

# **Can Annuity Purchase Intentions Be Influenced?**

**Sponsored by  
SOA Pension Section**

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## **Key Highlights**

The SOA commissioned behavioral research to analyze the effects of four types of informational interventions on annuity-related behavioral intentions and beliefs such as estimated retirement age and life expectancy. The online experimental research was conducted in January 2011 with 1,009 subjects aged 45 to 75 with self-reported retirement assets.

The research results suggest that the window of opportunity to influence annuity purchase behavior is during individuals' working lives and may end at retirement. Annuity purchase intentions of pre-retirees in each of the four treatment conditions differed significantly from those of pre-retirees in the control condition. However, none of the interventions tested had a significant effect on the annuity purchase intentions of retirees, suggesting that attitudes toward annuities may be solidified once individuals reach retirement.

More specifically, pre-retirees who were provided either with brief, basic factual information about immediate life income annuities or with anecdotal evidence negatively framing the effects of not annuitizing assets were three times more likely than pre-retirees in the control condition to report that they would buy an annuity. Pre-retirees in the control condition had a modeled probability of the intention to buy an annuity of 5.9 percent whereas those in the factual information and anecdotal evidence conditions had modeled probabilities of 20.9 percent and 20.1 percent, respectively. Providing pre-retirees with information about the behavioral biases that may impact their annuity purchase behavior was less effective. Still, these pre-retirees were twice as likely as pre-retirees in the control condition to report that they would buy a life income annuity (predicted probability of 14.1 percent).

Relative to providing only basic factual information, providing a combination of basic factual and behavioral bias information was less effective.

One of the strongest predictors of the intent to purchase an annuity is a higher level of self-reported annuity familiarization.

The research also finds that pre-retirees who have concerns about their retirement and expect to live longer (relative to the average pre-retiree) are more likely to report that they will buy an annuity.

Although the research pertains to single premium immediate annuities, the conceptual aspects of the findings may be relevant for certain other types of annuities (e.g., deferred income annuities) as well.

These findings as well as others within this report offer fertile ground for further research. They also suggest important implications for practitioners, academic professionals and policy makers who are engaged in attempts to solve the “Annuity Puzzle,” the unexplained (and significant) difference between *expected* annuity purchase behavior (based on a fully rational model) and *actual* annuity purchase behavior.

## **Introduction**

The rise in the number of retiring Baby Boomers brings with it a heightened interest in efforts to optimize financial decision making throughout retirement when assets are typically liquidated to fund living expenses. For many boomers, the allowable margin of error is narrow, the time to “make up” for mistakes short, and the potential consequences of blunders dire. Accordingly, significant attention is directed toward helping retirees protect against the risk of running out of money.

Although under-saving puts today’s longer-living retirees at greater risk, under-saving is but one of the factors giving rise to a concern that today’s retirees could outlive their retirement assets.

Relative to previous generations, a smaller proportion of retirees are now covered by defined benefit plans. According to Employee Benefit Research Institute’s 2011 Retirement Confidence Survey, the percentage of retirees receiving income from defined benefit plans has declined from 62 percent in 2006 to 51 percent in 2011. The drop in the number of single-employer defined benefit plans over the last two decades from approximately 92,000 in 1990 to less than 28,000 in 2009 suggests that this decline in retiree pension coverage will be a continuing trend (PBGC, 2009). According to the March 2010 National Compensation Survey, less than 20 percent of private industry workers participate in a defined benefit retirement plan.

Various changes in defined benefit and defined contribution plan design over the past ten years have also led to increased risk that retirees will outlive their assets (longevity risk). A majority of large U.S. defined benefit plans now have some type of freeze in place to limit future benefit accruals to participants. In a 2008 General Accounting Office survey of the largest private defined benefit plan sponsors, 62 percent of sponsors reported a freeze or a plan amendment that limits future pension accruals for some or all participants (2009).

Workers also now have much greater access to lump-sum payouts from company-sponsored retirement plans. In the past, most defined benefit plans only offered monthly lifelong payments after retirement. Now, many defined benefit plan sponsors have opened up plan payout options to include a lump sum benefit as an alternative. In 2005, over half of participants in private industry defined benefit plans have access to lump-sum payouts (Department of Labor, 2007). Defined contribution plans are also less likely to offer an annuity form of payment to provide participants with lifelong retirement income. In 2009, less than 20 percent of defined contribution plans offer an annuity as a form of distribution, compared to nearly 38 percent of plans in 1998 (PSCA, 2009 and 1999).

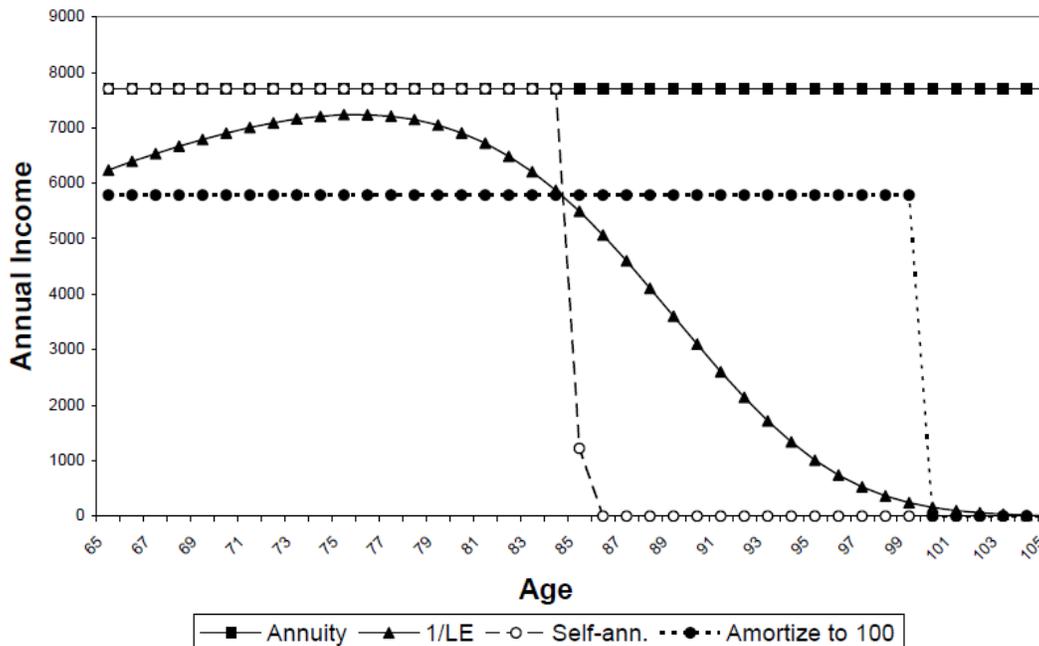
From a retiree’s perspective, one way to protect against the risk of running out of money during retirement is purchasing a life income annuity. In exchange for payment in the present, the purchaser (annuitant) receives periodic payments for as long as he lives. Of course, this exchange also results in a reduction of liquidity and potential bequests and a loss of control over the assets.

