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ABSTRACT

Two studies are reported that tested the effects of age with the predisposition to adopt videotex services. The first study, conducted in April 1982, consisted of 478 telephone interviews of Cox Cable subscribers in San Diego. The second study, conducted in summer 1982, consisted of face-to-face interviews with 107 respondents, selected through random digit dials of households in the San Diego Standard Metropolitan Statistical Area. Interviews for the second study were conducted after respondents were exposed to a half-hour demonstration of a working videotex system in a laboratory. The potential effects of three potential intervening variables--automated teller machine usage, prior "hands-on" computer experiences, and Home Box Office subscription status--were controlled. A strong, linear, negative relationship between consumer age and predisposition to adopt videotex services in both studies was found which was independent of the three variables. (Author/LMM)

CONSUMER AGE AS A PREDICTOR OF VIDEOTEX ADOPTION

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ABSTRACT

Two studies are reported that tested the effects of age with the predisposition to adopt videotex services. The potential effects of automated teller machine usage, prior "hands on" computer experiences, and HBO subscription status, as possible intervening variables, were controlled. A strong, linear, negative relationship between consumer age and predisposition to adopt videotex services in both studies was found independent of automated teller machine usage, computer experiences, and HBO subscription status.

CONSUMER AGE AS A PREDICTOR OF VIDEOTEX ADOPTION

Introduction

Interactive television cable systems are becoming increasingly a force of future consumerism. It is envisioned that by the end of the 1980's a significant number of consumers will possess the equipment to engage in airline and rail ticketing, banking activities, real estate purchasing, marketing, and other forms of similar transactions from the home.

As this communication technology develops, it behooves the manufacturers of such systems to identify the potential adopters of these innovations and target their marketing schemes accordingly. No doubt the predecessor to the interactive cable "boom" has been the home computer, carefully marketed to youth for its video game playing capacity and to adults for its educational and personal finance records maintenance capacities. By identifying demographically who these potential early adopters will be, manufacturers will be able to set the stage for subsequent widespread adoption, as more and more consumers become aware of the capabilities of the interactive cable system technology.

According to Rogers, there is inconsistent evidence in the literature about any possible relationship between age and rate of adoption of an innovation.[1] Rogers also notes, however, that "laggards," the last in a social system to adopt an innovation, use the past as a point of reference and represent near isolates in terms of social networks. Such individuals tend to rely on traditional values, being suspicious of innovations and change agents. The fact that laggards are resistant to innovations may be due to limited economic resources, such that they may decide that the innovation will not vanish from the market before they have a chance to adopt it. Rogers further points out that early adopters are more highly interconnected in the social system,

engage in more social participation, and have greater exposure to interpersonal communication channels than late adopters. All of the above would lead one to suspect that members of the younger generation, as interconnected as they are in a variety of formal social network systems (educational institutions, peer group social organizations, the work place), would be more likely to adopt an innovation such as the emerging interactive cable technologies than older individuals more inclined toward traditional values and relative social isolation.

Research Setting

Two studies were undertaken to assess any possible relationship between age and willingness to adopt videotex services. The first study, conducted in April 1982, consisted of 478 telephone interviews of Cox Cable subscribers in San Diego. The second study, conducted in the summer of 1982, consisted of face-to-face interviews with 107 respondents, selected through random digit dials of households in the San Diego Standard Metropolitan Statistical Area (SMSA).[2] In the second study, interviews were conducted after respondents were exposed to a half-hour demonstration of a working videotex system in a laboratory.[3]

San Diego served as an appropriate setting for videotex diffusion research. Cox Cable Communications, an Atlanta-based multiple system operator, began introduction of a two-way interactive system called INDAX in San Diego in 1981. The system, which supports such two-way services as home banking and home shopping, was also slated for expansion into Omaha and New Orleans as part of new franchise agreements. After franchises were awarded, however, implementation was substantially reduced. San Diego also

serves as a test market for a full-channel teletext system. Time, Inc., through its subsidiary, Southwestern Cable, began testing its teletext system in San Diego in 1982, one of two test markets.[4] In both the telephone interviews and the face-to-face laboratory demonstration studies, about 20 percent of the respondents had heard something of videotex services offered in the San Diego market.

