Dr. Mom and Other Influences on Younger and Older Adults' OTC Medication Purchases

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The present study examined age differences in the sources of information that older and younger adults use when making decisions about purchasing over-the-counter (OTC) cold/allergy medications. Participants completed a questionnaire addressing information sources that influence OTC purchases and advertising awareness. The questionnaire was given either before or after completing a decision task in which they searched a computerized display of label information and chose one of seven brand name medications to purchase. Analyses revealed age-related differences in sources of information considered and label information used when purchasing OTC medications. Priming participants to recall specific advertising claims using the questionnaire had little effect on the information used by younger or older adults. Younger adults relied on price and product use information, whereas older adults relied on side effect and drug interaction information. This finding has implications for OTC label design and health care professionals who counsel patients about OTC medication usage.

When consumers decide to purchase over-the-counter medications (OTCs), they often are perplexed because there are hundreds of products from which to choose. For example, more than 10 years ago there were over 800 OTCs available to treat symptoms of the common cold (Lowenstein & Parrino, 1987), and undoubtedly today there are more. Little is known about what factors are important to consumers as they make a decision about purchasing OTCs. Identifying these factors may be particularly important to

AUTHORS' NOTE: The authors thank Dr. David Wekstein, associate director of the Sanders-Brown Center on Aging, for his assistance in obtaining older adult participants. Thanks are also due to Bob Lorch, the reviewers, and the former journal editor, Graham Rowles, for their very helpful comments and suggestions on earlier versions of the article. Please send correspondence to Mitzi Johnson, Behavioral Science Department, University of Kentucky College of Medicine, Lexington, KY 40536-0086; phone: 606-323-6075; e-mail: mtzjhns@pop.uky.edu.

The Journal of Applied Gerontology, Vol. 19 No. 4, December 2000 441-459
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older adults who may be susceptible to making poor decisions due to normal declines in cognitive abilities associated with aging, and for whom even slight errors in medication use may be serious.

The Nonprescription Drug Manufacturers Association (NDMA) claims that most people rely on four sources of information with regard to the purchase of OTCs: family and friends, advertising, product labels, and health care professionals (NDMA, 1992). Family and friends are likely to be unreliable because they lack the knowledge of potential adverse outcomes (e.g., drug interactions) of OTC use in the elderly. Consumers often consider advertising a biased, as well as unreliable, source of often conflicting information because the primary goal of advertising is to sell products, not necessarily to provide adequate information for consumer decision making. Product labels, which require better than normal vision, may be inaccessible and incomprehensible because they are hard for young as well as older individuals to see and interpret (Federal Register, 1997). Health care professionals are not always available when consumers, particularly older adults, are making in-store decisions to purchase OTC medications. Indeed, a recent investigation indicated that pharmacy students, who consulted with 745 store customers intending to purchase an OTC, prevented potential adverse outcomes in 7.1% of the study population, demonstrating the potential dangers of poor in-store decision making in the selection of OTCs (Sclar, Robison, & Skaer, 1996).

Many older people treat their own illness symptoms. Recent studies have revealed that older adults, who constitute about 13% of the population, use 25% to 35% of OTCs (NDMA, 1992), and this number is expected to increase as the elderly population continues to grow. To investigate the health-care practices of older people, Stoller, Forster, and Portugal (1993) asked a sample of community-dwelling older adults (age 65 and older) to keep a health diary for 3 weeks. In the diary, older adults recorded any health problems experienced and how they treated the problem. An analysis of diary entries indicated that OTCs were the most frequently used treatments for the minor illness symptoms of fever, runny nose, sore throat, cough, nausea, diarrhea, constipation, indigestion, headache, and muscle or joint pain. A nationwide study by the NDMA (1992) found that 28% of the time, older adults (age 65 and older) treat everyday health problems such as arthritis, sleeping problems, and colds with OTCs. Self-treatment is a practice that is encouraged by the health care system as it is viewed as saving on health expenditures. For example, a typical doctor visit costs approximately $40, and a typical prescription drug costs nearly $25. In contrast, a typical OTC medication costs approximately $4. By using an OTC medication, the older person saves roughly $60 by self-medicating (NDMA, 1995).

