

Consumer Awareness of and Preference for Flame Retardant Apparel*

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防炎加工된 衣類에 對한 消費者들의 意識도와 嗜好도에 關하여

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國文要約

本 研究의 目的은 1. 防炎 加工된 衣類에 對한 消費者들의 認識도를 測定하고 2. 防炎 關係 法規를 擴大하여 12歲 以上の 어린이나 其他 年齡層에서도 防炎 加工된 衣類를 願하는지를 알아보고 3. 磷酸鹽系 防炎 加工劑 使用 禁止 措置가 防炎 加工 衣類에 對한 消費者들의 嗜好도에 影響을 미쳤는지 알아 보기로 하였다.

Alabama, Tuscaloosa 市에 있는 國民學校와 幼兒院에 다니는 어린이의 學父母 230名에게 1979년 9月 26日 質問紙를 配付하여 그後 3日부터 10日까지 質問紙를 回收하여 83장의 有効한 資料를 얻었다.

83名の 學父母를 Group 1: 幼兒院에 다니는 어린이의 父母 45명 Group 2: 國民學校에 다니는 어린이의 父母 38명으로 나누고, 두 Group의 各 目的에 對한 留意度を 알아 보기 위하여 Cattell's Profile Analysis를 하였다. 目的 1과 2에 對하여서는 Group間의 留意도가 發見되지 않았으며 目的 3에 對하여서는 Group間의 留意도가 發見되었다. 目的 3의 各 項目에 對하여 t-tests를 行하였다.

結果에 依하면 應答者들은 1. 防炎 加工된 잠옷이 市場에서 널리 팔리고 있음은 알고 있으나 防炎 加工에 關連된 關係法規에 對하여 完全히 理解하지 못하고 있었으며 2. 防炎 加工에 關連된 法規를 擴大하여 어린이나 老人層의 衣服이 防炎 加工되기를 願하고 있으며, 3. 市場에서 防炎 加工된 衣類와 防炎 加工되지 않은 衣類가 함께 진열되어서 選擇할 수 있는 契機를 願하고 있으며, 4. 幼兒의 父母들이 國民學生의 父母보다 防炎 加工의 害毒성에 對한 精確한 知識을 갖고 있었다. 그러나 이들 모두가 磷酸鹽系 防炎 加工劑의 害성에 對한 精確한 知識은 없었다.

I. Introduction

United States Consumer Product Safety

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Commission (U.S. CPSC) estimated that 21,000 injuries were caused annually by burns from flammable fabrics, and the financial losses due to flammable fabrics were approximately 299 million dollars¹⁾. Also it has been found that burns related to clothing ignitions are more serious in terms of probability of death than other types of burns²⁾. Children

under 5 years of age, handicapped persons of all age groups and persons over 65 are more likely to be the victims of clothing-related burn accidents than persons in other age groups³⁾.

Because of the potential danger posed by flammable fabrics, two separate standards have been issued by the federal government regarding children's sleepwear. The first (DOC FF 3-71) required that all children's sleepwear, sized 0 to 6x, be flame retardant by July 29, 1973⁴⁾. Later studies sponsored by the Department of Commerce provided evidence that children between the ages of 6 to 12 were as susceptible to burns related to sleepwear ignition as were younger children⁵⁾. Data from these studies led to the establishment of the second standard for children's sleepwear (DOC FF 5-74) which applied to all sleepwear sized 7 to 14⁶⁾.

In 1975 the CPSC proposed expansion of flammability regulations to cover women's robes, pajamas, nightwear and pants⁷⁾. However, no additional standards have as yet been issued.

During the past 10 years, much research has been conducted concerning fabric flammability and factors affecting flame retardance. However, the extent of consumer awareness of, and desire for, flame retardant apparel has not been widely ascertained. One study conducted in Georgia in 1977 indicated that local consumers were generally unaware of the availability of flame retardant apparel. Those consumers who were aware of flame retardant sleepwear tended to express positive attitudes toward the product and to desire expansion of flame retardant standards to cover other categories of clothing⁸⁾. The Georgia study was completed prior to the publication of much of the adverse inform-

ation concerning Tris, even though the controversy began in 1976. After the Tris controversy, some confused consumers tended to distrust all flame retardant chemicals applied to textiles⁹⁾. Some actually discontinued the use of flame retardant sleepwear and used untreated undergarments as a substitute.

