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THE PREFERRED ORDER OF OVER-THE-COUNTER (OTC) PHARMACEUTICAL LABEL COMPONENTS

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Recently there has been increasing interest in enabling consumers to more easily acquire information from over-the-counter (OTC) nonprescription pharmaceutical labels. Standardization of label formatting is being considered by industry, government, and health-related professional organizations as a way to facilitate their usability. Standardization can assist consumers in quickly locating information relevant to the safe use of medications. The present research sought to determine whether consumers prefer a certain consistent ordering of OTC drug label component headings. If such consistency is found, the results could serve as a partial basis for a standardized format. Results showed relatively consistent orders across four drugs, three participant groups (adults attending a flea market, older adults, and undergraduates) and four scenarios in which the drugs may be used (scenarios concerning the purchase, consumption, administration to another person, and taking into consideration all possible situations the drug may be used in). A different ordering was found for emergency situations involving the drug. In general, people prefer labels that first provide what the drug is used for (indications), second provide information on associated hazards (warnings, cautions, drug interaction precautions) and use (directions), and third provide information on active ingredients. For emergency situations, however, people prefer having the associated hazards and directions listed first, followed by the indications and active ingredients. The remaining components were ordered (across all scenarios) as follows: safety seal, inactive ingredients, storage instructions, manufacturer information, and the bar code. It is suggested that implementation of label standardization should have sections located to match people's expectations or schemas.

Key Words: Nonprescription medication; Consumer preference; Component ordering; Warnings

INTRODUCTION

IN RECENT YEARS, consumers have assumed more responsibility for their health and medical care. Accordingly, there has been increased interest in better enabling consumers to more easily acquire information from over-the-counter (OTC) nonprescription pharmaceutical labels (1). One set of proposals being considered by industry, government, and health-related professional organizations is OTC label standardization. This interest in standardization derives in part from the highly successful nutrition label which was mandated in the United States in 1990 through passage of the Nutrition Labeling and Education Act (NLEA). The NLEA requires most food products to have "Nutrition Facts" labels (2) with a standardized content and format, for example, word-

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ing and placement of information (3). Widespread belief regarding the benefits of standardization is apparent in the American National Standards Institute's (4) recommended guidelines for consumer product warnings, ANSI Z535.4. This standard specifies particular formats, styles, colors, and words for warning labels, based on the idea that a consistent appearance will facilitate transmission of information to consumers.

Potential Benefits of Label Standardization

What are the potential benefits of standardized labels, in particular, OTC labels? One advantage of a uniform format is that consumers will be able to quickly and accurately locate information on the label (5). This may be important when comparing OTC products in the store, and critical when determining whether a particular medication is appropriate in an emergency medical situation. Also, standardization may help people in becoming more familiar with the expected location of relevant information on drug labels. Consistency in format has been shown to be beneficial in other domains as well. For example, consistent placement of computer command menus and other categorized lists (6) and preservation of information groupings across computer display panels facilitates search speed and accuracy (7). Schneider and Shiffrin (8) have shown that consistent mapping of information leads to automatic, less effortful human information processing producing faster search times compared to varied-mapping of information which involves more effortful serial processing.

Given these and other potential benefits of standardized information formats, the United States Food and Drug Administration (FDA) and other organizations are currently considering the standardization of OTC medication labels. In testimony given to the FDA on OTC drug labeling, representatives of the American Pharmaceutical Association (APhA) (9) focused on four categories of information for possible standardization:

1. Primary use of the product,
2. Dosage,
3. Cautions and major side effects associated with the product's proper use, and
4. Active ingredients.

The APhA offered no recommendations, however, on the order or format of such information on OTC drug labels. In addition, the Nonprescription Drug Manufacturers Association (NDMA) proposed a standard OTC label, but offered no empirical data to support its utility with lay consumers (10). Recently, the United States FDA proposed a set of regulations governing OTC drug label standardization. The proposed regulations focus on the information which should be included on the labels, the organization of the information, and the size and spacing of the print (11). The regulations' purpose is to enhance reading and understanding and ultimately enable consumers to use products safely and effectively (11).

EFFECTS OF WARNING PLACEMENT

OTC drug labels usually contain substantial amounts of information. This may result in important information such as warnings being embedded within other less important information (12). Frantz (13) found that people were more likely to read and comply with warnings embedded in a set of directions for a water-repellent sealer compared to warnings separate from the directions. Wogalter, Godfrey, Fontenelle, Desaulniers, Rothstein, and Laughery (14) using a chemistry laboratory paradigm found that placing a warning before a set of instructions can produce greater behavioral compliance, compared to placing the warning after the instructions. In similar work, Strawbridge (15) found that embedding critical warning information within the warning section for a "Liquid Adhesive" reduced compliance rates compared to placing important information first in the warning. Strawbridge concluded that participants stopped viewing the label after reading the less important information and conse-

quently did not see the more important information.

Label Component Prioritization

Because the information on OTC drug labels is frequently extensive and varies in importance, some form of label component prioritization may be useful in enhancing the likelihood that receivers notice and acquire the most important information. Recent research using product manuals offers some guidance on how to prioritize OTC label components. Product manuals, like many OTC labels, contain substantial amounts of information and the statements' relative importance and its sequence in a list may influence the extent to which people will read the list. Showers, Celuch, and Lust (16) suggested that presenting obvious (already well known) warnings first in a list might deter the reading of subsequent (lesser known) warnings in the list. They were unable to verify this finding, however, in a subsequent study (17).

Using prescription drug labels, Morrow, Leirer, Altieri, and Tanke (19) found that older adults tended to order drug label components into three categories:

1. General identification information on the medication: doctor's name, medication name, and purpose,
2. How to take the medication: dosage, schedule, duration, and warnings, and
3. Possible outcomes from using the medication: mild side-effects, severe side-effects, and emergency information.

In a second experiment, Morrow et al. (19) demonstrated that instructions matching older adults' existing knowledge or schema for taking medications were better remembered and preferred to a less compatible organization of information. Morrow, Leirer, Andrassy, Decker, and Stine-Morrow (20) found the orderings by older adults and undergraduates concurred with those found in their first study (19) suggesting that people share similar schemas for prescription label components. According to Morrow et al. (20), label ordering that is compatible with people's schema facilitates information acquisition.

