

**The Psychology of SSA Claiming Decisions: Toward the Understanding and Design of Interventions**

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**Abstract**

In this research, we aim to test interventions related to information presentation that may redirect attention toward benefits of early versus late claiming of Social Security retirement benefits. Prior research has documented that higher perceived life expectations (which are subject to question framing), preferences for losses as measured through individual-level loss aversion, impatience or a preference for smaller amounts sooner versus larger amounts of money later, and personal beliefs about perceived ownership of SSA contributions are all significantly predictive of expressed preference for early versus late claiming. The interventions tested in this new project examine how providing cumulative payout information differentially affects claiming and annuity decisions, and also tests whether changing the format of such cumulative payout tables can affect claiming decisions. Furthermore, we utilize eye-tracking technology to better understand which information participants are attending to over the course of their decision making process.

## 1. Introduction

When asked “what is your single greatest fear about retirement?” the most frequently mentioned fears are “outliving savings” and “not being able to meet basic financial needs.” This fear is often referred to as **longevity risk**. It is a real risk given that a healthy person at age 65 has almost a 30 percent chance of reaching age 90 if male and almost a 40 percent chance if female. How can one insure against longevity risk? Two solutions are most commonly discussed. First, one can delay Social Security claiming which is the only hedge against longevity risk (the substantial risk of outliving one’s savings) for many retirees. Second, and in addition, one can at least partially annuitize one’s more private retirement savings through the purchase of some form of life annuity. Over past few years we have undertaken a program of study of the important and complex decisions under uncertainty that people make in trying to deal with longevity risk. In particular, we have investigated preferences for claiming one’s Social Security benefits (earlier or later) and preferences for purchasing a life-annuity, a product that provides insurance against outliving one’s savings. These two solutions for dealing with longevity risk are obviously related. However, they are not perfect substitutes. For example, there are good arguments for using, if necessary, part of one’s retirement savings for current consumption in order to delay as long as possible (up to age 70) beginning Social Security benefits.

In this paper we focus on psychological determinants of when people prefer to start claiming their Social Security benefits, and to a lesser extent on preferences for annuitization through the purchase of a life annuity. The decision on when to claim Social Security benefits, between the ages of 62 and 70, is clearly one of the most important financial decisions that most Americans will ever make (Scott, 2012). Social Security is the single largest source of retirement income for most retirees in the U.S. and one’s Social Security benefits are the only meaningful source of inflation-indexed retirement income for most Americans. Unfortunately, many people may not be making the wisest decisions about when to start claiming their Social Security benefits. Most Americans (50 percent) start collecting at age 62 or within two months of leaving the labor force, and eighty percent or more claim their Social Security benefits before the normal retirement age (NRA) of 66. The percentage who delay claiming to the maximum age of 70 is quite small, estimated at around 2 percent. Given both the substantial risks of

longevity, and the financial benefits from delaying claiming, it has been suggested that later claiming should generally be chosen and even that these percentages should be reversed (Shoven & Slavov, 2012; Tacchino, Littell, & Scholbel, 2012). More specifically, Shoven and Slavov (2012) suggest that delaying benefit claiming is actuarially advantageous for a large subset of people, noting that with today's interest rates, "primary earners with average life expectancy should delay benefits to age 70 to maximize expected present value." While one might argue the exact percentages of who should claim when, it seems clear that many Americans are claiming too early given the various factors that should go into that critical decision.

In the behavioral studies to be reported in the present paper, and in a number of previous behavioral studies that have been conducted with over 10,000 respondents, ages 35-65, we have consistently found that most of our respondents express preference to claim earlier rather than later. In addition, our studies have found that participants see purchasing an immediate life annuity as unattractive. Both of these findings are consistent with actual choices made by retirees for benefits claiming and annuity purchase. Taking advantage of these surveys and more experimental studies, we also have found in our previous work that individual differences in preferences for claiming and annuitization are related to individual differences in judgments about life expectations, loss aversion, perceived ownership, and intertemporal patience. The investigation of such individual differences is one way to better understand the psychology of Social Security claiming decisions.

Specifically, our studies find that the longer one expects to live, the later the preferred claiming age, consistent with standard economic assumptions. We also find in these same studies that individual differences in loss aversion, not risk aversion, appear to be negatively associated with delaying social security claiming such that more loss averse individuals are more likely to want to claim prior to reaching full retirement age. Third, we have also found that people who prefer smaller amounts of money sooner over larger amounts of money later also express an intention to claim earlier. Finally, we find that individuals who perceive their lifetime contributions to be "theirs" and that benefits are owed them based on those contributions are more likely to wish to claim early. Some of these variables, such as life expectations and time preferences, clearly fit within standard life cycle consumption models of annuitization. Other variables, such as loss aversion rather than risk aversion and perceived ownership, differ from standard factors and represent a more psychological approach to understanding these decisions.

Given that these individual measures of subjective life expectation, loss aversion, intertemporal patience, and perceived ownership are all significant drivers of claiming preferences, we wished to investigate whether manipulations of information presentation can change interest in early versus late claiming, and how those changes in information presentation may interact with individual differences. In part this interest in the potential of changes in information architectures reflects a suggestion by Kunreuther, Pauly, and McMorro (2013) in the context of life annuities as an insurance product for protecting against longevity risk. They argued that “the most obvious solution is to provide better and more convincing information on the attractive properties of annuities and *the very high return you get on your annuity investment if you live to a ripe old age*” (p. 142, emphasis added). Note that the idea is that one might overcome myopic thinking and minimize loss aversion in claiming decisions and in annuity decisions by making the future high returns available more salient. The three studies presented in this paper represent initial tests of such information presentation, with the choice of information driven by our knowledge of the psychological drivers of early versus late claiming.

## **2. Background**

Our studies investigate how different presentations of information about the benefits of claiming and annuitization affects participants’ choices for managing longevity risk. We also include the effects of four individual factors: subjective judgments of life expectations, loss aversion, perceived ownership, and intertemporal patience. Here, we briefly describe each factor and our findings on how each can affect individual level claiming and annuitization decisions.

### *2.1 Subjective life expectations*

Recent work has documented the effects of question framing on individuals’ judgments of their own life expectations, finding that asking questions in a “live to” frame rather than a “die by” frame can lead to an approximately ten year difference in predicted life expectations (Payne et al 2013). Because life expectation is a key input to the claiming decision, we ask individuals in our studies to make a subjective estimate of their life expectations. We then investigate how differences in how individuals respond to these life expectation solicitations affect later retirement decisions such as Social Security claiming. We test these effects in multiple ways. In Study 1, all individuals are asked to make these estimate within a “live to” frame since prior

research has found that individuals in the “live to” frame are more likely to use those estimates in their later decision making than those who answer questions framed as “die by.” We find a significant and persistent effect of subjective life expectation judgments on predicted claiming age. In Study 3, we expose some participants to either a “live to” or “die by” frame prior to making their hypothetical retirement decisions to see whether the different frames will affect those later decisions by shifting attention to different financial aspects of the decision. Consistent with prior research, we find that subjective life expectancies are positively related to intentions to purchase a life annuity and to delay claiming of Social Security, but that this positive relationship is much stronger when the life expectancies are asked in a live-to frame rather than a die-by frame.

## *2.2 Effects of loss aversion*

Another key psychological influence on claiming decisions that we have observed in previous studies is an individual’s measure of loss aversion, due to the perspective that not claiming early may result in a loss of benefits relative to a breakeven calculation or relative to the individual’s own contributions into Social Security during their working years. Note that high levels of loss aversion have different implications than high levels of risk aversion, since individuals with high levels of risk aversion should be more, rather than less, likely to want to delay claiming. In other words, because Social Security provides a guaranteed stream of lifetime income, larger monthly benefits are seen as a way to reduce risk and should be most highly valued by individuals with significant levels of risk aversion. Loss aversion, on the other hand, leads to earlier claiming because concerns that prior contributions to Social Security will be “lost” or wasted if claiming is delayed can motivate individuals to claim as soon as possible and avoid that loss.