The purpose of this study was to obtain information concerning the effects, if any, of the Tris ban upon consumer awareness of, and preference for flame retardant apparel. The following objectives were established for this study: 1. to determine consumer level of awareness of flame retardant apparel, 2. to determine consumer preference for expansion of flame retardant legislation to cover general apparel and for other age groups, and 3. to determine if the Tris ban has affected consumer attitudes toward flame retardant apparel.

The Tris ban was defined as follows: the U.S. CPSC banned the sale of any children's clothing containing the flame retardant chemical tris (2,3-dibromopropyl) phosphate on April 7, 1977. This ban also extended to any tris-treated fabric that is uncut but is intended for sale for use in children's wearing apparel¹⁰⁾.

II. Procedures

The researcher modified the questionnaire used by Rhodes⁸⁾ as a means of data collection. The questionnaire was divided into two sections. The first section consisted of comments designed to elicit consumer attitudes and opinions related to the three objectives of this study. In this section, a five-point scale was used to determine strength of agreement or disagreement with each comment. A rating of five represented strong agreement while a rating of one indicated strong disagreement.

The second section was designed to provide background information about the respondents.

The questionnaire was pretested using a randomly selected sample of parents with children enrolled in a nursery school in Tuscaloosa, Alabama. This group of parents was similar to the group which was used in the actual collection of data in terms of age and socio-economic level. Minor changes were made in the questionnaire as a result of the pretest.

The questionnaires were distributed to all respondents on September 26, 1979. A total of 230 questionnaires were circulated to the parents with children enrolled in preschool programs operating on The University of Alabama campus and one public elementary school in Tuscaloosa, Alabama. The researcher collected the questionnaires from the schools between the third and tenth day following the circulation of the questionnaires.

Eighty-three middle-class consumers with children between the ages of 0 and 12 years comprised the sample and were divided into two groups. Group 1 consisted of 45 parents with preschool children and Group 2 was comprised of 38 parents with elementary school children.

Cattell's Profile analysis was performed to identify similarities between the responses obtained from the two parental groups. Cattell's Coefficient of Profile Similarity was used to test the significance for this study because it accounts for the shape of the profiles and is sensitive to differences of elevation between elements of the profile pattern like the discriminant function¹¹⁾. Mean scores, Standard deviations, frequency counts, percentages, and t-tests were included in the analysis of the data.

III. Findings

Description of the Sample

An analysis of demographic characteristic revealed that majority of respondents in Group 1 were between the ages of 25 and 34, while the large number in Group 2 were between 25 and 34. The parents in Group 1 were more highly educated than in Group 2, even though the majority in both groups had either college, university, or graduate professional training. In regard to marital status, over 80% were married couples. The rest of the respondents were single, divorced, or separated.

Group Similarities

Results of Cattell's Profile analysis were nonsignificant for Objective 1 and Objective 2. A highly significant difference was found between Group 1 and Group 2 for Objective 3. T-tests were followed on each comment of Objective 3.

Table 1. Indexes of Pattern Similarity for Group 1 and Group 2

Objective	Coefficients
1. Consumer level of awareness of flame retardant apparel.	-.130
2. Consumer desire for expansion of flame retardant legislation to cover general apparel for children and for other age groups.	.241
3. Consumer attitudes toward flame retardant apparel after the Tris ban.	-.482**

**p < .01

Objective 1

The majority of the respondents in both groups were not aware that all sleepwear for

Table 2. Frequency and Percentage Data for Consumer Awareness of Flame Retardant Apparel for Group 1 and Group 2.

