads is not always helpful to the elderly.

Another potential problem with the comprehension of magazine drug advertisements is that they may be ambiguous. Magazine drug ads are designed to increase awareness of a drug and persuade consumers to try it. At times, ambiguous catchphrases or slogans are intentionally used in order to capture attention and make the drug ads memorable. As noted previously, ambiguity in ads is likely to worsen the processing capacity of older adults to encode ad information (Byrd, 1988), which will subsequently worsen recall for the information. As a result, ambiguity in magazine drug ads may lead to more confusion than persuasion in older adults and diminish memory for and comprehension of ad information.

Memory and comprehension are significantly correlated, central to cognitive processing, and contribute to overall cognitive performance (Engle, Cantor, & Carullo, 1992; Just & Carpenter, 1992). Therefore, comprehension problems for magazine drug advertisements will probably result in difficulty remembering them. Magazine drug ads

that include complicated, distracting, or ambiguous information, details, or backgrounds may be more difficult for older adults to remember and understand, even when the ads are relevant to them.

Previous research has neither examined implicit and explicit memory for prescription drug advertising nor extensively considered the ability of older adults to remember information from this context. More research is needed to better understand the relationship between aging and memory for drug advertising. In addition, advertising that is emotional, as drug ads often are, tends to be preferred and better remembered by older adults, which makes it particularly effective (Fung & Carstensen, 2003; Williams & Drolet, 2005). The current study is valuable to researchers as well as advertisers who are interested in how well older adults remember drug ads and how effective the ads are for this group. Although research on aging, memory, and advertising as specific topics is extensive, studies combining them are limited (e.g., Abernathy & Adams-Price, 2006; Morris, Brinberg, Klimberg, Rivera, & Millstein, 1986).

CHAPTER V

ADDITIONAL FACTORS

Salience

Salient information is information that is particularly pertinent to a circumstance or situation. In addition, salient information may increase the attention paid to certain drug advertisements and thus, improve memory for them. Moreover, salient items are features of ads that are boldly presented, the center of attention, or repeated to capture attention (Goode, 2007). Furthermore, the effect of pertinent information on implicit and explicit memory can be significant because it enhances processing at exposure and testing. In the current study, salient information was considered to be relevant or meaningful medical information that was presented through the reading of vignettes before the presentation of the prescription drug ads.

The salience manipulation is comparable to environmental support, because the salient information provides a sense of personal relevance and familiarity during exposure and testing. The presence of salient information or environmental support at exposure and testing may improve memory, especially in older adults who experience various memory-related deficits (Craik, 1986; Hess, 2005). Hulicka and Weiss (1965) suggested that the memory performance of older adults is affected by the importance they place on the memory task. Items that are important, or salient, to older adults may be

more easily remembered than items that are less important, or less salient. As a result, older adults may have better implicit and explicit memory for prescription drug advertisements that treat the medical conditions that they are familiar with and aware of than the drug ads that treat conditions unfamiliar and unaware to them. Older adults have been found to recall drug information better than younger adults when the ads were specific to them (Perri & Nelson, 1987). Therefore, the availability of salient information may create a feeling of personal relevance and familiarity that may have a favorable effect on memory.

Because older adults take more medications, prescription drug advertisements are likely to be more salient to them than to younger adults. The facilitative effects of salient information on memory may be more obvious in explicit tasks than in implicit tasks. In addition, explicit memory may reflect salient items of an ad, whereas implicit memory may reflect less salient items of an ad (Goode, 2007). Although little is known about the potential effect salient information might have on implicit memory, it makes sense to believe that the effect would be similar to that of explicit memory in adults, older and younger. Anxiety may also affect implicit and explicit memory for drug ads, and a review of research on anxiety is next.

Anxiety

Anxiety may negatively influence the cognitive abilities of older adults. Research has indicated that anxiety experienced by older adults leads to poorer general cognitive processing, especially memory performance (Andreoletti, Veratti, & Lachman, 2006; Deptula, Singh, & Pomara, 1993; Hogan, 2003; Wetherell, Reynolds, Gatz, & Pedersen,

2002). The State-Trait Anxiety Inventory (STAI) is a common assessment device used to measure anxiety. The STAI measures both "state anxiety," which reflects anxiety at the moment, and "trait anxiety," which reflects anxiety in general. Research on cognitive performance in older adults has used the STAI mainly to assess the state component of the measurement, although both components also have been measured (Andreoletti et al.; Hogan; Wetherell et al.). Obtaining an assessment of anxiety before, during, or after cognitive testing in older adults would be appropriate in research seeking to determine if higher anxiety results in lower cognitive performance.

An inverse relationship has been established between state anxiety and memory in older adults, specifically in explicit and working memory (Andreoletti et al., 2006; Wetherell et al., 2002). Moreover, elevated anxiety levels have been related to poorer performance on a complex divided attention task in older adults (Hogan, 2003). However, the studies also found other measures of cognitive performance that did not negatively correlate with anxiety in older adults. Furthermore, the studies did not establish similar associations between anxiety and cognitive ability in younger adults (Andreoletti et al.; Hogan; Wetherell et al.). In summary, although heightened anxiety appears to have a harmful effect on cognitive performance in older adults, research assessing state anxiety immediately after a memory test appears to be limited.

Additional factors that may contribute to the relationship between anxiety and memory include metamemory and stereotype threat. Metamemory is a people's ideas and beliefs about their own memory abilities and about how memory operates and performs (Dixon & Hultsch, 1983; Hertzog, Dixon, & Hultsch, 1990). The concept is significant because it is based on the idea that memory beliefs commonly guide memory

performance, particularly in older adults (Berry, West, & Dennehey, 1989). Older adults have a tendency to be more concerned about their cognitive abilities, specifically memory, and as a result they worry more, which results in anxiety (Andreoletti et al., 2006; Wetherell et al., 2002). Older adults generally are less confident in their memory ability than younger adults and believe that they are more likely to experience problems. In fact, many older adults believe that memory problems as we age are unavoidable and inevitable. Measurements of metamemory could also be described as measurements of memory self-efficacy (Berry et al.; Dixon & Hultsch; Hertzog et al.; Lachman, 1991).

Stereotype threat is the tendency for people's performance on tasks to be consistent with common stereotypes of performance on those tasks by members of groups to which individuals belong. Stereotype threat occurs when awareness that poor task performance is expected on the basis of race, gender, or age leads to poorer performance on tasks. Previous research has consistently observed heightened stereotype threat and resultant substandard performance in women, African Americans, and older adults across various tests and situations (Chasteen, Bhattacharyya, Horhota, Tam, & Hasher, 2005; Hess, Auman, Colcombe, & Rahhal, 2003; Spencer, Steele, & Quinn, 1999; Steele, 1997; Steele & Aronson, 1995). Moreover, stereotype threat is a form of self-fulfilling prophecy, and it contributes to rising levels of anxiety (Osborne, 2007). Furthermore, to the extent that older adults internalize the stereotype that they will have memory deficits, their memory performance tends to be poorer when they are aware that their memory is being tested.

Metamemory and stereotype threat appear to be importantly connected concepts. Moreover, both concepts seem to contribute to the relationship between anxiety and

cognitive performance in older adults. Furthermore, metamemory and stereotype threat may affect the level of anxiety older adults experience during memory testing. Rahhal, Hasher, and Colcombe (2001) appear to have effectively demonstrated the influence of metamemory and stereotype threat. The study compared the performance of older and younger adults on true-false trivia statements in two experiments. In the first condition, during the learning and testing phases, a person's memory or ability to remember was emphasized in the instructions. In the second condition, the instructions did not include any memory-related wording. Although age differences were observed when memory was emphasized in the instructions, they were not seen when it was not included. Similarly, Chasteen et al. (2005) showed that once stereotype threat has been activated, a simple change in instructions is not sufficient to eliminate its detrimental effect.

Metamemory concerns and the presence of stereotype threat can cause elevated levels of anxiety in older adults. Anxiety from being tested may be a partial explanation for the poorer cognitive processing and memory performance commonly observed in older adults. In summary, anxiety brings about cognitive interference in older adults (Deptula et al., 1993; Osborne, 2007). In fact, the cognitive deficits in older adults may appear larger than they actually are because of anxiety (Hogan, 2003). Because implicit memory tests do not refer specifically to memory, they may be less likely to activate stereotype threat and anxiety than explicit memory tests. Therefore, anxiety may be a factor in explaining larger age deficits in explicit than in implicit memory.

Moreover, attempting to control for anxiety may cause cognitive deficits in the elderly to diminish. Furthermore, the ability of older adults to develop effective strategies to manage and reduce memory-related anxiety may minimize the cognitive deficits that

are associated with it. Thus, the capacity to better cope with anxiety may also reduce some cognitive decline in aging (Andreoletti et al., 2006). Although anxiety diminishes the cognitive performance of older adults in the laboratory, little is known about the influence of anxiety in everyday cognitive tasks. In other words, the same memory-related anxiety that potentially leads to cognitive deficits in older adults in experimental settings may or may not be experienced in everyday life. The current study will address the matter by using memory stimuli that are similar to stimuli encountered in everyday life: prescription drug advertisements.

Current Study

Objectives

The primary objective in the current study was to examine implicit and explicit memory for information presented in prescription drug advertisements in both older and younger adults. The study explored the relationship between unconscious memory (automatic processing) and conscious memory (deliberate processing) after exposure to magazine-style prescription drug ads. Conscious awareness during exposure may not be necessary in order for the ads to be effective. Do people have memory for ads even though they do not remember seeing them? If they do, then advertising effectiveness may be better than typically revealed by direct tests of explicit memory.

Advertising effectiveness is commonly measured by a person's conscious abilities to recall or recognize ad information after a delay. Such direct measurements assess a person's explicit memory of ads. However, measurements of a person's unconscious processes, such as familiarity or preference that may influence decision making after

exposure to ads may be necessary in order to obtain a more complete estimate of ad effectiveness. Such indirect measurements would assess a person's implicit memory of ads.

A secondary objective in the study was to examine the effect of a previous presentation of salient information on implicit and explicit memory of advertisements in both older and younger adults. Salient information was considered to be information that is relevant to the ads. In other words, the study explored whether there are differences in memory for the ads in the presence or absence of previously presented salient information. In this case, salient information was presented in vignettes about people with medical conditions that were also mentioned in the ads. The availability of salient information may improve memory for ads. Do people have better memory for ads when they have previously seen information relevant to them? If they do, then advertising effectiveness may be enhanced when they have been exposed to information about the medical condition being advertised before they see the ad.

It is possible that the presence of salient information in advertisements might compensate for the comparatively pervasive cognitive decline in older adults, especially concerning the conscious, deliberate processing involved in explicit memory tasks. Therefore, the contextual and environmental support provided by salient information could have a positive effect on explicit, as well as implicit, memory ability in older adults.

An additional objective in the study was to examine the effect of the level of anxiety on implicit and explicit memory of advertisements in both older and younger adults. Anxiety has been shown to negatively impact cognitive performance, including

memory, in adults. The study explored whether the level of anxiety negatively impacts memory for the drug ads. Do people have better memory for ads when they have low levels of anxiety? If they do, then advertising effectiveness may be improved when they experience minimal anxiety during testing.

Older adults may be particularly susceptible to anxiety during testing situations as a result of stereotype threat. Stereotype threat is when people's performance on tasks is affected negatively by their perception that they will perform poorly because they are members of groups thought to be at a disadvantage on those tasks. For example, it is widely believed that older adults perform worse than younger adults on memory tasks. As a result, stereotype threat anxiety may affect the memory of older adults more than that of younger adults. Therefore, high levels of anxiety could have a negative impact on explicit, as well as implicit, memory ability in older adults. However, there is a greater likelihood that explicit memory would be impacted in anxiety situations, because older adults would be aware that their memory was being tested.

This study is important for a few reasons. First, prescription drug advertisements may be more effective than an explicit memory task alone demonstrates. Second, memory for drug ads may be better when a medical condition is more salient. Third, the prevalence of drug advertising might reinforce the belief that brand name drugs are better than generic alternative drugs.

Additional factors related to the objectives of the current study were also assessed. The factors included intelligence, cognitive state, and evaluation judgments of the advertisements. One or more of the factors may be correlated with implicit or explicit memory in older or younger adults. The study's various objectives should facilitate

further understanding of the memory abilities of older and younger adults who incidentally and intentionally examine prescription drug advertisements.

Research Questions

1. Are there differences between older and younger adults in implicit and explicit memory for prescription drug advertisements and if so, what are the effect sizes for the age deficit effects for implicit and explicit memory?

2. Does the presentation of salient or nonsalient information influence differences in implicit and explicit memory in older and younger adults?

3. Is the level of state anxiety related to differences in implicit and explicit memory in older and younger adults?

Hypotheses

1. There will be an age deficit effect in explicit memory, with older adults functioning worse than younger adults, but not in implicit memory. Thus, the effect sizes of the age deficit effects will be larger for explicit than for implicit memory.

2. The presence of salient information will decrease the age deficit effect compared to the presence of nonsalient information for explicit memory, but not for implicit memory.

3. The level of state anxiety will be negatively correlated with explicit memory in older adults, but not in younger adults, and will not be correlated with implicit memory in either age group.

In review, the primary objective in the current study was to examine implicit and explicit memory for prescription drug advertisements in older and younger adults. The drug ads were modeled after actual ads used by pharmaceutical companies. The secondary objective was to examine the effect of the presentation of salient information on implicit and explicit memory for drug ads. An additional objective was to examine the effect of state anxiety level on implicit and explicit memory for drug ads.

The first research question centers on age differences in implicit and explicit memory for drug advertisements in older and younger adults; are there age differences and if so, how small or large are the differences? The second research question concentrates on the impact of salient information on implicit and explicit memory for drug ads in older and younger adults; does salient information influence age differences in memory and if so, what is the extent of its effect? The third research question focuses on the impact of state anxiety on implicit and explicit memory for drug ads in older and younger adults; is state anxiety related to age differences in memory and if so, what is the extent of its effect?

In response to the first research question, the hypothesis is that there will be an age difference in explicit memory, with older adults performing worse, but not in implicit memory. For the second research question, the hypothesis is that the presence of salient information will decrease the age deficit in explicit memory. The hypothesis for the third research question is that the level of state anxiety will be negatively correlated with the explicit memory deficit in older adults.

The research questions and hypotheses refer to the probability that older and younger consumers will implicitly and explicitly remember drug advertisements, especially when memory is affected by salient information and anxiety, respectively. The current study examined age differences (older and younger adults) in memory (implicit and explicit) and the impact of both salient information and anxiety on memory using fictitious, but extensively pretested stimuli that were created for the study.

The results of this study have facilitated a better understanding of the overall relationship between age differences in implicit and explicit memory for drug

advertisements. In addition, the effect of the presence or absence of relevant information and anxiety on memory has been clarified. Finally, this study examined the value of measuring implicit memory when examining advertising effectiveness.