Theoretical economic models by Yaari (1965), Mitchell, Poterba, Warshawsky, and Brown (1999) and Davidoff, Brown and Diamond (2005) suggest that wealth annuitization (either full or partial) is rational under a relatively wide range of conditions. Figure 1, taken from work by Brown (2004 and 2007) clearly shows the potential benefit of annuitization by comparing a 65-year-old male’s purchase of a single premium (\$100,000) immediate life income annuity that produces \$7,704 in annual income to three other strategies.<sup>1</sup> Brown’s comparative strategies, along with their descriptions include:

- Self-annuitization, which Brown describes as investing \$100,000 in an account that earns a market rate of interest and consuming the same level of income as that produced by the annuity, which in this case depletes the assets around age 87 as noted below
- Amortization, defined as investing the \$100,000 at the market interest rate but spending an even amount each year by amortizing over 35 years (from 65 to 100), and
- “1/LE”, or “one divided by life expectancy” which Brown describes as using a strategy that is similar to that used for calculating required distributions from qualified plans.

As can be seen, each of these three alternatives produces income streams that are inferior to that produced by the purchase of a single-premium immediate annuity.

**Figure 1. Income from Alternative Payout Strategies**



<sup>1</sup> This text and Figure 1 are taken from Brown 2007. Please see Brown 2004 and 2007 for further explanation, including detailed assumptions.

However, few people employ this approach. Less than 10 percent of retirees receive guaranteed income for life from private annuities (LIMRA, SOA, InFre, 2009). Brown (2007) suggests that the “conclusion that the market is small is supported by standard household data sets that are used to track ownership, such as the Survey of Consumer Finances or the Health and Retirement Study. The frequency with which annuity owners appear in these data sets is so low that empirical work on private market annuity purchases in the U.S. has been severely limited.”

There are a variety of reasons people don’t buy life income immediate annuities, some of which relate to distribution and supply. For example, until relatively recently, distribution of life income immediate annuities was mostly limited to insurance sales agents. While most immediate annuities are still sold by insurance sales agents, a growing portion is sold through banks, national, full-service broker-dealers or independent broker-dealers (LIMRA 2010). However, many financial advisors do not recommend immediate annuities to their clients.<sup>2</sup> Even within the insurance channel, immediate annuities are just one of many products sold by agents, and it is one for which agents typically earn lower sales commissions. Therefore, there is less financial incentive for agents to explore them with clients. Finally, although annuity providers have responded to consumers’ preference with added features such as refund of premium and inflation-adjusted payouts, these features have been made available relatively recently.

Other potential explanations for a low level of annuitization relate to consumer preferences. Initially, researchers focused primarily on potential *rational* explanations for individuals’ low levels of annuitization (e.g., existing annuitization from Social Security, bequest motives, and less than favorable tax treatment). However, researchers posit that rational explanations fail to fully explain the dearth of annuity ownership. To solve this “annuity puzzle,” many have turned to behavioral economics by exploring potential decision-making biases that may undermine optimal annuitization. To date, this research has included survey and experimental studies and has explored various behavioral anomalies, including framing, the endowment effect, and risk-ordering biases.<sup>3</sup>

The research described herein attempts to identify what type of information is most effective in influencing annuity purchase intentions. The nature and extent of any behavioral biases that may be impacting the intent to buy an annuity are not explored. Instead, four different types of interventions are tested to determine their effects on annuity purchase intentions. In addition, the factors that predict annuity purchase intentions and their strength are analyzed, including subjects’ estimates of retirement date and life expectancy. The researchers also analyze the relationship between financial literacy and annuity purchase intentions. Herein, the research approach, findings and implications are described.

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<sup>2</sup> Note that in the 2009 Survey of Trends in the Financial Planning Industry, the College of Financial Planning found that less than 3 percent of advisers used immediate annuities in their practices. Only 16 percent of advisers expected a future increase in their use. Over 81 percent expected the low utilization to persist.

<sup>3</sup> For example, see Agnew, Anderson, Gerlach, and Szykman (2008), and Brown, Kling, Mullainathan and Wrobel, (2008), and Gazzale and Walker (2009).

## Research Objective and Approach

The objective of this research was to determine how reported annuity purchase intentions might be influenced by the four different treatment conditions tested (see inset below).

The treatment conditions were:

- **Factual Condition.** Very simple and neutral factual information related to retirement ages of American employees, life expectancy and annuity suitability was provided.
- **Behavioral Bias Condition.** Subjects were provided with brief insight about a few of the behavioral biases thought to negatively impact predicted retirement age, life expectancy, and annuity purchase decisions.
- **Combination Condition.** Both the factual and behavioral bias information above were provided.
- **Anecdotal Condition.** Evidence related to expected retirement age, life expectancy, and the potential impact of running out of money in retirement was provided to subjects in this condition.