In other recent research, Vigilante and Wogalter (18) used an empirical procedure to quantify statement order preferences for warnings in product manuals. Participants ordered warning statements taken from various power tool manuals based on how important they believed each statement was for the safe operation of the tool. The results produced a statement ordering (based on mean ranks) that could be predicted by ratings of importance, severity of potential injury, and likelihood of injury. This empirical assessment of warning statements could be useful in prioritizing information components of any kind, including those on OTC drug labels (18). This methodology served as a basis for the procedures employed in the present research.

Practical Implications

The purpose of the present study is to determine whether a consistent ordering of label components based on consumers' expectations can be found for OTC drug labels. Also addressed in the present research is whether a person's judgment of the importance of OTC label components depends on the particular drug. It is possible that for some medications, the warnings and cautions may be viewed as the most important information, whereas for other medications, the indications (what the drug is used for) may be viewed as the most important. Moreover, consumers' judgments may depend on demographic differences such as membership in a particular age group or the situation in which the drug is taken. If such differences exist, then it might not be possible to determine a consistent ordering of label components. If a consistent ordering of label information is found to exist, however, then the question becomes: what is its form? These issues are addressed in the present research.

Information from four actual OTC drug labels was used in the present study. Three population groups (adults attending a flea

market, older adults, and undergraduates) were sampled to increase the study's generalizabiltiy. Older adults were included because they tend to use more medications (21) and they generally experience more difficulty reading OTC medication labels due to age-related vision problems (eg, presbyopia) (22). The flea market sample comprised a general group of potential consumers and the undergraduate group was a convenience sample.

METHOD AND MATERIALS

Materials

The material used as the stimuli came directly from the text of four actual (store-bought) OTC pharmaceutical products:

1. Marezine® (for motion sickness), Himmel Pharmaceuticals Inc., Hypoluxo, FL,
2. Tavist-D® (antihistamine/nasal decongestant), Sandoz Consumer Pharmaceuticals Division, East Hanover, NJ,
3. Nytol® (sleep aid), Block Drug Company Inc., Jersey City, NJ, and
4. New-Skin® (liquid bandage), Medtech Laboratories Inc., Jackson, WY.

The four products represent a sample of available OTC products that consumers might purchase and administer without the advice of a professional health-care provider. Tavist-D® and Nytol® are frequently-advertised products and are probably familiar (in name and its potential use) to most United States citizens, whereas Marezine® and New-Skin® are lesser known products. Familiarity of the drugs, as assessed by a questionnaire following the experimental procedure, was confirmed by the undergraduate and flea market volunteers.

Table 1 shows the headings in the order that they originally appeared on the labels. Tavist-D® and Nytol® each contained 10 components while Marezine® and New Skin® only contained nine. The actual textual information found under each heading for the four drugs was also used in the study but is not shown in the table. The headings and associated textual material were reprinted in 46-point bold and 12-point regular Times font, respectively. The print size was enlarged and held constant with respect to sizes used on the actual drug labels to avoid introducing print size as a confounding variable. Issues associated with print size on drug labels have been investigated in other research (12,22,23). Each heading was accompanied by its associated text and printed on separate 10.2×15.2 cm (4×6 inch) cards.

Procedure

Participants first completed a consent form, then a questionnaire requesting demographic information such as gender, age, and highest education level. Participants were told that they would be ordering a set of label components from four actual nonprescription medications. Participants were given the label components on cards containing the headings and associated text and were asked to arrange them according to the best possible order given the following five scenarios in which they might need to consult the label:

1. **Purchasing:** How would you like to see the headings ordered on the drug label when purchasing this drug?
2. **Taking the medication:** How would you like to see the headings ordered on the drug label when you are about to take this drug?
3. **Administering to another individual:** How would you like to see the headings ordered on the drug label when you are giving this drug to others?
4. **Emergency:** How would you like to see the headings ordered on the drug label if you were involved in an emergency situations caused by this drug (eg, an overdose or allergic reaction)?
5. **For all situations:** What order of headings would you like to see on the drug label taking into account all possible situations that this drug would be involved in—given that there can be only one order of headings on a drug label?

TABLE 1
Original Ordering of Component Headings from the Actual Labels of the Four Drugs

Marezine®	Tavist-D®	Nytol®	New Skin®
Indications	Indications	Safety Sealed	Indications
Directions	Directions	Active Ingredients	Caution
Warnings	Warnings	Inactive Ingredients	Directions
Active Ingredients	Drug Interaction Precaution	Indications	Warnings
Inactive Ingredients	Active Ingredients	Directions	Storage
Storage	Inactive Ingredients	Warnings	Active Ingredients
Manufacturer	Storage	Storage	Manufacturer
Bar Code	Bar Code	Caution	Bar Code
Safety Sealed	Safety Sealed	Manufacturer	Safety Sealed
	Manufacturer	Bar Code	

The participants were given one of the first four scenarios and asked to sort the cards for each of the four drugs. The order of these scenarios, the drug presentations, and the cards for each drug were randomized for each participant and exposure trial. After completing the ordering of components for the four drugs for the first scenario, the sequence was repeated for another scenario; this procedure continued until all drug labels were sorted with respect to the first four scenarios. Finally, participants were asked to arrange the cards according to the single best possible ordering for each of the drugs; this fifth scenario was always presented last.

After the participants sorted the four drugs for each scenario, they were given two sets of rating scales to complete. Participants were first asked to rate the four drugs on the following four reading importance questions using nine-point Likert-type scales with the following numerical and verbal anchors: 0 = not at all important, 2 = somewhat important, 4 = moderately important, 6 = very important, 8 = extremely important. The questions were:

1. **Purchasing:** How important is it to read the directions before purchasing a drug?
2. **Taking:** How important is it to read the directions before taking a drug?
3. **Administering:** How important is it to read the directions before administering the drug to another person?
4. **Emergency:** How important is it to read the directions in an emergency situation caused by a drug?

After completing the reading importance ratings, participants were asked to rate each of the four drugs on four other questions using a nine-point Likert-type scale with the following numerical and verbal anchors: 0 = not at all, 2 = somewhat, 4 = moderately, 6 = very, 8 = extremely. The questions were:

1. **Familiarity:** How familiar are you with this drug?
2. **Hazardous:** How hazardous do you feel this drug to be if misused?
3. **Carefully Read:** How carefully would you read the directions for this drug?
4. **Amount Read:** To what extent would you read the label for this drug?

When the participants completed the ratings, they were debriefed on the study's purpose, thanked for their time, and released.