Therefore, an overall purpose was to demonstrate and establish that a complete assessment of advertising effectiveness should include indirect tests consistent with the implicit memory paradigm. The effectiveness of advertisements, in general, and prescription drug ads, in particular, can no longer be exclusively assessed by direct tests measuring explicit memory. Doing so validates the erroneous suggestion that memory can be tapped, in its entirety, with a single, direct test. Moreover, continuing to use a direct test approach alone to measure explicit memory will lead to an incomplete and thus, partial, assessment of ad effectiveness. The use of an indirect test to measure implicit memory, in addition to a direct test, will provide a more complete assessment of ad effectiveness (Krishnan & Shapiro, 1996). Furthermore, an indirect test will provide a method to explore the mere exposure effect noted by Zajonc (1980). In addition, little is known about the relationships between the mere exposure effect and drug advertising or mere exposure and the elderly. This study has intersected cognitive, aging, and advertising research in order to better address and answer these issues and questions.

CHAPTER VI

METHOD

Participants

The participants in the current study were 80 older adults and 80 younger adults, which produced two sample groups: older adults and younger adults. The responses of one older adult participant were removed from all data analyses because of a low score on the Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975). The sample size for both groups was large enough to detect or establish a medium effect size at the .05 significance level, with an acceptable degree of statistical power at .80, in order to compute a standard analysis of variance per the number of experimental conditions and variables (Cohen, 1992). The age of 55 was strategically selected as the minimum age for participants to be included in the older adult group rather than the more traditional age of 60 or 65. The cutoff age was chosen because medication use at 55 is similar to medication use at older ages, yet significantly higher than medication use at younger ages (Davis & Heavner, 2002).

The majority of older adults were recruited from various churches, groups, and organizations within the greater Starkville/Oktibbeha County (Mississippi) area. A few older adults were recruited from another similar area in another comparable state (Georgia), and their participation was completely voluntary. The younger adults were

enrolled in General Psychology courses at a medium-sized research university, and their participation was recruited through the Psychology Research Participation Program and fulfilled course completion requirements. Data were first collected for the younger adults, followed by the older adults, and the data collection process lasted approximately 2 months. The consent form can be found in Appendix A.

Both older and younger participants were equally likely to receive one of the four experimental packets, labeled A, B, C, and D. The purpose of the four packets was to present various orderings of the stimuli systematically, specifically the medical condition vignettes and prescription drug advertisements, in order to avoid any ordering effects that might impact the results. The various orderings were determined with a standard random sequence generator procedure. Therefore, the stimuli in the packets were methodically counterbalanced. Packets contained the same number of stimuli, vignettes and drug ads, and followed the same general organization. Participants received one of the four experimental packets, an identical data response packet, and followed the same experimental sequence.

Information on demographic variables was collected in a demographic survey from participants at the start of the study. The demographic information included age, gender, ethnicity, education level, marital status, occupational status, number of years lived at current residence, and town size. Older adults had a mean age of 68.34 (*SD* = 7.50), and the group consisted of 34 males and 45 females. Seventy-seven older adults were Caucasian and two were African American. In terms of education level, 41 older adults were college graduates with some postgraduate education.

Younger adults had a mean age of 18.60 (*SD* = 0.89), and the group consisted of 30 males and 50 females. Sixty-three younger adults were Caucasian and 15 were African American; there was also one Hispanic and one Asian participant in the sample group. In terms of education level, all younger adults were high school graduates (or had received a general equivalency diploma) and many reported completing some college. The demographic survey can be found in Appendix B.

On the Shipley Vocabulary Test (SVT; Shipley, 1940), older adults scored 32.65 (*SD* = 3.54) and younger adults scored 27.86 (*SD* = 3.87). Also on the MMSE, older and younger adults scored 28.30 (*SD* = 1.68) and 28.33 (*SD* = 1.46), respectively.

In addition, health-related information was collected in the Medical Conditions Survey (MCS) that consisted of a general rating of health, the number of current chronic health conditions, the number of current prescription medications taken, and the number of serious illnesses that had been experienced in the last 5 years. On the health rating, 88.60% of older adults and 91.20% of younger adults rated their health as "good" or "excellent." On the additional health-related questions, older adults reported having an average of 0.76 (*SD* = 1.21) chronic health conditions, taking an average of 3.71 (*SD* = 4.02) prescription medications, and experiencing an average of 0.35 (*SD* = 0.62) serious illnesses in the last 5 years. Also, younger adults reported having 0.13 (*SD* = 0.33) chronic health conditions, taking 0.60 (*SD* = 0.91) prescription medications, and experiencing 0.06 (*SD* = 0.24) serious illnesses in the last 5 years. The MCS also collected information about whether participants currently had or had experienced any of the medical conditions noted in the stimuli. Older adults and younger adults reported

experiencing 5.68 (*SD* = 3.49) and 3.15 (*SD* = 2.04) of the medical conditions, respectively.

Overview

The current study measured implicit and explicit memory in older and younger adults by employing medical-related stimuli, such as medical condition vignettes and prescription drug advertisements. The research team that worked on the study developed all original elements of the stimuli. In addition, the elements of the stimuli were extensively pilot-tested and completely fictitious. The development and pilot-testing of the stimuli occurred before the study's main experiment. Additional information about the effect of salient information and state anxiety on both types of memory in the two sample groups was collected. Other information about intelligence, health, and evaluation judgments that may potentially affect the assessment and evaluation of the study's various factors was collected, also.

Materials

Drug Names

Development of the drug names. The prescription drug names used were pilot-tested and fictitious. The development of the names took place in three different phases, but the process of developing them was similar each time. On each occasion, an aggregate list of names was compiled, the list was evaluated and narrowed, and a final list was selected and used in the pilot-testing process. The drug names used in the pilot-

testing process were selected on the basis of ecological face validity and collective preference.

Initially, 16 drug names were selected by a psychology laboratory for use in a familiarity check of a medical errors research project unrelated to the current study. During the development of the current study, 16 additional drug names were selected. Taken together, this preliminary set of 32 drug names was used and assessed during the first part of the pilot testing. As the study expanded, more fictitious drug names were selected. This additional set of 32 drug names was used and assessed during the second part of the pilot testing. Thus, 64 drug names were used in both parts of the pilot-testing process. The drug names were similar to other names commonly found in magazine-based, print prescription drug advertisements (e.g., number of letters and syllables, prefixes and suffixes). The complete list of fictitious drug names can be found in Appendix C.

Pilot-testing process for the drug names. The goal of pilot testing was to determine and establish pairs of drug names that were equally likely to be preferred by participants. Thus, participants would not be expected to prefer one drug name in a pair more than the other because the names had been previously evaluated as equivalent. Pilot testing enabled the researcher to find several pairings that could be used as stimuli in the implicit and explicit memory tasks.

The pilot-testing process for the drug names involved two phases, which took place on two different occasions. The same procedure was followed on both occasions. The first phase of the pilot testing employed a ratings survey in order to narrow down the

list of drug names to ones that were moderate in "appropriateness" or "suitability," and to remove any names that might be "inappropriate" or "unsuitable" as a result of poor (or low) ratings. In this phase, pilot participants were given a list of drug names, and were asked to rate them. The second phase employed preference surveys in order to narrow down the pairs of drug names to those that were equally preferred by participants. In this phase, participants were given pairs of drug names, and were asked either to choose between them or to indicate "no preference." Because the drug names were fictitious, participants in the pilot testing would have had no prior familiarity or exposure to them.

First round of pilot testing. The first phase of the pilot testing in the first round involved 27 students in an upper-level undergraduate psychology course who rated the first set of 32 drug names on a 7-point Likert-style scale, with choices ranging from low to high or from "poor name" to "excellent name." The students were told that a marketing firm was attempting to identify names for new prescription drugs, and they were asked to rate the prospective names on the rating scale. The drug name ratings task used was the same as described above, and in effect, was a measure of appeal or liking for the name. The drug name ratings survey from the first round can be found in Appendix D.

An average rating for each drug name was then calculated, and the names were paired according to their averages in a highest to lowest format. Therefore, the two drug names with the highest averages were paired together and so on until the two drug names with the lowest averages were paired together, resulting in 16 pairs.

The drug name pairings process enabled the researcher to arrange the drug name pairings systemically for the surveys used in the second phase of the pilot testing. A total

of eight surveys were developed for the second phase, with each consisting of 16 drug name pairings (32 drug names). The 8 pairs from the 16 highest rated drug names and the 8 pairs from the 16 lowest rated drug names were used in the first survey. For the seven additional surveys, the drug names were rotated within the high- and low-rated arranged groupings in order to create new drug name pairings for each survey. Thus, the highest and lowest rated drug names were always paired with other high- or low-rated names.

The second phase of the pilot testing in the first round involved 162 participants in undergraduate psychology courses who reviewed each of the 16 drug name pairings in one of the eight surveys and selected the name they preferred or considered to be the "best name for a new drug." Participants were General Psychology students, plus the students from one upper-level psychology course. An average of 20 students (range from 17 to 23) completed each of the eight surveys. The students were told that a marketing firm was attempting to identify names for new prescription drugs, and they were asked either to choose the better name or to indicate "no preference." The drug name preference task used was the same as described above, and in effect, was a measure of choice between the names. An example of the first drug name pairings preference survey can be found in Appendix E. Taken together, 128 drug name pairings were evaluated in the eight surveys.

From the first round of pilot testing, the first set of 10 drug name pairings (20 drug names) was selected and used in the study. The pairings were selected based on an equal or nearly equal preference for each drug name in a pair and on chi-square values, with high values indicating no significant differences for preference between the drug names in each pair. All chi-square values for the selected drug name pairings were above

0.600. Twelve drug names were eliminated from consideration after both phases of the pilot testing, 4 because of poor (or low) ratings during the first phase of the pilot testing, and 8 because they were not equally preferred with another name during the second phase.

Second round of pilot testing. The first phase of the pilot testing in the second round followed the same procedure as in the first round, except 37 students in two upper-level undergraduate psychology courses rated the second set of 32 drug names. In addition, the procedure was the same in the second phase of the pilot testing in the second round, except 180 participants reviewed the 16 drug name pairings. Most participants were again General Psychology students, but this time, students from two upper-level psychology courses also participated. Finally, an average of 23 students (range from 20 to 27) completed each of the eight surveys.

From the second round of pilot testing, the second set of 10 drug name pairings (20 drug names) was selected and used in the study. The pairings were selected through the same process described in the first selection process. All chi-square values for the selected drug name pairings were again above 0.600 in the second round. Twelve drug names were again eliminated from consideration after both phases of the pilot testing, using the same rationale for removal described in the first selection process.

The ratings survey and preference surveys used in both rounds of pilot testing were comparable in format and style, except the drug names were different. Both sets of the selected drug name pairings that were used in the study from the first and second rounds, along with their chi-square values, are given in Appendix F. The students who

participated in the pilot-testing process for the drug names did not participate in the current study.

Drug Name Pairings and Medical Conditions Matching Process

Both sets of drug name pairings that were selected during the first and second rounds of the pilot-testing process were next matched with two lists of medical conditions. The first list consisted of 15 conditions more commonly experienced by older adults, whereas the second list consisted of 15 conditions experienced equally by both older and younger adults. The first set was matched with 10 conditions related to the older adults, and the second set was matched with 10 medical conditions related to both older and younger adults, resulting in two groupings (first set = older adults and second set = older/younger adults). The development of the two lists of medical conditions and the use of the five remaining conditions in each list is described below.

The arrangement of the drug name pairings was based on chi-square values (highest to lowest), and the medical conditions were arranged alphabetically (A to Z). The pairings and conditions were matched accordingly. The two groupings were then interspersed, divided based on odd/even numberings, and alphabetized by medical condition. This procedure resulted in two new groupings consisting of 10 drug name pairing/medical condition combinations that included drug name pairings from both sets and medical conditions from both lists. The first new grouping was used to measure implicit memory, whereas the second new grouping was used to measure explicit memory. Thus, the drug name pairings and medical conditions used in the stimuli were specific to measuring one memory type or the other.

The two new combination groupings were used in all experimental packets. Therefore, both sets of drug name pairings and both lists of medical conditions were used to measure implicit and explicit memory in all four experimental packets (A, B, C, and D). The first drug name in each of the pairings was used in the prescription drug advertisements in Packets A and B, whereas the second name was used in the drug ads in Packets C and D. For example, the drug names Lynotine and Raloprox resulted in the pairing that was combined with acid reflux (heartburn). Thus, Lynotine was used in Packets A and B and Raloprox was used in Packets C and D, but both drug names were used in the acid reflux ad in all packets. This arrangement enabled the researcher to counterbalance the drug name pairings stimuli.

As a result, the 20 advertisements contained in all packets, 10 used to measure implicit memory and 10 used to measure explicit memory, appeared identical, having equivalent designs, except for different drug names used in the ads. In summary, 40 distinct drug names were used in 20 separate drug ads in order to develop four experimental packets, with all packets consisting of 10 ads in each memory condition (20 total). The drug ads in Packets A and B had identical, twin ads in Packets C and D, but with different drug names. Participants received one of the four experimental packets.

Because the selection of the drug name pairings was determined by student responses, initially from rating scores and then from preference responses, it was believed that the pairings were established by a systematic, yet randomized procedure. Accordingly, employing the first drug name from each of the pairings in Packets A and B and the second name in Packets C and D was thought to be experimentally sound, because none of the paired names differed significantly in preference.

Medical Condition Vignettes

The goal of the medical condition vignettes was to develop a brief narrative that portrayed a realistic, yet emotional, scenario about a person experiencing or suffering from a health-related condition. Thus, the vignettes were designed to elicit or evoke emotion from participants in the study. Medical condition vignettes were used in all experimental packets. All vignettes described a medical condition that could be treated with a prescription drug. The vignettes were used as a salience manipulation in the study, and they were presented to participants before any of the prescription drug advertisements were presented.

In the packets, half of the medical conditions described in the vignettes corresponded to the medical conditions noted in the drug ads, whereas the other half did not correspond to any of the conditions noted in the ads. The vignettes with medical conditions that corresponded to drug ads were labeled "salient," whereas the other vignettes were labeled "nonsalient." For example, in one packet participants read vignettes about acid reflux and acquired immune deficiency syndrome, but were exposed later to drug ads about acid reflux and emphysema. In other words, the salient vignette that described a narrative about acid reflux was followed by a drug ad about acid reflux. However, the nonsalient vignette that described acquired immune deficiency syndrome was not followed by a similar drug ad, but was instead followed by an emphysema drug ad. This dissimilar drug ad noted a medical condition that had not been read about previously. Therefore, the salient and nonsalient labels referred to whether or not the vignettes provided relevant and related medical condition information that corresponded to the drug ads clustered in the same memory condition.

Development of the medical condition vignettes. The goal during the development of the vignettes was to maintain as much experimental consistency as possible from one vignette to the next. The researcher and his advisor developed 30 brief vignettes. The medical conditions used in the vignettes were specific to measuring implicit or explicit memory. All medical conditions in the vignettes came from the two lists of medical conditions related to older adults and both older and younger adults noted above and described further below. A general template was used in developing the vignettes, which consisted of five sentences in paragraph form. Additionally, the vignettes were presented in 12-point, regular, Times New Roman font.