There are several implications of using loss aversion, rather than risk aversion, to explain claiming preferences. A very substantial behavioral literature exists on manipulations that moderate loss aversion in a wide variety of tasks. By thinking about the Social Security claiming decision in a loss aversion context, we can begin looking for ways to apply those findings to creating information interventions that influence the claiming decision. Since benefits may be perceived as already “owned” by the individual, the decision of when to claim begins to resemble an endowment effect situation, where currently held (owned) options are more highly valued than the same option when not owned. The standard explanation for the endowment

effect is loss aversion, in which the owner sees giving up the option as a loss and therefore demands a higher compensation. If Social Security benefits are also perceived to be owned by a potential claimant, the decision to delay looks like a potential loss (relative to either the breakeven value and/or death before any benefits are received). Thus, individuals who are high in loss aversion should be less likely to be willing to delay claiming.

Our studies on Social Security claiming described below do find that loss aversion, when measured at the individual level, is a significant predictor of preference for early versus late claiming. The empirical finding that individual level heterogeneity in loss aversion predicts claiming preferences supports theories proposed by other researchers on this topic. As noted by Brown (2007), individuals who delay claiming their Social Security benefits beyond age 62 are essentially purchasing an inflation-indexed annuity for the future; however, consumers sometimes view the purchase of an immediate annuity as “gambling on their lives.” Extending that idea, Hu and Scott (2007, p.8) suggest examining annuity choice from the perspective of more behavioral models such as Cumulative Prospect Theory (Tversky & Kahneman, 1992) under the argument that CPT is a better behavioral model than the classic expected utility model. Our findings support the argument that incorporating loss aversion into models of claiming decisions may improve those models predictive power.

### *2.3 Concerns about perceived ownership*

Perceived ownership has been found to be an important predictor of the size of endowment effect, the difference in object valuation between owners and non-owners (Peck and Shu 2009, Shu and Peck 2011). Ownership is clearly an important aspect of loss aversion, as without ownership, there would not be loss. A key aspect of loss aversion is reference dependence; the object must be integrated into the individual’s endowment so that not having it is seen as a loss. In other words, the individual must assess “is it a loss?” before loss aversion becomes relevant. It is not necessary to have legal ownership of an object for these effects to occur; anticipatory possession or pseudo-endowment can have similar psychological effects to legal ownership, even when the individual does not have legal possession of the object (Ariely and Simonson 2003; Hoch and Loewenstein 1991). Carmon, Wertenbroch, and Zeelenberg (2003) demonstrated through a comprehensive set of studies that “prefactual ownership” of an option can be affected by manipulations like the amount of deliberation spent on the decision. Psychological ownership has been explored in other domains as well. Pierce, Kostova and Dirks

(2001) define it as being characterized by the feeling that something is “mine.” We propose that a measure of psychological (or perceived) ownership can be used to capture these feelings of ownership, and that individuals with a higher perception of ownership for their benefits will be more likely to want to claim benefits early.

Thus, our studies include perceived ownership measures as an additional individual difference to see how they affect claiming decisions. Specialized measures for these dimensions in the context of claiming and annuity purchase are included in our studies. We consistently find that individuals who strongly agree with statements about Social Security benefits being “theirs” are more likely to claim early. Findings based on these measures are useful for suggesting improved messages and/or targeted interventions for individuals with high levels of ownership concerns.

#### *2.4 Intertemporal patience for long-run decisions*

The fourth individual level difference that we include in our studies is intertemporal patience, or the ability to wait for delayed (but larger) outcomes in exchange for giving up immediate rewards. In all of our studies, we use a measure of intertemporal discounting that is a set of four questions adapted from Schreiber and Weber (2013). Individuals receive a score of 0 to 4, with higher values indicating more patience for the future. Schreiber and Weber, in a large online survey, document that this discounting measure is predictive of willingness to annuitize a lump sum. They are able to show that time inconsistent preferences can explain an age effect for annuities, in which younger respondents report more interest in annuitization than older respondents (an effect also found in Brown et al. 2012).

The importance of intertemporal patience to the annuitization decision is consistent with models of hyperbolic discounting, under which near future outcomes are heavily discounted but far future outcomes are weakly discounted (Ainslie and Herrnstein 1981, Thaler 1981). Time discounting measures have been found to be important individual factors for other important financial and health decisions, such as generating high credit card debt (Meier and Sprenger 2010), gym attendance (DellaVigna and Malmendier 2006), and smoking behavior (Bickel et al 1999). Our prior studies have found that it is also an important determinant of early versus late Social Security claiming, and thus we include it in all three studies here as an additional individual measure.

#### *2.5 Information presentation interventions*

In addition to incorporating the individual behavioral measures outlined above, we also use our studies to examine potential choice architecture interventions that vary how information is presented. In particular, we extend the findings from our previous research on how cumulative payout information affects both claiming intentions and preference for annuities. This intervention is unique in the claiming literature in that it expands the set of years that are considered in the delay decision beyond a single breakeven age. We have previously documented that this intervention has significant effects on annuity choice, with information on cumulative payoffs increasing both overall liking for annuities and valuation of particular annuity attributes, relative to presentations that focus only on monthly income (Shu, Zeithammer, and Payne 2013). However, in contrast to these annuity results, our prior work has also found that the same information presentation manipulations delivered in a claiming task increase early claiming. In other words, providing cumulative payout information makes individuals more interested in long-term guaranteed income when making annuity decisions, but makes them more interested in immediate payouts in exchange for sacrificing long-term guaranteed income when making claiming decisions. The difference between the annuity purchase decision and the Social Security claiming decision may be related to the issue of perceived ownership ; with an annuity, the choice is one of purchase, while with claiming, the choice is of exercising an already held (owned) option. The influence of the cumulative table in the annuity environment may increase the perceived value of the annuity and thus make it more preferred as a purchase. However, in the claiming environment, the cumulative table may remind the individual of the high value of the option they already hold, making them more impatient for receiving it.

To more clearly test how cumulative tables differentially affect annuity and Social Security claiming decisions, the current project manipulates the availability of cumulative payout information for study participants who make both claiming and annuity decisions within the same study. We will then be able to see whether the cumulative payouts continue to operate in seemingly opposite ways for the same individual. We also further extend our testing of cumulative payout tables by bringing them into a laboratory environment where we can use eye tracking technology to see which parts of the table the study participants are fixing their attention on. Finally, we manipulate the presentation of the rows and columns in the cumulative tables to see whether a change in how the information is shown can shift attention from some cells to

others and therefore affect the choice of which age to claim benefits. This change in the order in which payout information is presented so that larger or smaller amounts are seen as the most salient reference point may be perceived as a form of framing. Note, however, that these proposed interventions differ from prior framing work by Brown, Kapteyn, and Mitchell (2011) and Liebman and Luttmer (2009) in several significant ways. First, our interventions more directly incorporate issues of life expectations, including self-generated judgments which are affected by how questions are framed. Second, we expect that effects of framing and information presentation will differ according to individual differences in loss aversion and perceived ownership, which we directly measure.