Methodologies

In the first study, attention was focused on the Cox Cable INDAX system.[5] Random dials of cable-subscribing households were made in zip code areas that the cable operator indicated most closely matched demographic characteristics of the INDAX test area.[6] A 10-minute interview was conducted. Capabilities of the INDAX system were explained to respondents, including the ability to purchase products from department stores, to conduct banking transactions, and to read news items and other information generally provided by newspapers, magazines and other specialized publications. Respondents were then asked if they would subscribe to such a service for six dollars a month.[7] In addition, respondents were asked if they used automated teller machines at their banks, if they ever had had "hands on" experiences with computers, and if they subscribed to Home Box Office, a cable channel dedicated to recent movies and other programming available for additional charges. Post hoc analysis indicated that these variables were among the most powerful predictors of INDAX adoption among respondents. Respondents were also asked how old they were. Ages ranged from 11 years to 86 years.

In the second study, a more generic approach to videotex adoption was pursued.[8] Subjects were identified through random digit dialing of

households, with subjects selected through a three-level stratification strategy that matched the sample to the San Diego population by age, gender and cable subscription status.[9] Respondents were interviewed at San Diego State University's Videotex Lab, a facility operated by the University's Center for Communications.[10] At the lab, respondents completed a pre-test questionnaire. Then respondents were taken to another room where an operating videotex system was demonstrated to them. The videotex system was simulated on a computer microprocessor. Following the simulation experience, respondents were asked how much they were willing to pay for a videotex service like the one they had seen. In addition, respondents were also asked if they used automated teller machines at their bank, if they ever had had "hands on" computer experiences, and if they subscribed to Home Box Office. Respondents were also asked how old they were. Ages ranged from 13 years to 72 years.

Both studies are reported here because the conditions of stimulus were so strikingly different. In the first study, respondents reacted to a verbal description of a specific videotex system over the telephone. In the second study, respondents evaluated their willingness to pay for such services after an intense half-hour experience with such services under laboratory conditions. Common findings from such different settings add weight to generalizations drawn from these studies.

On the basis of the foregoing rationale, an inverse relationship between age and videotex adoption (measured by willingness to pay) was hypothesized and subsequently tested. Each of three potential variables which might intervene in consumer age-videotex adoption was hypothesized as related to age. That is, younger people were hypothesized to be adopters of automated teller machines in greater frequency than older people. Younger people were

hypothesized to have had higher incidences of "hands on" experiences with computers when compared to older people. Finally, younger people were hypothesized to be Home Box Office subscribers with greater frequency than older people. Finally, a sustained inverse relationship between age and videotex adoption was hypothesized, controlling for effects of the three potential intervening variables, automated teller experience, prior "hands on" computer experience, HBO subscriber status.

Findings

In the telephone survey study, all three hypotheses were strongly supported. With the exception of those under 20 years,[11] younger respondents were more likely than older respondents to adopt and use automated teller machines.[12] Younger people were generally more likely than older people to have had prior "hands on" experiences with computers, with 66 percent of the respondents under 20 years having such experiences, compared to only 17 percent of those over 60 years having such experiences. Younger respondents were more likely to live in HBO-subscribing households. Sixty percent of respondents under 20 years subscribed to HBO, compared to only 24 percent of those 60 and older subscribing to Home Box Office.[13]

The relationships were not as striking among subjects who evaluated their willingness to pay for videotex services after a half-hour demonstration on a videotex simulator. Masking of relations was likely due to smaller sample size, the self-selection bias built into the recruitment of laboratory subjects, and the fact that cable non-subscribers as well as subscribers were studied.[14] Nonetheless, use of automated teller machines was related to age. Among subjects 20 to 59 years old, a full 74 percent used automated teller

machines. Only 46 percent of those 60 and older were ATM users. As in the telephone surveys, subjects under 20 were also infrequent ATM adopters, with only 43 percent of these subjects using automated teller machines.[15] No strong relationship was detected between age and prior "hands on" computer experiences, though the greatest frequency of such experiences was among subjects 20 to 29 years old (47 percent).[16] Younger subjects were more likely to subscribe to HBO than were older subjects, though subjects under 60 years were only modestly differentiated.[17] HBO subscription was most frequent among those 20 to 29 years old (41 percent).