### The Treatment Conditions

In each of the four treatment conditions, subjects were presented with a gender-specific hypothetical other person (including a photograph) and responded to three questions prior to answering the same set of questions as in the control condition. These three questions were designed to engage the subject prior to providing the relevant feedback information. For example, after answering the screening questions, male subjects in the treatment conditions were presented with the following:

Bill Marks is a typical American employee. He has a full-time job and is in good health. At what age would you expect Bill to retire from his primary career, assuming he is a typical American employee?

At age \_\_\_\_\_.



Female subjects viewed a picture of a hypothetical woman (Sarah Jones).

Other engagement questions included:

- Until what age would you expect John (Pam) to live, assuming he (she) is a typical American man (woman)?
- How likely do you think Dave (Judy) would be to buy a life income annuity?

After each question was answered, subjects received feedback. In the factual information condition, subjects received feedback that eight out of ten retirees retired before they reach age 65, and that nearly three out of ten retired before the age of 55.<sup>4</sup> They were also provided with same-gender life expectancy and

<sup>4</sup> Mathew Greenwald & Associates, Inc. and Employee Benefit Research Institute, 2010.

probability of living to 90 years of age. Finally, a very basic definition of a life income annuity was provided, along with the statement that “research has shown that purchasing a life income annuity makes sense for most Americans because it protects them from ever running out of money when they live longer than they had planned to live.”

In the behavioral bias condition, feedback after the response to the first engagement question from above explained that researchers in psychology and decision making find there are certain tendencies that affect how people choose their expected retirement age: optimism and anchoring. Each of these behavioral tendencies was briefly described. After each of the other two engagement questions, subjects were provided with a description of behavioral tendencies that may negatively impact the way people respond to the question posed.

In the combination condition, subjects received content from both the factual and the behavioral bias conditions.

The anecdotal evidence condition relayed narrative feedback after each of the engagement questions. For example, feedback for the last question was, “Dave did not buy a life income annuity to protect himself from running out of money. Instead, he decided to put his retirement savings in an account with the bank, thinking that would be the safest thing to do. Things were fine for the first 10 years of his retirement when he was able to maintain a comfortable lifestyle, but over time, his account dwindled. Eventually, he couldn’t afford to live in his home, and he was quickly running out of money. He wasn’t sure where to turn. He could move in with his son, but he knew it would put a strain on his son’s family life. In the end, that was the only thing he could do, and it was a very difficult situation for all involved. Had Dave purchased a life income annuity, he would have never run out of money and could have continued to pay for some, if not all or most, of his expenses.”

The research employed a five-condition (four treatment conditions and a control), between-subject design. Respondents were randomly selected from an online panel (Market Tools, Inc.) and screened for age (45 to 75) and the existence of retirement assets before they were randomly allocated to one of the five experimental conditions. The online survey was conducted January 4-5, 2011. The respondent group included 505 pre-retirees and 504 retirees. Additional information about the respondent group is presented in Appendix A.

Survey questions of primary interest (in each condition) pertained to annuity purchase intentions and included:

What do you think you (or your spouse/partner) will do with some or all of your retirement savings? (Indicate all that apply.)<sup>5</sup>

Invest or save it in accounts from which you withdraw as you like

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<sup>5</sup> The question was reworded slightly for retirees. They were asked, “What have you (or your spouse/partner) done and what do you plan to do with some or all of your retirement savings? (Indicate all that apply.)” In both cases, the order of responses was randomized.

- Invest or save it in accounts that provide a series of regular payments
- Spend it or use it to pay down debt
- Buy a life income annuity that provides guaranteed monthly payments for as long as you live

How likely are you to buy a life income annuity? (Here, subjects were presented with a 7(high)-point scale to rate their likelihood.)

Asking both of these questions captures not only the effect of the interventions on behavioral intentions (which is assessed by responses to the first question), but also the more subtle effect on attitudes (based on responses to the second question above).

Subjects also responded to questions about their actual or predicted retirement age, life expectancy, and annuity familiarity. Finally, the survey included five standardized questions designed to assess financial literacy<sup>6</sup> and asked the subjects to rate their overall financial knowledge on a 7-point scale.

## **Key Findings**

Key research findings are presented as follows. First, the effects of the interventions on subject responses in the following four important areas are discussed:

- intention to purchase an annuity from current savings,
- likelihood (on a 7-point scale) of purchasing an annuity,
- life expectancy, and
- for pre-retirees, expected retirement age.

Next, the results of regression analyses showing significant predictors of annuity purchase intentions, life expectancy and retirement age are discussed. Finally, financial literacy results are provided.

### **Effects of Treatment Conditions**

#### ***Annuity Purchase Intentions***

The main research question was whether (and how) the four different interventions affect subjects' responses to:

- Whether they had or would purchase a life income annuity (the intention to buy an annuity), and
- How *likely* they were to purchase an annuity (the likelihood of buying an annuity).