### **3. Empirical Results**

We have completed two online studies using national panels provided by data collection firm Qualtrics and a third laboratory study using eyetracking technology. The Qualtrics survey panels, while convenience samples, provide a distribution of American adults whose demographics fit reasonably well with national averages (see Table 1 for demographics from all three studies). Participants are recruited and screened by the firms and are paid for their participation. During the studies, participants are further screened by relevant demographic variables (for example, by age) and according to their successful completion of an attention check (see Oppenheimer, Meyvis, and Davidenko 2009). We find results from these surveys that are similar to the well-known, and often studied, HRS data on key questions such as life expectations and savings for retirement.

Our first study focuses on how presentation of cumulative payout information affects both claiming and annuity decisions for the same individuals. Study 2 attempts to understand the decision making process for Social Security claiming in more detail by using eyetracking technology to track relative attention (different fixation patterns) during the task. A key idea in psychological studies of decision behavior is that decisions often reflect selective attention to information. Study 3 returns to the annuity and claiming decisions tested in Study 1 with new information presentation manipulations in which reversal of table rows and columns is tested to see whether the order in which information is presented can affect these choices. The idea is that different ways of presenting the same information can impact choice by affecting the relative

saliency of the information. In all three studies, individual differences in life expectations, loss aversion, intertemporal patience, and perceived ownership are measured and controlled for.

### *3.1 Study 1: Effects cumulative information presentation on claiming and annuities*

Our intent in Study 1 was primarily to see whether providing decision makers with a table of cumulative payout information would have different and opposite effects on annuity and Social Security claiming decisions among the same study respondents. Prior research by the authors has found that providing a cumulative payout table increases interest in annuities but decreases predicted claiming age for Social Security. Since Social Security is a form of an annuity, for which later claiming results in higher monthly payouts, this inconsistency in effects suggests that individuals see these decisions as psychologically quite different. One reason for this difference may be that Social Security is already “owned” by (endowed to) the individual, while an annuity is a purchase decision for a non-owned product. To determine whether such an endowment effect may be driving the difference in response to the cumulative tables, we also collect for loss aversion and perceived ownership measures, and we test a variety of annuity tasks that differ in their level of prior endowment for the annuity option.

Participants. Study 1 is an online study with a convenience sample of U.S. residents aged 40 and above ( $N = 1010$ ) who were recruited and run online through the internet panel company Qualtrics. Respondents (71.2 percent female,  $M_{\text{age}} = 57$ ) were paid a fixed amount for participation.

Method. Participants in the study were randomly assigned to one of four conditions in a 2X2 design. The first manipulation is the order in which participants saw the annuity and claiming tasks. We had no particular prediction for an effect of order, except for the possibility that increased awareness for Social Security benefits due to completing the claiming task first might lead to lower interest in annuities. The second manipulation was in the presentation of information about cumulative payouts for the annuity and for Social Security claiming. Specifically, participants either saw basic information regarding monthly income from either Social Security or the annuity, or they saw a table with cumulative payouts for the ages 70, 75, 80, 85, 90, and 95 (a sample of the cumulative table for Social Security is shown in the top panel of Figure 2). Participants who saw the cumulative table for one task (e.g., the claiming task) also saw the cumulative table for the second task (e.g., annuities).

In addition to this 2X2 design, we had three variations of the annuity task, resulting in a total of 12 conditions in the full design. The differences in the annuity task were in how the annuity decision was described. In the first annuity task, the scenario was described as one in which the retiree had at least \$100,000 in retirement savings and was asked their likelihood for using the money for buying an annuity (purchase task). In the second task, the scenario was that the retiree had an employer-sponsored retirement plan which had a default payout as an annuity starting at age 65, similar to a pension (annuity default task). In this scenario, the dependent variable was the individual's likelihood of keeping the default annuity rather than converting it to a lump sum payout. In the third annuity task, the scenario was that the individual had an employer-sponsored retirement plan which had a default lump sum payout, similar to a 401k plan (lump sum default task). For this task, the dependent variable was the likelihood of keeping the payout as a lump sum rather than converting it to an annuity. Thus, the DV for the first and second tasks were likelihood of getting an annuity, while the DV for the third task was likelihood of taking the lump sum. Also, the first and third tasks have the common aspect of being a decision to convert a lump amount into an annuity (willingness to pay) rather than a decision to convert an existing annuity into a lump amount (willingness to accept). Finally, the second and third tasks are both described as employer-sponsored plans, which the first task is described as simply coming out of the individual's retirement savings. The inclusion of these different approaches to the annuity task allows us to test some key concepts from choice architecture, such as the role of defaults, endowment (WTP versus WTA), and perceived ownership.

We also included questions about perceived happiness for different retirement scenarios in association with the annuity task questions. Specifically, after indicating their likelihood of taking an annuity (or lump sum) and answering questions about perceived ownership for their savings, they answered two questions about how happy they expected to be under the scenarios of having the annuity or self-managing a lump sum of retirement savings. This measure was taken on a 7-item scale.

In addition to our dependent variables for claiming age and annuity likelihood, we collected individual difference measures of life expectation (taken in a "live to" frame), loss aversion (based on an 11-item measure), intertemporal patience (a 4-item measure), and perceived ownership for either the SSA contributions or the retirement plan option (savings, annuity, or lump sum). We also collect substantial additional information about each participant

to use as covariates in our analysis, including age, gender, current savings, and perception of future social security solvency.

Results. We start by converting the life expectancy probabilities taken for ages 65, 75, 85, and 95 into a single comprehensive measure of life expectation. More specifically, for each individual respondent, we estimated a set of Weibull parameters based on the individual's current age and the full set of probability responses. (The Weibull estimates assume a 0 percent chance of being alive at 130 years old to provide a reasonable ceiling to the model estimates; additional details about how these estimates are performed are provided in Payne et al 2013.) Using the estimated Weibull parameters per participant, a mean life expectancy was estimated per individual, at which the model predicted that person's chance of being alive to be exactly 50 percent. This single mean life expectation is then used in all remaining analysis. We now proceed to describing the findings for the claiming task and the three annuity tasks.

*Claiming.* The dependent variable for the claiming task was the age at which the individual indicated they expected to begin claiming their Social Security benefits. Participants were given the options of 62, 64, 66, 68, and 70 to select from. They were also able to indicate "I don't know"; respondents choosing this answer are excluded from the remaining analysis for a total of n=955 responses.

The first column of Table 2 provides regression results for the claiming age using both the manipulations and all individual difference measures as independent variables. Looking at the impact of our manipulations, we see that both the order and presentation manipulations were significant. (Additional analysis examining possible interactions between these conditions finds no significant interaction effect, and the resulting model has a lower R-squared.) Presentation has a significant negative effect ( $\beta = -.505, p < .001$ ) indicating that seeing the cumulative payout table (how much the individual will have received from Social Security at various ages from 70 to 95) causes earlier claiming, by about 6 months. This is consistent with our earlier findings on effects of the cumulative tables on earlier claiming. Order also has a significant negative effect ( $\beta = -.532, p < .001$ ) indicating that completing the questions about annuities prior to the claiming task also makes individuals want to claim earlier by about 6 months.

Most of the individual differences measures are significant and in the predicted direction based on our prior findings. Higher perceived ownership for SSA contributions, lower expected age, higher loss aversion, and lower patience all predict earlier claiming. Higher current age also

predicts earlier claiming, as does an increased belief that Social Security will not be available (solvent) in the future. Gender and reported savings were not significant predictors for claiming age.