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Previous research in cognitive aging has found evidence of age-related differences in decision-making strategies. Specifically, older individuals take more time to search relevant information and make decisions (Johnson, 1990, 1993). When making decisions, older adults also use less of the available information to aid them in their decision than younger adults (Hershey, Walsh, Read, & Chulef, 1990; Johnson, 1990, 1993; Streufert, Pogash, Piasecki, & Post, 1990). For example, Johnson (1993) found that older adults chose to view fewer of the available features about apartments (e.g., closet space, rent) than younger adults when making a decision about renting an apartment. It is not known if older adults apply these decision-making strategies to the purchase of OTCs. If older adults do use limited amounts of information when deciding which OTC product to purchase, it is important to document what information is most important to older consumers. Because OTC medication usage is not directly monitored by a physician, it is also important to determine what sources of information older consumers rely on when purchasing OTCs. Knowledge of how older consumers use the available information to make decisions with regard to the purchase of OTCs is crucial given the increased possibility of adverse drug reactions in this population.

The present study focused on age-related differences in factors that influence the purchase of OTC cold/allergy medications. A quasi-experimental design was employed using two age groups and manipulating the order of making a decision and completing a self-report advertising questionnaire. The decision task performance and self-report advertising questionnaire responses of older adults were compared to those of college-age adults to highlight age differences. The decision task required participants to make a decision with regard to which OTC cold/allergy medication they would purchase after viewing whatever product label information they wished. The task was computerized to make product label information more accessible to study participants by restating this information in simplified language and tabular form. Presenting product label information on a computer also allowed the monitoring of the on-line processing of the product label information used by study participants.

This study addressed four research questions. First, what or who are the sources of information concerning the purchase of OTC cold/allergy medications? Given the large number of available OTCs and the potential for improper use of these medications, it is important to determine the sources of information that influence typical OTC purchases by younger and older consumers (Sclar et al., 1996). Second, as a potential source of information, what impact does advertising have on the consideration and purchase of cold/allergy OTCs? Previous research has demonstrated that priming, which is a facilitation of memory resulting from an earlier encounter with a specific

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stimulus, can influence the interpretation of information (Fiske & Taylor, 1991). In the present study, manipulating the timing of a self-report questionnaire on OTC advertising was used to examine whether priming thoughts of specific brand names influenced the use of information when purchasing OTCs. If completing the advertising questionnaire primes participants' consideration of particular brand names and guides their search of information, we would expect to see an effect for timing of questionnaire completion on measures of information use. A third question was, Will older adults take more time and review less product label information when purchasing cold/allergy OTCs compared to younger adults? Previous research has shown that older adults take longer to search available information and use less available information when making purchasing decisions than younger adults (Hershey et al., 1990; Johnson, 1993; Streufert et al., 1990). However, these purchasing decisions have involved considerable expense such as financial planning for retirement or renting an apartment. It is not known whether age differences in decision-making strategies generalize to more common purchases such as the purchase of OTCs. The last question addressed was, What product label information is used by younger and older adults when deciding which cold/allergy OTC to purchase? Although it has been suggested that product label information is one source of information that is relied on when purchasing OTCs (NDMA, 1992), it is not known which product label information is most important to younger and older consumers.

Method

Design and Participants

A 2 (age group) $\times$ 2 (order of questionnaire presentation) design was used to address study questions. Older and college-aged participants composed the two age groups. The sources of OTC medication information and advertising awareness questionnaire was completed either before or after the decision task, which allowed an examination of whether priming thoughts of television advertising influenced cold/allergy OTC purchasing decisions. The decision task yielded data from computerized search protocols that measured information use, search times, and the pattern of searches that participants used when making cold/allergy OTC purchasing decisions. In addition, participants also answered questions with regard to their sources of information about OTC medications and their awareness of advertisements and demographic questions that allowed for sample descriptions.

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Thirty college-age adults (16 females, 14 males) were recruited from upper level psychology classes at the University of Kentucky and participated to partially fulfill a course requirement. Thirty older adults (17 females, 13 males) were recruited from the Sanders-Brown Center on Aging (a unit within the University of Kentucky) volunteer research subject pool. They were not reimbursed for their participation. Mean age of the college-age participants was 23.80 years (±4.54) and of the older adults was 76.93 years (±6.85). All participants were White except for one Asian American college-aged adult.