From the general template, each of the five sentences had a specific purpose and played a particular role in the vignettes. The first sentence introduced and named a character or person. Both male and female names were used equally in the vignettes (15 each). The second sentence noted either the medical condition the character suffered from or noted various adverse effects, limitations, or symptoms of the medical condition. The third sentence also noted either the medical condition or the symptoms, depending on which component of the information had been noted in the second sentence. The second and third sentences rotated from one vignette to another. The selected symptoms of the medical condition used in the vignettes originated from the Web MD internet website. The fourth sentence stated the family's emotional reaction or response to the character suffering from the medical condition. A strategically selected emotional word was used in the fourth sentence and how the word was chosen is described below. The fifth sentence again mentioned the character's name and made a concluding statement about the present or future.

In order to elicit or evoke emotion from participants in the study, strategically selected emotional words were used to describe the family's reaction or response to the situation. The words were selected from the Affective Norms for English Words (ANEW) report (Bradley & Lang, 1999). Using male and female participants, the report established normative emotional ratings for more than 1,000 words across three dimensions: pleasure, arousal, and dominance. The pleasure and arousal dimensions were used to select emotional words for the study, whereas the dominance dimension was not used.

The words in the ANEW report had been rated on the pleasure and arousal dimensions with a 9-point scale. The researcher selected emotional words with average ratings between 2 and 6 (ranging from unhappy to happy) for pleasure and between 4 and 8 (ranging from calm to excited) for arousal. Therefore, although the words were rated as generally unpleasant and aroused, they were neither extremely unpleasant nor aroused. Twenty emotional words were selected from the ANEW report and used in the vignettes. A listing of the emotional words used in the vignettes and their pleasure and arousal ratings can be found in Appendix G.

Readability of the medical condition vignettes also was carefully considered during the development process. Vignettes were developed using standard readability scores: the Flesch Reading Ease score (FRE; Flesch, 1948) and the Flesch-Kincaid Grade Level score (FKGL; Kincaid, Fishburne, Rogers, & Chissom, 1975), in Microsoft Word (version 2002). The FRE score rates text on a 100-point scale, and the higher the score, the easier it is to understand the document. A standard document aims for a score of approximately 60 to 70. The FKGL score rates text on a U.S. grade-school level, and a

score of 8.0 means that an eighth grader can understand the document. A standard document aims for a score of approximately 7.0 to 8.0. All vignettes developed and used in this study had FRE scores ranging from 60 to 70 and FKGL scores ranging from 7.0 to 8.0, with average scores of 64.8 and 7.5, respectively. An example of the first set of the medical condition vignettes from the implicit memory condition that was used in Packet A can be found in Appendix H.

Organization of the medical condition vignettes. In the vignettes (30) and drug ads (20), half of the medical conditions described in the vignettes and noted in the drug ads pertained to older adults and half were related to both younger and older adults. Although the medical conditions in the drug ads were the same in all packets, the medical conditions in the vignettes varied partially from one packet to the next. As noted earlier, half of the medical conditions described in the vignettes corresponded to medical conditions in the drug ads, whereas the other half did not.

Packets consisted of two sets of 10 medical condition vignettes and two sets of 10 prescription drug advertisements. The sets of vignettes were partially the same and partially different and, the sets of drug ads were the same, except for the drug names. After reading the first set of vignettes and rating the first set of drug ads, participants' implicit memory for the ads was tested with a drug name preference test. After reading the second set of vignettes and studying the second set of ads, participants' explicit memory for the ads was tested with a drug name recall test. The full procedure is described further below.

In each of the memory conditions and from both sets of vignettes used in each condition, five of the vignettes were salient items, whereas five were nonsalient items, which created an experimental and control condition for the vignettes. As a result, 10 vignettes were salient and 10 were nonsalient. The nonsalient vignettes in the control condition were the same in all experimental packets. However, the salient vignettes in the experimental condition varied from one packet to the next. For example, the salient vignettes that referenced the medical conditions–acid reflux, emphysema, glaucoma, and allergies–were all found in different packets and different memory conditions.

In the implicit memory condition and both sets of vignettes specific to it, five salient vignettes were used in Packets A and C, whereas another five salient vignettes were used in Packets B and D. In the explicit memory condition and both sets of vignettes specific to it, the same arrangement of salient vignettes was used in the packets. Because the vignettes in the packets were partially the same and partially different, they were initially arranged alphabetically (A to Z) by medical condition in the packets, then rearranged by a random sequence generator. Thus, the orderings of the vignettes (salient and nonsalient) in the packets were varied and counterbalanced.

The sentence in the salient vignettes that stated the family's emotional reaction or response to the character suffering from the medical condition was used interchangeably in two vignettes. For example, the word "nervous" was used in both of the salient vignettes about glaucoma and allergies. The exchange occurred to maintain consistency from one vignette to the next, because one participant read a vignette about acid reflux in a packet, whereas another participant read a vignette about emphysema in another packet. However, the same sentence in the nonsalient vignettes was specific to the medical

condition and was not used in another vignette. No exchange was necessary, because all participants read the same nonsalient vignettes in all packets.

In summary, half of the vignettes in the packets were salient or nonsalient in that they either did or did not provide relevant medical condition information that corresponded to the drug ads clustered in the same memory condition. The vignettes provided an additional experimental condition that measured the effect of salience on both implicit and explicit memory.

Development of the Medical Conditions Lists

Initially, the researcher and his advisor compiled two extensive lists of common medical conditions experienced by adults. The two lists were used to develop the vignettes and drug ads stimuli. The first list was related specifically to medical conditions more commonly experienced by older adults, whereas the second list was generally related to medical conditions experienced equally by both older and younger adults.

An adult development and aging textbook and the WebMD internet website assisted in creating the two lists (Papalia, Sterns, Feldman, & Camp, 2007). Both sources provided valuable information about the related medical conditions included in the lists. In addition, prior research on medical conditions targeted by prescription drug advertisements confirmed the relative accuracy of the two lists (Bell et al., 2000; Bell, Wilkes et al., 1999; Burak & Damico, 2000; Woloshin et al., 2001).

Next, the two lists were narrowed and final lists of 15 medical conditions each were determined for both groups. The researcher and his advisor chose the final two lists based on the conditions they considered to be most familiar to and associated with the

particular groups. Of the 15 medical conditions included in each list, 10 were used in both the vignettes and drug ads, whereas 5 were used only in the vignettes. The two lists of medical conditions can be found in Appendix I. The older-age specific and general medical conditions were evenly represented in the sets of vignettes and drug ads in all experimental packets. Accordingly, half of the medical conditions in the sets of vignettes and drug ads were related to older adults, and half of the medical conditions were related to both older and younger adults.

Prescription Drug Advertisements

The goal of the prescription drug advertisements was to develop drug ads to use as stimuli to measure implicit and explicit memory. The drug ads were considered appropriate for measuring everyday memory in a real-world context. Implicit and explicit memory was assessed by participants' preferences for and recognition of drug names noted in the drug ads. Although the drug ads were fictitious, the components or features described below were considered information commonly found in such print ads. Participants were told that the drug ads were "works in progress" and "potential ads," in order to explain why they might appear less complete or polished than actual ads.

Development of the prescription drug advertisements. The goal during the development of the prescription drug advertisements was to maintain as much experimental consistency as possible from one drug ad to the next. Using Microsoft Office Publisher (version 2003), the research team created a total of 20 prescription drug ads. The drug name pairings and medical conditions used in the drug ads were specific to measuring implicit or explicit memory. Two versions of each ad were created, because

two different drug names from the drug name pairings were used in the same ad. The different versions appeared in different packets in order to counterbalance the drug names. The first drug name from each of the pairings was used in Packets A and B, and second drug name was used in Packets C and D. Other than the drug names, all other components of the ad were identical.

The prescription drug advertisements were modeled after colorful ads that are designed to be eye catching and are commonly found in popular magazines. The researcher reviewed several colorful prescription drug ads from widely read magazines, such as *Southern Living*, *Time*, and *Newsweek*, and noted the characteristics and design layouts many of them have in common. The review process was performed in order to give the drug ads an acceptable degree of ecological validity.

All prescription drug advertisements were created horizontally, in portrait orientation similar to their presentation in a magazine, and two general models or formats were selected and used as the layouts in their development. The first model included a picture in the top half of the drug ad with a drug name, point of contact, and catchphrase or slogan in the bottom half. The second model included a picture along the right side of the drug ad with a drug name, point of contact, and catchphrase or slogan along the left side. Twelve of the drug ads were developed from the first model, and 8 were developed from the second model. In some drug ads, regardless of the model, the drug name and point of contact was presented first with the catchphrase beneath them. However, in the other drug ads the catchphrase was presented first with the drug name and point of contact beneath it. All components of the drug ads were centered, with appropriate margins.

The background of the prescription drug advertisements was plain, because they were printed on white paper. All pictures used in the drug ads were .jpg files and in color, with the exception of one picture, which was black and white. In addition, about half of the pictures included people, whereas the remaining pictures included objects. Although a majority of the drug ads included one picture, a couple of ads included more than one picture in order to present a "before and after" concept. The selected pictures were *not* supposed to elicit or evoke any strong emotion from participants who saw them.

The drug names selected by the drug name development and pilot-testing process described earlier were written in capital letters and ranged from seven to nine letters long. Although a few contained either two or four syllables, the majority were three syllables long. The drug names were also followed by a 16-point, bold font style registered trademark symbol–®. The contact points were placed immediately below the drug names in the drug ads and consisted of either a telephone number or a website address. The telephone number was a 1-800 number followed by a general health-related word or arrangement (e.g., 1-800-4DOCTOR). The website address was also a general health-related word or arrangement (e.g., http://www.safeway.com).

Neither the drug names nor the points of contact used in the advertisements bore any relationship to the medical condition. In other words, both components of the drug ads were neutral. The catchphrases in the drug ads were written in complete sentences, including proper upper- and lower-case lettering and punctuation and were 8 to 12 words long. In addition, each catchphrase noted the medical condition the drug treated but did not begin with the condition. The catchphrases were basic, simple, and straightforward statements; some were "proactive," whereas others were "reactive." In other words, some

catchphrases centered on preventing a condition, whereas others focused on treating a condition. The catchphrases were also developed and selected in order *not* to elicit or evoke any strong emotion from participants who read them.

The drug name, point of contact, and catchphrase appeared in black text in the drug ads. The two standard fonts of Times New Roman and Arial were used for all text in bold style. The drug name and point of contact were presented in one font, whereas the catchphrase was presented in the other font in the drug ads. The font used for the drug name and point of contact and the font used for the catchphrase were rotated from one ad to the next. The font sizes for the drug name, point of contact, and catchphrase were 48-, 24-, and 30-point, respectively. In a few instances, the font size for the drug name was slightly reduced for formatting purposes. In summary, although the components of the drug ads may have varied slightly, they were comparable in their design layouts. Five sample prescription drug advertisements from the implicit memory condition that were used in Packet A can be found in Appendix J.

In review, 40 prescription drug advertisements were used in the study (20 ads with 2 versions each). The 20 ads used in Packets A and B included the first drug name from each of the drug name pairings, whereas the 20 ads used in Packets C and D included the second drug name. In other words, both versions of each ad were identical except for the drug name. A set of 10 drug ads was presented to participants after a set of 10 medical condition vignettes in order to measure implicit memory, and 10 drug ads were presented after 10 vignettes in order to measure explicit memory.

Therefore, memory was measured in two conditions at two different times, and one set of drug ads and vignettes was used in each of the memory conditions. The

medical conditions noted in the drug ads were the same in all packets. In addition, half of the medical conditions noted in the drug ads were related to older adults and half were related to both younger and older adults based on the drug name pairings and medical conditions matching process described above. Half of the medical conditions noted in the drug ads were also primed with previously read vignettes that provided relevant medical condition information, whereas the other half of the medical conditions were not primed with vignettes. The arrangement of the drug ads in the packets was determined by a random sequence generator. Thus, the orderings of the drug ads were varied and counterbalanced.

Drug Advertisement Ratings Survey

The purpose of the ratings survey was to expose participants to the prescription drug advertisements in order to have them incidentally process the ads. A ratings survey was thought to be an experimentally appropriate method to have participants process information through incidental exposure. Therefore, the ratings survey was used in the implicit memory condition, and the instructions for the survey were called incidental instructions. Incidental instructions were used with the indirect test of memory, described below, to measure implicit memory.

The researcher developed the ratings survey with a 5-point Likert-style scale for participants' responses. The survey instructed participants to rate the appropriateness of the drug name for the medical condition noted in each drug ad. The survey responses ranged from "not at all appropriate" (1), to "extremely appropriate" (5). A sample of the drug advertisement ratings survey can be found in Appendix K.

Immediately before viewing the second set of prescription drug advertisements, participants were given the intentional instructions, which exposed them to the drug ads so that they would deliberately process the ads. Intentional instructions were thought to be an experimentally appropriate method for having participants process information through study and memorization. Therefore, the intentional instructions were used in the explicit memory condition, and they directed participants to study the drug name and associated medical condition noted in each drug ad for a later memory test. Intentional instructions were used with the direct test of memory, described below, to measure explicit memory.

Indirect Test of Memory

The indirect test of memory was used to measure implicit memory for the drug names in the ads. The indirect test was used with the incidental instructions to rate the drug ads to measure implicit memory. The same indirect test of memory was given to all participants. The indirect test consisted of 10 drug name pairings, which included 1 drug name from the set of 10 previously rated ads and 1 drug name that had not been seen. Participants were instructed to circle the drug name they thought was better.

The same set of prescription drug advertisements was used in all experimental packets in the implicit memory condition, except that the drug names in Packets A and B were different from the drug names in Packets C and D, based on the drug name pairings. The first drug name in each of the pairings was included in Packets A and B, whereas the second name was included in Packets C and D. Thus, the drug names were counterbalanced, with the result that participants were exposed to one of the drug names

in the pairings during the ratings exercise, but not to the other drug names in the pairings. For example, the drug names from Packets A and B, such as Lynotine and Marolfan, were paired with the drug names from Packets C and D, such as Raloprox and Doyestin. The drug name pairings on the indirect memory test were listed vertically and side by side; however, the positioning of the paired drug names (first or second position) based on which name had been rated was varied. The indirect test of memory can be found in Appendix L.

Direct Test of Memory

The description of the direct test of memory is similar to the description of the indirect test of memory, because the tests were developed identically and presented to participants similarly in the data response packet. The direct test of memory was used to measure explicit memory rather than implicit memory for the drug names in the ads. The direct test was used with the intentional instructions to study the drug ads to measure explicit memory. The same direct test of memory was given to all participants. The direct test consisted of 10 drug name pairings, which included 1 drug name from the set of 10 previously studied ads and 1 drug name that had not been seen. Participants were instructed to circle the drug name they remembered from the ads.

The same set of prescription drug ads was used in all experimental packets in the explicit memory condition, except that the drug names in Packets A and B were different from the drug names in Packets C and D. The first drug name in each of the pairings was included in Packets A and B, whereas the second name was included in Packets C and D. Thus, the drug names were counterbalanced, with the result that participants were

exposed to one of the drug names in the pairings during the study and memorization exercise, but not to the other drug names. For example, the drug names from Packets A and B, such as Winoxyl and Kentadrin, were paired with the drug names from Packets C and D, such as Pendian and Glenestex. The drug name pairings on the direct memory test were listed vertically and side by side; however, the positioning of the paired drug names (first or second position) based on which name had been studied was varied. The direct test of memory can be found in Appendix M. Because of the high level of similarity between the indirect and direct memory measures, they are comparable instruments.