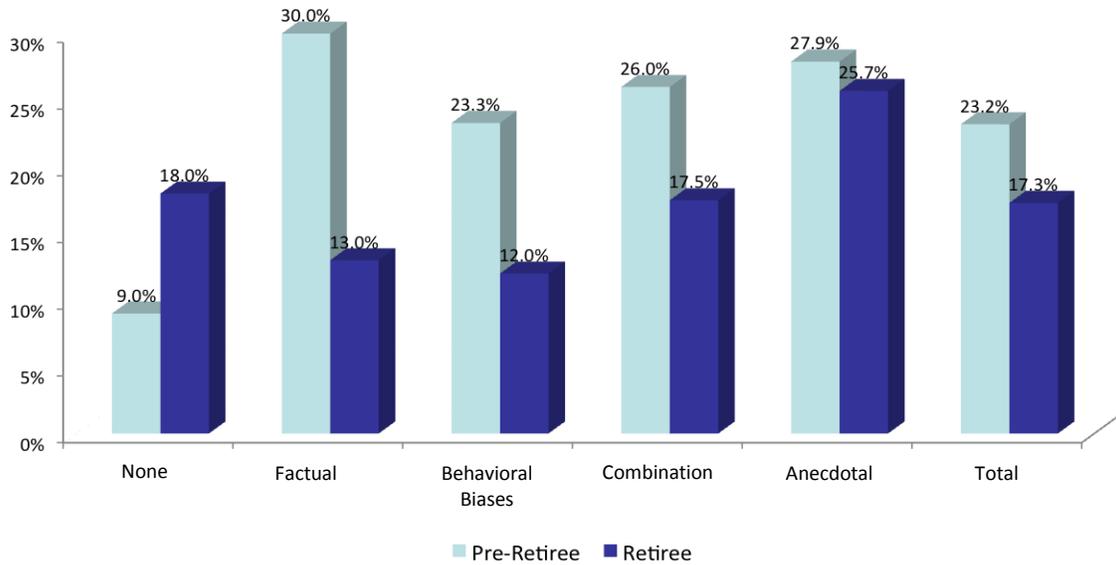
In general, pre-retirees were much more positively affected by the interventions than retirees were. See Figure 2 for raw results; modeled results are presented in Figure 3. As noted, the treatments for pre-retired participants significantly increased the probability of reporting they have intentions to purchase an annuity; the amount of increase ranged from 8.1 to 14.9 percent, compared to those in the control condition (accounting for the

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<sup>6</sup> Refer to financial literacy questions on pages 10 and 11.

included demographic factors), with stronger effects from the factual and anecdotal information. Retired participants showed no significant changes from the control group, with size of the difference relative to those in the control condition ranging from -3.5 to 4.0 percent. Please refer to Appendix B for complete regression results.

**Figure 2. Percentage of Respondents Having or Intending to Buy An Annuity by Condition and Employment Status (Raw Results)**



*Condition Descriptions*

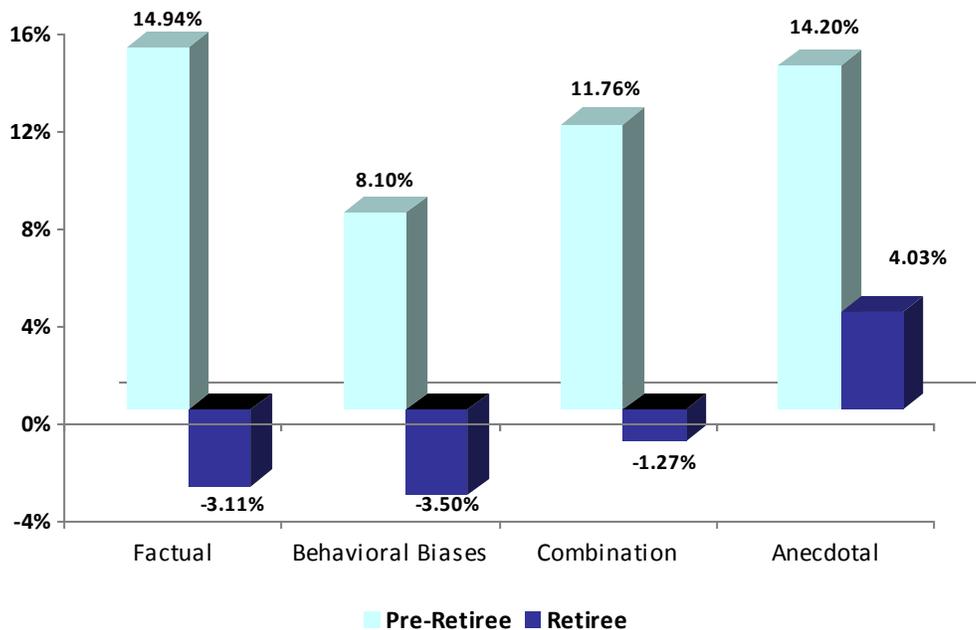
**Factual:** Very simple and neutral factual information related to retirement ages of American employees, life expectancy, and annuity suitability was provided.

**Behavioral Bias:** Subjects were provided with brief insight about a few of the behavioral biases thought to negatively impact predicted retirement age, life expectancy, and annuity purchase decisions.

**Combination:** Both the factual and behavioral bias information above were provided.

**Anecdotal:** Brief narrative related to expected retirement age, life expectancy, and the potential impact of running out of money in retirement was provided to subjects in this condition.

**Figure 3. Modeled Probability Differentials for Having or Intending to Buy An Annuity by Condition and Employment Status (Modeled Results)**



Note: Figure shows increase or decrease in reported intention to buy an annuity, as compared to subjects in the control condition, controlling for other variables. See detailed regression results in Appendix B.

As noted above, subjects were also asked how likely they were to buy an annuity on a 7(high)-point scale. This is a more sensitive measure that can capture subtle changes in attitude not evident in the binary (yes/no) question. Here there are also significant differences between the treatment conditions and the control when directly comparing the reported *likelihood* of purchasing an annuity in the pre-retiree group, based on pairwise t-tests of the different conditions ( $p < .001$ ). Each of the four treatments increased annuity purchase likelihood when directly compared to the control condition. For the retiree group, pairwise t-test results show an effect from the behavioral bias and anecdotal conditions relative to the control condition, with a stronger effect from the anecdotal condition ( $p = .003$ ). Regression results for the reported likelihood of purchasing an annuity support this finding (see Table 3, Appendix B). A significant effect was found for each condition with strongest effects in the factual and behavioral bias combination condition and in the anecdotal condition ( $\beta = 0.84$  and  $\beta = 0.95$ , respectively). Additional regression results are presented in Appendix B.