All three types of prior innovative behavior, which tended to be more frequent among younger people, would suggest that the correlation between age and videotex adoption is spurious. Younger people simply have had different life experiences than older people, experiences which include specific innovative behavior with computerized technology and with specialized cable services. The case can be made that these specific life experiences, not age, are what determine willingness to adopt videotex services. Age, according to this argument, is simply a proxy measure of these prior, high-tech experiences, of no theoretical significance in itself.

To test this argument, relations between videotex adoption and age were tested. As expected, age is a strong negative predictor of videotex adoption: younger people are much more likely to adopt videotex services than older people.[18] Additional tests were then made of that relationship, controlling for the influence of automated teller machine usage, the influence of prior "hands on" computer experiences, and the influence of HBO subscription status.

In Table 1, the relationship between videotex adoption and age is displayed for those telephone survey respondents who did not use automated teller

machines. Among these non-innovative respondents (with regard to computerized banking), age remained a powerful predictor of videotex adoption. A full 57 percent of those under 20 years were adopters, while only four percent of those 60 years and older were adopters. Similar results occurred among subjects who were given a videotex simulation. Among those subjects not using automated teller machines, those under 20 years were willing to pay $11.25 per month on the average for videotex services, while those 60 years and older were only willing to pay $2.50 per month.[19]

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Table 1 about here

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Table 2 displays the relationship between videotex adoption and age for those telephone survey respondents who did use automated teller machines. Among those innovative respondents, age remained related to videotex adoption. Among that smaller number of respondents under 20 years who used automated teller machines (or banks at all), all were videotex adopters. The next highest level of adoption was among respondents 20 to 29 years old (48 percent). Older respondents, 60 years and above, were remarkably innovative (46 percent were adopters), but ones who used automated teller machines were relatively rare.[20] Similar patterns emerged when ATM users who saw the videotex demonstration were asked how much they would pay for videotex services. Among these innovative subjects, those under 20 years were willing to pay $23.33 per month on the average for videotex services, while those innovative subjects 60 years and older were only willing to pay $6.40 per month.

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Table 2 about here

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Table 3 displays the relationship between videotex adoption and age for those telephone survey respondents who had had no "hands on" experiences with computers. Among these non-innovative respondents, nearly half of those under 20 years (46 percent) were adopters, while only seven percent of those 60 years and older were willing to adopt. Similar results occurred among subjects shown a working videotex simulator. Among those subjects with no prior "hands on" computer experience, those under 20 years were willing to pay $15.18 per month for videotex services, while those 60 years and older indicated that they would pay no more than one dollar per month for videotex services.[21]

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Table 3 about here

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Table 4 displays the same relationship for those telephone survey respondents <u>with</u> "hands on" computer experiences. A full 71 percent of these innovative respondents under the age of 20 indicated a willingness to adopt videotex services. Only 19 percent of those innovative subjects 60 years and older were willing to subscribe to videotex services. These findings were confirmed by subjects who viewed a videotex demonstration. Among the laboratory subjects with prior "hands on" computer experience, those under 20 years were willing to pay $15.18 per month for videotex services, while those 60 years and older were only willing to pay eight dollars per month.

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Table 4 about here

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Table 5 displays the relationship between videotex adoption and age for those telephone survey respondents who do not subscribe to HBO. Among these non-innovative respondents (as regards cable services), 58 percent of those under 20 were videotex adopters. Only eight percent of those not subscribing to HBO 60 years and older were videotex adopters. Among subjects who saw a videotex demonstration in the laboratory, those under the age of 20 from non-subscribing HBO households were willing to pay $14.27 for videotex services. Those subjects 60 years and older from non-subscribing HBO households were only willing to pay $3.36 for videotex services.[22]

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Table 5 about here

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Table 6 shows the same relationship for telephone survey respondents who did subscribe to Home Box Office. Among those HBO subscribers under 20 years, as many as two-thirds were videotex adopters, while only ten percent of the HBO subscribers 60 and older were videotex adopters. Findings from the laboratory simulation study were again consistent. Those innovative subjects from HBO-subscribing households under the age of 20 were willing to pay $19.17 per month for videotex services. Those innovative HBO subscribers 60 years and older were only willing to pay ten dollars per month for videotex services.