Shipley Vocabulary Test

The SVT is a brief psychometric component of a measure commonly used to assess cognitive or intellectual impairment and deterioration (Shipley, 1940). The SVT is one part of a two-part self-administered scale. The other part of the scale is an abstract thinking test, which was not used in the current study.

The SVT is a synonym test with multiple-choice style responses. The test consists of 40 words or items each followed by four possible answers, and becomes increasingly more difficult as it progresses. In order to make both parts of the SVT equally difficult in this study, the first part included the odd items of the original SVT, whereas the second part included the even items. The normative data for the complete scale was established with children, adolescents, and young adults. The reliability alpha coefficients were .87 for the vocabulary part of the scale and .92 for both parts of the scale. Although the scale was not designed to be an intelligence test, it is reasonable to conclude that both parts of the scale are central to intellect. Therefore, the scale may be considered as an alternative

assessment for intelligence (Shipley, 1940). The SVT was used in this study as an indicator of crystallized intelligence and in order to ensure that the older and younger adults were comparable groups. A sample of the SVT can be found in Appendix N.

State-Trait Anxiety Inventory

The State-Trait Anxiety Inventory (Form Y) (STAI; Spielberger, 1983) is a brief psychometric measure commonly used to assess anxiety by indicating signs of distress, uneasiness, fear, apprehension, and tension. The STAI is a popular assessment of anxiety and has been broadly used in both research and clinical practice (Spielberger). The STAI consists of two parts and 40 statements or items (20 in each part) followed by four possible responses in multiple-choice style. About half of the items are phrased positively, and scored reversed, accordingly.

The two parts measured in the inventory are "state anxiety" and "trait anxiety." State anxiety is situational anxiety, or anxiety at a particular time in response to a certain situation. Moreover, it is a temporary or short-lived condition. Trait anxiety is pervasive anxiety, or the propensity to experience anxiety across situations. Furthermore, it is a more general or long-lasting condition. The S-Anxiety scale measures a person's feelings "right now, at this moment." The state part also estimates current feelings of apprehension, tension, nervousness, and worry about immediate physical danger and psychological stress. The T-Anxiety scale measures a person's feelings "generally." The trait part is also used as a device for screening and identifying people with anxiety disorders (Spielberger, 1983).

The normative data for the inventory was established with working adults, college students, high school students, and military recruits. The STAI was found to be both reliable and valid. The reliability alpha coefficients were .92 for the S-Anxiety scale and .90 for the T-Anxiety scale (Spielberger, 1983). The STAI was used in this study to measure anxiety in the older and younger adult groups for comparative purposes and to observe the effect of anxiety on memory. A sample of the STAI can be found in Appendix O.

Mini-Mental State Examination

The MMSE is a brief psychometric measure commonly used to assess the competence, ability, and current mental status of adults. In addition, the MMSE assesses level of cognitive functioning (high or low), degree of cognitive deficits or impairments, and tracks cognitive decline or improvement over time (Folstein et al., 1975).

The MMSE has two parts and 11 questions: a verbal part that addresses orientation, memory, and attention and a manual part that involves reading and writing. The normative data for the exam was established with clinical patients with a range of psychological conditions, and it was found to be both reliable and valid. The reliability alpha coefficients were .89 with the same tester and .83 with different testers (Folstein et al., 1975). The exam was used in this study to ensure that participants, especially older adults, were cognitively high functioning and to indicate any signs of cognitive performance deficits or impairments. Thus, both the MMSE and the SVT were used to make certain that participants in the older adult group were competent and had no indications of mental instability. A score below 24/30 on the MMSE indicates subpar

performance and is indicative of cognitive impairment (McHugh & Folstein, 1979). A sample of the MMSE can be found in Appendix P.

Medical Conditions Survey

The researcher and his advisor developed the MCS to collect health-related information from participants. The survey was used in this study to collect information about whether participants currently had or had experienced any of the medical conditions (30 total) noted in the vignettes or drug ads stimuli. In addition, the survey asked for a general rating of health, the number of current chronic health conditions, the number of current prescription medications taken, and the number of serious illnesses a person had had in the last 5 years. The chronic health conditions, prescription medications, and serious illnesses were also listed in the survey. The MCS can be found in Appendix Q.

Drug Advertisement Evaluation Judgments Survey

A drug advertisement Evaluation Judgments Survey (EJS) was designed to measure attitudes toward drug advertisements. The survey was a combination of two previously used scales that measured attitudes and feelings toward television ads.

The survey consists of 18 words or items followed by five possible responses in multiple-choice style. Some of the items are reversible and are phrased and scored accordingly. The normative data for the two scales was established with female consumers, advertising practitioners, and participants recruited from announcements. The reliability alpha coefficients ranged from .89 to .93 for the evaluation scales (Burke & Edell, 1989; Edell & Burke, 1987; Whipple & Courtney, 1980).

The survey was used in this study to gauge participants' evaluations of the prescription drug advertisements that were rated and studied in the experimental packets. The drug ads were evaluated collectively by participants, rather than individually. Collecting evaluation data was thought to be important, particularly because the drug ads were fictitious. The drug advertisement EJS can be found in Appendix R.

Experimental Packet

Four experimental packets, labeled A, B, C, and D, were used in the study. Packets were evenly distributed to all participants in both groups. Participants received one of the four experimental packets, which consisted of a set of 10 vignettes, 5 on two pages, followed by a set of 10 prescription drugs, 1 per page. The vignette/drug ad arrangement was presented twice in all packets, and both sets of vignettes and ads were presented in the same format. Thus, all experimental packets had two sets of vignettes followed by two sets of drug ads, with a blank page separating the sets of vignettes and drug ads.

The vignettes and drug ads were varied and counterbalanced in each of the packets. As a result, participants received similarly organized, but distinctly arranged experimental packets of vignettes and drug ads. As noted previously, half of the medical conditions described in both sets of the vignettes were different (salient) and half of the conditions were the same (nonsalient) in certain packets. Both sets of drug ads were identical in all packets, except for the drug name, which was a different name in certain packets. Salient vignettes were associated with one of the subsequent drug ads, whereas nonsalient vignettes were not associated with any of the ads. The salience manipulation

resulted in an experimental condition (salient) and control condition (nonsalient) in both the implicit and explicit memory conditions.

Data Response Packet

Participants received an identical data response packet. The data response packet was applicable to or valid for all experimental packets. Therefore, the data response packet could be used with any of the experimental packets. However, the data response packets were numbered per the experimental packet used in order to determine correct answers (e.g., the response packets used with experimental packet A were numbered in the 100s, experimental packet B were numbered in the 200s, and so on). The response packet consisted of the demographic survey, drug ad ratings survey, first part of the SVT, indirect test of memory, second part of the SVT, direct test of memory, STAI S-Anxiety scale, STAI T-Anxiety scale, MCS, and drug ad EJS. The data response packet also included instructions for each of the surveys, tests, and scales, except for the demographic survey. Some instructions were presented on the page before the measures, whereas other instructions were at the top of the same page as the measures. All materials have been described in detail above.

Procedure

The study was a 2 x (2) mixed experimental design with one between-participants variable and one within-participants variable. The between-participants variable was age group (older vs. younger adults) and the within-participants variable was the salience manipulation (salient vs. nonsalient) used to compare implicit and explicit memory. The

implicit memory condition employed incidental instructions and an indirect test, and the explicit memory condition employed intentional instructions and a direct test.

The memory test measures were the outcome variables of the study. Therefore, the salience manipulation (salient/nonsalient) and memory condition (implicit/explicit) were the independent variables and memory performance (proportion of preference and recognition) was the dependent variable. All variables have been described in detail above.

Participants, in both the older and younger adult groups, were exposed to the same experimental conditions and followed the same experimental sequence. Participants received one of the four experimental packets and a data response packet. The experimental sessions were scheduled for two participants, and a different experimental packet was given to each participant when the sessions actually included two participants. At times, however, sessions were performed with a single participant. Participants were given as much time as necessary to complete each part of the session, and this was typically between 45 minutes and 1 hour. In some instances, the time needed to complete the session was slightly longer than an hour, particularly for the older adults.

Data were collected first for the younger adults, followed by the older adults. The experimental sessions for the younger adults were conducted in the Department of Psychology in Magruder Hall on the Mississippi State University campus, whereas the experimental sessions for the older adults were conducted at a local church in the two states. All experimental sessions were conducted in a controlled, laboratory setting. Three different experimenters conducted the sessions, and each experimenter followed the same procedural guidelines or instructions in order to be as consistent as possible from one

session to the next. The researcher conducted approximately half of the sessions, and the remaining sessions were divided more or less equally between the other two experimenters.

Participants were greeted as they entered the testing room, and the experimenter introduced himself to them. Next, the experimenter encouraged participants to listen carefully to the instructions so that they could respond appropriately to each part of the packet. Participants were given two copies of the consent form and instructed to carefully read one copy and sign it and to take the other copy with them when they left the testing site. Participants were then given a randomly selected experimental packet and data response packet.

Participants were asked initially to complete the demographic survey by writing in and circling the appropriate responses. The demographic survey was the first page of the data response packet. When two participants were in the same experimental session, they were instructed to sit patiently and quietly if one participant completed a part of the packet before the other participant completed it. Participants were also told at the beginning of each new part of the packet to take their time, because they had unlimited time to complete it. Unlimited time was given in each part of the session, except when participants rated or studied the prescription drug advertisements. During the rating and studying parts, a 15-second interval was imposed; both timed parts are described below. Throughout the session, the experimenter instructed participants when to turn the page of their folder or packet in order to begin the next part. The experimenter also carefully observed participants in order to ensure that they understood the directions and procedure

of each part. After participants completed the demographic survey, the main parts of the experimental session began.

Participants were then instructed to open their folder to a set of 10 vignettes that they were told to read. After participants read the vignettes, they were directed to the ratings survey and were instructed to rate the appropriateness of the drug name for the medical condition in a set of 10 prescription drug advertisements they were about to view. These instructions were designed to promote incidental processing, because participants were informed that they needed to evaluate the information. The responses ranged from "not at all appropriate" to "extremely appropriate." Participants were also told that they would have 15 seconds to rate the appropriateness of the drug name for the medical condition in each ad. During the ratings exercise, participants were instructed to "begin," "stop," and "turn" (the page) until each drug name in the set of ads had been rated. A stopwatch was used to track each time interval and a "beep," initiated by the experimenter, sounded at the beginning and ending of each interval.

Participants next completed the first part of the SVT, where they were instructed to circle the word that meant the same thing, or most nearly the same thing, as the first word. The odd/even distribution of items noted earlier was thought to provide experimental consistency and better ensure that the two parts were comparable. The modification of the SVT was necessary, because it was intentionally used twice in the session as a meaningful activity, both times between the instructions (to rate or study) and memory test (indirect or direct). Thus, it was important for both parts to be analogous. Otherwise, if the original version had been used, participants might have

completed items 1-20 far more quickly than items 21-40, and the latencies between the instructions and memory test might have been significantly different.

After participants completed the first part of the SVT, they were directed to the indirect test of memory, where they were instructed to circle the drug name from each pair that they thought was the better drug name. The drug name pairings presented in the test were from the process described earlier, and participants had previously rated one of the drug names in the pairings, but not the other name. The experimenter specifically instructed participants to circle only one of the two drug names in each of the pairings. The incidental instructions and indirect test of memory were used collaboratively to measure implicit memory. After both participants completed the implicit memory task, they were told to place their packet to the side of the table and turn their attention back to their folder. Participants were then instructed to turn to the next page in their folder, which contained an additional set of 10 vignettes that they were told to read.

After participants read the additional vignettes, they were shown another set of 10 prescription drug advertisements. This time they were instructed to study the drug name and associated medical condition in the drug ads for a later memory test. These instructions were designed to promote intentional processing, because participants were informed that they needed to remember the information. Participants were also told that they would have 15 seconds to study the drug name and medical condition in each ad. During the study exercise, participants were instructed to "begin," "stop," and "turn" (the page) until each drug name and medical condition in the set of ads had been studied. Again, a stopwatch was used to track each time interval and a "beep," initiated by the experimenter, sounded at the beginning and ending of each interval.

Participants next completed the second part of the SVT, after which they were directed to the direct test of memory, where they were instructed to circle the drug name from each pair that they recognized or remembered from the advertisements. In each case, participants had previously studied one of the drug names in the pairings, but not the other name. Again, the experimenter instructed participants to circle only one drug name in the pairings. The intentional instructions and direct test of memory were used collaboratively to measure explicit memory. The procedures for measuring implicit and explicit memory were comparable, if not identical, in that participants read vignettes, rated or studied drug names, completed part of the SVT, and then selected between two drug names.

After participants finished the explicit memory task, they completed the STAI S-Anxiety scale. Participants were instructed to read each statement and then circle the appropriate number to the right of the statement to indicate how they felt *right now*, *at this moment*. The responses ranged from "not at all" to "very much so." The STAI S-Anxiety scale was strategically administered immediately after participants were aware that their memory had been tested. Next, participants completed the STAI T-Anxiety scale on which they were instructed to read each statement and then circle the appropriate number to the right of the statement to indicate how they *generally* felt. The responses ranged from "almost never" to "almost always."

To this point, each survey, test, and scale had occupied a single page in the data response packet. The remaining MCS and drug ad EJS consisted of two pages. As a result, participants were instructed to complete the first page of each survey and then the

second page, which were different instructions than they had been previously given and had become accustomed to following.

After participants completed both scales of the STAI, they were directed to the first page of the MCS and instructed to indicate any medical conditions they currently had or had experienced in the last 5 years by circling Y for yes and N for no. On the second page, they were told to circle their responses concerning their health, whether they had any chronic health conditions, were taking any prescription medications, and had any serious illnesses in the last 5 years. Participants were also asked to note the number of chronic health conditions, prescription medications, and serious illnesses as well as list them if they responded affirmatively to any of the items.

Participants were then directed to the drug ad EJS and instructed to tell how well they thought each of the listed words described all of the ads, on average, they had just seen by circling the number that best represented their thoughts. The experimenter emphasized that their evaluation judgments should be for all of the drug ads that had been rated and studied. The responses ranged from "not at all well" to "extremely well." Both pages of the drug ad EJS followed the same format.

After the data response packet and the main parts of the experimental session had been completed, participants were told that there was one brief, final part of the session, which would be conducted individually. In addition, participants were informed that one participant would need to step out into the hallway and that the experimenter would be with him or her in a few minutes. A chair located away from the door was provided for the participant to sit on during the brief waiting period. The experimenter did not decide which participant would leave and which participant would remain. This decision was

amicably agreed upon by the participants in almost every instance, and none of them appeared to be distressed or troubled by the change in procedure. In fact, one of the participants would usually quickly volunteer to step out into the hallway.

When the experimental session involved only one participant, the participant was also told that there was one brief, final part of the session, but none of the additional information was given. Next, all folders and packets were removed from the table, and the MMSE was administered to all participants by the experimenter. Upon completion of the MMSE, participants were given a debriefing form, asked not share any information about the experimental session with anyone, and thanked for their time. One older adult participant who scored less than 24/30 on the MMSE did not have his data responses used in the statistical analyses because a score below that threshold suggests cognitive impairment. A diagram of the experimental sequence can be found in Appendix S. The debriefing form can be found in Appendix T.