Participants

A total of 140 individuals participated, and they were composed of three subgroups. One

subgroup consisted of 50 adults solicited at a flea-market in Raleigh, North Carolina (42% females); they had a mean age of 38 (SD = 10.57) ranging from 23 to 60. They reported their highest attained educational level as follows: 6% did not complete high school, 8% completed high school, 28% had some college or trade school, 44% had a bachelors degree, 2% had some postgraduate study, 8% had a masters degree, and 4% had a doctoral degree.

A second subgroup consisted of 40 older adults recruited from a retirement community in Chapel Hill, North Carolina (60% females); they had a mean age of 78 (SD = 7.35) with ages ranging from 61 to 91. They reported their highest attained educational levels as follows: 5% completed high school, 7.5% had some college or trade school, 32.5% had a bachelors degree, 15% had some postgraduate study, 17.5% had a masters degree, and 22.5% had a doctoral degree.

A third subgroup consisted of 50 undergraduates from North Carolina State University, who received credit in their introductory psychology course (60% females); they had a mean age of 19 (SD = 1.76) ranging from 17 to 25.

RESULTS

Mean Ranking

The headings for each drug were ordered and converted to rank scores with low numbers representing positions closer to the top of the label. The mean rankings across all the participants (N = 140) for each label component and for each drug are listed in Table 2. These data were produced using an unweighted means computation given the unequal sample sizes in the three groups. Table 3 lists the mean rankings for each label component across the four drugs for the undergraduates (N = 50), Table 4 lists the mean rankings for the flea-market volunteers (N = 50), and Table 5 lists the mean rankings for the older adults (N = 40).

The component orders for each drug by participant group were first analyzed using the nonparametric multicondition within-subjects Friedman test; all were significant, $ps < .0001$. These analyses were followed by paired comparisons among label components using the Wilcoxon Matched-Pair Signed-Rank test. Because there were as many as 36 pairwise comparisons among components for each drug, alpha error rate was controlled by using the Bonferroni correction technique which indicated the use of a .001 probability level for establishing significance.

Results of the Wilcoxon test for the four drugs can also be found in Tables 2 through 5. The headings in these tables are ordered by mean rank for the fifth or "across all situations" scenario. The subscripts following each component in the table indicate which components are significantly different from other components within each drug/participant grouping. Components with the same letter subscript are not significantly different. These tables show a reasonably consistent ordering of components across the three population groups, the four drugs, and four out of the five scenarios. Generally, the components are arranged in the following order:

1. Indications (always ranked first),
2. Personal Hazard Information (including Warnings, Caution, and Drug Interaction Precautions) and Directions,
3. Active Ingredients, Safety Sealed, and Inactive Ingredients, and
4. Storage, Manufacturer, and Bar Code (in this order).

For emergency situations involving the drug, however, the participants preferred a different ordering:

1. Personal Hazard Information (Warnings, Caution, and Drug Interaction Precautions),
2. Directions,
3. Indications, and
4. Active Ingredients.

The remaining components were ordered identically to the other scenarios.

While the component orders did not vary

TABLE 2
Mean Rank of Headings for All Participants ($N = 140$) in All Situations

Heading	All M	Buying M	Taking M	Giving M	Emergency M
Marezine®					
Indications	1.63[a]	1.78[a]	2.20[a]	2.02[a]	3.26[a]
Warnings	2.63[b]	2.87[b]	2.67[b]	2.72[ab]	1.89[b]
Directions	2.81[b]	2.64[b]	2.33[ab]	2.44[b]	3.24[a]
Active Ingredients	4.41[c]	4.32[c]	4.51[c]	4.56[c]	3.65[a]
Safety Sealed	4.76[c]	4.74[c]	4.55[c]	4.52[c]	5.37[c]
Inactive Ingredients	5.59[d]	5.72[d]	5.88[d]	5.89[d]	5.19[c]
Storage	6.47[e]	6.38[e]	6.27[d]	6.20[d]	6.54[e]
Manufacturer	7.76[f]	7.54[f]	7.65[e]	7.71[e]	6.91[e]
Bar Code	8.96[g]	9.00[g]	8.94[f]	8.93[f]	8.96[f]
Tavist-D®					
Indications	1.87[a]	1.75[a]	5.58[a]	2.25[a]	4.09[a]
Warnings	2.95[b]	3.41[b]	3.16[a]	3.07[b]	2.49[b]
Directions	3.16[b]	3.14[b]	2.73[a]	3.11[b]	3.89[a]
Drug Interaction	3.19[b]	3.28[b]	3.04[a]	3.01[b]	2.54[b]
Active Ingredients	5.41[c]	5.46[c]	5.31[b]	5.41[c]	4.51[a]
Safety Sealed	5.79[c]	5.39[c]	5.44[b]	5.58[c]	5.98[c]
Inactive Ingredients	6.80[d]	6.84[d]	6.73[c]	6.70[d]	6.20[c]
Storage	7.34[d]	7.26[d]	7.42[d]	7.24[d]	7.58[d]
Manufacturer	8.55[e]	8.52[e]	8.64[e]	8.65[e]	7.81[d]
Bar Code	9.96[f]	9.94[f]	9.93[f]	9.97[f]	9.96[e]
New Skin®					
Indications	1.93[a]	1.79[a]	2.50[a]	2.28[a]	3.59[a]
Caution	2.94[b]	3.27[b]	2.98[a]	2.96[b]	2.59[b]
Directions	3.06[bc]	2.93[b]	2.61[a]	2.75[ab]	3.41[a]
Warnings	3.59[c]	3.94[c]	3.76[b]	3.76[c]	2.82[ab]
Safety Sealed	5.14[d]	4.94[d]	4.87[c]	4.92[d]	5.35[c]
Active Ingredients	5.20[d]	5.22[d]	5.23[c]	5.41[d]	4.59[c]
Storage	6.61[e]	6.51[e]	6.48[d]	6.37[e]	6.70[d]
Manufacturer	7.59[f]	7.49[f]	7.72[e]	7.59[f]	7.01[e]
Bar Code	8.94[g]	8.96[g]	8.96[f]	8.94[g]	8.94[f]
Nytol®					
Indications	1.70[a]	1.94[a]	2.64[a]	2.61[a]	4.06[a]
Warnings	3.06[b]	3.34[b]	3.10[a]	2.81[ab]	2.22[b]
Directions	3.27[b]	3.11[b]	2.77[a]	2.99[ab]	3.93[a]
Caution	3.42[b]	3.46[b]	3.12[a]	3.14[b]	2.87[c]
Active Ingredients	5.24[c]	5.63[c]	5.35[b]	5.26[c]	4.31[a]
Safety Sealed	5.79[cd]	5.46[c]	5.44[b]	5.54[c]	6.22[d]
Inactive Ingredients	6.61[d]	6.88[d]	6.71[c]	6.74[d]	6.22[d]
Storage	7.49[e]	7.30[d]	7.39[d]	7.31[d]	7.47[e]
Manufacturer	8.36[f]	8.22[e]	8.53[e]	8.58[e]	7.77[e]
Bar Code	9.99[g]	9.97[f]	9.95[f]	9.99[f]	9.92[f]

much, significant differences among the components varied depending on the drug and participant group. The older adults showed the fewest statistically separate or distinct groupings of label components. This result might be partly due to two factors. Sample size was smaller in this group compared to the other two groups making the means less stable or the order assignments by individuals in this group were more variable.