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Table 6 about here

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Conclusions

The purpose of this research was to test the effects of age with the predisposition to adopt videotex services. All hypothesized relationships were found to be significant.

Age is not simply a proxy measure of discrete innovative experiences (e.g., automated teller usage, prior "hands on" computer experience, HBO subscription status) directly related to computers and cable technology. Rather, age has some theoretical significance all its own. As system theory suggests, the whole is greater than the sum of the parts. Perhaps the overwhelming predisposition of younger people to adopt videotex technology reflects a genuine "generation gap" that is something more than greater opportunities for exposure to computers. Rather, a more diffuse set of factors may lead younger people toward innovative behavior regarding in-home computer technology such as videotex. Individuals raised in an environment where space travel is routine, where "intelligent" devices (automated tellers, personal computers, video-cassette recorders, videotex services, etc.) are part of the natural terrain may simply look at technology differently than do those who regard these innovations as mind-boggling reorderings of technical and social reality. Discrete sets of experiences with computer and cable innovations serve to close the gap somewhat, but profound differences remain.

NOTES

[1]Rogers, Everett M., Diffusion of Innovations, New York: The Free Press, 1983.

[2]The second study was part of the Videotex Topic Preference Study conducted in 1982 by the Center for Communications at San Diego State University. The study was funded through a grant from HomServ, Inc., a subsidiary of American Can Corporation.

[3]Laboratory simulations were programmed on a Cromeco microprocessor to precisely duplicate services currently or potentially available to videotex subscribers, using either coaxial cable or telephone linkage from the central computer to the subscribing household. Programming was provided by Apple Maddox, a graduate student in Telecommunications and Film at the University, and information package production was provided by Nancy Bamberger of the Center's staff.

[4]Time, Inc. conducted pilot tests in Miami and San Diego in 1982. The teletext system offered by Time, Inc. includes a large number of screen pages (about 10,000), in contrast to broadcast teletext systems limited to about 200 screen pages. Time Inc.'s teletext system also differs from Cox Cable's INDAX system, in that the teletext user cannot communicate back to the cable head end to perform home banking and home shopping functions. The teletext system simulates interactivity by allowing individual users to select a particular screen page as it cycles through the system in a continuous, one-way "loop."

[5]The study was assisted by Cox Cable Communications by providing computer listings of current cable subscribers. Graduate and undergraduate students in a mass communication research methods course at San Diego State University conducted the interviews.

[6]Listings were provided for zip code areas that marketing specialists at Cox felt best matched the newer, upscale suburban areas that served as initial target for INDAX services.

[7]Respondents were asked if they would subscribe to INDAX if it were made available to them at six dollars per month. That figure reflected the $5.95 fee that Cox Cable was then charging users who were not participating in market research projects funded by Cox Cable.

[8]HomServ, Inc. was a videotex packaging enterprise providing home banking services but also interested in other information-providing roles. As such, HomServ was interested in generic interest in a wide range of videotex services among potential subscribers.

[9]Age, gender and cable subscription status were deemed important variables by HomServ. As a consequence, stratification of subjects was targeted such that laboratory participants would match the San Diego area with regard to gender (50 percent male/50 percent female) and cable subscription status (55 percent subscribers/45 percent non-subscribers). In addition, 1980 census data were used to stratify by age in ten-year increments.

[10] The principal investigator was John Witherspoon, Director of the Center. The first author was the project director.

[11]Respondents under the age of 20 were infrequent users of banks. About 10 percent had no bank accounts, while another 13 percent used banks less than once a week. This infrequent usage compares to only three percent of the sample overall that used banks less frequently than once a week.