CHAPTER VII

RESULTS

Analyses were performed using the SPSS statistical package (version 15.0). To measure the effectiveness of the implicit memory manipulation, a *t* test was performed. Memory measures were analyzed using a 2 x (2) mixed repeated measures analysis of variance (ANOVA), and was performed with age group (older vs. younger) as the between-participants factor and salience (salient vs. nonsalient) as the within-participants factor. The repeated measures ANOVA was applied to the implicit memory measure as well as to the explicit memory measure. One major interest was in memory for the drug names that participants had rated or studied previously in each of the drug name pairings. Memory was assessed by the proportion of preference in the implicit memory condition and the proportion of recognition in the explicit memory condition.

In addition to the primary statistical analyses, secondary analyses were performed, such as correlational analyses that examined the relationships between memory and anxiety (state and trait) and the influence of age, salience, and type of memory measure on the memory-anxiety relationship. A 2 (age group) x (2) (salience) analysis of covariance (ANCOVA) with state anxiety as the covariate was also performed. Taken together, the statistical analyses adequately examined the data set and addressed the

research questions and hypotheses. The means and standard deviations for measures in all conditions can be found in Table 1.

Table 1

Means and Standard Deviations for Memory and Anxiety Measures

	Older Adults		Younger Adults	
Measure	***M***	***SD***	***M***	***SD***
Implicit Memory Salient	2.97	1.07	2.83	1.12
Implicit Memory Nonsalient	3.01	1.25	2.99	1.20
Explicit Memory Salient	4.26	0.80	4.55	0.81
Explicit Memory Nonsalient	4.25	0.97	4.46	0.81
State Anxiety	29.63	9.02	34.45	10.08
Trait Anxiety	32.59	7.52	37.77	7.17

Implicit Memory

As a check on the success of the implicit memory manipulation, the correct response total for overall implicit memory was tested with a *t* test to determine whether performance was greater than chance. The implicit memory performance correct response total ($M = 5.90$) was significantly different from chance performance ($M = 5.00$), $t(158) = 6.89$, $p < .001$. Therefore, implicit memory was effectively manipulated in the study.

A repeated measures ANOVA for a mixed experimental design with one between-participants factor (age group) and one within-participants factor (salience) was performed to examine the effects of age group and salience on implicit memory. One purpose of the analysis was to determine the main effect of the presentation of salient information on implicit memory. The analysis indicated no significant difference in

implicit memory for the salient items versus the nonsalient items, $F(1, 157) = 0.60$, $p = .44$, partial-$\eta^2 = .004$.

The main effect for age group on implicit memory also was not significant, $F(1, 157) = 0.45$, $p = .51$, partial-$\eta^2 = .003$. The age x salience interaction for implicit memory also was not significant, $F(1, 157) = 0.23$, $p = .63$, partial-$\eta^2 = .001$. See Table 1 for means and standard deviations of the various measures.

The results of the analyses were consistent with the first and second hypotheses. The analysis indicated no significant difference in salience for implicit memory, no significant difference between age groups for implicit memory, and no significant interaction effect between salience and age groups for implicit memory. See Table 2 for the complete source table for the ANOVA.

Table 2

Repeated Measures Analysis of Variance for Implicit Memory

Source	***df***	***SS***	***MS***	***F***	***p***	**partial-η^2**
Between participants						
Age group	1	0.61	0.61	0.45	.51	.003
Error 1	157	213.59	1.36			
Within participants						
Salience	1	0.80	0.80	0.60	.44	.004
Salience x Age group	1	0.31	0.31	0.23	.63	.001
Error 2	157	209.89	1.34			

$p < .05$

Explicit Memory

A parallel repeated measures ANOVA for a mixed experimental design was used to examine the effects of age and salience on explicit memory. Again, the design

employed one between-participants factor (age group) and one within-participants factor (salience). One purpose of the analysis was to determine the main effect of the presentation of salient information on explicit memory. The analysis indicated no significant difference in explicit memory for the salient items versus the nonsalient items, $F(1, 153) = 0.34$, $p = .56$, partial-$\eta^2 = .002$.

The main effect for age group on explicit memory was significant, $F(1, 153) = 4.19$, $p < .04$, partial-$\eta^2 = .027$. The older adults recognized an average of 4.28 ($SE = .08$) drug names, and the younger adults recognized an average of 4.51 ($SE = .08$) drug names. The age x salience interaction for explicit memory was not significant, $F(1, 153) = 0.34$, $p = .56$, partial-$\eta^2 = .002$. See Table 1 for means and standard deviations of measures.

The results of the analyses were consistent with the first hypothesis, but inconsistent with the second hypothesis. The analysis indicated a significant difference between age groups for explicit memory. However, the analysis also indicated no significant difference in salience for explicit memory and no significant interaction effect between salience and age groups for explicit memory. See Table 3 for the complete source table for the ANOVA.

Table 3

Repeated Measures Analysis of Variance for Explicit Memory

Source	*df*	*SS*	*MS*	*F*	*p*	partial-η^2
Between participants						
Age group	1	3.96	3.96	4.19	.04*	.027
Error 1	153	144.73	0.95			
Within participants						
Salience	1	0.15	0.15	0.34	.56	.002
Salience x Age group	1	0.15	0.15	0.34	.56	.002
Error 2	153	67.19	0.44			

*$p < .05$

Anxiety and Memory Performance

Correlations were examined to assess the relationships between anxiety and memory performance. In particular, correlations were computed between the type of anxiety (state and trait) and the type of memory performance (implicit and explicit), with participant subgroups divided by type of salience and age groups. In addition, scatterplots were examined for all of the correlations, and no outliers, influence points, or nonlinear trends were noted. Nonetheless, no significant correlations were found between anxiety and memory performance.

Further, to determine if state anxiety played a role in the analysis of age group and salience on the memory measures (from the third hypothesis), the 2 x (2) analyses were repeated with state anxiety as the covariate. The ANCOVAs showed that the state anxiety covariate was not significant, either for the implicit memory measure, $F(1, 150) = 2.16$, $p = .14$, partial-$\eta^2 = .014$, or for the explicit memory measure, $F(1, 147) = 3.18$, $p = .08$, partial-$\eta^2 = .021$. Tables 4 and 5 contain the complete source tables for each of the ANCOVAs.

Table 4

Repeated Measures Analysis of Covariance for Implicit Memory

Source	*df*	*SS*	*MS*	*F*	*p*	partial-η^2
Between participants						
Age group	1	1.84	1.84	1.36	.25	.009
State anxiety	1	2.93	2.93	2.16	.14	.014
Error 1	150	203.46	1.36			
Within participants						
Salience	1	1.81	1.81	1.34	.25	.009
Salience x Age group	1	1.00	1.00	0.74	.39	.005
Salience x State anxiety	1	1.32	1.32	0.98	.32	.006
Error 2	150	201.90	1.35			

$p < .05$

Table 5

Repeated Measures Analysis of Covariance for Explicit Memory

Source	*df*	*SS*	*MS*	*F*	*p*	partial-η^2
Between participants						
Age group	1	4.81	4.81	5.15	.03*	.034
State anxiety	1	2.97	2.97	3.18	.08	.021
Error 1	147	137.36	0.93			
Within participants						
Salience	1	0.00	0.00	0.00	.96	.000
Salience x Age group	1	0.11	0.11	0.26	.61	.002
Salience x State anxiety	1	0.03	0.03	0.08	.78	.001
Error 2	147	64.04	0.44			

*$p < .05$

The collected results of the correlational analyses were partially consistent with the third hypothesis. That is, the analyses indicated no significant relationships between anxiety and memory performance. As expected, no significant correlation between state anxiety and implicit memory was found; however, contrary to expectation, no significant

correlation between state anxiety and explicit memory was found. See Tables 6 and 7 for correlations between anxiety and memory measures in older and younger adults, respectively.

Table 6

Correlations for Memory and Anxiety Measures in Older Adults

	State Anxiety	Trait Anxiety
Implicit Memory Salient	.17	.11
Implicit Memory Nonsalient	-.07	-.12
Explicit Memory Salient	-.10	-.10
Explicit Memory Nonsalient	-.16	-.13
State Anxiety		.47**

**$p < 0.01$

Table 7

Correlations for Memory and Anxiety Measures in Younger Adults

	State Anxiety	Trait Anxiety
Implicit Memory Salient	.13	.06
Implicit Memory Nonsalient	.11	-.02
Explicit Memory Salient	-.10	-.05
Explicit Memory Nonsalient	-.10	-.07
State Anxiety		.44**

**$p < 0.01$

Summary Results

For implicit memory, no significant difference in salience or between age groups was found, and no significant interaction effect between salience and age groups was established. For explicit memory, a significant difference between age groups was found, but no significant difference in salience was found and no significant interaction effect

between salience and age groups was established. No significant correlations were found for anxiety and memory performance.

CHAPTER VIII

DISCUSSION

Prescription drug advertisements have become commonplace in magazines and on television, because pharmaceutical company expenditures for drug ads continue to increase. Accordingly, the public has become rather familiar with drug ads, because the ads make it appear that medications are available for almost any condition. Many of the drug ads are aimed at older adults, because they are viewed as more likely to use medications than younger adults. However, the effectiveness of drug ads on influencing older adults' requests for prescriptions is uncertain. Although previous research has indicated that older adults do not explicitly remember drug ads as well as younger adults (Abernathy & Adams-Price, 2006), how well older adults implicitly remember drug ads is not known. In addition, research has found age differences favoring the young are typically found on explicit memory tasks, but not on implicit memory tasks (Light & Singh, 1987, Light et al., 1986). One implication of research showing fewer age differences in implicit memory is that older adults may be influenced implicitly by drug ads even though they cannot explicitly remember seeing them.

Implicit memory involves unconscious awareness and unintentional processing, and it is evidenced through improvement in task performance as a result of previous exposure to a stimulus even though a person has no conscious memory of the previous

exposure. Therefore, previous experiences and events can have an influence on present responses even when a person cannot consciously remember them. Explicit memory involves conscious awareness and intentional processing. Implicit memory is measured with incidental instructions and indirect tests, and explicit memory is measured with intentional instructions and direct tests. Many researchers have examined implicit and explicit memory and have found differences between them in various groups including brain-damaged adults (e.g., Graf & Schacter, 1985), cognitively intact adults (e.g., Tulving et al., 1982), and the elderly (e.g., Light et al., 1986). In general, the studies have found group differences in explicit memory, but not in implicit memory.

The primary purpose of the current study was to compare older and younger adults' implicit and explicit memory for magazine-style prescription drug advertisements. A secondary purpose of the study was to determine whether age differences in implicit and explicit memory were affected by salient information and level of anxiety. Another overall objective of the study was to demonstrate that an indirect test of implicit memory adds value to the process of estimating advertising effectiveness.

The study was theoretically important because it contributed to cognitive aging research and examined memory within an everyday context. Some forms of cognitive performance, such as explicit memory, decline in older adults. Nonetheless, some forms of cognitive performance, such as implicit memory, appear to be relatively spared from cognitive age-related deficits. The results showed no age difference for implicit memory for drug advertisements, although an age difference was found for explicit memory for drug ads. Therefore, the findings were consistent with other memory research (e.g., Graf & Schacter, 1985; Light et al., 1986; Tulving et al., 1982), except that everyday stimuli

were used in this study. In addition, this study also tested the hypotheses that an observed age difference in explicit memory might be related to the salience of the stimuli or to anxiety.

The study was practically important because pharmaceutical companies spend vast amounts of money on prescription drug advertisements that may or may not be effective with their target population: older adults. Presenting drug ads directly to consumers has also affected the dynamics of the health care industry. The drug ads used in this study appeared to be effective based on implicit and explicit memory for them, even though older adults performed slightly more poorly on explicit memory.

Study Findings

The primary objective in the current study was to examine implicit and explicit memory for prescription drug advertisements in older and younger adults. Of particular interest was whether there are differences between older and younger adults in implicit and explicit memory for drug ads and the significance or size of any observed differences. It was hypothesized that a significant age difference would be found for explicit memory between older and younger adults, with older adults performing more poorly, but that no such age difference would be found for implicit memory. As expected, the results demonstrated a significant age difference in explicit memory between older and younger adults, and the study also found no significant difference in implicit memory between the groups. Therefore, the findings supported the first hypothesis.

The implicit and explicit memory results are not surprising. In fact, the results were comparable to most previous research that has examined implicit and explicit

memory in older and younger adults: no age difference for implicit memory, but an age difference for explicit memory (Brooks et al., 2001; Light & Singh, 1987, Light et al., 1986; Mitchell, 1989; Mitchell & Bruss, 2003; O'Hanlon et al., 2001). Accordingly, this study successfully replicated a series of previous studies. The component of this study that may be most important is that the results expanded everyday memory research to another context using an implicit memory measure of mere exposure. In other words, this study addressed the effectiveness of prescription drug advertising with an indirect test, and the drug ads were found to be effective. Thus, the results were specific to the real-world setting of drug advertising and the older adult consumers that most drug ads are attempting to influence.

Advertising effectiveness is demonstrated by positive brand feeling, which is sometimes called brand equity. Brand equity influences purchase decision making and buying behavior (Cramphorn, 2006; Plassmann et al., 2007). Repeated exposure to brands through advertisements can increase brand equity (Braun-LaTour & LaTour, 2004). Repeated exposure can also increase brand familiarity and preference for those brands (Coates et al., 2004; 2006).

Measuring memory for prescription drug advertising is consistent with the recent movement in memory research called everyday memory, which is studying memory in everyday contexts or settings. Neisser (1978) recommended that more real-world memory research was needed in order to further the application of its findings. This study used stimuli from the real-world context of drug advertising and measured implicit and explicit memory in a controlled environment. Therefore, this study involved a realistic

setting and maintained experimental control in addressing its objectives, which gives its results an acceptable degree of ecological validity and generalizability.

A secondary objective was to examine the effect of salient information on implicit and explicit memory for drug advertisements in older and younger adults. Of interest was whether salience influenced differences in implicit and explicit memory in the different age groups based on research indicating the positive effects of salience (e.g., Hulicka & Weiss, 1965; Perri & Nelson, 1987). Salient information was expected to reduce the age difference found in explicit memory between older and younger adults, but to have no impact on implicit memory because no age difference is typically found in performance. The results indicated that salient information had no effect on either explicit or implicit memory. Therefore, the findings did not support the second hypothesis, because salience had no effect on explicit memory.

A few explanations might account for the lack of significance for the salience effect. One explanation centers on the experimental procedure. For example, the salience manipulation may not have worked because aspects of the procedure were ineffective because of the way it was performed. Initially, the medical conditions were presented to participants through the reading of vignettes. Next, the medical conditions were paired with drug names in the drug advertisements. Then, participants were instructed either to rate or study the conditions and names in the drug ads depending upon the experimental condition. Finally, memory was either indirectly or directly measured for the drug names in the drug ads.

Too many vignettes and drug advertisements may have been presented, and this may have diminished the salience of the stimuli. In addition, the stimuli were only

semantically associated or related at the learning episode and at testing and thus, were not the same. That is, information for the medical conditions was presented in the vignettes, but memory was only measured for the drug names. As a result, there may have been no exact connection made between the conditions and names, and the vignettes may have been too weak and ineffective to work as a proper form of salience or environmental support for the drug ads.