The flea-market volunteers and undergraduates were highly similar in terms of order and number of distinct groupings of components. The undergraduate population's

TABLE 3
Mean Rank of Headings for Undergraduates ($N = 50$) in all Situations

Heading	All M	Buying M	Taking M	Giving M	Emergency M
Marezine®					
Indications	1.52[a]	1.52[a]	1.66[a]	1.56[a]	3.14[a]
Warnings	2.40[b]	2.74[b]	2.70[b]	2.56[b]	1.88[b]
Directions	3.42[c]	2.94[b]	2.72[bc]	2.96[bc]	3.14[a]
Active Ingredients	4.40[c]	4.38[c]	4.72[d]	4.72[d]	3.98[ac]
Safety Sealed	4.58[cd]	4.76[cd]	4.28[cd]	4.46[cde]	5.28[cde]
Inactive Ingredients	5.66[de]	5.78[de]	5.92[e]	5.86[fe]	5.34[d]
Storage	6.26[e]	6.08[e]	6.16[e]	5.96[f]	6.38[df]
Manufacturer	7.78[f]	7.80[f]	7.84[f]	7.96[g]	6.88[ef]
Bar Code	9.02[g]	9.00[g]	9.00[g]	8.96[h]	8.98[g]
Tavist-D®					
Indications	1.80[a]	1.42[a]	2.02[a]	1.72[a]	3.98[a]
Drug Interaction	2.58[ab]	2.92[b]	2.72[ab]	2.72[b]	2.28[b]
Warnings	3.12[b]	3.48[b]	3.42[bc]	3.38[b]	2.40[b]
Directions	4.28[c]	3.52[b]	3.30[bd]	3.48[b]	4.10[a]
Active Ingredients	5.28[c]	5.44[c]	5.58[de]	5.64[d]	4.74[ac]
Safety Sealed	5.34[cd]	5.56[cd]	4.92[cde]	5.44[de]	6.06[cd]
Inactive Ingredients	6.60[de]	6.78[de]	6.84[f]	6.80[ef]	6.18[d]
Storage	7.26[e]	7.12[e]	7.24[f]	7.02[f]	7.46[e]
Manufacturer	8.74[f]	8.76[f]	8.88[g]	8.80[g]	7.82[e]
Bar Code	10.00[g]	10.00[g]	9.98[h]	10.00[h]	9.98[f]
New Skin®					
Indications	1.70[a]	1.40[a]	1.98[a]	1.78[a]	3.62[a]
Caution	2.82[b]	3.02[b]	2.80[a]	3.00[b]	2.52[a]
Warnings	3.20[cd]	3.76[bc]	3.66[bc]	3.62[bc]	2.80[a]
Directions	4.04[cd]	3.28[b]	3.06[ab]	3.24[b]	3.22[a]
Safety Sealed	4.74[de]	5.18[cd]	4.70[cd]	4.78[cd]	5.42[b]
Active Ingredients	5.22[e]	5.16[d]	5.52[d]	5.46[de]	4.94[b]
Storage	6.52[f]	6.42[e]	6.36[e]	6.22[e]	6.58[c]
Manufacturer	7.76[g]	7.78[f]	7.92[f]	7.90[f]	7.00[c]
Bar Code	9.00[h]	9.00[g]	9.00[g]	8.98[g]	8.90[d]
Nytol®					
Indications	1.70[a]	1.48[a]	1.96[a]	1.86[a]	3.84[ab]
Warnings	2.88[a]	3.26[a]	3.24[b]	3.02[b]	2.04[c]
Caution	3.20[a]	3.22[a]	3.02[ab]	3.08[b]	3.12[a]
Directions	4.24[a]	3.42[a]	3.20[b]	3.58[bc]	3.92[ab]
Active Ingredients	5.18[b]	5.40[b]	5.58[c]	5.52[d]	4.60[b]
Safety Sealed	5.42[bc]	5.60[bc]	5.06[c]	5.20[cde]	6.24[de]
Inactive Ingredients	6.54[cd]	6.76[cd]	6.84[d]	6.72[ef]	6.10[d]
Storage	7.16[d]	7.12[d]	7.22[d]	7.02[f]	7.26[df]
Manufacturer	8.68[e]	8.74[e]	8.88[e]	8.90[g]	7.92[fe]
Bar Code	10.00[f]	10.00[f]	10.00[f]	10.00[h]	9.96[g]

overall (all) ordering most closely resembled the original component orderings for the Marezine®, Nytol®, and New-Skin® drug labels. The flea-market's overall (all) ordering most closely resembled the original ordering on the Tavist-D® label.