Procedure

Participants completed the protocol individually in a single session. On arrival for testing, participants completed demographic questions and the vocabulary subscale of the Shipley Institute of Living scale (Shipley, 1967). Demographic questions included date of birth, gender, race, years of education, employment status, self-reported income, self-reported health status (poor, fair, good, excellent), and occupation (categorized as homemaker, unskilled worker, service provider, semi-skilled worker, skilled worker, clerical, management, or professional). The classification of occupation was based on the Duke University OARS study. The Shipley vocabulary subscale, which is a normed proxy for the vocabulary subscale of the Wechsler Adult Intelligence Scale (Wechsler, 1955), consisted of 40 multiple choice items and yielded scores ranging from 0 to 40. Because the college-age participants were likely to have had more years of education, the vocabulary subscale was administered to determine if older participants were functioning at an educational level comparable to college-age participants. If older participants are found to have higher vocabulary scores than younger participants, this indicates that they are likely functioning at an educational level comparable to younger adults despite having fewer years of education. Next, the half of the participants randomly assigned to complete the self-report advertising awareness questionnaire before the experimental task did so. (The remaining participants completed this questionnaire after the computerized decision task.) Questions included hours of weekday television viewing, recall and description of a specific television commercial advertising cold/allergy OTCs, self-reported influence of the indicated commercial on purchase of the medication (1 = *not at all* to 5 = *always*), recall of all the brand names of cold/allergy OTCs that participants could verbally list, the brand name of the cold/allergy OTC they typically purchased, and the factors that determined their purchase.

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Before completing the experimental task, participants interacted with the experimenter during a demonstration of the experimental task (involving choosing a pain reliever) to become comfortable using the computer. An IBM® personal laptop computer was used to present the demonstration and experimental tasks. To begin the demonstration, participants read a scenario on the computer screen that indicated they had experienced some back pain after working around their house on the weekend. In the scenario, their physician instructed them to purchase a nonprescription pain reliever, naming seven brands from which they could choose (Advil®, Aleve®, Bayer®, Excedrin®, Motrin®, Orudis®, and Tylenol®). Participants were told the brand name OTCs from which they could choose and the medication label information that would be available in an information table. The medication label information for both demonstration and experimental tables included the active ingredients, dosage, drug interactions, price, side effects, uses, and warnings. The instructions for obtaining information from the table were presented next. These instructions were displayed on the computer screen and informed participants that information was hidden until the participant moved to a specific table entry and pressed Enter (a blue colored key). When the participant finished viewing the information, they pressed the Backspace key (colored green). The information display was replaced by an asterisk marking the viewed table cell and participants continued. When participants were prepared to make a decision, they pressed the Escape key (colored yellow) and made their decision. The computer recorded what information was viewed, for how long, and participants' final choice for purchase. Participants then viewed the demonstration table, practiced requesting information, and finally made a choice. During the demonstration, the experimenter answered questions and reassured participants that they could use as much time and information as they wished. Some participants asked whether they could take notes and were told there was no need to take notes because they could re-access information they might have forgotten. At the end of the demonstration, when the experimenter had addressed all questions, participants began the experimental task involving choosing a cold/allergy medication.

For the experimental task, participants read a scenario that indicated they had gotten a cold while they were visiting some family. Because they wanted to get rid of the cold as soon as possible, they contacted their physician who recommended that they obtain a cold/allergy medication. The scenario indicated that seven cold/allergy medications were available at the store (Actifed®, Alka-Seltzer+®, Contact®, Dimetapp®, Dristan Cold®, Drixoral®, and Triaminicin®). The information table for the experimental task is shown in Table 1. The computer displays that followed were similar to

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Table 1. Cold/Allergy OTC Decision Matrix

	Actifed	*Alka-Seltzer+*	*Contact*	*Dimetapp*	*Dristan Cold*	*Drixoral*	*Triaminicin*
Active ingredient	Pseudoephedrine HCl, Triprolidine	Pseudoephedrine HCl, Chlorpheniramine M, Acetaminophen	Phenylpropanolamine HCl, Chlorpheniramine M	Phenylpropanolamine HCl, Brompheniramine M	Phenylephrine HCl, Chlorpheniramine M, Acetaminophen	Pseudoephedrine Sulfate, Dexbrompheniramine Maleate	Phenylpropanolamine HCl, Chlorpheniramine M, Acetaminophen
Dosage	1 tablet every 4-6 hours	2 softgels every 4 hours	1 capsule every 12 hours	1 tablet every 12 hours	2 tablets every 4 hours	1 tablet every 12 hours	1 tablet every 4-6 hours
Drug interactions	Rx for MAOI for depression, Parkinson's	Rx for high blood pressure, MAOI for depression, Parkinson's	Antihypertensives, antidepressants MAOI RX	Rx for MAOI for depression, Parkinson's	Rx for MAOI for depression, Parkinson's	Rx for high blood pressure or depression	Rx for MAOI for depression, Parkinson's
Price	$3.35/12 tablet pack	$4.79/12 softgel pack	$4.79/10 capsule pack	$5.39/12 tablet pack	$5.29/20 tablet pack	$5.29/10 tablet pack	$4.49/12 tablet pack
Side effects	Excitability (esp. in children), drowsiness	Excitability (esp. in children), drowsiness	Excitability (esp. in children), drowsiness	Excitability (esp. in children), drowsiness	Excitability (esp. in children), drowsiness	Excitability (esp. in children), drowsiness	Excitability (esp. in children), drowsiness
Uses	Antihistamine, decongestant	Antihistamine, decongestant, analgesic	Antihistamine, decongestant	Antihistamine, decongestant	Antihistamine, decongestant, fever reducer	Antihistamine, decongestant	Antihistamine, decongestant, fever reducer, pain reliever
Warnings	Avoid if have heart or thyroid disease, high BP, or diabetes	Avoid if breathing problems, heart disease, glaucoma, or high BP	Avoid if have heart or thyroid disease, high BP, or diabetes	Avoid if breathing problems, heart disease, high BP, or diabetes	Avoid if breathing problems, heart disease, glaucoma, or high BP	Avoid if breathing problems, heart disease, glaucoma, or high BP	Avoid if have heart or thyroid disease, high BP, or diabetes