One might expect that participants receiving both bias and factual information would reap the combined benefits of the bias and factual information. However, the research results show that the increase in pre-retiree intention to purchase annuities in the combined condition was *lower* than in the condition where factual information alone was shown, but higher than in the condition where bias information was shown alone.

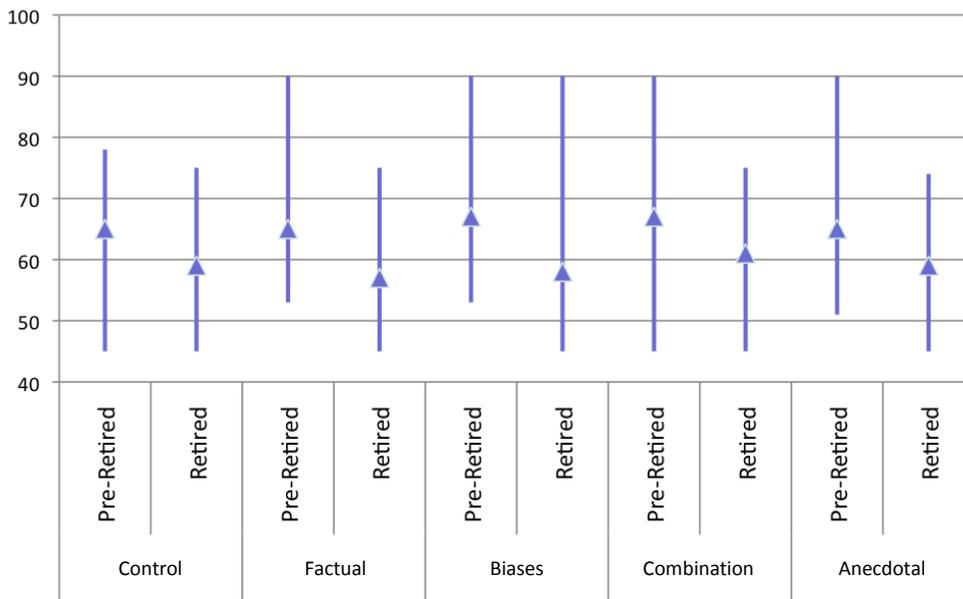
### ***Estimated Retirement Age and Life Expectancy***

It is reasonable to hypothesize that annuities would be less appealing if the number of retirement years that must be funded were underestimated. Therefore, subjects were

asked how long they expect to live and when they expect to retire (or did retire if the respondent indicated that she had already done so).

Consistent with other research, pre-retirees report higher expected retirement ages than retirees' actual retirement ages, by about 8 years on average (66.3 vs. 58.2). Raw responses are presented in Figure 4. Counterintuitively, pre-retiree subjects who were presented with only behavioral bias information (informing them that people have a tendency to overestimate their retirement ages) reported *higher* retirement ages (marginally significant,  $p = .05$ ) suggesting that this information was actually counterproductive. There was no effect from any of the other treatment conditions.

**Figure 4. Expected Retirement Age (Minimum, Median and Maximum Responses)**



*Note: The line represents the range of responses. The arrow identifies the median estimated retirement age.*

Average subjective life expectancy of female respondents was 85.4, versus 84.2 for male respondents, and there was no effect from any of the treatment conditions.

Table 1 summarizes the effects of each of the treatment conditions based on the results of regression analyses.

**Table 1. Effects from Interventions**

<i>Effect of</i>	<b>Factual Information</b>	<b>Behavioral Bias Information</b>	<b>Combination Information</b>	<b>Anecdotal Information</b>
<i>On</i>	<b>Annuity Purchase Intentions</b>			
<i>For Pre-Retirees</i>	+	+	+	+
<i>For Retirees</i>	n.s.	n.s.	n.s.	n.s.
<i>On</i>	<b>Likelihood (Ratings) of Purchasing Life Income Annuity</b>			
<i>For All Subjects</i>	+	+	+	+
<i>On</i>	<b>Expected Retirement Age</b>			
<i>For Pre-Retirees</i>	n.s.	+ <sup>1</sup>	n.s.	n.s.
<i>On</i>	<b>Subjective Life Expectancy</b>			
<i>For All Subjects</i>	n.s.	n.s.	n.s.	n.s.

+ Statistically significant positive effect

- Statistically significant negative effect

n.s. No significant effect

<sup>1</sup>Indicates an increase in expected retirement age (an undesirable effect)

### **Other Related Findings**

#### ***Annuity Purchase Intentions***

The most reliable predictor of (1) an intention to purchase an annuity and (2) a higher purchase likelihood rating (on the 7-point scale) was self-reported annuity familiarity. The higher one rates her familiarity with annuities, the more likely she will report that she will buy an annuity, and she reports a stronger likelihood that she will do it---particularly if she is a retiree. Specifically, an increase in annuity familiarity of just one rating point from the average raises the probability of buying an annuity by 7.9 percentage points. Similar (although not as strong) effects are found for pre-retirees and on the likelihood of annuity purchase responses as well.

Other significant factors increasing the probability of a pre-retiree’s intention to buy an annuity include having a retirement-related concern such as the ability to maintain a certain standard of living, to afford adequate health care, or to achieve investment earnings that exceed inflation. Pre-retirees who expect to live longer are also more likely to say they plan to buy an annuity.

Reducing the probability of the intention to buy an annuity for both the pre-retiree and retiree is the reported desire to invest in accounts from which withdrawals can be made at will.

Solely within the retiree respondent group, we find that females are nearly 11 percentage points more likely to report intentions to buy an annuity (p = .01).