Ratings of Importance of Reading Labels

Separate 3 (participant group) X 4 (drug) ANOVAs were performed on each of the reading importance questions for each sce-

TABLE 4
Mean Rank of Headings for the Flea-Market Participants ($N = 50$) in All Situations

Heading	All M	Buying M	Taking M	Giving M	Emergency M
Marezine®					
Indications	1.70[a]	1.98[a]	2.88[a]	2.66[a]	4.20[a]
Directions	2.40[ab]	2.26[a]	1.70[b]	2.02[a]	3.72[abc]
Warnings	2.68[b]	3.08[b]	2.58[a]	2.60[a]	1.36[d]
Active Ingredients	4.30[c]	4.24[c]	4.30[c]	4.30[b]	2.84[b]
Safety Sealed	5.12[cd]	4.62[bcd]	4.96[cd]	4.58[bc]	5.62[a]
Inactive Ingredients	5.30[d]	5.72[d]	5.84[de]	5.82[cd]	4.80[ac]
Storage	6.66[e]	6.66[e]	6.48[ef]	6.64[d]	7.04[f]
Manufacturer	7.88[f]	7.44[f]	7.38[f]	7.52[e]	6.48[ef]
Bar Code	8.96[g]	9.00[g]	8.88[g]	8.86[f]	8.96[g]
Tavist-D®					
Indications	1.74[a]	1.74[a]	3.06[ab]	2.58[ab]	5.12[ab]
Warnings	2.34[ab]	3.12[bc]	2.82[a]	2.56[a]	1.92[c]
Directions	2.52[b]	2.68[b]	2.06[a]	2.78[ac]	4.20[a]
Drug Interaction	3.76[c]	3.84[cd]	3.38[b]	3.40[bc]	2.34[c]
Active Ingredients	5.36[d]	5.70[e]	5.06[c]	5.24[d]	3.98[a]
Safety Sealed	6.30[de]	5.08[de]	6.02[cd]	5.78[de]	6.12[bd]
Inactive Ingredients	7.10[ef]	7.16[f]	6.58[d]	6.70[ef]	6.14[bd]
Storage	7.46[f]	7.36[f]	7.62[e]	7.42[f]	7.76[e]
Manufacturer	8.42[g]	8.32[g]	8.48[f]	8.58[g]	7.50[de]
Bar Code	10.00[h]	10.00[h]	9.92[g]	9.96[h]	9.92[f]
New Skin®					
Indications	1.96[a]	1.86[a]	3.08[a]	2.78[ab]	4.10[ab]
Directions	2.24[ab]	5.52[ab]	1.90[b]	2.08[a]	3.70[ac]
Caution	2.98[b]	3.48[bcd]	2.94[a]	2.76[a]	2.48[c]
Warnings	3.80[c]	4.30[ce]	3.76[ac]	3.82[b]	2.48[c]
Active Ingredients	5.20[d]	5.36[ef]	5.08[d]	5.44[c]	4.16[ab]
Safety Sealed	5.84[de]	4.84[de]	5.14[cd]	5.42[c]	5.42[bd]
Storage	6.60[e]	6.44[fg]	6.56[e]	6.50[d]	6.78[e]
Manufacturer	7.44[f]	7.26[g]	7.66[f]	7.24[e]	6.92[de]
Bar Code	8.94[g]	8.94[h]	8.92[g]	8.96[f]	8.96[f]
Nytol®					
Indications	1.58[a]	2.10[a]	2.86[ab]	3.46[ab]	5.00[ab]
Directions	2.34[b]	2.76[ab]	2.06[a]	2.14[ac]	4.40[a]
Warnings	3.22[c]	3.28[b]	2.98[b]	2.42[c]	1.94[c]
Caution	3.40[c]	3.74[b]	3.18[b]	2.94[bc]	2.28[c]
Active Ingredients	5.40[d]	5.58[c]	5.24[c]	5.04[d]	3.64[a]
Safety Sealed	6.32[de]	5.28[c]	6.00[cd]	6.14[de]	6.34[bd]
Inactive Ingredients	6.70[e]	7.26[d]	6.74[d]	6.86[ef]	6.12[bd]
Storage	7.86[f]	7.46[d]	7.74[e]	7.70[fg]	7.86[e]
Manufacturer	8.20[f]	7.72[d]	8.24[e]	8.34[g]	7.44[de]
Bar Code	9.98[g]	9.94[e]	9.96[f]	9.96[h]	9.98[f]

nario (purchasing, taking, administering, and emergency). All of the ANOVAs showed significant main effects and a significant interaction of participant group and drug, $ps < .05$. Table 6 shows the means. Tukey's HSD test among the participant group means showed that for all scenarios the flea-market volunteers' ratings were significantly higher than the undergraduates ($p < .05$). The older adults were intermediate and significantly

TABLE 5
Mean Rank of Headings for the Older Adults ($N = 40$) in All Situations

Heading	All M	Buying M	Taking M	Giving M	Emergency M
Marezine®					
Indications	1.68[a]	1.85[a]	2.03[a]	1.80[a]	2.23[a]
Directions	2.55[ab]	2.73[a]	2.63[ab]	2.33[ab]	2.75[a]
Warnings	2.85[b]	2.78[a]	2.75[a]	3.08[b]	2.58[a]
Safety Sealed	4.53[c]	4.88[bc]	4.38[bcd]	4.53[bcd]	5.18[bc]
Active Ingredients	4.58[c]	4.35[b]	4.50[c]	4.68[c]	4.28[b]
Inactive Ingredients	5.85[cd]	5.65[cd]	5.88[d]	6.03[d]	5.48[c]
Storage	6.50[d]	6.43[d]	6.15[d]	5.95[d]	6.10[c]
Manufacturer	7.58[e]	7.35[e]	7.75[e]	7.65[e]	7.48[d]
Bar Code	8.90[f]	9.00[f]	8.95[f]	8.98[f]	8.95[e]
Tavist-D®					
Indications	2.13[a]	2.18[a]	2.68[a]	2.50[a]	2.95[a]
Directions	2.58[ab]	3.23[ab]	2.85[a]	3.08[a]	3.25[ab]
Drug Interaction	3.25[ab]	3.03[ab]	3.00[a]	2.90[a]	3.10[ab]
Warnings	3.53[b]	3.70[bc]	3.28[a]	3.33[a]	3.30[a]
Active Ingredients	5.63[c]	5.20[d]	5.30[b]	5.35[b]	4.90[bc]
Safety Sealed	5.73[cd]	5.58[cde]	5.35[bc]	5.50[bc]	5.70[cd]
Inactive Ingredients	6.68[d]	6.53[ef]	6.78[cd]	6.58[cd]	6.30[de]
Storage	7.30[d]	7.33[f]	7.43[cd]	7.28[d]	7.50[ef]
Manufacturer	8.48[e]	8.48[g]	8.53[e]	8.55[e]	8.18[f]
Bar Code	9.85[f]	9.78[h]	9.88[f]	9.95[f]	9.98[g]
New Skin®					
Indications	2.18[a]	2.18[a]	2.43[a]	2.28[a]	2.93[a]
Directions	2.88[abc]	3.00[ab]	2.93[ab]	2.98[ab]	3.28[ab]
Caution	3.03[ab]	3.33[abc]	2.95[ab]	3.18[ab]	2.83[a]
Warnings	3.83[bd]	3.70[bc]	3.88[bc]	3.88[bc]	3.28[ac]
Safety Sealed	4.78[cde]	4.75[cd]	4.75[bde]	4.48[bd]	5.18[cde]
Active Ingredients	5.18[e]	5.13[d]	5.05[cd]	5.30[cd]	4.67[bd]
Storage	6.75[f]	6.70[e]	6.53[e]	6.43[e]	6.75[ef]
Manufacturer	7.58[f]	7.40[e]	7.55[f]	7.63[f]	7.15[f]
Bar Code	8.88[g]	8.93[f]	8.95[g]	8.88[g]	8.95[g]
Nytol®					
Indications	1.85[a]	2.30[a]	3.23[ab]	2.50[a]	3.15[ab]
Warnings	3.08[b]	3.50[abc]	3.08[a]	3.03[ab]	2.80[a]
Directions	3.23[bc]	3.18[b]	3.13[a]	3.30[abc]	3.35[ab]
Caution	3.73[cd]	3.43[ab]	3.18[a]	3.48[bd]	3.30[ab]
Active Ingredients	5.13[e]	5.05[cd]	5.20[bc]	5.20[e]	4.80[bc]
Safety Sealed	5.58[def]	5.50[de]	5.20[cd]	5.23[cdef]	6.05[cd]
Inactive Ingredients	6.58[fg]	6.55[ef]	6.50[de]	6.60[fg]	6.50[cde]
Storage	7.43[g]	7.33[f]	7.18[e]	7.20[g]	7.25[de]
Manufacturer	8.18[h]	8.20[g]	8.50[f]	8.48[h]	8.00[e]
Bar Code	9.98[i]	9.98[h]	9.88[g]	10.00[i]	9.80[f]