Comment	Strongly Agree		Agree		Don't Know		Disagree		Strongly Disagree	
	Group 1 n(%)	Group 2 n(%)	Group 1 n(%)	Group 2 n(%)	Group 1 n(%)	Group 2 n(%)	Group 1 n(%)	Group 2 n(%)	Group 1 n(%)	Group 2 n(%)
a. All children's sleepwear under size 14, regardless of price, is flame retardant.	6(13)	1(3)	7(16)	9(24)	16(36)	11(29)	12(26)	16(42)	4(9)	1(3)
b. All sleepwear I have purchased for my child this year has been flame retardant.	12(27)	4(11)	14(31)	19(50)	9(20)	7(18)	8(18)	7(18)	2(4)	1(3)
c. All children's sleepwear under size 14, regardless of its brand or where it is sold, is flame retardant.	6(13)	1(3)	4(9)	6(16)	15(33)	15(39)	16(36)	14(37)	4(9)	2(5)
d. The federal law requires that all children's sleepwear under size 14 must be flame retardant.	8(18)	3(8)	12(27)	13(34)	21(46)	19(50)	3(7)	3(8)	1(2)	0(0)
e. Infants' sleepwear size 0 to 6 months is exempted from flame retardant legislation	0(0)	2(5)	2(5)	1(3)	23(51)	22(58)	11(24)	9(24)	9(20)	4(11)
f. I really want flame retardant sleepwear for my child because of protection from fire.	15(33)	15(39)	16(36)	18(47)	5(11)	3(8)	6(13)	2(5)	3(7)	0(0)

n₁ = 45
n₂ = 38

Note. Due to computer rounding error, percent totals may be more or less than 100.

3. Frequency and Percentage Data for Consumer Preference for Expansion of Flame Retardant Legislation to Cover General Apparel for Children and for other Age Groups for 1 and Group 2.

Comment	Strongly Agree		Agree		Don't Know		Disagree		Strongly Disagree	
	Group 1 n(%)	Group 2 n(%)	Group 1 n(%)	Group 2 n(%)	Group 1 n(%)	Group 2 n(%)	Group 1 n(%)	Group 2 n(%)	Group 1 n(%)	Group 2 n(%)
a. I would like the federal government to require more children's clothing to be flame retardant.	12(27)	7(18)	11(36)	17(45)	1(2)	6(16)	14(31)	7(18)	2(4)	1(3)
b. I would like the federal government to require more teenagers' (13 to 19 years old) clothing to be flame retardant.	7(16)	6(16)	11(24)	15(39)	6(14)	4(11)	19(42)	12(32)	(2 4)	1(3)
c. I would like the federal government to require more adults' (20 to 65 years old) clothing to be flame retardant.	7(16)	2(5)	8(18)	14(37)	6(14)	6(16)	22(49)	15(39)	2(4)	1(3)
d. I would like the federal government to require more elderly adults' (over 65 years old) clothing to be flame retardant.	12(27)	9(24)	15(33)	15(39)	1(2)	5(13)	16(36)	8(21)	1(2)	1(3)
e. I would prefer that a choice between flame retardant clothing and non-flame retardant clothing be available on the market.	14(31)	4(11)	25(56)	27(71)	1(2)	3(7)	2(4)	4(11)	3(7)	0(0)

n₁ = 45 n₂ = 38

Note. Due to computer rounding error, percent totals may be more or less than 100.

children under size 14 must be flame retardant regardless of price (comment "a") its brand or where it is sold (comment "c"). Fifty-eight percent of the respondents in Group 1 and 61% in Group 2 stated that all children's sleepwear which they purchased was flame retardant (comment "b"). At least 55% of the respondents in both groups did not know that federal legislation requires all children's sleepwear under size 14 to be flame retardant (comment "d"). Over 50% of the respondents in both groups did not know that federal legislation covers sleepwear for infants 0 to 6 months old (comment "e"). Sixty-nine percent of the respondents in Group 1 and 86% in Group 2 stated that they really want flame retardant sleepwear for their children.

Objective 2

At least 60% of the respondents in both

groups had favorable attitudes toward expansion of flame retardant legislation to cover general apparel for children and the elderly (comment "a" and "d"). Over 50% of the respondents in Group 2 wanted expansion of flame retardant legislation for teenagers but the respondents in Group 1 differed in their opinion on this issue. Over 50% of the respondents in Group 1 did not want federal legislation expanded to cover adults' clothing (comment "c"). Respondents in Group 2 had equally divided opinions whether or not to expand federal legislation to cover adult's clothing. Eighty-seven percent in Group 1 and 82% in Group 2 stated that they prefer to have a choice between flame retardant clothing and non-flame retardant clothing on the market.