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the demonstration and the information table was in the same format as the demonstration table so that all the steps for viewing information and making a decision were the same.

Measures

Measures from the decision task included the following: viewing time per cell, total cells viewed, total viewing time, product label information repetitions, and brand name repetitions. Viewing time per cell was calculated as the mean number of seconds spent viewing each cell accessed. Total cells viewed was determined by counting the total number of cells accessed, and total viewing time indicated the total time taken to complete the experimental task from the appearance of the information table until the decision. A ratio reflecting the product label information repetitions ratio (PLIRR) was computed as: PLIRR = [(product label information repetitions -1) - (number of dimensions - 1)] / [(total number of cells accessed - 1) - (number of dimensions - 1)]. The brand name repetitions ratio was calculated by substituting brand name repetitions for product label information repetitions. These repetition ratios are proportions ranging from zero to one (similar to subjective organization measures of free recall such as Adjusted Ratio of Clustering; see Murphy & Puff, 1982) and take into account the total information viewed as well as the table's two dimensions of product label information and brand name OTCs. For example, for a participant who looked at the side effect information for all brand names and then looked at the price, dosage, and active ingredients for Brand B and the price, dosage, and active ingredients for Brand D, the PLIRR = .36. Measures from the self-report questionnaire included hours of weekday television viewing, whether participants were able to recall and describe a television commercial advertising a brand name cold/allergy OTC, self-reported influence of the indicated commercial on purchase of the medication, number of brand name cold/allergy OTCs that participants could verbally list, the brand name of the cold/allergy OTC typically purchased, and the factors that determined their purchase.

Results

Sample Characteristics

Analysis of variance revealed no differences in demographic measures associated with the time of questionnaire completion, indicating that random assignment into groups was successful. Older adults did report a higher

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income ($F(1,55) = 32.93$, $p < .001$) and had higher vocabulary scores ($F(1,55) = 4.67$, $p = .035$) than college-age adults. There was also an age difference associated with occupation ($F(1,55 = 4.31$, $p = .043$). The majority of college-age participants (53%) reported unskilled work in their occupation history, whereas the majority of older participants reported either homemaker (30%) or professional worker (27%) as their occupation. There were no age differences found for other demographic measures.

Self-Report Questionnaire

Older adults reported significantly more hours of weekday television viewing (M = 4.3±1.44) than college-age adults (M = 2.0±1.43), $t(58) = 6.11$, $p < .001$. The majority of older ($n = 22$) and college-age adults ($n = 24$) recalled a commercial that advertised an OTC cold/allergy medication. Chi-square analysis revealed no age or time of questionnaire completion differences in the ability to recall a commercial. Older adults reported that the recalled commercial only somewhat influenced their decision to purchase the medication (M = 1.4±.73) as did college-age adults (M = 1.8±1.07). A 2 (Age) × 2 (Order) ANOVA revealed no significant differences associated with age or time of questionnaire completion.

Most participants described the details of the commercial they remembered ($n = 46$). These descriptions were categorized according to whether participants mentioned: 1) imagery, 2) safety, 3) slogans, 4) brand name, and 5) repetition. All categories were coded using a scale of 1 (*not mentioned*), 2 (*mentioned but not emphasized*), and 3 (*thematically emphasized*), except for the brand name category that was coded using a present/absent scale. The imagery category reflected comments that indicated the commercial had created a mental image that made the advertised product more memorable. One participant stated, "I found the commercial humorous and cheery. I remember the image of the box that was shown. The scene was hazy before the drug was taken and clear afterwards." The safety category was coded based on whether participants remembered that the commercial addressed safety issues such as warnings, side effects, and drug interactions. For example, one participant responded that "the commercial said not to take the drug if you have high blood pressure." Participants that indicated they remembered a slogan from a commercial and could quote it verbatim (e.g., the Nyquil® slogan) received a rating of 3 for the slogan category. If participants could remember the specific brand name of the commercial they reported viewing, then a present rating was assigned; if not, an absent rating was assigned. To receive a rating of 3 for the repetition category, participants had to indicate that seeing the commercial presented numerous times had increased their

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ability to recall the commercial. For example, one participant said, "this commercial is shown over and over."