different from the other two groups except they were not significantly different from the flea market-volunteers for administering the drug to another or from the undergraduates for emergencies. Tukey's HSD test also showed that reading importance for the New-Skin® label was significantly lower than the other three drugs in all four scenarios ($ps < .05$).

The participant group by drug cell means in Table 6 show that the reading importance ratings across the drugs were consistent across the three participant groups except for

TABLE 6
Mean Ratings for Importance for Reading the Directions in Each of the Scenarios Across the Four Drugs and Three Population Groups

Population	Marezine®	Tavist-D®	Nytol®	New Skin®	Mean
Importance in reading the label when *purchasing* the medication					
Flea Market	7.86_a	7.64_a	7.76_a	7.56_a	7.66_a
Older Adults	7.33_a	7.00_b	7.23_a	6.45_b	7.00_b
Undergraduates	5.72_b	5.86_c	5.98_b	4.28_c	5.46_c
Mean	6.91_a	6.83_a	6.99_a	6.10_b	
Importance in reading the label when *taking* the medication					
Flea Market	7.82_a	7.88_a	7.80_a	7.72_a	7.81_a
Older Adults	7.30_b	7.25_b	7.18_b	6.65_b	7.09_b
Undergraduates	6.70_c	6.68_c	6.78_b	4.98_c	6.28_c
Mean	7.27_a	7.27_a	7.25_a	6.44_b	
Importance in reading the label when *administering* the medication to another					
Flea Market	7.80_a	7.80_a	7.76_a	7.66_a	7.56_a
Older Adults	7.45_{ab}	7.60_a	7.40_{ab}	7.18_a	7.41_a
Undergraduates	7.20_b	7.00_b	7.00_b	5.64_b	6.70_b
Mean	7.48_a	7.47_a	7.39_a	6.83_b	
Importance in reading the label in *emergency* situations caused by the drug					
Flea Market	7.88_a	7.86_a	7.84_a	7.86_a	7.86_a
Older Adults	7.25_b	7.45_{ab}	7.18_b	6.75_b	7.16_b
Undergraduates	7.26_b	7.22_b	7.04_b	6.26_b	6.95_b
Mean	7.46_a	7.51_a	7.35_a	6.96_b	

*All comparisons are made within columns, except the overall drug means which are compared within a row.

New-Skin® where the undergraduates gave lower ratings than the other two groups.

Other Ratings

The ANOVA on the familiarity ratings produced main effects for participant group, $F(2, 137) = 12.48$, $p < .0001$, and drug, $F(3, 137) = 122.75$, $p < .0001$. The older adults gave significantly lower familiarity ratings ($ps < .05$) than the other two groups who did not significantly differ. Nytol(R) was rated most familiar followed by Tavist-D®, New-Skin®, and Marezine®. Comparisons showed that all of the drug means were significantly different ($ps < .05$). The interaction was also significant, $F(6, 137) = 25.26$, $p < .0001$. The cell means in Table 7 show that New-Skin® and Marezine® were given low familiarity ratings across all participant groups. Nytol® and Tavist-D® were judged as more familiar by both the undergraduates and flea-market volunteers. The older adults, however, gave relatively low familiarity ratings for all of the drugs.

The ratings of perceived hazard produced main effects for participant group, $F(2, 137) = 41.45$, $p < .0001$, and drug, $F(3, 137) = 65.18$, $p < .0001$. The flea market volunteers' hazard ratings were significantly higher than the undergraduates and older adults ($ps < .05$), with the later two groups not differing significantly. Nytol® was rated most hazardous followed by Marezine®, Tavist-D®, and New-Skin®. All were significantly different except that Marezine® was not different from Nytol® or Tavist-D®. The interaction was also significant, $F(6, 137) = 17.95$, $p < .0001$. The drug hazard ratings were consistent across participant groups except New-Skin® which was rated significantly less hazardous by the undergraduates and older adults compared to the flea-market volunteers.