*Annuities.* An analysis of all the annuity tasks combined shows a limited number of significant effects on likelihood of selecting an annuity. Note that the DV for the third annuity task, lump sum default, has been reverse-coded to indicate annuity likelihood rather than lump sum likelihood. Using this collapsed dataset, we see from column 2 of Table 2 that only perceived ownership (for either the cash or the annuity depending on task default) and the measure of intertemporal patience are significant for likelihood of selecting an annuity. Manipulations of order and information presentation are not significant. It is also clear, however, that the type of annuity task is significantly affecting individuals' reported likelihood of taking the annuity. Likelihood of choosing an annuity is highest when the annuity is a default option through an employer sponsored plan, with average likelihood at 45.8 percent for this condition. Second highest is when the money for the annuity also comes from the employer plan; here, the average likelihood of taking the annuity is 39.4 percent even though it requires conversion from a lump sum default. Likelihood in the basic annuity purchase task is lowest at 31 percent. To better understand the drivers of annuity likelihood for each type of decision, we proceed to analyzing each task separately.

First is a basic scenario in which the individual is asked to imagine an annuity from current retirement savings, with no mention of an employer-provided plan. The regression results for this annuity task are in the third column of Table 2. For this task, the presentation of cumulative payout tables has no significant effect, and neither does predicted life expectation, loss aversion, or intertemporal patience. The lack of an effect for the cumulative payout table is surprising since prior studies have shown it to make individuals more likely to select an annuity (Shu, Zeithammer, and Payne 2013); here, the effect is in the right direction but not significant. Younger people like annuities better than older individuals, consistent with prior findings. Strong feelings of ownership toward current retirement savings, concerns about getting the money back after purchase of an annuity, and feeling a loss of ownership when getting an annuity are all significant for not wanting one.

Second is the scenario where the annuity is a default choice provided through an employer-sponsored plan, similar to a pension. Again, no significant effects are found for the

cumulative payout table manipulation, life expectations, loss aversion, or intertemporal patience. Strong feelings of ownership toward retirement savings significantly reduce the expressed likelihood of an annuity as does (surprisingly) a strong sense of ownership for the annuity itself. Also unpredicted is that the measure for concerns about one's getting money back with an annuity has the opposite sign from its effect on the annuity purchase decision in the first task.

Third is the scenario where the lump sum is a default choice provided through an employer-sponsored plan, similar to a 401k plan. The actual question for this task is the individual's likelihood of retaining the lump sum (rather than converting it to an annuity) so the answer has been reverse coded to represent the likelihood of taking an annuity, for easier comparison with the other annuity tasks. Again, no significant effects were found for presenting cumulative payout tables or life expectancy measures. Loss aversion and intertemporal patience are marginally significant for this task. Strong feelings of ownership toward retirement savings in general actually seem to increase the likelihood of converting to an annuity, but feelings of ownership toward the lump sum in particular significantly reduces the likelihood of taking an annuity. Concerns about getting one's money back with an annuity and feelings of lack of ownership after conversion also both predict lower likelihood of taking the annuity.

*Happiness.* One last question included in this survey had to do with predicted happiness during retirement for self-management of retirement savings (as with a lump sum) and for the annuity after each annuity scenario. Happiness was scored on a 1-7 scale (higher values indicate greater happiness). A graph of the average predicted happiness score for self-management and annuity per condition is shown in Figure 1. Analysis finds that people predict significantly higher happiness under self-management than under annuities in general (4.82 vs 4.46,  $t(1009)=5.41$ ,  $p<.001$ ). Further testing finds that this difference is not significant in the second task where the annuity is the default for retirement (4.72 vs 4.60,  $t(324)=1.02$ , n.s.). The difference is largest when the lump sum is the default. The size of the difference between the two happiness measures is a significant predictor for annuity likelihood when it is included in the previously tested regression models, and model fit is also improved, suggesting that individuals' predictions of happiness under different scenarios for retirement income affects their choice, but that these predictions of happiness are also dependent on the default settings in the scenario under consideration.

Discussion. The results for this study were mixed given our expectations and prior empirical findings for similar tasks. For the Social Security claiming task, our findings directly mirrored prior results in which providing cumulative payout information caused respondents to express desire for earlier claiming ages. We also find significant effects for our standard individual difference measures of subjective life expectations, loss aversion, intertemporal patience, and perceived ownership. We also find that participants who thought about annuity decisions prior to the claiming task were more likely to want to claim earlier.

However, for the annuity tasks, we are unable to replicate previous findings of an increased preference for annuities after seeing cumulative payout tables. We also find no effects of task order, life expectations, loss aversion, or intertemporal patience, as we saw in the Social Security claiming task. Taken together, these results imply that the decision to take an annuity is quite different psychologically than the decision of when to claim Social Security benefits. The one individual difference measure that is significant in both types of decision is a measure of perceived ownership for the benefits in question. For Social Security claiming, the perceived ownership is toward the contributions made to Social Security during the individuals' working years. For the annuity tasks, significant effects of perceived ownership concern both general retirement savings and also ownership for particular aspects of the default plan, whether annuity or lump sum.

### *3.2 Study 2: Tracking the decision process for claiming and annuity decisions*

In the study above, and in several previous studies we have found effects of providing cumulative payout information on the expressed preference decision when to claim. For Study 2, we wished to gain a better understanding of how individuals were using the information in the cumulative payout tables to guide their claiming decisions. To do so, we take advantage of current technology in eyetracking during computer-based surveys. By tracking where the participant is looking at the study materials, and for how long, we can generate heat maps and fixation analyses that can then be linked to the ultimate task choice. We are also able to do a dynamic processing analysis which uses fixation stages to help predict choice before the participant has committed to an outcome. Ultimately it is a powerful test of eye-tracking to show whether or not one can predict prior to a decision being expressed what decision will be made based on pre-decisional patterns of information acquisition.

Participants. Study 2 was completed in the behavioral decision laboratory at Duke University where a computer with Tobii eyetracking technology has been installed. Participants were recruited from the local community to come to the lab for a computer study on retirement decisions. While sitting at the computer, they proceeded through a task similar in design to Study 1. The computer was able to track their gaze throughout the study and link it to the information presented on the screen. In this way, we are able to see what they are looking at and for how long.

We were able to recruit 87 subjects (between 38 and 64 years old) to participate in the study. Any participants with missing fixation data rates of 40 percent or higher were excluded from any analysis; therefore, at least 60 percent of the data were captured as fixation or saccades. Participants with any fixation less than 50ms and with any tasks with less than 8 non-consecutive fixations on the main cells were also excluded. After these cleaning processes, n=66 participants were retained in the claiming task.

Method. Participants in the study first completed the life expectation estimate task in the live-to framing. Then they were taken through the same instructions for the claiming task as used in Study 1. The primary dependent variable was their predicted claiming age, as a choice between ages 62, 64, 66, 68, and 70, as well as an option for “I don’t know.” While making the choice, participants were also shown a table of cumulative payouts from Social Security for ages 73 through 93 in five year increments. The columns corresponded to these “live to” ages for the cumulative payout, while the rows corresponded to the claiming age. Thus, the uppermost left cell indicated the cumulative payout by age 73 if the individual claimed at age 62 (\$176,700), while the lowermost right cell indicated the cumulative payout by age 93 if the individual claimed at age 70 (\$661,000). Average life expectations for each “live to” age were also provided in the top row of the table. Participants were welcome to look at the payout table for as long as they wanted during the decision task, and we tracked their gaze for each cell of the table throughout this time. After completing the claiming task, they completed individual difference measures of , loss aversion (based on an 9-item measure), self-rated health, age, and gender.

Results. Overall, the majority of participants indicated that they would claim early at either 62 (25.8 percent) or 64 (24.2 percent). The percentages indicating late claiming were 9.1 percent for age 68 and 16.7 percent for age 70. For the remainder of the analysis, we separate

these two groups as early claimers ( $n=31$ ) and late claimers ( $n=17$ ); all remaining participants had chosen either normal claiming age of 66 or the answer of “I don’t know.”