Participants' responses were coded by the first author and a colleague naive to the purposes of the present study. To determine interrater agreement, the number of times each rater made the same rating was divided by 46, which was the total number of participants able to recall a commercial. Interrater agreement was 91%, 96%, 98%, 100%, and 96% for the categories of imagery, safety, slogans, brand name, and repetition, respectively. Ten participants (all were college-age) mentioned the commercial's imagery. Safety issues were mentioned by six participants (4 college-age and 2 older) and slogans were mentioned by nine participants (7 college-age and 2 older). Ninety-two percent of college-age participants who were able to recall a commercial were able to remember the brand name of the advertised product, whereas only 55% of older participants were able to remember the brand name. Five participants (3 college-age and 2 older) commented on the advertisements' repetition. Chi-square analysis revealed a significant difference associated with age for imagery, $X^2(1) = 11.18$, $p = .001$, and brand name, $X^2(1) = 8.63$, $p = .003$. There were no differences associated with questionnaire/task order for any category.

Each participant was asked to orally list all the brand names of cold/allergy OTCs they could recall. A 2 (Age) × 2 (Order) ANOVA revealed a significant difference associated with age ($F(1,56) = 24.39$, $p < .001$) but no difference associated with order. Overall, college-age participants were able to recall more brand name cold/allergy OTCs (M = 7.5±2.32) than older participants (M = 4.9±1.53). Participants who completed the questionnaire after the decision task recalled on average six brand name OTC cold/allergy medications (M = 6.4±2.24) as did participants who completed the questionnaire before the decision task (M = 6.0±2.44). The brand names recalled were classified into three categories (cold/allergy OTCs from the experimental task, e.g., Contact®; cold/allergy OTCs not in the experimental task, e.g., Nyquil®; and additional OTCs not specifically labeled as cold/allergy medications, e.g., Excedrin®) to see if the experimental task influenced recall. A 2 (Age) × 2 (Order) ANOVA was conducted on the number of cold/allergy OTCs recalled in each category. These ANOVAs revealed a main effect for age for cold/allergy OTCs not in the task ($F(1,56) = 10.80$, $p = .002$) and additional OTCs ($F(1,56) = 6.54$, $p = .013$). A main effect for order was found for cold/allergy OTCs not in the task ($F(1,56) = 7.66$, $p = .008$) and cold/allergy OTCs from the task ($F(1,56) = 43.35$, $p < .001$). A significant interaction between age and order was found for cold/allergy OTCs from the task ($F(1,56) = 7.27$, $p = .009$). When the questionnaire was completed before the decision task, college-age participants recalled fewer cold/allergy OTCs

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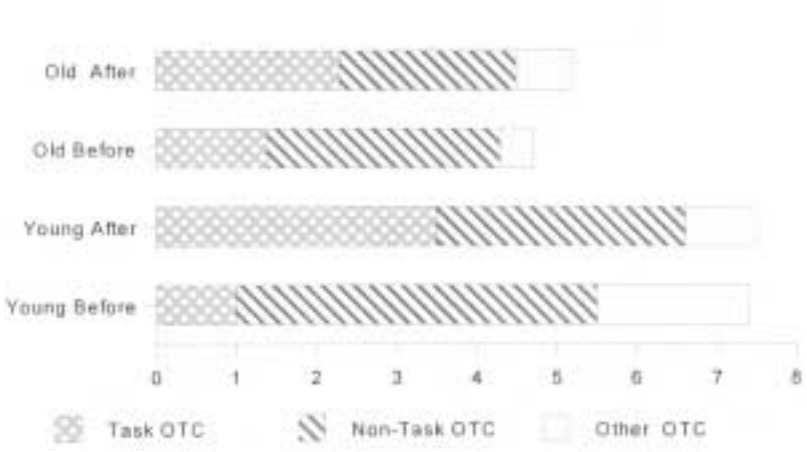

Figure 1. Number of brand names recalled.

from the task than older participants, whereas when the questionnaire was completed after the decision task, college-age participants recalled more cold/allergy OTCs from the task than older participants (see Figure 1).