The effects of many of these factors are intuitive; much less intuitive are the findings that those who are unmarried or in a permanent relationship are less likely to intend to purchase an annuity (whether pre-retiree or retiree) compared to married individuals and that retirees who report that they are in excellent (subjective) health are five percentage points less likely to have or buy an annuity.

### ***Estimated Retirement Age and Life Expectancy***

Statistically significant factors related to pre-retirees' expected retirement age not previously mentioned are subjective life expectancy, which is positively correlated, and coverage under a defined benefit plan, which unsurprisingly reduces expected retirement age.

The most significant predictors of subjective life expectancy include:

- Age, which is negatively correlated,
- Poor subjective health, also negatively correlated,
- A concern about one's standard of living in retirement (negatively correlated),
- Employment status (pre-retirees report shorter subjective life expectancies), and
- Expected or actual retirement age (the later retirement occurred or is expected to occur, the longer one's subjective life expectancy).

### ***Financial Literacy***

To address the financial literacy of the respondent group, the online survey included five standardized financial literacy questions<sup>7</sup> (see inset below). Subjects were also asked to self-rate their financial knowledge on a 7-point scale.

#### **Standardized Financial Literacy Questions Included in Research**

Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

- More than \$102
- Exactly \$102
- Less than \$102
- Do not know
- Refuse to answer

Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

- More than today
- Exactly the same
- Less than today
- Do not know
- Refuse to answer

If interest rates rise, what will typically happen to bond prices?

- They will rise

<sup>7</sup> The actual literacy questions included were provided by Annamaria Lusardi. See Lusardi and Mitchell (2007).

- They will fall
- They will stay the same
- There is no relationship between bond prices and the interest rates
- Do not know
- Refuse to answer

Please tell me whether this statement is true or false. A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less.

- True
- False
- Do not know
- Refuse to answer

Please tell me whether this statement is true or false. Buying a single company's stock usually provides a safer return than a stock mutual fund.

- True
- False
- Do not know
- Refuse to answer

Retirees rate their financial knowledge more highly than do pre-retirees (4.23 vs. 4.03 on the 7-point scale). However, the objective results show no significant difference in accuracy between the pre-retiree and retiree groups. Accuracy was predicted by education level, level of savings, gender and income. Females were less accurate in responding than were males. Approximately one-third of respondents correctly answered all five literacy questions. Consistent with prior research, over half of respondents incorrectly answered a question about the relationship between interest rates and bond prices.

As noted above, self-reported annuity familiarity is the strongest predictor of the willingness to purchase an annuity. In this data, we observe interesting relationships between annuity familiarization, subjective financial knowledge, objective literacy score, and education. Correlations are presented in Table 2.

**Table 2. Financial Literacy Correlations**

Relationship	r value
Subjective financial knowledge and objective literacy score	.37
Education and subjective financial knowledge	.20
Education and objective literacy score	.28
Annuity familiarization and subjective financial knowledge	.46
Annuity familiarization and objective literacy score	.15

*Note: All  $p < .001$*

Annuity familiarization is highly correlated with subjective financial knowledge, and much less correlated with respondents' objective literacy scores. However, we do see a relatively high degree of correlation between subjective financial knowledge and subjects' objective literacy score. These relationships suggest that there may be some effect of confidence that is captured in the subjective ratings of both annuity familiarization and financial knowledge. It should be noted that while annuity familiarity was the strongest predictor of annuity purchase intention and likelihood, excluding it from the model in place of self-rated financial literacy shows weaker but still at least

marginally significant effects. In other words, the predictive information in annuity familiarity is also less strongly captured by self-rated financial knowledge. This is actually not the case for objective financial knowledge, suggesting that the predictive information is related to participants' confidence rather than their actual knowledge.

## Summary of Findings and Implications

Although additional empirical research is necessary to more fully explore the strength of the findings suggested by this work, several important implications are worthy of consideration.

Pre-retirees' annuity intentions are more dynamic than retirees' intentions; their purchase intentions were influenced by all three types of information tested in this research. This finding, along with cognitive decline in later years, suggests that individuals may be well served if they receive annuitization guidance *during* their working lives.

Providing pre-retirees with neutral factual information and negatively framed anecdotal evidence (of not annuitizing) were associated with higher levels of annuity purchase intentions. Informing pre-retirees about the behavioral biases that may negatively impact their decision making was less effective (although still more effective than any of the treatments on retirees). Practitioners responsible for communicating with individuals about life income annuities will want to consider these findings when they design and deliver annuity education and messaging.

Providing pre-retirees with both factual and behavioral bias information was less effective in predicting an increase in pre-retirees' intention to purchase an annuity than providing them with only factual information. However, the combination of both types of information was more effective than only providing behavioral bias information. This highlights the fact that these different interventions cannot necessarily be combined for added benefit.

*Self-reported* annuity familiarity is a significant predictor of annuity purchase intentions for both retirees and pre-retirees. In some respects the relationship is not surprising. Who would admittedly say they would buy a financial product which is unfamiliar? This may reflect that people who are independently interested in and have researched annuities both rate themselves as being more familiar with them, and tend to rate their purchase intentions and likelihood favorably. However, annuity familiarity is not as highly correlated with objective financial knowledge (as measured by the five financial literacy questions in this research) as it is with subjective financial knowledge. These self ratings could signify overconfidence, and although overconfidence can certainly be detrimental, it could be that knowledge without some level of confidence is less effective in optimally motivating behavior than knowledge and confidence. Additional research is necessary to further explore this relationship.

Pre-retirees who are concerned about various aspects of retirement and who expect to live longer appear to be more open to annuitizing their retirement assets. Increasing the salience of these matters during the annuity communication process---possibly by helping individuals envision retirement life---may improve their ability to perceive the benefits of annuitizing (and/or the risks of not annuitizing) a portion of their retirement assets.