The bottom half of Table 7 shows the

TABLE 7
Mean Ratings for Each of the Four Dimensions

Population	Marezine®	Tavist-D®	Nytol®	New Skin®	Mean
How *familiar* are you with this drug?					
Flea Market	0.76_a	2.72_a	7.28_a	0.04_a	2.80_a
Older Adults	1.08_b	1.80_a	2.85_b	2.10_b	1.96_b
Undergraduates	0.76_a	4.86_b	5.26_c	2.14_b	3.26_a
Mean	0.87_a	3.13_b	5.13_c	1.55_d	
How *hazardous* do you feel this drug to be if misused?					
Flea Market	7.72_a	7.70_a	7.78_a	7.60_a	7.70_a
Older Adults	5.62_b	5.38_b	5.70_b	4.05_b	5.20_b
Undergraduates	6.06_b	6.06_c	6.82_c	3.52_b	5.62_b
Mean	6.47_{ab}	6.38_a	6.77_b	5.06_c	
How *carefully* would you read the directions for this drug?					
Flea Market	7.90_a	7.92_a	7.84_a	7.78_a	7.86_a
Older Adults	6.80_b	6.93_b	6.90_b	6.28_b	6.73_b
Undergraduates	6.70_b	5.88_c	6.18_c	4.54_c	5.83_c
Mean	7.13_a	6.91_a	6.97_a	6.20_b	
To what *extent* would you read the label for this drug?					
Flea Market	7.88_a	7.88_a	7.88_a	7.80_a	7.86_a
Older Adults	6.98_b	6.85_b	6.80_b	6.28_b	6.73_b
Undergraduates	6.70_b	5.92_c	5.90_c	4.34_c	5.72_c
Mean	7.19_a	6.88_a	6.86_a	6.14_b	

*All comparisons are made within columns, except the overall drug means which are compared within a row.

ratings for the two questions "How carefully would you read the drug label?" and "To what extent would you read the drug label?" Both questions produced nearly the same pattern of means, and both produced main effects for participant group, $F(2, 137) = 39.57$ and 25.57, $ps < .0001$, respectively, and drug, $F(3, 137) = 22.41$ and 47.36, $p < .0001$, respectively. The flea-market volunteers' ratings were significantly higher than the older adults, who were, in turn, significantly higher than the undergraduates ($ps < .05$). New-Skin® received significantly lower ratings than the other three drugs ($ps < .05$). The interactions were also significant, $F(6, 137) = 9.39$ and 10.45, $ps < .0001$, respectively. The pattern of means was similar to the hazard ratings and the importance ratings discussed previously. Again New-Skin® showed differences as a function of participant group that were not seen for the other three drugs. The ratings for New-Skin® were significantly lower for the undergraduates and older adults compared to the flea-market volunteers.

DISCUSSION

This study provides evidence for the existence of a preferred order of drug label components. The results showed reasonably consistent ordering of information across drugs, participant groups, and four out of five scenarios. If people did not have ordering preferences, then the components would have been ordered randomly and there would have been no (or only a few, as a result of chance) statistically significant differences between the components.

In particular the results show that people expect/desire labels first to indicate what the drug is used for (Indications); second, to indicate the hazards associated with the drug (Warnings, Cautions, Drug Interaction Precautions) and how to use the drug (Direc-

tions); and third, to indicate the chemicals involved (Active and Inactive Ingredients). The other components in order were Safety Sealed, Storage, the Manufacturer, and Bar Code.

Many of the sections within each grouping did not differ from each other. The implication of this finding is that statistically it does not matter which sections are presented first within each grouping. On other grounds, however, it may be important to place one section before another to facilitate communication of certain information to consumers. For example, although location of the directions and warnings components in general did not significantly differ in this study it might be better to place the warnings before the directions because when scanning down the label people may not see the warnings after reading the directions if the warnings are placed after the directions.

The results found in this study are similar to those reported by Morrow et al. (19) in which older adults preferred prescription drug information to be ordered according to:

1. What the product is and used for,
2. How the drug should be taken, and
3. Warnings, hazards, and emergency information associated with the drug.

Morrow et al. (19,20) suggest that these orderings reflect people's mental models of how to take medications, and proper use of relevant label information is likely to be facilitated when the design of drug labels accommodates consumer's preexisting cognitions (20).

The Non-Prescription Drug Manufacturer Association (NDMA) recently recommended a standard label format for OTC medications to the FDA (10). A representation of this format is shown in Table 8. In general, the NDMA design corresponds to the present study's empirical findings except for the placement of the active ingredients section which is placed first on the NDMA label. The participants did not prefer active ingredients listed first for any drug or scenario. Most lay consumers have little or no knowledge of the chemical/pharmaceutical "names" of the ingredients. Therefore, this information has little value in terms of recognition or understanding to most consumers about the purpose, usage, or potential dangers of a drug. While chemical ingredients may be important information to experts, as they could cue extensive knowledge on the drug's purpose, actions, and cautions, the purpose of OTC drugs is self-medication by a wide variety of nonexperts. Therefore, OTC drug label organization should be based on lay persons' mental models and not the professionals'. Furthermore, if the placement of ingredients is standardized, it is likely that professionals would be able to quickly and automatically find relevant information in the middle of a list given repeated exposure to and practice with the format.

Many of the OTC drug labels on the market today already order drug information similar to that found in this study, as evidenced by three of the drugs (Marezine®, Tavist-D®, and New Skin® being arranged in a manner consistent with the drugs' original labels (Table 1). Participants orderings for Nytol®, however, were substantially different from the original label.

The ratings from this study indicate that people generally believe that it is important to carefully read OTC medication labels. This supports the notion that OTC drug labels should be organized in a way that facilitates reading. The pattern of means also suggest that people (especially students) are less likely to carefully read the directions for a drug that they perceive as less hazardous (or safe). This finding is consistent with other research involving various kinds of consumer products (24,25). Together this research points to the difficulty of motivating people to read information on labels of products that they believe are safe. This tendency can be a particular problem when people's beliefs do not concur with the actual level of hazard associated with a product. Additional research is needed to determine the factors that will produce appropriate beliefs regard-

TABLE 8
A Representation of the Non-Prescription Drug Manufacturers Association's Suggested OTC Label

Active Ingredients Action FOR: DIRECTIONS: WARNINGS: Do not use: If . . . Do not use without asking a doctor if you have: Do not use without asking a doctor if you are: When using this product: Stop use and ask a doctor if: Keep out of reach of children. In case of accidental overdose, seek professional assistance or call a Poison Control Center right away.	Brand Name 30 mg tablets Temporary relief of . . . Storage: Inactive Ingredients: Manufacturer: Bar Code

ing OTC drug safety and motivate people to read the labels.

Given the reasonably consistent orders generated by participants in this and the research by Morrow et al. (19,20), if OTC label standardization is implemented the ordering should roughly reflect these empirical findings. It is important to note, however, that the emergency scenario produced a somewhat different pattern than the other scenarios. This finding should be considered with respect to label standardization because arguably this situation is among the most critical where information acquisition is time constrained and under duress. Nevertheless, an overall scenario was included where participants arranged the label components considering all of the situations that they need to read the label including the emergency situation and these results were consistent with the basic orderings described earlier.