When asked which brand name OTC cold/allergy medication participants typically purchased, 12 participants (8 older and 4 college-age) indicated brand names from the experimental task. Ten of these 12 participants had completed the questionnaire after the decision task. The association between when participants completed the questionnaire and citing brand names used in the experimental task as their typical purchase was statistically significant, $X^2(1) = 6.67$, $p = .01$, although the age difference was not statistically significant.

Participants also reported what or who typically influences their OTC cold/allergy medication purchases. These sources of influence were classified into six categories: cautions (e.g., drug interactions and warnings); formal care providers such as physicians, nurses, and pharmacists; potential informal care providers such as family and friends; positive past experiences in using the product; the packaging/presentation of the product (e.g., gel caps); and product convenience (e.g., dosing schedule). To determine interrater agreement, participants' responses were coded by the first author and a colleague naive to the purpose of the study. Interrater agreement was 100% for all categories. Cautions were reported 19 times by older adults and

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Table 2. Means and Standard Deviations for Each of the Decision Task Performance Measures

	Older		*College-Age*	
Measure	*Mean*	SD	*Mean*	SD
Mean viewing time per cell (sec.)	8.28	2.03	4.05	1.03*
Total cells viewed	8.07	4.58	15.50	13.79*
Total viewing time (sec.)	199.03	119.92	169.70	130.57
Product label information repetitions ratio**	.38	.33	.53	.34
Brand name repetitions ratio	.21	.30	.23	.34

*Age differences significant at $p < .05$.
**Differences in repetitions measure significant at $p < .05$.

4 times by college-age adults; chi-square analysis confirmed a significant difference associated with age, $X^2(1) = 15.86$, $p < .001$). Fifteen participants (14 older adults and 1 college-age adult) reported that formal care providers influenced their typical cold/allergy OTC purchases, and chi-square analysis confirmed a significant difference associated with age, $X^2(1) = 15.02$, $p < .001$. In contrast, significantly more college-age adults ($n = 7$) reported informal care providers as an influence than older adults ($n = 1$), $X^2(1) = 5.19$, $p = .02$. Positive past experiences were reported equally ($n = 24$) by college-age and older adults. Thirteen older adults and 20 college-age adults reported that product convenience influenced their typical cold/allergy OTC purchase. Four participants reported that packaging/presentation influenced their purchases (3 college-age and 1 older participant). Chi-square analysis revealed no age difference associated with the responses of positive past experience, product convenience, or packaging/presentation.

Decision Task Performance

2 (Age) × 2 (Order) ANOVAs were conducted on mean viewing time for cells accessed, total cells viewed, and total viewing time. There were no differences associated with order on any of the decision task performance measures. Thus, means and standard deviations are collapsed across order for each age group for the decision task performance measures in Table 2. A main effect for age was found on mean viewing time for cells accessed ($F(1,56) = 89.76$, $p < .001$) and total cells viewed ($F(1,56) = 11.72$, $p = .001$). Older adults viewed information cells longer and used less information than college-age adults.

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Table 3. Means, Standard Deviations, and Confidence Intervals Reflecting the Proportion of Times Older and College-Age Participants Accessed Each Feature From the Decision Matrix

	Older		*College-Age*		*95% Confidence Interval*
Feature	*Mean*	SD	*Mean*	SD	*for Age Group Differences*
Active ingredient	.07	.14	.11	.21	–.10 to .18
Dosage	.11	.19	.12	.17	–.15 to .17
Drug interactions	.25	.21	.07	.09	.01 to .36[a]
Price	.08	.21	.27	.25	.05 to .38[a]
Side effects	.28	.28	.17	.20	.10 to .32[a]
Uses	.04	.11	.21	.22	.01 to .33[a]
Warnings	.19	.17	.06	.09	–.03 to .29

a. Confidence intervals do not include zero.

Because the ratio of repetition of product label information and brand name repetition are closely related, a 2 (Measure) × 2 (Age) × 2 (Order) mixed ANOVA was performed. The only significant effect was for type of measure ($F(1,56) = 16.22$, $p < .001$). This indicates that participants organized information about the available OTCs using categories of product label information. Because one of the goals of the study was to determine what information on product labels influences cold/allergy OTC purchase, it was of interest to determine if there were differences in the number of times the product label information available for the seven brand names was accessed by participants. The number of times each type of product label information was accessed by participants was divided by the number of cells viewed from that type of information. The means and standard deviations reflecting the proportion for each type of product label information are presented in Table 3. A 2 (Age) × 2 (Order) × 7 (Product Label Information) mixed ANOVA with product label information treated as a within-subjects variable was conducted and revealed a main effect for age ($F(1,56) = 7.69$, $p = .008$) and product label information ($F(6,51) = 2.88$, $p = .01$). A significant interaction was also found between age and product label information ($F(6,51) = 6.15$, $p < .001$), indicating that older and college-age adults used different information from product labels to make their decisions. The confidence intervals for age group differences in Table 2 show age-related differences in the use of information with regard to drug interactions, price, side effects, and uses.