A second explanation focuses on the emotional words used in the vignettes. The purpose of the words was to elicit or evoke emotion from the readers. Although the carefully selected emotional words were rated as being both generally unpleasant and excitable, they were neither extremely unpleasant nor excitable. Because the words were mostly, but not entirely, emotional, they may not have induced sufficient emotion from participants. In other words, the vignettes might have appeared more casual and matter-of-fact, rather than moving and stirring. In addition, the reading of 10 consecutive vignettes in a brief period of time may have also resulted in their blending together and eliminating the possibility of a salience effect. Blending means that the vignettes may have appeared more alike than different to participants. A habituation effect is particularly likely because the vignettes followed a specific template and thus, were not very distinctive.

A third explanation concerns the amount of time participants were exposed to the drug advertisements. Although participants rated and studied drug ads, they were only exposed to them for 15 seconds each. They were instructed to concentrate on the drug name as it related to the medical condition during that time frame, but the length of time may not have been sufficient enough to establish a semantic relationship between the

name and condition. In addition, this duration was relatively brief and the exposure to 10 consecutive drug ads might also have had a habituation effect, comparable to the reading of the vignettes, which reduced the likelihood of a salience effect occurring.

An additional objective was to examine the effect of anxiety on implicit and explicit memory for drug advertisements in older and younger adults. Of interest was whether anxiety influenced differences in implicit and explicit memory in the different age groups based on research indicating the negative effects of anxiety (e.g., Andreoletti et al., 2006; Deptula et al., 1993; Hogan, 2003; Wetherell et al., 2002). State anxiety was expected to be negatively correlated with explicit memory in older but not younger adults, but it was not expected to be correlated with implicit memory because performance is usually equally good in both groups. The results indicated that state anxiety was not correlated with either explicit or implicit memory performance. Therefore, the findings did not support the third hypothesis, because state anxiety had no relationship with explicit memory.

A few explanations might also account for the lack of relationship between anxiety and memory. One explanation centers on the length of the direct test used to measure explicit memory. The direct test of memory included 10 drug name pairings that required a simple decision-making process. Because both the older and younger adults usually completed it quickly, perhaps the direct test was too abbreviated to show a relationship between anxiety and memory. The ability to complete the direct test promptly suggests that it was not challenging enough to participants to produce much anxiety, even in the older adults.

A second explanation focuses on the type of direct test used to measure explicit memory. The test was a recognition task, and performance is usually better on recognition tasks than on recall tasks in both older and younger adults. Recognition tasks involve more automatic processing and require far less deliberate processing than recall tasks, making older adults' performance on them similar to younger adults' performance (Craik, 1994; Craik & McDowd, 1987; Hasher & Zacks, 1979). Again, the direct test may not have been challenging enough to participants because it was a recognition task. If the direct test had been longer and had taken more time or had been a recall task, more state anxiety might have been produced in participants, particularly the older adults, with a subsequent impact on explicit memory. For this study, the direct test of memory was developed purposefully to be comparable to the indirect test of memory. Because the indirect test asked participants to make simple preference choices between two drug names, the direct test followed the same format. The resulting recognition task, although completed more successfully by younger adults than older adults, was relatively easy for both groups.

Taken together, the length of the task and the type of task are important to consider when trying to explain the lack of relationship between anxiety and explicit memory. Both state and trait anxiety were strategically measured, in that order, immediately after the explicit memory task.

The reason that anxiety was measured at that point in the study was because it was believed to be the time when participants, particularly the older adults, would experience the most anxiety. The idea that older adults would be experiencing anxiety after the measurement of explicit memory came from metamemory research showing that

older adults report low confidence in their memory ability and high fear of memory problems (Dixon & Hultsch, 1983; Hertzog et al., 1990; Lachman, 1991). In addition, research on stereotype threat and memory in older adults suggests that their memory is reduced when they are aware of the stereotype that older adults are poor at remembering (Chasteen et al., 2005; Hess et al., 2003). Thus, people's awareness that their memory is being tested in explicit memory tasks may cause anxiety, and the presence of that anxiety brings about cognitive deficits in older adults. Therefore, task-related anxiety is another explanation for cognitive deficits in older adults, and research has shown that elevated anxiety is associated with poorer cognitive performance in older adults, especially in memory (Andreoletti et al., 2006; Deptula et al., 1993; Hogan, 2003; Osborne, 2007; Wetherell et al., 2002).

Despite the placement of the anxiety measure, little anxiety was found. Perhaps another measure of anxiety would have detected more anxiety. It is also possible that the instructions used for the direct memory test would have produced more stereotype threat if they had mentioned the age-memory stereotype. In addition, it is possible that more anxiety would have been detected if anxiety had been measured immediately before the direct memory test, as opposed to right after the test. Because the older adults performed relatively well on the direct memory test, their level of anxiety after the test may have been lower than it was before the test.

A third explanation for the lack of relationship between anxiety and memory concerns the level of education in the older adult group. Over half of the older adults were college graduates with some post-graduation education. Therefore, the older adults were collectively a highly educated group, potentially making the direct test of memory

less challenging because educated older adults tend to age, particularly cognitively, more successfully than uneducated older adults (Baltes, 1997; Hess, 2005). In fact, the education variable alone makes the results of this study less generalizable to the population at large. Perhaps a measure of metamemory should have been administered to participants in order to attain a measurement of memory self-efficacy. If highly educated older adults are more confident in their cognitive abilities, especially on a specific task, they may not experience as much anxiety as most older adults when their memory is tested.

A final explanation has to do with the memory performance. Both the older and younger adults performed well in both implicit and explicit memory. In fact, the explicit memory average scores were high for both groups, especially the younger adults. In addition, there was no significant difference found in either implicit or explicit memory between the salient items versus the nonsalient items. Therefore, the observed ceiling effect of the explicit memory average scores might have contributed to the lack of relationship between anxiety and memory. Participants may also have felt comfortable and relaxed at the testing site and thus, experienced little anxiety. This might particularly have been true for the older adults, who were tested at a local church.

Study Strengths

First, the stimuli were extensively pretested and pilot-tested in order to provide greater experimental consistency and control. This should also have minimized the influence of any potential extraneous variables. In addition, a set of decision rules was carefully established in developing and creating the stimuli (e.g., vignettes, drug ads).

Strategic counterbalancing was performed in the experimental packets as well as in the data response packet. Additionally, the experimental procedure was highly structured and precise. Therefore, the medical condition vignettes and prescription drug advertisements were generated with consistency and control, and the potential for any ordering effects that might have influenced the results were minimized.

Second, the number of participants in each group was more than adequate to detect or establish a medium effect size at the .05 significance level, with sufficient statistical power at .80, in order to identify any significant differences in the various analyses (Cohen, 1992). The MMSE was administered at the end of the experiment, and practically all participants performed well on it. Thus, their scores indicated that both groups were similar in cognitive performance even after a lengthy testing session and a battery of tests.

Third, the study employed incidental instructions and an indirect test to measure implicit memory as well as intentional instructions and a direct test to measure explicit memory. These instructions/test groupings represent the truest methods for measuring implicit and explicit memory. This methodological component is a strength of the study, especially when compared to numerous previous studies that claimed to have measured both types of memory but used a variety of instructions/test groupings, which makes it difficult to determine the type of memory being measured. In summary, both implicit and explicit memory were measured in the current study using the most valid procedures available.

A general strength of the study is that it demonstrated that value of employing the implicit memory paradigm in helping determine advertising effectiveness. The implicit

memory measure used in the study based on the mere exposure effect would be useful to advertisers in order to better detect the subtle effects of advertising (e.g., Coates et al., 2006; Duke & Carlson, 1993; Yoo, 2008).

Study Limitations

First, fictitious stimuli were employed, such as prescription drug names that were used in both rounds of the pilot testing as well as in the study. Some of the drug names were similar to common names of actual drugs that have been advertised, are currently being advertised, or drugs that participants may take (e.g., Tylomex vs. Tylenol, Zolatol vs. Zoloft). The similarity between the fictitious and actual drug names may have resulted from either the appearance (spelling) or pronunciation (sounds) of the names. Any perceived similarity by participants in any phase of the pilot testing or the study could have caused some drug names to have an unintentional advantage over other names that might not have shown up in pretesting with the young.

A follow-up study using fictitious drug names could avoid this potential limitation by pilot testing in order to validate that the drug names seem completely novel and unfamiliar to participants. Because a few of the older adults commented without being asked that they had not previously seen any of the drug names, it was assumed, perhaps erroneously, that participants were not familiar with the drug name stimuli.

In the pilot-testing process, participants rated drug names and compared drug name pairs without reference to a medical condition, and a few participants asked about the condition for which the names were being evaluated. A follow-up study could

incorporate decision making about drug names that are related to specific medical conditions.

Second, some uncertainty about the authenticity of the prescription drug advertisements may have occurred. The drug ads used in the study were developed to resemble real drug ads that are found in popular magazines. The research team attempted to create drug ads that appeared authentic within the experimental confines of the study. Drug ads that might have appeared unauthentic could have slightly affected participants' responses. To compensate for this potentially problematic perception, participants were informed in the instructions before both sets of drug ads that the ads were "works in progress" and "potential ads." In addition to the instructions, evaluation judgments of all of the drug ads together were collected in order to estimate participants' perceptions of the ads. The older adults' average score per item for the evaluation judgments was 2.99 (SD = 0.70), and the younger adults' average score per item was 3.09 (SD = 0.57). The mean scores indicate that participants thought the drug ads were "fairly well" described as being believable, informative, worth remembering, etc. based on a 5-point Likert-style scale. The difference between the average scores of the evaluation judgments of the older and younger adults was not significant.

Third, older adults probably know more about medical conditions and prescription drugs than younger adults. As expected, older adults reported having more chronic health conditions and taking more prescription medications. However, it is uncertain how having greater knowledge of health information might have affected the results, and it would be difficult to regulate older adults' knowledge of health information. Because the drug ad stimuli were fictitious, this potential limitation was at

least partially addressed in the study. Nonetheless, more knowledge in the health area might have affected some perceptions and responses of the older adults.

Conclusions and Recommendations

Cognitive aging research has repeatedly demonstrated that older adults, compared to younger adults, display cognitive deficits, particularly memory deficits, across numerous tasks and situations (e.g., Craik, 1994; Craik & McDowd, 1987; Hess, 2005; Salthouse, 2004). This study successfully replicated previous research that found differences or dissociations between implicit and explicit memory in older and younger adults (Brooks et al., 2001; Mitchell, 1989; Mitchell & Bruss, 2003; O'Hanlon et al., 2001). As expected, no significant age difference was found in implicit memory, whereas an age difference was found in explicit memory. However, this study did not find that salient information or anxiety influenced either type of memory in either group.

The prescription drug advertising context in which memory was measured may be the most important component of this study, because it is consistent with the current movement in memory research called everyday memory. The everyday memory movement examines memory in customary contexts or settings. In addition, implicit and explicit memory research was extended to another real-world context, which gives it further practical application. In other words, although the results may not have established any novel memory findings, the research was conducted in a contemporary, everyday memory situation within a controlled environment. Additionally, this study addressed the effectiveness of drug advertising in older adult consumers, who constitute the target audience for most drug ads. Advertising effectiveness was also measured by a

less frequently used implicit memory measure of mere exposure. Therefore, this study involved a realistic setting and maintained experimental control in measuring memory, which provided an acceptable degree of ecological validity and generalizability to the results.

Future studies may want to consider the various explanations for why the salience and anxiety manipulations had no effect on memory. The modifications in the stimuli and procedure in a follow-up study needed to address the possible problems with this study are readily achievable. The limitations of this study may also add valuable information for developing a follow-up study. Plus, a careful consideration of the limitations in the stimuli development (e.g., drug names, drug ads) may enable another similar study to control better for the influence of additional extraneous variables.

In review, there are a number of explanations for why salience had no effect on memory. First, the presentation of the salient information did not seem to have allowed for a direct connection to have been made between the conditions and names. The presentation method seemed to have resulted in a weaker salience manipulation, whereas the use of a different presentation might have resulted in a stronger manipulation. Second, the inclusion of extremely emotional words in the vignettes, rather than the generally emotional words that were used might have made the salience manipulation more effective. Perhaps the salient vignettes should have included emotional words in order to better attract attention to the medical conditions, and the nonsalient vignettes should have included nonemotional words. Third, more time of exposure to the drug ads might have resulted in a salience effect on memory.

There are also a number of explanations for why anxiety had no effect on memory. First, a relatively short, direct test of memory was used; perhaps a lengthier, test of explicit memory should have been used. Second, a relatively easy recognition task was used, whereas a more difficult recall task to measure explicit memory would have been preferable. Interestingly, an age difference was found in this study for explicit memory using a recognition task. Most research has shown recognition memory performance to be comparable among older and younger adults: no age difference (Craik, 1994; Craik & McDowd, 1987).

A lengthier and more difficult test of recall might have been more challenging and created more anxiety in participants, particularly the older adults. Metamemory and stereotype threat might have had more of an influence on memory if the direct test of memory had been modified to be lengthier and more difficult. Third, the older adult group that participated was not a representative sample because of their high level of education. A sample of older adults more representative of the general population would probably be found in a city or town that is not a college community. In addition, another measure of anxiety might have identified the presence of more anxiety. Also, adding a measure of metamemory might have provided additional information concerning older adults' thoughts about their memory.

The results of the STAI might be flawed because several of the items on the anxiety scales are worded oppositely (positive and negative) in conflicting directions (e.g., I feel pleasant, I feel nervous and restless). Some participants, especially the older adults, may have become confused in responding because of the wording. After participants became familiar with the direction of the response scale on a couple of items,

the wording of the statements would change in the other direction (from positive to negative or vice versa) and a response consistent with preceding items would then be at the opposite end of the response scale. In support of this possibility, a recent study compared the performance of various self-report measures of anxiety in older adults, and the STAI T-Anxiety scale was eliminated from consideration because of the high number of errors older adults made on it (Dennis, Boddington, & Funnell, 2007). In addition, Dennis et al. concluded that none of the measures adequately assessed anxiety in older adults. The experimenters observed the responses of the older adults to avoid this potential problem, but it might have occurred at times. Perhaps higher anxiety ratings would have been found if a more sophisticated measure of anxiety had been available.

One significant methodological concern is the length of time between exposure to the drug ads and testing memory for the drug names. After participants either rated or studied the drug ads, they completed an equivalent part of the SVT. On average, this task took two minutes to complete, and then participants' memory was tested. Therefore, the length of time between exposure to the drug ads and testing memory for the drug names was brief. The short time between exposure and testing probably contributed to the high explicit memory average scores obtained (ceiling effect). Future studies should develop a procedure to ensure that more time lapses between the learning episode and testing.

Some theoretical issues and questions of interest for future research are noted below. For example, an age difference favoring the young was found in recognition memory performance. Because an age difference is usually not found in recognition tasks, one possible explanation is that the prescription drug advertising context played a role in the observed age difference even though older adults probably have more health

knowledge. An everyday context should provide environmental support for memory making performance better, especially in older adults. Recognition memory performance might be different in older and younger adults depending on the real-world stimuli that are used. Drug advertisers might also benefit from studies that address the information-processing abilities of older adults relative to the arrangement of the ad information, the amount of the ad information, or the information from the ad that is better remembered. Thus, informational aspects of the drug ad such studies might determine: which arrangement of information is most effective; the amount of information that is too much or little to be effective; and which information is easier to remember.