Besides the ordering of label components, there are other factors that may be important for OTC labels that need to be addressed in research. These include:

1. A consideration of the size of component sections relative to the label configuration and space available (eg, sections may be too long for a single column of text on some containers and may not fit or look right in some label arrangements),
2. Whether or not pictorials/icons should be included,
3. The possible need for flexibility when a drug has critical lesser-known risks that need to be communicated to consumers,
4. Whether to use bullet-type marks to highlight main points, and
5. How to make the trade-off between print size and white space in label format and design. The latter will facilitate reading by individuals with vision problems (eg, presbyopia) and the former will make the label more attractive enhancing the likelihood that it will be read.

It is also necessary to consider the potential negative effects of label standardization. One potentially important downside of standardization is that consumers may become overly familiar and begin to habituate to the consistent formatting; ultimately, missing important safety information. Problems can also arise if a product is changed in some fashion (eg, a revision in ingredients or dosage); consumers may become so accustomed to a particular format that they may not notice

subtle differences. The communication of new information might (or might not) be more difficult with standardized labels and thus would seem to require an empirical test to assess the impact. Another potential problem is deciding which headings should be contained on all labels (and which might be optional), what the names of the headings should be, and where information should be placed. Of the four drugs used in this study, none had exactly the same set of headings.

The basis of label designs and formats should include evaluations from consumers to empirically determine whether the labels are usable. Future research in which performance (eg, accuracy and response time) in information search tasks is measured should also be conducted to determine whether a standard preferred ordering of information does indeed facilitate label information search and acquisition. Research conducted for the purpose of finding the best ways to present information is likely to benefit consumers by facilitating knowledge acquisition, promoting proper use, and preventing negative outcomes.

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REFERENCES

1. U.S. Food and Drug Administration. Public Hearing on Over-the-Counter Drug Labeling, Washington, DC, Sept. 29, 1995.
2. *Federal Register.* 1991: Vol. 56, no 229, Nov. 27. Dept. of Agriculture, Food Safety and Inspection Service.
3. Wogalter MS, Kalsher MJ, Litynski DM. Influence of food label quantifier terms on connoted amount and purchase intention. *Proceedings of the Human Factors and Ergonomics Society 40th Annual Meeting.* 1996.
4. ANSI. *American National Standard for Safety Warnings.* Washington DC: American National Standards Institute; 1991.
5. Wogalter MS, Kalsher MJ. Product label list format of item arrangement and completeness on comparison time and accuracy. *Proceedings of the Human Factors and Ergonomics Society 38th Annual Meeting.* 1994;389–393.
6. Somberg BL. A comparison of rule-based and positionally constant arrangement of computer menu items. *Chi 1987 Proceedings.* 1987;150–153.
7. Tullis TS. *Predicting the usability of alphanumeric displays.* Ph.D. dissertation, Rice University; 1984.
8. Schneider W, Shiffrin RM. Controlled and automatic human information processing: I. Detection, search, and attention. *Psychol Rev.* 1977;1–66.
9. Engle JP. Testimony of the American Pharmaceutical Association: FDA Public Hearing on Over-the-Counter Drug Labeling, Sept. 29, 1995.
10. Testimony of the Non-Prescription Drug Manufacturers Association: FDA Public Hearing on Over-the-Counter Drug Labeling. Sept. 29, 1995.
11. *Federal Register.* 1997: Vol. 62, no 39, Feb. 27. Over-the-Counter Human Drugs: Proposed Labeling Requirements. Food and Drug Administration.
12. Wogalter MS, Dietrich DA. Enhancing label readability for over-the-counter pharmaceuticals by elderly consumers. *Proceedings of the Human Factors and Ergonomics Society 39th Annual Meeting.* 1995; 143–147.
13. Frantz JP. Effect of location and procedural explicitness on user processing of and compliance with product warnings. *Human Factors.* 1994;36(3):532–546.
14. Wogalter MS, Godfrey S, Fontenelle G, Desaulniers D, Rothstein P, Laughery, K. Effectiveness of warnings. *Human Factors.* 1987;29(5):599–612.
15. Strawbridge JA. The influence of position, highlighting, and imbedding on warning effectiveness. *Proceedings of the Human Factors and Ergonomics Society 30th Annual Meeting.* 1988;716–720.
16. Showers LS, Celuch KG, Lust JA. Consumers' use of product owner manuals. *Advanc Consumer's Interest.* 1992;4(1):22–28.
17. Lust JA, Celuch KG, Showers L. An investigation of the effects of placement of obvious warnings and safety warning format in product manuals. *Proceedings of the Marketing and Public Policy Conference.* Atlanta: Georgia State University; 1995:11–20.
18. Vigilante WJ Jr, Wogalter MS. On the prioritization of safety warnings in product manuals. *Int J Ind Ergonomics.* In press.
19. Morrow DG, Leirer VO, Altieri P, Tanke ED. Elders' schema for taking medication: implications for instruction design. *J Gerontol.* 1991;46:378–385.
20. Morrow DG, Leirer VO, Andrassy JM, Tanke ED, Stine-Morrow EAL. Medication instruction design: Younger and older adult schemas for taking medications. *Human Factors.* 1996;38(4):556–573.
21. Morrow, DG, Leirer VO, Sheikh J. Adherence and medication instructions: Review and recommendations. *J Am Geriatric Soc.* 1988;36:1147–1160.
22. Watanabe RK. The ability of the geriatric population to read labels on over-the-counter medication bottles. *J Am Optometric Assoc.* 1994;65:32–37.
23. Wogalter MS, Magurno A, Scott K, Dietrich DA.

Facilitating information acquisition for over-the-counter drugs using supplemental labels. *Proceedings of the Human Factors and Ergonomics Society 40th Annual Meeting*. 1996;732–736.

24. Godfrey SS, Allender L, Laughery KR, Smith VL. Warning messages: Will the consumer bother to look? *Proceedings of the Human Factors Society 27th Annual Meeting*. 1983;950–954.
25. Wogalter MS, Brelsford JW, Desaulniers DR, Laughery KR. Consumer product warnings: The role of hazard perception. *J Safety Res*. 1991;22:71–82.
26. Vigilante WJ Jr, Wogalter MS. The ordering of over-the-counter pharmaceutical label components. *Proceedings of the Human Factors and Ergonomics Society 40th Annual Meeting*. 1996;141–145 .