Practitioners will want to be aware of potential gender differences, particularly within the retiree population. This data show that women retirees appear to be more inclined to say they will purchase an annuity.

Finally, this research finds that individuals who believe they are in excellent health are significantly less likely to report an intention to annuitize. This finding is concerning if subjective health approximates objective health status since these individuals are likely to live longer lives and may be more at risk of outliving their money.

Any one of these findings singularly sheds new light on annuity purchase intentions, and in totality, they offer practitioners, policy makers and academic professionals fertile ground for future efforts.

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## Appendix A: Respondent Group Details

Participants were randomly recruited by email invitations from MarketTools' panel, ZoomPanel, which resembles the demographic mix of the U.S. census. Subjects were screened for age (45 to 75) and the existence of retirement assets (self-reported). We requested an even split between pre-retirees and retirees, with an even gender split within each group. Differences due to rounding.

	Pre-Retirees	Retirees	All Participants
n	505	504	1,009
Average Age	55.9	63.6	59.7
% Female	50.9%	49.6%	50.2%
<b>Employment Status:</b>			
Retired	0.0%	96.0%	48.0%
Working full time for pay	86.3%	0.0%	43.2%
Working part time for pay	5.3%	2.2%	3.8%
Unemployed and looking for work	5.0%	1.4%	3.2%
Something else	3.4%	0.4%	1.9%
<b>Marital Status:</b>			
Married	60.8%	64.7%	62.7%
Unmarried and living with a partner in a permanent relationship	4.6%	4.0%	4.3%
Divorced	12.7%	10.9%	11.8%
Separated	0.4%	1.2%	0.8%
Widowed	5.0%	9.3%	7.1%
Single, never married	16.6%	9.9%	13.3%
<b>Subjective Health:</b>			
Excellent	18.0%	11.5%	14.8%
Very good	44.6%	38.9%	41.7%
Good	27.9%	34.7%	31.3%
Fair	8.1%	11.5%	9.8%
Poor	1.4%	3.4%	2.4%
<b>Household Income:</b>			
Less than \$25,000	6.7%	11.1%	8.9%
\$25,000 to less than \$35,000	9.9%	11.9%	10.9%
\$35,000 to less than \$50,000	16.0%	20.2%	18.1%
\$50,000 to less than \$75,000	26.9%	26.6%	26.8%
\$75,000 to less than \$100,000	17.0%	14.7%	15.9%
\$100,000 or more	23.4%	15.5%	19.4%
<b>Education:</b>			
Some high school or less	0.0%	0.4%	0.2%
High school graduate	12.9%	14.1%	13.5%
Some college/trade or business school	34.3%	38.9%	36.6%
Bachelors degree	27.9%	20.0%	24.0%
Post graduate work	7.7%	7.1%	7.4%
Graduate degree	17.2%	19.4%	18.3%
<b>Savings and Investments:</b>			
Less than \$25,000	17.6%	9.5%	13.6%
\$25,000 to less than \$50,000	11.9%	9.7%	10.8%
\$50,000 to less than \$100,000	13.9%	12.9%	13.4%
\$100,000 to less than \$250,000	24.6%	24.0%	24.3%

\$250,000 to less than \$500,000	19.2%	22.4%	20.8%
\$500,000 to less than \$1 million	8.9%	12.9%	10.9%
\$1 million or more	4.0%	8.5%	6.2%

## Appendix B: Detailed Regression Results

**Table B1. Pre-Retiree Intention to Purchase Annuity**

	Estimate	Std. Error	Pr(> z )	Significance	Effect Size (1)
(Intercept)	-2.76	0.67	0.000	***	5.93%
Life Expectancy	0.05	0.02	0.008	**	0.27%
Shown only Factual Information	1.43	0.44	0.001	**	14.94%
Shown only Bias Information	0.95	0.45	0.034	*	8.10%
Shown both Factual and Bias Information	1.23	0.45	0.006	**	11.76%
Shown Anecdotal Information	1.39	0.44	0.002	**	14.20%
Schooling	-0.23	0.12	0.055	.	-1.14%
Self rating of annuity familiarity	0.30	0.07	0.000	***	1.93%
Objective Knowledge	0.13	0.12	0.264		0.76%
Income	0.06	0.11	0.569		0.37%
Savings	0.03	0.09	0.748		0.17%
Female	-0.13	0.26	0.605		-0.71%
Most concerned about standard of living	1.34	0.46	0.004	**	13.40%
Most concerned about adequate healthcare	1.21	0.49	0.014	*	11.47%
Most concerned about savings given inflation	1.15	0.55	0.036	*	10.73%
Most concerned about money to heirs	0.68	0.93	0.462		5.15%
Most concerned about changes in interest rates	0.44	0.80	0.580		2.99%
Unmarried in a permanent relationship	-1.70	0.81	0.036	*	-4.79%
Divorced	-0.01	0.40	0.979		-0.06%
Separated	1.87	1.64	0.254		23.04%
Widowed	0.91	0.53	0.090	.	7.57%
Single never married	0.05	0.37	0.901		0.26%
Support another	0.19	0.30	0.520		1.17%
Intend to invest retirement assets in account from which they can withdraw as desired	-0.67	0.26	0.009	**	-2.80%
Intend to invest retirement assets in accounts that provide regular payments	0.05	0.26	0.841		0.30%
Intend to use retirement assets to pay down debt	0.01	0.29	0.962		0.08%
Have 401(k) benefits	-0.01	0.31	0.979		-0.05%
Have defined benefit	0.15	0.32	0.635		0.91%
Unsure of retirement benefits	0.06	0.63	0.929		0.32%
No benefits	-0.41	0.32	0.205		-1.92%
No monthly pension payments	0.18	0.52	0.737		1.06%
Excellent health	-0.52	0.44	0.238		-2.33%
Other health status	0.22	0.19	0.235		1.37%

Significance Codes : \*\*\*= 0.001, \*\*=0.01, \*=0.05, .= 0.1

(1) Represents the absolute change in probability of annuity purchase intention for those in the labeled group, (e.g., the change in 'yes' proportion for one experimental condition or for people with a particular marriage status) or for a one unit increase from the median response (e.g., the change for each year of life expectancy longer than the median, or for a one point increase in subjective knowledge from the median response). The first row (intercept) gives the base rate of responding. For example, as fit by the regression model, being in the statistics condition increased the proportion of reported purchase intentions from 5.93 percent to 20.87 percent (5.93 percent plus 14.94 percent).