We start by examining how claiming choices relate to fixation durations on the cumulative payout tables. A heatmap for fixations of early claimers is shown in Figure 2a, while a similar heatmap for late claimers is shown in Figure 2b. The early claimers spent more time looking at the monthly payment amounts than did the late claimers ( $M = .31$  and  $M = .24$ ,  $p = .05$ ). In contrast, the late claimers spent relatively more time looking at the cumulative amounts paid to later “live to” ages (ages 88 and 93 vs. ages 73 and 78) than did early claimers ( $M = .27$  and  $M = .12$ , respectively,  $p = .05$ ). The late claimers also spent relatively more time looking at the cumulative amounts that correspond to later claiming ages (claiming at 68 and 70 vs. claiming at 62 and 64) than did the early claimers ( $M = .60$  and  $M = .39$ , respectively,  $p = .01$ ).

We can also look at how claiming choice (early or late) corresponds to which particular columns and rows the participants focused on. We start by doing a column-level analysis. We find that early claimers spent significantly more time on the columns for the younger “live to” ages of 73 and 78 relative to the columns for age 83 and 88 ( $M = .87$ ) than late claimers ( $M = .73$ ,  $p = .01$ ). While average life expectations were explicitly provided in the table, we had also collected subjective life expectations prior to the claiming task from each participant. However, these individual level life expectations do not significantly predict the relative time spent on any of the columns. In terms of other individual difference measures, we find that older subjects spent more time on older columns (i.e., age 88 and 93,  $p = .05$ ) than for younger columns. Finally, neither the 9-item loss aversion measure nor self-rated health predict time spent on any of the columns.

Taking a look at fixation for the rows, we find that early claimers spent significantly more time on the rows for claiming ages 62 and 64) relative to claiming ages 66 and 68 ( $M = .61$ ) than late claimers ( $M = .39$ ,  $p < .01$ ). Subjective life expectations had a marginal effect on time spent looking at the row for claiming age of 68; the older a participant expects to live, the more time was spent looking at that row (corr coefficient = .23,  $p = .06$ ). None of the individual measures for age, loss aversion, or self-rated health significantly predict the relative time spent on any of the rows.

Finally, we turn to a dynamic processing analysis of the fixation data, which tells us how attention changes over the course of the decision making process. For each task per subject,

fixation counts were used to divide the fixations into 4 bins (e.g., first 25 percent of the trial, next 25 percent of the trial, and so on). If subject had number of fixation counts that cannot be divided by 4, then we put more fixation counts in the earlier bins than later bins. Then fixation durations were used to calculate the relative time spent on each AOI. Using this data, we generated graphs to represent the relative time spent on the chosen option (e.g., red line in the graph) and the average relative time spent on the options not chosen (e.g., blue line). See Figure 3a and 3b for these graphs for early and late claimers respectively.

Early claimers quickly focused on the information relevant to early claiming and continue to spend relatively more time on that information until the very end when they looked more at the information relevant to late claiming. Late claimers, however, first focused on the information relevant to early claiming, and about half way through their decision process, they moved on to the information relevant to the late claiming. The order of the attention – starting with early claiming information before shifting to late claiming information – is most likely due to how the information was presented on the table (e.g., claiming at 62 to 70, from top to bottom). Early claimers on average spent a total of 14 seconds on the main (e.g., red) cells and late claimers on average spent a total of 11.4 seconds on the main cells. This suggests that the late claimers both more quickly and more evenly looked at information relevant to both early and late claiming.

The main effect of time was significant for both the early claimers ( $p < .001$ ) and the late claimers ( $p < .01$ ). Additional analyses revealed that the early and the late claimers spent increasingly longer time in the relevant AOI with time within the trial ( $p < .001$ ). The green boxes on the graphs indicate that the data points are significantly different from the base rate (e.g., 50 percent). Bonferroni-corrected significance levels ( $p < .0125$ ) were used to correct for the multiple comparisons. While much more work would be needed to reach definitive conclusions this result does indicate the potential value of measuring the selective attention to information prior to a decision on when to claim.

Discussion. Study 2 finds significant differences in how early claimers and late claimers look at the information provided to them regarding cumulative payouts for different claiming ages. Early claimers spent significantly more time on the columns for the younger “live to” ages of 73 and 78, while late claimers spent relatively more time looking at the cumulative payout

amounts for later ages of 88 and 93. We also observe an attention shift midway through the decision task for late claimers which does not seem to occur for early claimers.

The focus on different information for early and late claimers, and the shift in focus across this information, suggests that attention to information is an important element of why individuals choose particular ages at which to claim Social Security. This raises the question of whether presenting this information in different formats, which may lead to more attention to later cumulative payout amounts, could result in different claiming decisions. In other words, is it possible to create an intervention that presents the payout information in a different order that could then encourage individuals to claim later than they otherwise might? One possible intervention would be to reorganize the cumulative payout table's rows and columns in an attempt to draw more attention to the benefits of later claiming. Study 3 takes a step in this direction by testing two different cumulative payout table formats. It also tests whether bringing attention to "live to" versus "die by" life expectation probabilities can affect claiming decisions.

### *3.3 Study 3: Testing of information presentation and life expectation priming interventions*

Study 3 continues to test the importance of individual measures of life expectancy judgments, loss aversion, and perceived fairness on intentions to claim Social Security benefits and likelihood of taking an annuity. More importantly, to further explore how information presentation may also influence these decisions, we modify the cumulative payout tables tested in Studies 1 and 2 to see whether reversing rows and columns in an attempt to shift attention to later payout ages will affect claiming decisions. This emphasis on table layout is consistent with recent eyetracking research that shows how horizontal eye movements can play an important role in information gathering (Shi, Wedel, and Pieters 2013). We also further explore how life expectations influence choice by employing a framing manipulation that focuses attention on the probabilities of living to older ages versus the probability of dying by older ages. We expect that this frame should interact with the table presentation manipulation such that those seeing a "live to" probability and also seeing a presentation which highlights the cumulative payout benefits of later claiming ages will report an increased intention to claim later.

Participants. Study 3 is an online study with a convenience sample of U.S. residents aged 40 to 65 (N = 831) who were recruited and run online through the internet panel company Qualtrics. All participants were required to pass multiple attention filters. Participants (49

percent percent female, aged 40 to 62) were paid a fixed amount for participation. Some 6.1 percent (n=51) subjects were excluded from further analysis due to violations of coherency for the life expectation task or invalid responses such as all 0 percent for all life expectation ages. N=780 were retained for further analysis.

Method. Participants in the study were randomly assigned to one of four conditions in a 2x2 design. The first design factor was a modification of the cumulative payout tables used in Studies 1 and 2. Participants saw either the same cumulative payout used in those studies in which rows represented claiming age options and columns represented the age for the cumulative payout figure, or a modified table that put the claiming ages into columns and the payout ages into the rows. Examples of both tables are provided in Figure 4. The second manipulation is whether the life expectation judgments were collected in a “live to” frame versus a “die by” frame. Specifically, participants were asked to estimate and report the chance that they would live to [die by] a certain age or older [younger] using a slider scale for each of the ages 65, 75, 85, and 95. Note that for any given individual, the answers to these two question frames should perfectly mirror each other, with the probability of living to a given age being one minus the probability of dying by that age. However, prior research shows that framing has a significant effect, with implied probabilities of living much higher in the live-to frame. We keep this framing consistent throughout the study, with the average probabilities provided on the cumulative table also presented as either “live to” or “die by” values.