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Discussion

The first question addressed in the study was, What or who are the sources of information used by consumers when deciding which OTC to purchase? The results indicated that formal care providers and the cautions concerning medication use listed on the label are major sources of information that influence the typical OTC purchases of older adults. Older adults' use of formal care providers as sources of information is consistent with findings of Stoller and her colleagues (Stoller et al., 1993). However, if older adults rely heavily on the recommendations of formal care providers when purchasing OTCs, the question of whether these professionals are providing older adults with the information they need in a timely manner remains to be answered. College-age participants reported that they rely on informal care providers such as family and friends for information when purchasing OTCs, which may reflect their lack of experience in purchasing and using OTCs.

These results support the notion that health care professionals and product labels are important sources of information for older adults about the purchase of cold/allergy OTCs. Because older adults rely heavily on information from health care professionals when making OTC purchasing decisions, it is crucial that these professionals take time to consult with elderly patients about OTC use. This consultation should address which OTCs safely and effectively treat illness symptoms. Any consultation should also stress the importance of reading and understanding product label information. Many pharmacists are now given consultation training and can provide older consumers with accurate advice about their selection of OTCs. Also, pharmacists are likely to be more readily available to consumers than other health care professionals when consumers are making in-store OTC purchasing decisions. For these reasons, physicians and nurses can encourage patients to consult a pharmacist if product label information is incomprehensible or if additional questions arise concerning the safe and effective use of a particular OTC medication. However, because older adults may also purchase OTCs at locations other than pharmacies (e.g., grocery stores, discount stores, etc.) where a pharmacist may not be available, it is crucial that OTC labels are readable and comprehensible to older adults.

The second question addressed in the present study concerned the impact of priming thoughts about advertising on the purchase of cold/allergy OTCs. There were no main effects for order of performing the decision task relative to answering questions concerning recall of advertising except for the listing of brand names typically purchased. These findings suggested that the decision task influenced this listing—not that recalled brand names or television

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commercials influenced participants' decision making. Although this is not a strong test of the influence of advertising, it appears that recalling an advertisement did not prime participants to choose any particular brand name or to search for information in any particular order. This finding is consistent with social perception theory that suggests that people infer their beliefs from environmental factors that provide cues about their beliefs (Bem, 1967). The results also revealed that older adults were able to recall less information from television commercials and recalled fewer brand name cold/allergy OTCs relative to college-age adults, suggesting that due to their poorer memory for advertising, older adults are less likely to be influenced by advertising. These age differences in recall are consistent with previous research showing that free recall declines with age (see Perlmutter, 1988).

The third question addressed in the present study was whether younger and older adults use different decision-making strategies when purchasing OTCs that are consistent with age differences in decision-making strategies that have been previously documented. The finding that older adults take more time to search available information and make a decision than college-age participants is consistent with previous research in other domains (Johnson, 1990, 1993; Riggle & Johnson, 1996). Age-related differences in search time indicate that older adults need more time to search available information when purchasing OTCs, which may simply reflect a slowing in cognitive abilities, although it is also possible that older adults use less information and take longer to view it to be more certain of their processing of that information. This explanation suggests that older adults have developed decision-making strategies that are appropriate to their age, experience, and cognitive abilities.

The finding that older adults search a limited amount of available information is consistent with previous research (Johnson, 1990, 1993; Riggle & Johnson, 1996). One explanation suggests that the search strategies used by older adults require less information than strategies used by college-age adults. Another implies that with fewer cognitive resources older adults cannot "afford" to search more information. A third explanation is that older adults are more familiar with information about OTC medications because they use OTCs more than younger adults. Regardless, this finding suggests that older adults strategically use less product label information, so the information they do use should be prominently displayed and easy to comprehend. The Food and Drug Administration (FDA) has recently called for the design of product labels that enable consumers to more easily acquire product information based on their conclusions that current OTC labels are difficult for many consumers to read and comprehend, especially older consumers

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(Federal Register, 1997). Given that older adults use OTCs more frequently, knowledge of what information is important to older adults can help improve the design of product labels. Patterns in the use of information as reflected in the findings from analyses of the repetitions of product label information and brand names showed that when information is abstracted from labels and presented in tabular form, young adults and older adults organize their searches using product label information. This may be an artifact of the task; however, these findings underscore the importance of formatting information in an accessible way that enables consumers to directly compare products across key types of information.