Objective 3

A highly significant differences were found

Table 4. Means of Profile Elements and t-Tests Between Group 1 and Group 2 at $\alpha=0.01$.

Comment	Means of profile elements in z-score form		t-Value
	Group 1	Group 2	
a. All flame retardant chemicals applied to fabrics are hazardous to my child's health.	-.716	.847	.301**
b. Only some of the flame retardant chemicals (Tris) are hazardous to my child's health.	-1.030	1.219	.272**
c. Fabrics made from fibers that naturally resist burning (those which don't require special finishes) are hazardous to my child's health.	-1.607	1.903	.288**
d. Textile manufacturers no longer produce Tris-treated sleepwear.	1.071	-1.268	.272**
e. I have discarded all flame retardant sleepwear that might cause any side effects upon my child's health.	.300	-.356	.446**
f. After several washings, any harmful side effects of flame retardant chemicals can be eliminated.	.992	-1.174	.290**
g. There has been a lot of publicity about health hazards which may be caused by Tris-treated flame retardant sleepwear.	1.426	-1.689	.322**
h. My child no longer wears flame retardant sleepwear because of adverse publicity about Tris.	.642	-.760	.354**

**P<.01

Table 5. Central Tendencies for Consumer Attitudes Toward Flame Retardant Apparel after the Tris-ban.

Comment	Group 1		Group 2	
	Mean	Standard Deviation	Mean	Standard Deviation
a. All flame retardant chemicals applied to fabrics are hazardous to my child's health.	2.40	0.06	2.58	0.55
b. Only some of the flame retardant chemicals (Tris) are hazardous to my child's health.	2.60	0.72	2.39	0.59
c. Fabrics made from fibers that naturally resist burning are hazardous to my child's health.	2.36	0.80	2.74	0.55
d. Textile manufactures no longer produce Tris-treated sleepwear.	3.56	0.72	3.32	0.57
e. I have discarded all flame retardant sleepwear that might cause any side effects upon my child's health.	3.11	1.15	3.00	1.01
f. After several washings, any harmful side effects of flame retardant chemicals can be eliminated.	3.13	0.81	2.89	0.56
g. There has been a lot of publicity about health hazards which may be caused by Tris-treated flame retardant fabrics.	3.93	0.89	3.55	0.65
h. My child no longer wears flame retardant sleepwear because of the adverse publicity about Tris.	2.56	1.01	2.37	0.63

N₁ = 45N₂ = 38

between Group 1 and Group 2 for each comment of Objective 3.

Table 5 shows that Group 1 had more accurate knowledge concerning health hazards of flame retardant apparel, acted more sensitively to the flame retardant apparel as a result of adverse publicity about Tris, and changed their attitudes toward flame retardant apparel than those of Group 2.

IV. Conclusions

The following conclusions were drawn based on the data obtained:

1. Consumers who participated in this study were aware that flame retardant sleepwear was available on the market but they lacked

general knowledge about federal legislation regarding flame retardant apparel.

2. These consumers had favorable attitudes toward expansion of flame retardant legislation to cover general apparel for children and the elderly. However, they wanted a choice between flame retardant clothing and non-flame retardant clothing for some apparel categories and some age groups.

3. Those consumers with younger children had more accurate Knowledge concerning health hazards of flame retardant sleepwear than those with older children. Both groups of consumers were aware of the adverse publicity about Tris, but they did not know that washing Tris-treated garments could remove the health hazards from the finish.

V. Implications

Consumers who participated in this study were well educated members of the middle class, but they showed a marked lack of understanding of legislation governing flammable fabrics. There is a great need for wide educational campaigns which are designed to inform consumers of industrial and governmental changes which affect textile products available in the market place.

Much attention has been directed toward preventing or minimizing clothing related injuries and deaths from fire after the Hotel Daiyongak accident. Also, there is a growing need of special clothes for children, the elderly, and the handicapped people in our society. Clothes made of nonflammable fabric or self-extinguishing fabric should be available in our market

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