The dependent variables in this study are similar to Study 1 in that participants completed tasks about both predicted Social Security claiming age and likelihood of purchasing an annuity. Unlike Study 1, the order of tasks was held constant with the claiming task always completed first and the annuity task second. Also, there was only one version of the annuity task: the annuity purchase scenario used in Study 1. For this annuity task, rather than asking a likelihood of purchasing an annuity, individuals were asked whether they would choose an immediate life annuity (i.e., starting at age 65), a delayed annuity (starting at age 70 or later), or self-management of the retirement savings. By changing the annuity dependent variable in this way, the annuity choice becomes more similar to the Social Security claiming age decision.

In addition to the manipulations of cumulative payout information and the life expectation frame, we collect our standard measures of self-reported age, gender, and retirement

assets as demographics. As psychographics, we ask for perceptions of SSA solvency, perceived ownership, intertemporal patience, and loss aversion.

Results. As with Study 1, we convert the life expectancy probabilities taken for ages 65, 75, 85, and 95 into a single comprehensive measure of life expectation using a Weibull estimation procedure. We begin our analysis by checking to see whether the “live-to” versus “die-by” framing for the life expectations questions replicates prior findings (Payne et al 2013). Indeed, we find that individuals in the live-to condition indicated that they expected to live longer than those in the die-by condition ( $M = 80.8$  and  $M = 76.6$  respectively,  $p < .001$ ).

Next, we analyze participants’ answers regarding their intentions for which age they expect to claim their Social Security benefits, and how our manipulations affected these decisions. This study allowed an answer of “I don’t know” to the main dependent variable of predicted claiming age, and participants who selected this answer are excluded from further analysis on this variable, reducing our sample to 771 respondents. Results of a linear regression with claiming age as the DV is shown in the first column of Table 3. We find that neither the type of information display (manipulation of rows versus columns for claiming ages) nor the live-to versus die-by manipulation have a significant simple main effect on the expressed claiming age. However, the interaction of these two manipulations does have a significant effect on claiming, which we investigate in more detail below. We also find significant effects of many of our individual difference variables, consistent with our findings in Study 1. Specifically, a longer expected age, lower perceived ownership of Social Security contributions, lower loss aversion, and more intertemporal patience are all indicators of a later claiming age (all  $p < .05$ )<sup>1</sup>. Women and younger subjects also indicate that they will claim later. Concerns about Social Security program solvency do not seem to have a significant effect.

As noted above, while there was no significant main effect of life expectations framing ( $p = .7$ ) or information display ( $p = .6$ ) on claiming, the interaction between these two was significant ( $p = .04$ ). Additional analysis demonstrated that the claiming age in the column/live-to condition ( $M = 65.2$ ) was marginally different from the claiming age in the column/die-by condition ( $M = 64.8$ ,  $p = .09$ ) and the row/die-by condition ( $M = 64.8$ ,  $p = .07$ ). That is, subjects who

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<sup>1</sup> Previous studies on the influence of life expectation framing questions on Social Security claiming have found that the significant effect of life expectations is dependent on which frame participants are in for their life expectations questions. With this study, while the main effect of life expectations is significant, further analysis finds that the effect is actually only significant for the live-to frame and not for the die-by frame when those populations are analyzed independently.

received the starting claiming age listed in the columns along with life expectancy described with live-to framing indicated a desire to claim later than those who received the die-by framing in the same information display condition, but also later than those who received the starting age listed in the rows with live-to framing. Interestingly, individuals who saw claiming ages listed in rows and also considered die-by framing indicated later claiming ages ( $M=65.1$ ), but pairwise comparisons with the other conditions were not significant.

For the annuity decision, we run two separate analyses of participants' responses. Recall that participants had the opportunity to select self-management, an immediate annuity, or a deferred annuity. Looking first at who selects an annuity relative to self-management at all, we find that across conditions approximately 38 percent of respondents prefer self-management, while the remaining 62 percent select some form of annuity. A logistic regression with choice between an annuity and self-management finds no significant effects of condition (or their interaction) on this decision; results are shown in column 2 of Table 3. None of the individual difference measures significantly influence this choice, with the exception of individuals' level of agreement with the statement, "If I convert my savings into an annuity, I won't feel that I own the money anymore."

A separate analysis was run among the individuals who selected an annuity to examine who preferred immediate annuities starting at age 65 relative to delayed annuities starting at age 70 or later ( $n=485??$ ). The immediate annuity was by far the preferred choice, selected by approximately 81 percent of this subpopulation. Again, a logistic regression was run for this choice (column 3 of Table 3) to examine who was most likely to select the delayed annuity. Here, we find that a longer life expectation and a higher amount of intertemporal patience are both significant for selecting the delayed annuity. None of the variables for the manipulations or the other individual difference measures are significant.

Discussion. Consistent with many of the effects found in Study 1, Study 3 shows that individual measures of life expectancy, loss aversion, perceived ownership, and intertemporal patience are all significant individual differences that can predict intentions for early versus late Social Security claiming. We also find a significant interaction effect on claiming for our manipulations of life expectations framing and information presentation. Participants who think about their probabilities of living to older ages and then see an information table presented in a

way that better highlights the benefits of claiming later do indicate claiming ages that are later by an average of around 5 months.

While not analyzed here in detail, we also note that there seems to be an interaction between the life expectations framing manipulation and the individual level expected age measure. Specifically, life expectations are a more strongly significant predictor of claiming age for participants in the live-to framing condition. Thus, individuals in the live-to frame appear to be more appropriately using their own predicted life expectancies, while those in the die-by frame are not integrating them in the same way. This may suggest something like an “ostrich effect” in which thoughts about dying result in unwillingness to consider important choices related to retirement. One implication of this result is that researchers hoping to gather behavioral measures that fully reflect respondents’ true subjective life expectations should be careful to use live-to framing when doing so (an approach we follow in Studies 1 and 2). The choice of frame for life expectation information is also relevant for public policy decisions about provision of such information to individuals making retirement decisions. For example, the British pension system is considering providing retirees with information about when they are going to die (Bennhold 2014); our findings suggest that this information will be most effective at influencing subsequent decisions if it is delivered in a live-to frame.

In terms of our annuity measures, which asked about choice of immediate versus delayed annuities and were designed to more closely mirror the timing issues inherent in the claiming decision, we see somewhat different effects. For these measures, only a subset of the individual differences measures are significant. In particular, issues of perceived ownership affect the decision between an annuity and self-management, while differences in expected age and intertemporal patience affect the decision of an immediate versus a delayed annuity. None of our framing or information presentation manipulations had a significant effect in these decisions.

#### **4. Summary**

Overall, we have documented that higher perceived life expectations, preferences for losses as measured through individual-level loss aversion, intertemporal patience (preference for smaller amounts sooner versus larger amounts of money later), and personal beliefs about perceived ownership of prior SSA contributions are all significantly predictive of expressed preference for early versus late claiming. These findings both replicate our prior research on this

topic and provide strong support to hypothesized effects of how behavioral science and decision making literature can inform research on Social Security claiming (Knoll 2011). They also speak to the importance of including psychological measures in studies of how individuals choose to manage longevity risk, a problem that both Social Security benefits and annuities are designed to help solve.

In addition to continuing to document the importance of these individual difference measures, the current project extends our work on testing interventions for affecting Social Security claiming decisions. Note that our information-based interventions differ from the behavioral interventions that have been previously tested in the Social Security claiming area which have focused on manipulations of gain/loss framing (e.g., Brown, Kapteyn, and Mitchell 2011; Liebman and Luttmer 2009). We had found indications in prior testing that providing individuals with cumulative payout tables had contrasting effects for claiming decisions versus annuity decisions; the cumulative payout table increased preference for annuities but led to earlier claiming for Social Security. Study 1 of this paper tests that issue directly by exposing the same pool of participants to an information manipulation for both the claiming and annuity decision. While we find that the cumulative table continues to lead to earlier claiming, we do not find an effect of the tables on annuity preferences. Thus, contrary to what has been suggested in the literature (e.g., Kunreuther et al 2013), the provision of information on the long term value of delaying claiming does not increase the likelihood that respondents will prefer to delay claiming. On the other hand, cumulative payout information either makes purchasing an annuity more attractive (as in Shu et al 2014) or has no significant effect (Study 1). This suggests that claiming later and purchasing an annuity may be less equivalent ways to manage longevity risk than has been suggested in the annuity literature.