One practical issue of interest for future research concerns ethics. For example, some might consider it unethical for psychologists to provide information to advertisers that would help them make their ads more effective.

There are potential advantages for research on aging and memory for prescription drug advertisements. For example, research may show that drug ads may encourage people to get treatment for undertreated medical conditions and increase health-related knowledge (Schommer et al., 1998). Research using indirect tests of memory can also demonstrate that drug ads can be effective at encouraging people to accept needed treatment even when those people do not specifically remember the ads for those drugs. In addition, making advertisers aware of the limits in the information-processing abilities of older adults would enable them to increase the effectiveness of the drug ads. Therefore, advertisers may be able to develop drug ads that are more easily remembered and understood by older adults.

However, research on aging and memory for prescription drug advertisements could also bring about some potential disadvantages. For example, Findlay (2001), McGinley (1999), and Schommer et al. (1998) suggested that drug ads promote expensive brand name drugs, rather than generic alternative drugs, and may increase the cost of health care. In addition, the number of older adult patients asking their physicians for certain drugs may increase and potentially complicate their relationship with their physicians or compromise their treatment. Rising health care costs and drug requests are possible, because drug ads are becoming more effective because of increased frequency and the growing amounts of money spent on them. Although advertisers want ads to be persuasive, ads for everyday, commonly used products are different from ads promoting better health. Drug ads must be carefully designed to inform consumers with precise information, rather than to manipulate them with promising information. Again, some might question whether it is ethical for psychologists to help advertisers make their ads more persuasive.

Examinations of memory for prescription drug advertisements that treat medical conditions participants actually have might provide some additional helpful information for this area of research. In particular, older adults may be more affected by drug ads that are for conditions they commonly experience. Future studies might want to examine if memory is better for drug ads that describe personally experienced conditions, if people pay more attention to relevant ads, and if so, the particular information they attend to in them.

An overall objective of this study was to demonstrate and establish that a complete assessment of advertising effectiveness should include an indirect test to assess

implicit memory, in addition to a direct test to assess explicit memory. The former measurement frequently has been overlooked, and the latter measurement repeatedly has been overused when estimating advertising effectiveness. Advertising effectiveness has been measured traditionally by direct tests of memory (Holden & Vanhuele, 1999; Shapiro & Krishnan, 2001; Perfect & Askew, 1994). However, the use of direct tests of memory solely to measure ad effectiveness may be a mistake. In order to address the mistake, researchers should use indirect tests of memory within the implicit memory paradigm. Both measurements are needed for a full assessment.

The observation that the implicit memory manipulation was successful accomplished this objective. The indirect test of implicit memory revealed that exposure to the drug ads did influence memory; that is, the ads were persuasive. Therefore, unconscious processing is influenced by previous activities even when a person cannot remember the activities. Within an everyday context, further examinations of cognition in general, and memory in particular, without conscious awareness and deliberate processing might illustrate just how influential and powerful unconscious processes are in shaping behavior.

Similar to the results of this study, other research has demonstrated that an assessment of implicit memory is a viable alternative for measuring advertising effectiveness (Holden & Vanhuele, 1999; Krishnan & Shapiro, 1996; Shapiro & Krishnan, 2001; Shapiro et al., 1997). An indirect test indicates whether the advertisement made a favorable impression on the consumer, which may in turn influence buying behavior. A consideration of affective differences, as measured by implicit tests of memory, is an innovative way to further examine and assess ad

effectiveness. As a result, indirect tests should be more widely promoted to advertisers and used by them to measure ad effectiveness (Duke & Carlson, 1993; Shapiro et al., 1999). Advertisers should begin using indirect tests of implicit memory as gauges for persuasion and affect in order to determine the influence of unconscious processes on the effectiveness of ads.

Future research should examine implicit memory for internet advertising. The prevalence of internet advertising is increasing. Similar to other advertising findings, directly measuring memory for internet ad information has been found to be poor; however, indirectly measuring memory has been found to be good. Also similar to other research, brand choice is favorably influenced after a single exposure to internet advertising (Yoo, 2008).

Using advertising effectiveness measures based solely on conscious decision making can lead to the conclusion that advertisements are not very effective. This may be especially true for internet ads, which may be less likely to be consciously recalled than magazine ads. However, implicit memory measures can be employed to complement explicit memory measures to demonstrate ad effectiveness. Explicit measures have limitations that implicit measures do not have because explicit measures require conscious awareness, whereas implicit measures do not (Yoo, 2008).

The mere exposure effect (Zajonc, 1980) is an excellent example of implicit memory that is relevant to the goal of persuasion in advertising. Because advertisers aim to persuade consumers to like their products and eventually purchase them, it makes sense to measure advertising effectiveness using indirect tests of implicit memory to assess affective differences. Therefore, the use of the implicit memory paradigm and its

associated affective measures provides another practical means to assess memory for advertisements, which contributes to determining their overall effectiveness (Butler & Berry, 2001; Duke & Carlson, 1993; Finlay et al., 2005; Goode, 2007; Krishnan & Shapiro, 1996; Shapiro et al., 1999). Thus, a complete assessment of ad effectiveness requires tests of familiarity and preference in order to assess implicit, in addition to explicit, memory for ads (Krishnan & Shapiro).

Given that older adults have poorer explicit memory than younger adults, but not poorer implicit memory, it is particularly important for advertisers to use implicit memory measures when assessing advertisements aimed at older adult consumers. Future research should also examine the effects of repeated exposure to ads on older adults' perceptions of drug ads, and older adults' memory for the source of drug ads. Such studies would allow future researchers and advertisers to compare the cumulative effects of drug ads over time on decisions to take particular medications, especially brand name drugs versus generic alternative drugs. Such decisions can affect the cost and quality of health care for older adults.

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APPENDIX A

CONSENT FORM

Consent Statement and Description of the Experiment

Perceptions of Potential Prescription Drug Advertisements
Mississippi State, Mississippi 39762

Ty Abernathy, Mississippi State University (662) 325-0595
Dr. Carolyn Adams-Price, Mississippi State University (662) 325-7658

Prescription drug advertising on television and in magazines has affected the health behaviors of Americans in both positive and negative ways. The purpose of this research is to examine perceptions of potential prescription drug advertisements, and to assess the potential impact of the ads on viewers.

You will be asked to examine some potential drug advertisements and to rate them on several characteristics. In addition, you will be asked to complete some questionnaires about your health and well-being. You will also be asked to complete some measures that assess your mental skills. Your participation in this experiment should take approximately one hour.

Your participation in this experiment is completely voluntary. You may withdraw at any time or refuse to answer any specific question. There are no expected risks or discomforts associated with your participation. Your input will enable the researchers to better understand how potential prescription drug advertisements are perceived and the roles certain mental skills play in that perception. Mississippi State University students will receive 1 research credit for their participation in this experiment.

Personal information, such as your name, will be stored separately from your responses to questionnaires and other data. Your responses in this experiment will be kept confidential and stored in a locked cabinet. No one other than the researchers will have access to your responses. *Also, please note that these records will be held by a state entity and therefore are subject to disclosure if required by law.

Please contact the researchers noted above with any concerns or questions you may have about this experiment or your participation in it. The Institutional Review Board approval number for this experiment is 07-254. For additional information regarding your rights as a research participant, please feel free contact the Mississippi State University Regulatory Compliance Office at (662) 325-5220.

Please understand that your participation is voluntary**, your** refusal to participate will involve no penalty or loss **of benefits to which you are otherwise entitled, and you** may discontinue your participation **at any time without penalty or loss of benefits.**

Thank you for your participation in this experiment.

You will be given a copy of this form for your records.

Participant Signature	Date
Investigator Signature	Date
Investigator Signature	Date

APPENDIX B

DEMOGRAPHIC SURVEY

1. How old are you?

_____ years

2. Please circle your gender:

male female

3. Please circle your race/ethnicity:

Caucasian/white	African-American/black
Hispanic	American Indian
Asian	other _____

4. Please circle your education level:

college graduate with some post-graduation education
college graduate
some college
high school graduate (or general equivalency diploma)
did not complete high school (if not, please indicate the highest grade completed _____)

5. Please circle your marital status:

married	single
divorced/separated	widowed

6. Please circle your current occupational status:

student	working full-time
retired	working part-time
disabled	unemployed (looking for work)
homemaker	unemployed (not looking for work)

7. How long have you lived at your current residence?

_____ years

8. Please circle the size of the largest city/town within 10 miles of your residence:

500,000 or more	100,000-500,000
30,000-100,000	5,000-30,000
1,000-5,000	1,000 or less

APPENDIX C

COMPLETE LIST OF FICTITIOUS DRUG NAMES

First round of pilot testing	Second round of pilot testing
Altrozine	Bendovel
Betaxyl	Brinzite
Carpalan	Bromaxx
Cherilium	Caprizine
Defonex	Chromatan
Dilactrim	Coratum
Dolomane	Denonax
Dopadryl	Halopax
Donasum	Dyzoidan
Doyestin	Heptopan
Garicin	Lanintal
Glenestex	Lobusect
Halerol	Lynotine
Joneryx	Mavakene
Karodine	Mentabro
Kentadrin	Nocrozin
Kyegran	Nylatrex
Lapricin	Obelzone
Marolfan	Padrysel
Orikiax	Paraclett
Peglemar	Pendian
Phylopsin	Polsolop
Rutalan	Raloprox
Scoplatin	Ranatar
Tabitrol	Remusel
Tennine	Rinavis
Tracadrin	Rybusol
Tylomex	Sportintz
Upsilonox	Triferone
Vicolate	Unibide
Xidafed	Winoxyl
Zenopryal	Zolatol

APPENDIX D

DRUG NAME RATINGS SURVEY

A marketing firm is attempting to identify names for new prescription drugs. Please rate the following prospective names based on whether you think they would be "excellent" or "poor" drug names. Please circle the number along the scale that best represents your opinion.

Altrozine

Poor						Excellent
1	2	3	4	5	6	7

Betaxyl

Poor						Excellent
1	2	3	4	5	6	7

Carpalan

Poor						Excellent
1	2	3	4	5	6	7

Cherilium

Poor						Excellent
1	2	3	4	5	6	7

Defonex

Poor						Excellent
1	2	3	4	5	6	7

Dilactrim

Poor						Excellent
1	2	3	4	5	6	7

Dolomane

Poor						Excellent
1	2	3	4	5	6	7

Donasum

Poor						Excellent
1	2	3	4	5	6	7

Dopadryl

Poor						Excellent
1	2	3	4	5	6	7

Doyestin

Poor						Excellent
1	2	3	4	5	6	7

Garicin

Poor						Excellent
1	2	3	4	5	6	7

Glenestex

Poor						Excellent
1	2	3	4	5	6	7

Halerol

Poor						Excellent
1	2	3	4	5	6	7

Joneryx

Poor						Excellent
1	2	3	4	5	6	7

Karodine

Poor						Excellent
1	2	3	4	5	6	7

Kentadrin

Poor						Excellent
1	2	3	4	5	6	7

Kyegran

Poor						Excellent
1	2	3	4	5	6	7

Lapricin

Poor						Excellent
1	2	3	4	5	6	7

Marolfan

Poor						Excellent
1	2	3	4	5	6	7

Orikiax

Poor						Excellent
1	2	3	4	5	6	7

Peglemar

Poor						Excellent
1	2	3	4	5	6	7

Phylopsin

Poor						Excellent
1	2	3	4	5	6	7

Rutalan

Poor						Excellent
1	2	3	4	5	6	7

Scoplatin

Poor						Excellent
1	2	3	4	5	6	7

Tabitrol

Poor						Excellent
1	2	3	4	5	6	7

Tennine

Poor						Excellent
1	2	3	4	5	6	7

Tracadrin

Poor						Excellent
1	2	3	4	5	6	7

Tylomex

Poor						Excellent
1	2	3	4	5	6	7

Upsilonox

Poor						Excellent
1	2	3	4	5	6	7

Vicolate

Poor						Excellent
1	2	3	4	5	6	7

Xidafed

Poor						Excellent
1	2	3	4	5	6	7

Zenopryal

Poor						Excellent
1	2	3	4	5	6	7

APPENDIX E

EXAMPLE OF FIRST DRUG NAME PAIRINGS

PREFERENCE SURVEY

A marketing firm is attempting to identify names for new prescription drugs. Please circle the prospective drug name from each pair you prefer or think is the best name. In other words, please circle which of these drug names you think is the better name. If you have no favorite between the two drug names, please circle "No preference."

Tabitrol	**Tylomex**	**No preference**
Altrozine	**Lapricin**	**No preference**
Tracadrin	**Zenopryal**	**No preference**
Dilactrim	**Phylopsin**	**No preference**
Defonex	**Xidafed**	**No preference**
Vicolate	**Betaxyl**	**No preference**
Karodine	**Glenestex**	**No preference**
Kentadrin	**Dolomane**	**No preference**
Garicin	**Halerol**	**No preference**
Rutalan	**Dopadryl**	**No preference**
Scoplatin	**Tennine**	**No preference**
Marolfan	**Doyestin**	**No preference**
Upsilonox	**Cherilium**	**No preference**
Donasum	**Carpalan**	**No preference**

Kyegran	**Peglemar**	**No preference**	
Joneryx	**Orikiax**	**No preference**	1

APPENDIX F

SETS OF SELECTED DRUG NAME PAIRINGS

First round of pilot testing

Drug name pairings		chi-square values
Marolfan	Doyestin	1.000
Kentadrin	Glenestex	1.000
Garicin	Carpalan	1.000
Tabitrol	Lapricin	1.000
Defonex	Betaxyl	1.000
Dilactrim	Phylopsin	.827
Karodine	Tylomex	.827
Altrozine	Xidafed	.819
Scoplatin	Tennine	.796
Donasum	Cherilium	.637

Second round of pilot testing

Drug name pairings		chi-square values
Lynotine	Raloprox	1.000
Winoxyl	Pendian	1.000
Ranatar	Paraclett	1.000
Halopax	Caprizine	1.000
Bendovel	Nocrozin	.827
Mentabro	Polsolop	.827
Heptopan	Coratum	.808
Brinzite	Chromatan	.796
Rinavis	Padrysel	.670
Bromaxx	Nylatrex	.637

APPENDIX G

LISTING OF EMOTIONAL WORDS

Word	Valence Mean (SD)	Arousal Mean (SD)
Afraid	2.00 (1.28)	6.67 (2.54)
Anguished	2.12 (1.56)	5.33 (2.69)
Anxious	4.81 (1.98)	6.92 (1.81)
Confused	3.21 (1.51)	6.03 (1.88)
Crushed	2.21 (1.74)	5.52 (2.87)
Defeated	2.34 (1.66)	5.09 (3.00)
Discouraged	3.00 (2.16)	4.53 (2.11)
Disturbed	3.66 (2.00)	5.80 (2.39)
Embarrassed	3.03 (1.85)	5.87 (2.55)
Fearful	2.25 (1.18)	6.33 (2.28)
Frustrated	2.48 (1.64)	5.61 (2.76)
Guilty	2.63 (1.98)	6.04 (2.76)
Horrified	2.76 (2.25)	7.21 (2.14)
Irritated	3.11 (1.67)	5.76 (2.15)
Neglected	2.63 (1.64)	4.83 (2.31)
Nervous	3.29 (1.47)	6.59 (2.07)
Overwhelmed	4.19 (2.61)	7.00 (2.37)
Panicked	3.12 (1.84)	7.02 (2.02)
Stressed	2.09 (1.41)	7.45 (2.38)
Troubled	2.17 (1.21)	5.94 (2.36)

APPENDIX H

EXAMPLE OF FIRST SET OF MEDICAL CONDITION

VIGNETTES

David has not been feeling well for the past few months. He has noticed some changes in his bowel movements and bleeding. He was diagnosed with colon cancer after meeting and talking with his physician. His family is crushed by his diagnosis, but encouraged that it was found early. David is learning all he can about his condition and trying to stay upbeat.