The last question addressed in this study focused on the types of product label information most important to consumers. Findings indicated that information with regard to side effects was most important to older adults. In contrast, college-age adults indicated that price was most important to them. An analysis of where participants started in their search for information also indicates the product label information most important to participants. These post hoc analyses revealed that older participants starting with side effects contributed to the modal response of their age group, whereas college-age participants starting with price contributed to the modal response for their age group. These findings suggest that the sources of information from product labels chosen as most important to consumers should be prominently displayed on the label. For example, because side effects were important to older adults, this information should be easily accessible by consumers. Understanding the most important sources of product label information could be used to extend research indicating that consumers prefer that product label information appear in a consistent order (Vigilante & Wogalter, 1996). According to this research, participants preferred that indications appear first on the label followed by personal hazard information including warnings, cautions, and drug interactions. Thus, findings from the present study and that of Vigilante and Wogalter could form the basis for designing better product labels that allow consumers improved access to product label information.

The results of the present study are limited for several reasons. First, a self-report questionnaire was used to assess the influence of advertising on the consideration and purchase of OTCs. One disadvantage of a self-report measure is the potential for socially desirable responses. Participants who watch many hours of television or who routinely purchase frequently advertised cold/allergy OTCs may have misrepresented their behavior on the self-report questionnaire. Second, the experimental task limited the ecological validity of the study. In a natural setting, product label information is not as easily accessible as it was in the computerized table of information.

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Additional effort would be required if consumers were to make the comparisons across product label information in the way participants did in this study. Third, only cold/allergy OTCs were examined in the study. Although both younger and older adults use cold/allergy OTCs, there are different age-related patterns for other OTC use. For example, laxatives have a different use pattern among younger and older adults, and this difference in experience may result in different search strategies than those used in this investigation. Fourth, it was not known when the televised commercials recalled by participants were aired (e.g., time of day and year). Differences in the time of day, week, or seasons that different age groups watch television and the variation of cold/allergy symptoms may influence commercial recall. Finally, the sample used in this study was highly educated and quite healthy. Although samples with these characteristics are common in aging research, the frequency of problems caused by improper selection of OTCs could be much more severe in a less educated and less healthy sample and their decision-making strategies correspondingly different.

Another limitation of the present study was that manipulation of questionnaire completion was not a direct test of the influence of advertising on the purchase of OTCs by younger and older adults. A possible solution to this limitation would be to have younger, middle-aged, and older adults view an advertisement and track OTC purchasing behaviors after presentation of the advertisement to determine if age differences exist. However, methods for tracking OTC use are likely to be problematic. One method for tracking OTC purchasing behaviors would be to ask participants to report on their OTC purchases after a set amount of time has passed since advertisement viewing. However, this method may not accurately determine actual OTC purchases because of the problems with self-report information discussed above. Researchers could also measure in-store OTC purchases after advertisement viewing, but this method would be time-consuming, expensive, and invasive. In addition to these difficulties, the effect of advertising may not be adequate for measurement after only one presentation of an advertisement. It may take repeated presentations for an advertisement to influence purchasing behaviors.

Future research may address the limitations of the present study. Researchers should determine if consumers use the same search strategies when deciding which OTC to purchase in a more natural setting. Less educated and less healthy participants should also be included in future studies, given the additional problems that decisions about self-treatment pose for these individuals. Finally, findings from the present study confirm that consumers use product label information when purchasing cold/allergy OTCs. Therefore, as the FDA has suggested, product label information should be

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more easily accessible and comprehensible. Empirical data addressing the issues of what content, format, and wording allow for easier access to and comprehension of product label information could aid the FDA in designing more effective OTC labels.

In summary, the NDMA claimed that most consumers rely on family and friends, advertising, product labels, and health care professionals as sources of information when purchasing OTCs (NDMA, 1992). Data from this study indicated that family and friends are important to college-age but not necessarily older consumers when purchasing cold/allergy OTCs. Priming thoughts related to the advertising of brand name OTCs appears to have little impact on the purchase of cold/allergy OTCs, especially purchases made by older consumers. Product labels are used by consumers when considering and purchasing cold/allergy OTCs, and this study revealed an age difference in the types of product label information used by younger and older consumers. Older participants reported that health care professionals are important sources of information with regard to the purchase of cold/allergy OTCs, which suggests that health care professionals need to allow time to consult with older consumers about OTC purchases. These findings suggest that older adult consumers would greatly benefit from improving the product label information on OTC drugs.

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Article accepted April 17, 2000.

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