We further test the impact of information presentations on claiming in Studies 2 and 3. Study 2 takes advantage of eyetracking methodology to track what information participants look at, and for how long. We find that early claimers spend more time looking at the top rows (showing payouts for earlier claiming ages) and leftmost columns (showing cumulative payouts for younger ages), while later claimers move away more quickly from the top rows to spend more time looking at the bottom rows (showing payouts for later claiming ages) and rightmost columns (showing cumulative payouts for older ages). Given this correlation between claiming age and row and column presentation, we attempted to shift the focus for participants by

rearranging the rows and columns for Study 3. This change in presentation did have a significant effect leading to later claiming, but only among individuals who also considered their life expectations in a live-to frame. It did not have a similar effect on annuity choices.

An interesting set of insights regarding the similarity of the claiming choice and an annuity choice emerges by considering the results of Studies 1 and 3 together. We find in these studies that firstly, the individual differences measures are much stronger predictors of claiming behavior than of annuity preferences, and secondly, that interventions that affect claiming decisions have little or opposite effects on annuity decisions. Overall, these results imply that the decision to take an annuity is quite different psychologically than the decision of when to claim Social Security benefits. This is an important point because many of the recent efforts in understanding, and influencing, Social Security claiming behavior have used annuity choices structured to mimic Social Security benefits as the experimental materials. The differences we document, even for highly similar tasks tested on the same participants, suggest that it is not just the payouts that matter, but the name of the product mentioned during the decision process.

The one individual difference measure that does regularly display significance for both types of decision is a measure of perceived ownership for the benefits in question. Perceived ownership, as a purely psychological measure that can be unrelated to actual legal ownership, is a concept not normally included in standard economic models of when to claim or whether to purchase an annuity. The perceived ownership questions we use in our studies vary according to the choice under consideration, being focused either on Social Security program contributions (e.g., “I feel that I have earned these social security benefits”, “The Social Security benefits that I will receive come from the money that I contributed”) or on retirement savings and annuity choices (e.g., “I feel that I have earned the money put aside as my retirement savings”, “I feel a strong sense of ownership toward my retirement savings”).<sup>2</sup> The importance of these feelings of ownership, along with the significance of loss aversion for the claiming tasks, suggests that these decisions may have much in common with work on the endowment effect, where perceived ownership has also been shown to be an important predictor of value. We hope to continue testing the joint roles of loss aversion and perceived ownership in future development of intervention materials.

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<sup>2</sup> Another ownership related measure that was significant for annuities in Study 3 was the statement, “If I convert my savings into an annuity, I won’t feel that I own the money anymore.”

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Table 1. *Participant Demographics from Online studies 1 - 3*

	<b>Study 1 (n=1010)</b>	<b>Study 2 (n=66)</b>	<b>Study 3 (n=831)</b>
Source	Qualtrics	eye tracking	Qualtrics
Age	min 40, max 88, mean 57	min 38, max 64, mean 50	min 40, max 62, mean 50
Gender	71.2% female , 28.8% male	43.9% female, 56.1% male,	49.1% female , 50.9% male
Retirement savings	min 2.5k, max 1.5m, median 37.5k	min 2.5k, max 1.0m, median 12.5k	min 2.5k, max 1.5m, median 12.5k
Subjective life exp.	min 47, max 120, mean 86	min 57, max 117, mean 84.1	min 48.3, max 120, mean 79.5
Loss aversion	min 0, max 10, mean 5.71	min 0, max 9, mean 4.36	min 0, max 10, mean 5.45
Intertemporal patience	min 0, max 4, mean 2.14	N/A	min 0, max 4, mean 1.94

Table 2. *Regression Results for Study 1*

	DV: claiming	DV: annuities (all)	DV: annuity task #1	DV: annuity task #2	DV: annuity task #3
Constant	67.51*** (.95)	3.58*** (.54)	4.41*** (.79)	3.10*** (.96)	5.03*** (.93)
<b><i>Demographics</i></b>					
Age	-.038*** (.011)	-.006 (.005)	-.030*** (.008)	.001 (.01)	.011 (.009)
Gender (female=1)	-.139 (.194)	.099 (.112)	.248 (.168)	-.005 (.202)	.294 (.193)
Life expectancy	.041*** (.007)	.002 (.004)	.03 (.008)	.004 (.006)	-.005 (.006)
Loss aversion	-.078 *** (.03)	-.006 (.017)	-.032 (.028)	-.048 (.03)	.049* (.029)
Perceived ownership	-.407*** (.084)	-.246*** (.037)	-.177*** (.064)	-.236*** (.061)	-.228*** (.067)
Intertemporal patience	.338*** (.063)	.075** (.036)	.076 (.052)	.035 (.065)	.120* (.062)
SSA solvency	-.010*** (.004)				
<b><i>Manipulations</i></b>					
Presentation	-.505*** (.173)	.097 (.10)	.143 (.153)	.142 (.181)	.035 (.169)
Order	-.532*** (.173)	-.106 (.101)			

*Notes:* Reports non-standardized coefficients from OLS regressions. Standard errors are in parentheses.

\*\*\* Significant at the 1 percent level

\*\* Significant at the 5 percent level

\* Significant at the 10 percent level

Table 3. *Regression results for Study 3*

	DV: claiming age n=771	DV: annuity vs self-mgmt n=774	DV: immediate vs delay annuity n=481
Constant	66.52***	-2.01	-2.09
<b><i>Demographics</i></b>			
Age	-.053***	.024	-.030
Gender (female=1)	.411**	.046	-.057
Life expectancy	.041***	-.005	.029**
Loss aversion	-.061**	.029	-.005
Perceived ownership	-.250***	-.181*	-.184
“Will no longer own”		.471***	.016
Intertemporal patience	-.457***	-.059	-.260***
SSA solvency	-.002	.001	-.007
<b><i>Manipulations</i></b>			
Information display	.267	-.596	1.101
Life expectation framing	.226	-.588	1.114

Display * frame interaction	-.703**	.414	-.602
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*Notes:* Reports non-standardized coefficients from OLS (column 1) or logistic regressions (columns 2 and 3). Standard errors are in parentheses.