[12]Among respondents less than 20 years, 19 percent used automated teller machines. Adoption was found to be more widespread among those respondents 20 to 29 years old: 60 percent of these younger respondents used ATMs. ATM usage dropped to 40 percent among respondents 30 to 59 years old. Among

respondents 60 years and older, only 13 percent used automated teller machines. (Chi square = 59.6; d.f. = 3; $p < .0001$)

[13]The complete breakdown of respondents with "hands on" computer experiences: less than 20 years, 66 percent; 20 to 29 years, 64 percent; 30 to 59 years, 49 percent; 60 years and older, 17 percent. (Chi square = 54.9; d.f. = 3; $p < .0001$.) The complete breakdown of respondents from households subscribing to Home Box Office: less than 20 years, 60 percent; 20 to 29 years, 54 percent; 30 to 59 years, 48 percent; 60 years and older, 24 percent. (Chi square = 23.2; d.f. = 3; $p < .0001$)

[14]In the telephone survey, 478 respondents were interviewed, while only 107 subjects in the laboratory simulation study were interviewed. Subjects participating in the laboratory interviews were paid $20 each for about one and a half hours of their time. Because potential subjects could refuse to participate, subjects who "self-selected" to participate were most likely interested in the research topic (videotex) or research in general. Further, because nearly half the 107 subjects were not cable subscribers, relations between Home Box Office subscription (as an additional cable service among current cable subscribers) and videotex adoption could only be tested among a relatively small number of respondents.

[15]Among laboratory subjects, automated teller machine usage was broken down as follows: under 20 years, 43 percent; 20 - 29 years, 75 percent; 30 to 59 years, 74 percent; 60 years and older, 46 percent. (Chi square = 7.38; d.f. = 3; $p = .061$)

[16]Self-selection among laboratory subjects can be seen in the prior "hands on" experiences reported by these subjects in different age categories. For example, 40 percent of the subjects 60 years and older in the laboratory studies had prior "hands on" computer experiences, compared to only eight

percent of the telephone respondents 60 years and older who had had such experiences. Prior "hands on" experiences were reported among laboratory subjects by the following age categories: under 20 years, 33 percent; 20 to 29 years, 47 percent; 30 to 59 years, 40 percent; 60 years and older, 40 percent. (Chi square = 0.91; d.f. = 3; p = .82)

[17]Subjects in the videotex laboratory demonstrations reported the following breakdown of Home Box Office subscription: under 20 years, 37 percent; 20 to 29 years, 41 percent; 30 to 59 years, 35 percent; 60 years and older, 13 percent. (Chi square = 3.71; d.f. = 3; p = .29)

[18]Among telephone survey respondents, willingness to subscribe to INDAX at six dollars per month was broken down as follows: under 20 years, 63 percent; 20 to 29 years, 49 percent; 30 to 59 years, 26 percent; 60 years and older, 9 percent. (Chi square = 60.51; d.f. = 6; p < .0001) A similar powerful relationship was detected for subjects in the videotex laboratory demonstrations. When asked how much they would pay per month for videotex services like those demonstrated, subjects under 20 years indicated $16.50. Subjects 20 to 29 years indicated they would pay $13.03 per month. Subjects 30 to 59 years indicated they would pay $10.38, while subjects 60 years and older indicated they would pay only $4.38 per month. [The relationship is negative and linear: $F(3,93) = 4.84$; $p = .004$]

[19]Differences in willingness to pay remained statistically significant among different age groups after the effects of automated teller machine usage were controlled. [$F(3,77) = 3.82$; $p = .013$]

[20]Only 11 of the 90 telephone survey respondents 60 years and older were automated teller machine users.