Thomas has been experiencing some slight physical discomfort. He has been urinating less than normal and feeling sick to his stomach lately. He was informed, after an exam, that he has signs of kidney disease. His family is frustrated because there is not much they can do to help. Thomas is convinced he can continue to live a full life.

William has not felt this bad in some time. He has noticed irregular heartbeats along with feelings of weakness and dizziness in the past few months. His physician recently told him that he has signs of heart disease. His family is stressed by this news and wants to help in any way they can. William is trying to rest more and keep his activity level to a minimum.

Jennifer has had a change in her personality. She was informed that she was going through some depression after discussing her thoughts and feelings with a health professional. She has felt sad and hopeless most days at some point and experienced some weight loss. Her family is afraid of how this problem might affect her life. Jennifer is seeking help and moving forward step by step.

Mary has not been as active the past several weeks. She has experienced a lack of energy and some weight loss. She found out after a checkup that she has acquired immune deficiency syndrome. Her family is horrified about her condition. Mary thinks she can live a mostly normal life, but will need to stay conscious of her overall health.

Robert has simply not been himself since he started his new job. His level of anxiety is high and it has consistently caused stress and panic on a daily basis. He often has a racing heart and feels a loss of control when he is at work. His family is troubled by his problems and wants to help in any way they can. Robert plans to take a vacation sometime soon and contemplate his future.

Christopher has been having some lip and mouth problems. In fact, he has been infected with forms of both cold sores and fever blisters. He has frequently battled a fever, a sore throat, and swollen lymph glands in his neck. His family is irritated because his problems do not appear to be getting any better. Christopher hopes he can get rid of his infection soon.

Donald has lost much of his confidence and poise. He is going through a tough time of common sexual dysfunction. His desire for and interest in sexual activity has decreased the past few months because of both physical and psychological causes. His family is embarrassed to talk with him about his problem due to the nature of it. Donald is looking for a few good friends to lean on at the moment.

Patricia has not at all been herself lately. She has been becoming lost in places she knows well and getting very confused about time, people, and places. She was recently told she has the beginning stages of Alzheimer's disease. Her family feels overwhelmed by her condition because they do not know what to do. Patricia is taking it one day at a time and hoping for the best.

James has not been enjoying eating the past few months. His physician suggested he has been experiencing heartburn and acid reflux following meals. He has had some chest pain and burning in his throat. His family is fearful that his condition will make eating less enjoyable. James hopes that a change in his diet will help improve his condition.

APPENDIX I

LISTS OF MEDICAL CONDITIONS

Older adults

Advertisements and vignettes
Alzheimer's disease (dementia)
Arthritis (joint and muscle pain)
Cardiovascular disease (heart attack/heart disease/congestive heart failure)
Cholesterol
Emphysema
Glaucoma
Lung cancer
Osteoporosis
Overactive bladder
Skin cancer (melanoma)

Vignettes only
Colon cancer
Hypertension (high blood pressure)
Kidney disease
Parkinson's disease
Sexual dysfunction

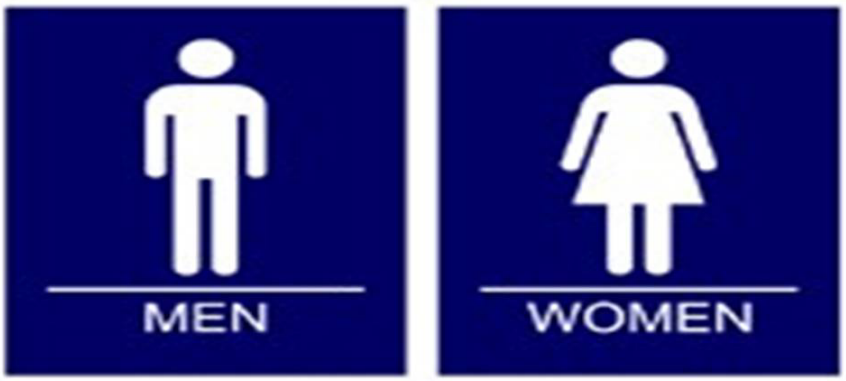
Older/younger adults

Advertisements and vignettes
Acid reflux (heartburn)
Allergies
Anxiety (stress/panic)
Asthma
Depression
Fungal nail infection
Headaches (migraines)
Irritable bowel syndrome
Skin problems (acne)
Sleep problems (insomnia)

Vignettes only
Acquired immune deficiency syndrome
Chronic fatigue syndrome
Kidney stones
Lip and mouth problems (cold sores/fever blisters)
Stomach problems (ulcers)

APPENDIX J

SAMPLE PRESCRIPTION DRUG ADVERTISEMENTS



SCOPLATIN®

1-800-4DOCTOR

Spend less time going, more time on the go; defeat overactive bladder.

BENDOVEL®

1-800-RXHELPS

Do something about your depression because you have a beautiful smile.

MAROLFAN®

1-800-PSYLABS

Three things to remember with Alzheimer's disease: yesterday, today, and tomorrow.

APPENDIX K

DRUG ADVERTISEMENT RATINGS SURVEY

The set of prescription drug advertisements you are about to see are considered to be works in progress. In other words, these ads are potential ads that might be used later as an actual ad. For each drug advertisement you are about to see, please rate the appropriateness of the drug NAME for the medical condition.

You will have 15 seconds to rate the appropriateness of the drug name for the medical condition in each ad.

Advertisement 1

1	2	3	4	5
Not at all appropriate	Not very appropriate	Fairly appropriate	Very appropriate	Extremely appropriate

Advertisement 2

1	2	3	4	5
Not at all appropriate	Not very appropriate	Fairly appropriate	Very appropriate	Extremely appropriate

Advertisement 3

1	2	3	4	5
Not at all appropriate	Not very appropriate	Fairly appropriate	Very appropriate	Extremely appropriate

Advertisement 4

1	2	3	4	5
Not at all appropriate	Not very appropriate	Fairly appropriate	Very appropriate	Extremely appropriate

Advertisement 5

1	2	3	4	5
Not at all appropriate	Not very appropriate	Fairly appropriate	Very appropriate	Extremely appropriate

APPENDIX L

INDIRECT TEST OF MEMORY

Please circle the drug name from each pair below that you think is the better drug name.

1. Paraclett	Ranatar
2. Padrysel	Rinavis
3. Tylomex	Karodine
4. Raloprox	Lynotine
5. Marolfan	Doyestin
6. Garicin	Carpalan
7. Defonex	Betaxyl
8. Coratum	Heptopan
9. Bendovel	Nocrozin
10. Scoplatin	Tennine

APPENDIX M

DIRECT TEST OF MEMORY

Please circle the drug name from each pair below that you recall or remember studying in the advertisements.

1. Lapricin	Tabitrol
2. Donasum	Cherilium
3. Xidafed	Altrozine
4. Mentabro	Polsolop
5. Dilactrim	Phylopsin
6. Pendian	Winoxyl
7. Halopax	Caprizine
8. Chromatan	Brinzite
9. Kentadrin	Glenestex
10. Nylatrex	Bromaxx

APPENDIX N

SHIPLEY VOCABULARY TEST

On the test below, the first word of each line is printed in CAPITAL LETTERS. Opposite it are four other words. CIRCLE the one word which means the same thing, or most nearly the same thing, as the first word. A sample has been worked out for you. If you don't know, guess. Be sure to circle the one word on each line which means the same thing as the first word.

sample:

	LARGE	red	big	silent	wet
1.	TALK	draw	eat	speak	sleep
2.	PARDON	forgive	pound	divide	tell
3.	REMEMBER	swim	recall	number	defy
4.	HIDEOUS	silvery	tilted	younger	dreadful
5.	EVIDENT	green	obvious	skeptical	afraid

APPENDIX O

STATE-TRAIT ANXIETY INVENTORY

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right* now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel.

	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
21. I feel pleasant	1	2	3	4
22. I feel nervous and restless	1	2	3	4

APPENDIX P

MINI-MENTAL STATE EXAMINATION

The next series of questions are designed to measure you mental abilities related to memory and arithmetic. Some of the questions may seem easy, some may seem hard. Just do the best you can.

1a. What year is it? _____

2a. What state are we in? _____

3. Now I am going to name three objects. When I finish I would like you to repeat them back to me. Ready? The objects are **penny, apple,** and **table.** (PAUSE) Now repeat them back to me.

PENNY APPLE TABLE

4. Now I will ask you to complete a counting exercise. Please begin counting with 100 and count backwards by 7s. Keep going until I ask you to stop.

93, 86, 79, 72, 65 ___ ___ ___ ___ ___

APPENDIX Q

MEDICAL CONDITIONS SURVEY

Please indicate any medical conditions you currently have or have experienced in the last 5 years by circling Y for yes and N for no.

Acid reflux Y N
(heartburn)

Acquired immune deficiency syndrome Y N

Allergies Y N

Alzheimer's disease Y N
(dementia)

Anxiety Y N
(stress/panic)

Arthritis Y N
(joint and muscle pain)

Asthma Y N

Cardiovascular diseases Y N
(heart attack/heart disease/congestive heart failure)

High cholesterol Y N

Chronic fatigue syndrome Y N

Colon cancer Y N

Depression Y N

Emphysema Y N

Fungal nail infection Y N

Glaucoma Y N

Headaches Y N
(migraines)

Hypertension Y N
(high blood pressure)

Irritable bowel syndrome Y N

Kidney disease Y N

Kidney stones Y N

Lip and mouth problems Y N
(cold sores/fever blisters)

Lung cancer Y N

Osteoporosis Y N

Overactive bladder Y N

Parkinson's disease Y N

Sexual dysfunction Y N

Skin cancer Y N
(melanoma)

Skin problems Y N
(acne)

Sleep problems Y N
(insomnia)

Stomach problems Y N
(ulcers)

List any other conditions:
_____
_____

Please circle your responses.

1. How you would rate your health:

poor fair good excellent

2. Do you have any chronic health conditions? (Chronic conditions are long-lasting conditions such as asthma, cancer, or heart disease.)

yes no

If yes, how many? _____

Please list these conditions:_____

3. Are you taking any prescription medications?

yes no

In yes, how many? _____

Please list these medications:_____

4. Have you had any serious illnesses in the last 5 years?

yes no

If yes, how many? _____

Please list these illnesses:_____

APPENDIX R

DRUG ADVERTISEMENT EVALUATION

JUDGMENTS SURVEY

Please tell us how well you think each of the words listed below describes all of the ads, on average, you have just seen by circling the number that best represents your thoughts. We are interested in your thoughts about all of the ads and how well you think the word describes them.

Believable

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

For me

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Informative

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Interesting

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Irritating

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Meaningful to me

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Phony

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Ridiculous

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Terrible

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Valuable

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Worth remembering

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Convincing

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Important to me

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Stupid

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Realistic situation

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Original

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Intelligent

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

Makes me want to buy

1	2	3	4	5
Not at all well	Not very well	Fairly well	Very well	Extremely well

APPENDIX S

DIAGRAM OF THE EXPERIMENTAL SEQUENCE

Consent form

↓

Demographic survey

↓

First set of vignettes

↓

Drug advertisement ratings survey

↓

First part of Shipley Vocabulary Test

↓

Indirect test of memory

↓

Second set of vignettes

↓

Drug advertisement study exercise

↓

Second part of Shipley Vocabulary Test

↓

Direct test of memory

↓

State-Trait Anxiety Inventory

↓

Medical conditions survey

↓

Drug advertisement evaluation judgments survey

↓

Mini-Mental State Examination

↓

Debriefing form

APPENDIX T

DEBRIEFING FORM

Debriefing Statement

Perceptions of Potential Prescription Drug Advertisements
Mississippi State, Mississippi 39762

Ty Abernathy, Mississippi State University (662) 325-0595
Dr. Carolyn Adams-Price, Mississippi State University (662) 325-7658

The purpose of this experiment is to examine perceptions of potential prescription drug advertisements, and to assess the potential impact of the ads on viewers. You have just participated in an experiment designed to explore the relationship between several cognitive performance factors and processes, such as memory, intelligence, and anxiety. Your input will enable the researchers to better determine the roles these factors and processes play in everyday cognitive functioning, independently and collectively, in both old and young adults.

The experiment consisted of medical condition vignettes and prescription drug advertisements containing fictitious information and related implicit and explicit memory measures. The experiment also consisted of a demographic survey, a cognitive exam, a vocabulary test, an anxiety inventory, a medical conditions survey, and an ads evaluation judgments survey. These materials are designed to assess certain cognitive capacities. The researchers are studying whether drug ads have an effect on memory and cognitive processing even when a person cannot remember seeing them.

Your participation is greatly appreciated. For further concerns or questions about your participation in this experiment, please contact the researchers noted above. Thank you for your participation in this experiment.

APPENDIX U

INSTITUTIONAL REVIEW BOARD APPROVAL FORM

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Mississippi State University

October 11, 2007

Ty Abernathy
Mail Stop 9628
Mississippi State, MS 39762

RE: IRB Study #07-254: An Examination of Adult Age Differences in Implicit and Explicit Memory for Prescription Drug Advertisments as a Function of Exposure to Salient Information

Dear Mr. Abernathy:

The above referenced project was reviewed and approved via expedited review for a period of 10/11/2007 through 9/15/2008 in accordance with 45 CFR 46.110 #7. Please note the expiration date for approval of this project is 9/15/2008. If additional time is needed to complete the project, you will need to submit a Continuing Review Request form 30 days prior to the date of expiration. Any modifications made to this project must be submitted for approval prior to implementation. Forms for both Continuing Review and Modifications are located on our website at: http://www.msstate.edu/dept/compliance.

Any failure to adhere to the approved protocol could result in suspension or termination of your project. Please note that the IRB reserves the right, at anytime, to observe you and any associated researchers as they conduct the project and audit research records associated with this project.

Please refer to your docket number (#07-254) when contacting our office regarding this project.

We wish you the very best of luck in your research and look forward to working with you again. If you have questions or concerns, please contact Christine Williams at cwilliams@research.msstate.edu or by phone at 662-325-5220.

Sincerely,

[For electronic submission]

Christine Williams
IRB Compliance Administrator

cc: Carolyn Adams-Price

Office for Regulatory Compliance
P.O. Box 6223 • 85 Morgan Street • Mailstop 9563 • Mississippi State, MS 39762 • (662) 325-3994 • FAX (662) 325-8776