\*\*\* Significant at the 1 percent level

\*\* Significant at the 5 percent level

\* Significant at the 10 percent level

Figure 1. Predicted Happiness During Retirement for Different Financial Options, Study 1

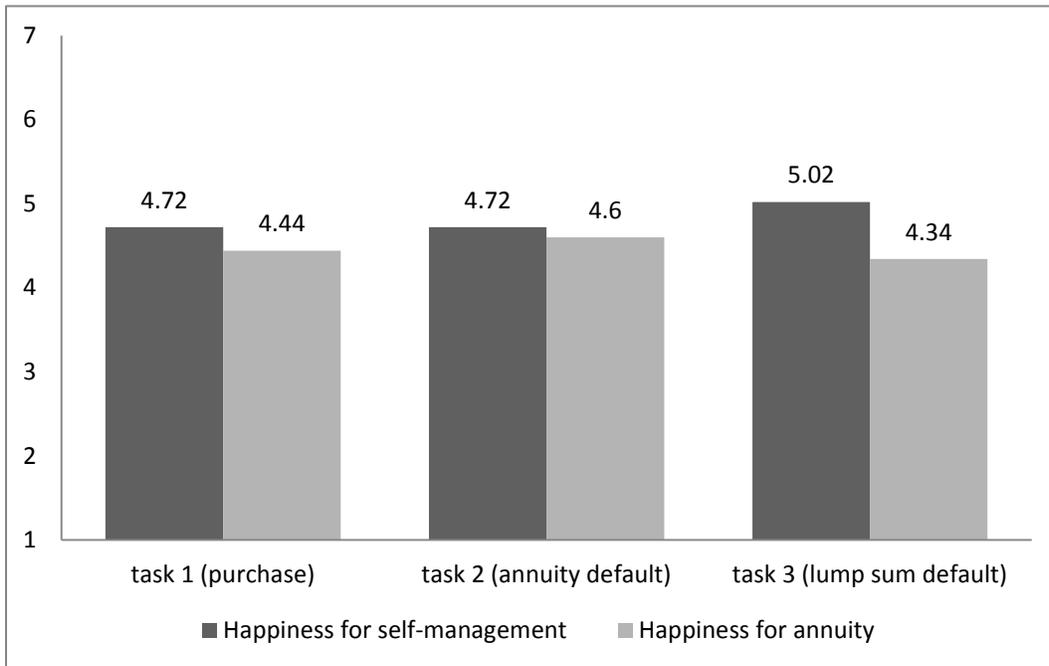


Figure 2a. *Heat Maps for Fixations Among Early Claimers in Study 2 (n=31)*

	73	78	83	88	93
	81%	68%	51%	31%	13%
62 (\$1,339/month)	\$176,700	\$257,100	\$337,400	\$417,800	\$498,100
64 (\$1,544/month)	\$166,800	\$259,400	\$352,000	\$444,700	\$537,300
66 (\$1,793/month)	\$150,600	\$258,200	\$365,800	\$473,400	\$580,900
68 (\$1,960/month)	\$117,600	\$235,200	\$352,800	\$470,400	\$588,000
70 (\$2,395/month)	\$86,200	\$229,900	\$373,600	\$517,300	\$661,000

	5.9	2.7	1.9	1.0	0.8
	6.7	3.2	1.5	0.9	0.6
12.6	7.0	3.1	1.7	0.6	1.0
7.7	2.9	2.3	1.4	0.6	0.8
1.9	1.2	0.8	0.7	0.2	0.4
1.7	1.3	0.6	0.6	0.2	0.3
10.7	8.6	2.8	0.8	0.3	0.0

Figure 2b. *Heat maps for fixations among late claimers in Study 2 (n=17)*

	73	78	83	88	93
	81%	68%	51%	31%	13%
62 (\$1,339/month)	\$176,700	\$257,100	\$337,400	\$417,800	\$498,100
64 (\$1,544/month)	\$166,800	\$259,400	\$352,000	\$444,700	\$537,300
66 (\$1,793/month)	\$150,600	\$258,200	\$365,800	\$473,400	\$580,900
68 (\$1,960/month)	\$117,600	\$235,200	\$352,800	\$470,400	\$588,000
70 (\$2,395/month)	\$86,200	\$229,900	\$373,600	\$517,300	\$661,000

	5.4	3.0	1.4	1.6	2.2
	5.1	3.1	1.3	0.9	0.5
7.0	2.8	1.8	1.2	0.9	0.7
3.4	1.9	0.7	0.6	0.3	0.2
8.4	2.5	1.1	1.7	1.0	1.2
4.6	3.0	1.2	0.9	0.8	0.7
1.9	5.1	4.5	10.9	4.2	0.4

Figure 3a. *Dynamic Processing Analysis of Eyetracking Claiming Task in Study 2, Early Claimers Only*

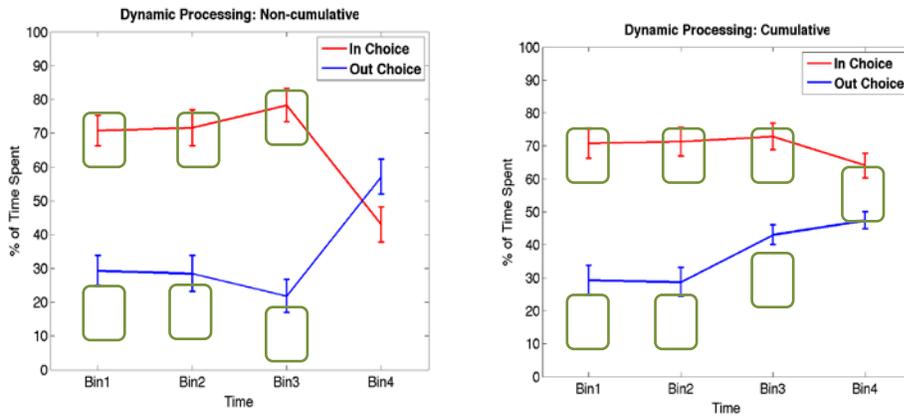


Figure 3b. *Dynamic Processing Analysis of Eyetracking Claiming Task in Study 2, Late Claimers Only*

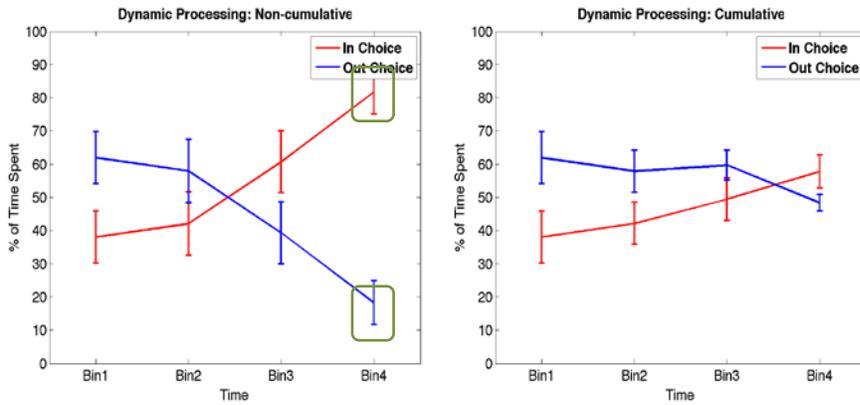


Figure 4. *Examples of Claiming Tables Used in Study 3 (Rows vs. Columns)*

Cumulative amount paid to you by Social Security

If you live to age: Starting Age and Payment	70	75	80	85	90	95
62 (\$1,339/month)	\$112,476	\$192,816	\$273,156	\$353,496	\$433,836	\$514,176
64 (\$1,544/month)	\$92,640	\$185,280	\$277,920	\$370,560	\$463,200	\$555,840
66 (\$1,793/month)	\$64,548	\$172,128	\$279,708	\$387,288	\$494,868	\$602,448
68 (\$1,960/month)	\$23,520	\$141,120	\$258,720	\$376,320	\$493,920	\$611,520
70 (\$2,395/month)	\$0	\$114,960	\$258,660	\$402,360	\$546,060	\$689,760

Cumulative amount paid to you by Social Security

Starting Age and Payment If you live to age:	62 (\$1,339/month)	64 (\$1,544/month)	66 (\$1,793/month)	68 (\$1,960/month)	70 (\$2,395/month)
70	\$112,476	\$92,640	\$64,548	\$23,520	\$0
75	\$192,816	\$185,280	\$172,128	\$141,120	\$114,960
80	\$273,156	\$277,920	\$279,708	\$258,720	\$258,660
85	\$353,496	\$370,560	\$387,288	\$376,320	\$402,360
90	\$433,836	\$463,200	\$494,868	\$493,920	\$546,060
95	\$514,176	\$555,840	\$602,448	\$611,520	\$689,760