[21]Differences in willingness to pay remained statistically significant among different age groups after the effects of prior "hands on" computer experiences were controlled. [$F(3,83) = 3.50$; $p = .019$]

[22]Differences in willingness to pay remained significant among the different age groups after the effects of Home Box Office subscription were controlled. [$F(3,87) = 3.55$; $p = .018$]

Table 1

Relationship Between Age and Videotex Adoption Among Respondents Who Did Not Use Automated Teller Machines

(Telephone Survey of Cable Subscribers)

	AGE OF RESPONDENT				
SUBSCRIBE TO VIDEOTEX?	Under 20 Years	20 - 29 Years	30 - 59 Years	60 Years & Older	TOTAL
No	4 19%	17 31%	44 50%	55 69%	120 49%
Maybe	5 24%	10 18%	25 28%	21 27%	61 25%
Yes	12 57%	28 51%	19 22%	3 4%	62 26%
TOTAL	21 9%	55 23%	88 36%	79 32%	243 100%

Chi Square = 53.06; d.f. = 6; $p < .0001$

Table 2

Relationship Between Age and Videotex Adoption Among Respondents Who Used Automated Teller Machines

(Telephone Survey of Cable Subscribers)

	AGE OF RESPONDENT				
SUBSCRIBE TO VIDEOTEX?	Under 20 Years	20 - 29 Years	30 - 59 Years	60 Years & Older	TOTAL
No	0 0%	26 31%	24 38%	2 18%	52 32%
Maybe	0 0%	18 21%	20 31%	4 36%	42 26%
Yes	5 100%	40 48%	20 31%	5 46%	70 43%
TOTAL	5 3%	84 51%	64 39%	11 7%	164 100%

Chi Square = 12.37; d.f. = 6; p = .0543

Table 3

Relationship Between Age and Videotex Adoption Among Respondents Who Had Had No "Hands On" Experiences with Computers

(Telephone Survey of Cable Subscribers)

SUBSCRIBE TO VIDEOTEX?	AGE OF RESPONDENT: Under 20 years	20 - 29 Years	30 - 59 Years	60 Years & Older	TOTAL
No	3 27%	19 37%	39 49%	51 67%	112 51%
Maybe	3 27%	13 25%	22 28%	20 26%	58 27%
Yes	5 46%	20 39%	19 24%	5 7%	49 22%
TOTAL	11 5%	52 24%	80 36%	76 35%	219 100%

Chi Square = 24.52; d.f. = 6; p = .0004

Table 4

Relationship Between Age and Videotex Adoption Among Respondents Who Had Had "Hands On" Experiences with Computers

(Telephone Survey of Cable Subscribers)

SUBSCRIBE TO VIDEOTEX?	AGE OF RESPONDENT: Under 20 years	20 - 29 Years	30 - 59 Years	60 Years & Older	TOTAL
No	2 10%	25 28%	29 40%	7 44%	63 32%
Maybe	4 19%	15 17%	23 32%	6 38%	48 24%
Yes	15 71%	49 55%	21 29%	3 19%	88 44%
TOTAL	21 11%	89 45%	73 37%	16 8%	199 100%

Chi Square = 23.03; d.f. = 6; p = .0008

Table 5

Relationship Between Age and Videotex Adoption Among Respondents Who Did Not Reside in Households That Subscribed to Home Box Office

(Telephone Survey of Cable Subscribers)

SUBSCRIBE TO VIDEOTEX?	AGE OF RESPONDENT: Under 20 Years	20 - 29 Years	30 - 59 Years	60 Years & Older	TOTAL
No	2 17%	21 40%	36 50%	39 63%	98 49%
Maybe	3 25%	14 26%	22 31%	18 29%	57 29%
Yes	7 58%	18 34%	14 19%	5 8%	44 22%
TOTAL	12 6%	53 27%	72 36%	62 31%	199 100%

Chi Square = 22.43; d.f. = 6; p = .001

Table 6

Relationship Between Age and Videotex Adoption Among Respondents Who Resided in Households That Subscribed to Home Box Office

(Telephone Survey of Cable Subscribers)

SUBSCRIBE TO VIDEOTEX?	AGE OF RESPONDENT: Under 20 years	20 - 29 Years	30 - 59 Years	60 Years & Older	TOTAL
No	3 17%	15 24%	28 41%	13 62%	59 35%
Maybe	3 17%	8 13%	21 30%	6 29%	38 22%
Yes	12 67%	39 63%	20 29%	2 10%	73 43%
TOTAL	18 11%	62 36%	69 41%	21 12%	170 100%

Chi Square = 30.64; d.f. = 6; $p < .0001$