**Table B2. Retiree Intention to Purchase Annuity**

	Estimate	Std. Error	Pr(> z )	Significance	Effect Size (1)
(Intercept)	-2.60	0.69	0.000	***	6.93%
Life Expectancy	-0.02	0.02	0.361		-0.13%
Shown only Factual Information	-0.63	0.51	0.215		-3.11%
Shown only Bias Information	-0.74	0.50	0.138		-3.50%
Shown both Factual and Bias Information	-0.22	0.47	0.647		-1.27%
Shown Anecdotal Information	0.50	0.47	0.282		4.03%
Schooling	-0.02	0.12	0.871		-0.12%
Self rating of annuity familiarity	0.85	0.11	0.000	***	7.87%
Objective Knowledge	0.01	0.14	0.940		0.07%
Income	0.18	0.13	0.161		1.26%
Savings	-0.08	0.11	0.471		-0.49%
Female	1.06	0.34	0.002	**	10.82%
Most concerned about standard of living	0.35	0.42	0.407		2.63%
Most concerned about adequate healthcare	0.53	0.48	0.270		4.32%
Most concerned about savings given inflation	0.46	0.46	0.316		3.61%
Most concerned about money to heirs	0.45	0.69	0.513		3.56%
Most concerned about changes in interest rates	-2.13	1.18	0.072	.	-6.05%
Unmarried in a permanent relationship	-2.21	1.10	0.044	*	-6.12%
Divorced	0.39	0.57	0.497		2.98%
Separated	0.50	1.15	0.663		4.04%
Widowed	0.50	0.49	0.309		4.02%
Single never married	0.49	0.51	0.341		3.88%
Support another	-0.34	0.48	0.474		-1.90%
Intent to invest retirement assets in account from	-1.16	0.35	0.001	***	-4.64%
Intent to invest retirement assets in accounts that	-0.28	0.31	0.375		-1.59%
Intend to use retirement assets to pay down debt	-0.39	0.53	0.457		-2.14%
Have 401(k) benefits	0.61	0.34	0.071	.	5.10%
Have defined benefit	-0.12	0.44	0.791		-0.71%
Unsure of retirement benefits	0.93	0.72	0.197		8.99%
No benefits	0.04	0.44	0.922		0.28%
No monthly pension payments	2.49	1.72	0.147		40.27%
Excellent health	-1.42	0.71	0.045	*	-5.17%
Other health status	-0.07	0.22	0.743		-0.44%

Significance Codes : \*\*\*= 0.001, \*\*=0.01, \*=0.05, .= 0.1

(1) Represents the absolute change in probability of annuity purchase intention for those in the labeled group, (e.g., the change in 'yes' proportion for one experimental condition or for people with a particular marriage status) or for a one unit increase from the median response (e.g., the change for each year of life expectancy longer than the median, or for a one point increase in subjective knowledge from the median response). The first row (intercept) gives the base rate of responding.

**Table B3. Likelihood of Purchasing Annuity**

	Estimate	Std. Error	Pr(> z )	Significance
(Intercept)	1.38	0.25	0.000	***
Pre-retired	0.56	0.13	0.000	***
Life Expectancy	0.01	0.01	0.282	
Shown only Factual Information	0.56	0.17	0.001	***
Shown only Bias Information	0.77	0.17	0.000	***
Shown both Factual and Bias Information	0.84	0.17	0.000	***
Shown Anecdotal Information	0.95	0.17	0.000	***
Schooling	-0.05	0.05	0.278	
Self rating of annuity familiarity	0.31	0.03	< 2e-16	***
Objective knowledge	-0.03	0.05	0.548	
Income	0.06	0.05	0.161	
Savings	0.00	0.04	1.000	
Female	0.37	0.11	0.001	***
Most concerned about standard of living	1.07	0.16	0.000	***
Most concerned about adequate healthcare	0.83	0.18	0.000	***
Most concerned about savings given inflation	0.82	0.19	0.000	***
Most concerned about money to heirs	0.94	0.30	0.002	**
Most concerned about changes in interest rates	0.46	0.27	0.083	.
Unmarried in a permanent relationship	-0.51	0.26	0.056	.
Divorced	-0.03	0.18	0.859	
Separated	-0.09	0.60	0.879	
Widowed	0.11	0.22	0.612	
Single never married	0.31	0.17	0.066	.
Support another	0.17	0.14	0.222	
Intent to invest retirement assets in account from which they can withdraw as desired	-0.52	0.13	0.000	***
Intend to invest retirement assets in accounts that provide regular payments	0.13	0.12	0.278	
Intend to use retirement assets to pay down debt	-0.29	0.15	0.055	.
Have 401(k) benefits	0.10	0.13	0.427	
Have defined benefit	-0.03	0.15	0.838	
Unsure of benefits	-0.10	0.25	0.692	
No benefits	-0.02	0.15	0.919	
No pension	0.09	0.32	0.772	
Excellent health	-0.43	0.19	0.026	*
Other health status	-0.01	0.08	0.857	

Significance Codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 '.' 1